

Revised December 20, 2020
October 26, 2020

Zoning Board of Adjustment
Bordentown Township
1 Municipal Drive
Bordentown, NJ 08505

Re: Traffic Evaluation
Old York Business Park – Building 1
2471 Old York Road
Langan Project No.: 130161301

Dear Board Members:

Langan Engineering and Environmental Services prepared this revised traffic evaluation for a proposed delivery station to occupy an approved 434,250 square foot warehouse building located at 2471 Old York Road. The warehouse building is built but unoccupied. We revised the original traffic evaluation to address county review comments. Specifically, we performed the following tasks:

- reviewed the anticipated occupancy proposal;
- estimated the delivery station trip generation;
- compared the proposed trip generation to what was approved;
- evaluated traffic operations; and
- reviewed the site plan for the adequacy of access and circulation.

We have assumed the proposed delivery station will have a standard operation from February through November. As requested by the county, we have also evaluated an estimated peak operation during the holiday period from November through January.

Based on this revised traffic evaluation, we expect area traffic operations will not significantly change because of the proposed delivery station, particularly during commuting periods. Moreover, the site design is consistent with current standards and provides adequate access and circulation.

OCCUPANCY PROPOSAL

The township tax maps identify the site as Block 137.02, Lots 1 and 11.03. The delivery station site is located along the north side of Old York Road. Interstate 295 bounds the site to the north. Figure 1 on the following page shows the site location.

The planning board previously granted site plan approval for a 434,250 square foot warehouse building (Building 1) in the rear of the site and for a 102,003 square foot building (Building 2) in the front of the site. The developer has completed construction of both buildings. Two full-access driveways provide site access along Old York Road.

The proposed delivery station will occupy Building 1 and operate 24-hours a day, seven days a week. Site changes to accommodate the delivery station include reconfiguration of the site around Building 1 to

provide additional passenger car and van parking spaces. Moreover, the proposed delivery station will only use a small number of the previously approved Building 1 loading docks.



Figure 1 – Site Location

EXISTING CONDITIONS

Study Intersections

Old York Road is an undivided road that provides one lane for each travel direction near the site and will accommodate all of the delivery station traffic. Accordingly, we focused this traffic evaluation on the following intersections:

- Old York Road (County Route 660) and Rising Sun Road; and
- Old York Road and Site Driveways.

For analysis purposes, this traffic evaluation conservatively assumes only one site driveway along Old York Road. This traffic evaluation also assumes Old York Road has an east-west orientation and Rising Sun Road and the site driveways have a north-south orientation. Old York Road has a posted speed limit of 45 MPH near the site. Rising Sun Road has a posted speed limit of 30 MPH near the site.

Old York Road and Rising Sun Road

Old York Road and Rising Sun Road intersect to form a “T” shaped intersection under stop control. All approaches to this intersection provide one lane to accommodate all movements. Stop signs control the Old York Road approaches.

Old York Road and Site Driveways

Old York Road and the two site driveways intersect to form “T” shaped intersections under stop control. All approaches to these intersections provide one lane to accommodate all movements. Stop signs control the southbound site driveway approaches.

Existing Traffic Volumes

We were unable to conduct traffic counts because of the pandemic affecting traffic volumes. Accordingly, we used the traffic volumes contained in the Traffic Impact Study – Old York Business Park, dated December 6, 2017, prepared for the built warehouses.

A traffic count firm conducted turning movement counts for the 2017 study on Thursday, September 28, 2017 from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM at the Old York Road and Rising Sun Road intersection. Additionally, the traffic count firm installed an automatic traffic recorder (ATR) along Old York Road to record hourly traffic volumes in front of the site. The ATR recorded hourly traffic volumes from Monday, October 23, 2017 to Tuesday, November 1, 2017.

Based on the traffic counts, the weekday morning peak hour occurred from 7:00 AM to 8:00 AM and the weekday evening peak hour occurred from 4:00 PM to 5:00 PM. As discussed later, the delivery station’s peak hour of operation is 10:00 AM to 11:00 AM. For this mid-morning peak hour, we conservatively assumed the same traffic volumes as those for the weekday morning peak hour.

Attached are the traffic counts and a figure from the 2017 study that shows the 2017 existing peak hour traffic volumes.

TRIP GENERATION

We expect the delivery station will have the attached tenant-provided trip projections for their standard operation (February through October) and their peak operation (November through January). The delivery station’s finite operating capacity dictates those trip projections. The operating capacity is primarily a function of the sorting equipment inside the building and the number of van loading spaces.

Projected Employees

Table 1 shows the approximate core employee shifts the delivery station will use. Those employees will primarily run the inside operations of the building. Outside those core shifts, there might be a limited amount of other people inside the building doing small tasks such as equipment maintenance or janitorial services.

**Table 1 – Core Employee Shifts
 (Standard Operation)**

Shifts	Employees
Shift 1 – 2:00 AM to 12:30 PM	77
Shift 2 – 6:00 AM to 2:30 PM	23
Shift 3 – 1:30 PM to 10:00 PM	23
Shift 4 – 2:00 PM to 6:00 PM	19
Shift 5 – 12:00 PM to 10:30 PM	<u>4</u>
Total	146

During peak operation, the number of shift 1 employees will increase to approximately 145 people. Also, there could be an additional approximately 145 people working inside the building overnight from 5:30 PM to 1:00 AM.

Truck Operation

Table 2 below shows the tractor-trailers that will arrive to and depart the delivery station each day. Tractor-trailer arrivals and departures will be spread evenly over the timeframes shown and amount to approximately 1-2 tractor-trailer trips in any single hour. Employees inside the building will empty the tractor-trailers and sort the packages into individual delivery routes. Delivery vehicle drivers will then transfer and load the sorted packages into delivery vehicles as described below.

**Table 2 – Truck Operation
 (Standard Operation)**

Timeframe	Tractor-Trailers
8:00 AM to 6:00 PM	3
6:00 PM to 8:00 AM	<u>12</u>
Total	15

During peak operation, approximately 20 additional tractor-trailers will arrive to and depart the delivery station each day and mostly during evening hours.

Delivery Van Operation (DSP)

Delivery van drivers will arrive to and depart the site each day. Delivery Service Partner (DSP) is the descriptor for the delivery van drivers. DSPs are third party contractors who work with the tenant to obtain delivery vans and logistics systems. Delivery van drivers will drive to the site in their personal vehicles. The delivery van drivers will park their personal vehicles, get into empty delivery vans and drive to the staging/loading area. The delivery van drivers will load their delivery vans with packages. Once the delivery van drivers are finished loading their delivery vans, they will exit the site and make their deliveries over the course of their workday. The delivery van drivers typically will start returning to the site approximately ten hours after they leave the site with their loaded van. Upon return to the site at the end of their workday, the delivery van drivers will park their empty vans and then leave the site in their personal vehicles.

The delivery station will provide 48 delivery van loading spaces, which will limit the number of delivery vans that can depart the site at one time. The delivery van drivers will depart the delivery station in managed waves of 48 vans every 20 minutes in an orderly fashion. During standard operation, we anticipate approximately 155 delivery van drivers will arrive to and depart the delivery station between 9:00 AM and 11:30 AM. During peak operation, there could be an additional 146 delivery van drivers arriving and departing between 6:30 AM and 8:30 AM and an additional 158 delivery van drivers arriving and departing between 9:00 AM and 12:30 PM.

Personal Vehicle Delivery Operation (Flex)

The delivery station will also use drivers with their personal vehicles to delivery packages. Flex is the descriptor for the personal vehicle delivery drivers. Those drivers will enter the site, drive to the staging/loading area, load their personal vehicles with packages, and then exit the site to make their deliveries. The majority of these drivers will not return to the site. We anticipate approximately 44 Flex drivers during standard operation and 47 Flex drivers during peak operation will arrive to and depart the delivery station between 4:00 PM and 5:30 PM.

Peak Hour Trip Generation

Given the unique operation, the delivery station will generate little traffic during weekday peak commuting periods from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM most of the year. Table 3 on the following page shows the delivery station trip generation estimates for various hours of a typical day.

Table 3 – Trip Generation Estimates

Time Period	Standard Operation (Feb. - Oct.) Trips	Peak Operation (Nov. - Jan.) Trips
Weekday Morning Network Peak Hour (7:00 AM to 8:00 AM)		
Enter	1	82
<u>Exit</u>	<u>1</u>	<u>97</u>
Total	2	179
Weekday Morning Delivery Station Peak Hour (10:00 AM to 11:00 AM)		
Enter	75	144
<u>Exit</u>	<u>145</u>	<u>145</u>
Total	220	289
Weekday Evening Network Peak Hour (4:00 PM to 5:00 PM)		
Enter	45	240
<u>Exit</u>	<u>23</u>	<u>97</u>
Total	68	337

TRIP GENERATION COMPARISON

Table 4 below compares the trip generation estimates for the proposed delivery station with the approved trip generation for Building 1. The trip generation comparison is for the weekday peak hours that occur during commuting periods.

Table 4 – Trip Generation Comparison

Time Period	Proposed Delivery Station Standard Operation (Feb. - Oct.)	Proposed Delivery Station Peak Operation (Nov. - Jan.)	Approved Building 1	Trip Difference Standard Operation	Trip Difference Peak Operation
Weekday Morning Network Peak Hour (7:00 AM to 8:00 AM)					
Enter	1	82	27	-26	55
<u>Exit</u>	<u>1</u>	<u>97</u>	<u>9</u>	<u>-8</u>	<u>88</u>
Total	2	179	36	-34	143
Weekday Evening Network Peak Hour (4:00 PM to 5:00 PM)					
Enter	45	240	13	32	227
<u>Exit</u>	<u>23</u>	<u>97</u>	<u>31</u>	<u>-8</u>	<u>66</u>
Total	68	337	44	24	293

Table 4 shows during standard operation the proposed delivery station will generate less weekday morning peak hour trips and more weekday evening peak hour trips than approved for Building 1. Consequently, the relatively low trip generation of the proposed delivery station will not cause a discernable difference to area traffic operations during commuting periods, compared to what the planning board approved for Building 1. During peak operation, the proposed delivery will generate more trips during both weekday peak hours but as discussed later the road network can accommodate the delivery station traffic.

Table 5 compares the estimated truck generation for the proposed delivery station with the approved truck generation for Building 1. The truck generation comparison is for the weekday peak hours that occur during commuting periods and for an entire day.

Table 5 – Truck Generation Comparison

Time Period	Proposed Delivery Station Standard Operation (Feb. – Oct.)	Proposed Delivery Station Peak Operation (Nov. – Jan.)	Approved Building 1	Trip Difference Standard Operation	Trip Difference Peak Operation
Weekday Morning Network Peak Hour (7:00 AM to 8:00 AM)					
Enter	1	1	5	-4	-4
Exit	<u>1</u>	<u>1</u>	<u>2</u>	<u>-1</u>	<u>-1</u>
Total	2	2	7	-5	-5
Weekday Evening Network Peak Hour (4:00 PM to 5:00 PM)					
Enter	1	1	3	-2	-2
Exit	<u>0</u>	<u>2</u>	<u>6</u>	<u>-6</u>	<u>-4</u>
Total	1	3	9	-8	-6
Daily – 24 Hours					
Enter	15	35	48	-33	-13
Exit	<u>15</u>	<u>35</u>	<u>48</u>	<u>-33</u>	<u>-13</u>
Total	30	70	96	-66	-26

Table 5 shows the proposed delivery station will generate significantly fewer trucks than the planning board approved for Building 1. Area traffic operations will benefit from having the delivery station generate fewer trucks to and from the site as compared to a typical warehouse tenant.

TRIP DISTRIBUTION AND ASSIGNMENT

We understand the delivery station will serve an area defined by the following approximate municipal limits:

- North – East Windsor;
- South – Shamong;
- Southeast – Pemberton; and
- East – Jackson/Howell.

The service area will primarily consist of areas to the east of the Route 206 corridor. Accordingly, Route 206 will carry the majority of the delivery station traffic to and from the site. We expect the majority of tractor-trailers will arrive and depart to the north by Route 206 and the NJ Turnpike. Table 6 shows on the following page the delivery station’s trip distribution.

Table 6 –Trip Distribution

Direction	Arrival and Departure Distributions			
	Cars and Vans		Tractor-Trailers	
	Arrival	Departure	Arrival	Departure
Rising Sun Road (North)	25%	60%	20%	80%
Old York Road (East)	60%	25%	80%	20%
Old York Road (West)	15%	15%	-	-
Total	100%	100%	100%	100%

Attached are trip distribution and delivery station generated traffic volume figures.

FUTURE TRAFFIC VOLUMES

For analysis purposes, we assumed a 2021 build year. Building 1 is built and we anticipate the proposed delivery station will be operational soon after approval. We increased the 2017 existing traffic volumes by an annual 1.50% growth rate to account for background traffic growth and to derive the 2021 base traffic volumes. The New Jersey Department of Transportation published that growth rate for Burlington County. We then added traffic volumes for Building 2 on the site to derive the 2021 no-build traffic volumes. We understand that a tenant will occupy Building 2 in the near future. Finally, we added the delivery station’s traffic to the 2021 no-build traffic volumes to derive the 2021 build traffic volumes.

Attached are the traffic volume worksheets.

OPERATIONAL ANALYSIS

We conducted a capacity analysis of the study intersections using the SYNCHRO analysis software. That software uses analysis methodologies contained in the Highway Capacity Manual published by the Transportation Research Board. Level of service (LOS) is the term used to denote the operating condition of a road segment or intersection under prevailing conditions and reflects several factors such as number of travel lanes, traffic volume, speed, and motorist delay. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing poor operating conditions.

LOS designations are different for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection. For unsignalized intersections, the analysis considers the operation of all movements that conflict with other movements, such as main-line left turns and traffic exiting a side street.

The HCM defines LOS for unsignalized intersections as follows:

LOS	Delay Range (sec/veh)
A	<10 sec
B	≥10 and ≤15 sec
C	≥15 and ≤25 sec
D	≥25 and ≤35 sec
E	≥35 and ≤50 sec
F	>50 sec

Capacity Analysis

Attached are the capacity analysis printouts. Tables 7 and 8 summarize the levels of service, delays and maximum queues for the weekday morning peak hour, weekday mid-morning delivery station peak hour, and the weekday evening peak hour for the standard and peak operation respectively.

**Table 7 – Intersection Capacity Analysis Summary
 Standard Operation**

Location	Movement		2021 No-Build Condition			2021 Build Condition Standard Operation		
			AM	MID	PM	AM	MID	PM
Old York Road / Rising Sun Road	EB	L,T	B (13.9) [0.52]	B (13.9) [0.52]	B (13.9) [0.24]	B (13.9) [0.52]	C (20.7) [2.48]	C (15.4) [0.52]
	WB	T,R	A (9.8) [0.16]	A (9.8) [0.16]	B (12.0) [0.8]	A (9.9) [0.16]	B (12.5) [0.52]	B (13.2) [1.16]
	SB	L,R	A (7.6) [0.44]	A (7.6) [0.44]	A (7.2) [0.4]	A (7.6) [0.44]	A (7.0) [0.44]	A (6.8) [0.4]
Old York Road / Site Driveways	EB	L,T	A (7.4) [0.0]	A (7.4) [0.0]	A (7.6) [0.0]	A (7.4) [0.0]	A (7.6) [0.0]	A (7.7) [0.0]
	SB	L,R	A (9.2) [0.0]	A (9.2) [0.0]	A (9.4) [0.0]	A (9.2) [0.0]	B (10.8) [0.8]	A (9.9) [0.2]

*Level of Service (Average delay per vehicle in seconds) [95th Percentile Queue in vehicles]

**Table 8 – Intersection Capacity Analysis Summary
 Peak Operation**

Location	Movement		2021 No-Build Condition			2021 Build Condition Peak Season		
			AM	MID	PM	AM	MID	PM
Old York Road / Rising Sun Road	EB	L,T	B (13.9) [0.52]	B (13.9) [0.52]	B (13.9) [0.24]	C (18.5) [1.72]	C (24.1) [2.92]	E (35.6) [3.08]
	WB	T,R	A (9.8) [0.16]	A (9.8) [0.16]	B (12.0) [0.8]	B (12.6) [0.56]	B (14.2) [1.0]	C (23.3) [4.36]
	SB	L,R	A (7.6) [0.44]	A (7.6) [0.44]	A (7.2) [0.4]	A (6.9) [0.44]	A (6.5) [0.44]	A (5.4) [0.4]
Old York Road / Site Driveways	EB	L,T	A (7.4) [0.0]	A (7.4) [0.0]	A (7.6) [0.0]	A (7.6) [0.0]	A (7.8) [0.1]	A (8.5) [0.1]
	SB	L,R	A (9.2) [0.0]	A (9.2) [0.0]	A (9.4) [0.0]	B (10.4) [0.5]	B (11.5) [0.9]	B (12.9) [0.9]

*Level of Service (Average delay per vehicle in seconds) [95th Percentile Queue in vehicles]

As Tables 7 and 8 show, the proposed delivery station will not significantly affect area traffic operations during peak hours. Moreover, the site driveways along Old York Road will operate efficiently. We have analyzed the two site driveway intersections as one intersection to be conservative.

Old York Road and Rising Sun Road Intersection – Multi-Way Stop Evaluation

We have evaluated the need for multi-way stop control at the Old York Road and Rising Sun Road intersection. We used the traffic volume criteria in the Manual On Uniform Traffic Control Devices

(MUTCD) for our evaluation. We have considered Old York Road to be the major road since it has the higher posted speed limit and comprises two legs of the three-legged intersection. The MUTCD traffic volume criteria for multi-way stop consideration consist of the following:

- total traffic volumes of both major road approaches is 210 vehicles per hour for any eight hours of an average day, and
- total vehicular, pedestrian and bicycle volume of the minor road approach is 140 units per hour for the same eight hours evaluated for the major road.

The above traffic volume thresholds are 70% of the typical traffic volume thresholds because Old York Road has a posted speed limit of 45 MPH near the intersection.

We have four hours of traffic counts of the intersection. We also have 24-hour traffic counts along Old York Road in front of the site. We used the hourly variation of the 24-hour traffic counts to develop additional hourly traffic volumes for the intersection. We added the delivery station’s peak operation hourly traffic volumes to the hourly intersection traffic volumes to derive the hourly volumes for multi-stop evaluation. Table 9 shows the multi-stop evaluation. The derived traffic volumes do not warrant multi-way stop control as only two hours meet the traffic volume criteria.

**Table 9 –Old York Road and Rising Sun Road Intersection
 Multi-Stop Evaluation**

	Old York Road Approaches			Rising Sun Road Approach			Criteria Met?
	2021 Base	Delivery Station	Total	2021 Base	Delivery Station	Total	
7:00-8:00 AM	99	131	230	180	20	200	Y
8:00-9:00 AM	90	42	132	114	0	114	N
9:00-10:00 AM	53	131	184	96	20	116	N
10:00-11:00 AM	48	209	257	87	36	123	N
11:00-12:00 PM	51	136	187	93	13	106	N
12:00-1:00 PM	64	128	192	116	0	116	N
1:00-2:00 PM	51	26	77	58	11	69	N
2:00-3:00 PM	61	0	61	68	20	88	N
3:00-4:00 PM	120	0	120	135	0	135	N
4:00-5:00 PM	136	59	195	153	16	169	N
5:00-6:00 PM	106	231	337	153	61	214	Y

SITE PLAN REVIEW

We have reviewed the site plan for the proposed delivery station. In particular, we focused our review on access, circulation and parking design, which the following items address:

- The site plan shows two site driveways along Old York Road. Both driveways are full-access and stop-controlled. The west driveway will serve both buildings and the east driveway will serve

Building 2. We expect the site driveways will allow vehicles to turn into and out of the site efficiently.

- The proposed passenger car parking supply provides perpendicular parking. The perpendicular parking spaces will be 9.0 feet wide and 18.0 feet deep served by two-way aisles with a minimum width of 25.0 feet. The parking space dimensions and aisle widths are consistent with current car parking design standards.
- The proposed van parking supply also provides perpendicular parking. Those perpendicular parking spaces will be 11.0 feet wide and 27.0 feet deep served by two-way aisles with a minimum width of 30.0 feet. These parking space dimensions and aisle widths are consistent with current van parking design standards.

Based on our review, we believe the site plan provides convenient access and circulation throughout the site.

CONCLUSION

We expect area traffic operations will not significantly change because of the proposed delivery station. In addition, the site design is consistent with current standards and provides adequate access and circulation.

Should you have any questions or comments concerning this traffic evaluation, please do not hesitate to contact our office.

Sincerely,
Langan Engineering and Environmental Services, Inc.



Daniel D. Disario, P.E., PTOE
Principal

DDD:jeg

TRAFFIC COUNTS

TRAFFIC VOLUME FIGURES

TRIP PROJECTIONS

CAPACITY ANALYSIS PRINTOUTS