

WWW.TRAFFICPD.COM

March 28, 2017

Mr. Neal Fisher, P.E. Hankin Group 707 Eagleview Boulevard Exton, PA 19341

RE: Preliminary Traffic Evaluation

DASD Mixed-Use Development Uwchlan Township, Chester County, PA TPD No. HANK.00020

Dear Mr. Fisher:

As requested, Traffic Planning and Design, Inc. (TPD) has completed a preliminary traffic evaluation for the Proposed DASD Mixed-Use Development, along Lionville Station Road in Uwchlan Township, Chester County, PA. The primary purpose of this evaluation is to provide a trip generation comparison between the proposed mixed-use development and a "by-right" scenario.

The existing "by-right" development plan consists of the following:

- 470,000 square feet (s.f.) of warehouse space (ITE #150)
- 80,000 s.f. elementary school for 670 students (ITE #520)
- 470,000 s.f. of general office space (ITE #710)
- 30,000 s.f. of retail space (ITE #820)

For comparison, the Proposed DASD Mixed-Use Development is assumed to consist of the following:

- 127 single family homes (ITE #210)
- 273 multi-family townhomes/condominiums (ITE #230)
- 80,000 s.f. elementary school for 670 students (ITE #520)
- 441,000 s.f. of general office space (ITE #710)
- 30,000 s.f. of retail space (ITE #820)

Following are TPD's findings:

TRIP GENERATION

The trip generation rates for the proposed mixed-use development were obtained from the manual *Trip Generation*, Ninth Edition, 2012, an Institute of Transportation Engineers (ITE) Informational Report. The

statistics in *Trip Generation* are empirical data based on more than 4,800 trip generation studies. The data are categorized by Land Use Codes, with total vehicular trips for a given land use estimated using an independent variable and statistically generated rates or equations. **Table 1** shows the trip generation data utilized for this trip generation comparison.

Land Use ITE #		ITE #	Time Period	Equations/Rates	Entering %	Pass-By %		
Marahausa	150		Weekday A.M. Peak Hour	Ln(T) = 0.55*Ln(X) + 1.88	79%	0%		
warenouse			Weekday P.M. Peak Hour	25%	0%			
Single-Family	2	10	Weekday A.M. Peak Hour	25%	0%			
Homes	Ζ.	10	Weekday P.M. Peak Hour	63%	0%			
Multi-Family	220		Weekday A.M. Peak Hour	Ln(T) = 0.80*Ln(X) + 0.26	17%	0%		
Townhouse	Ζ.	50	Weekday P.M. Peak Hour	67%	0%			
Elementary	ry _{F20}		520		Weekday A.M. Peak Hour	$T = 0.45^{*}(X)$	55%	0%
School	Э.	20	Weekday P.M. Peak Hour	49%	0%			
0.5	71.0		Weekday A.M. Peak Hour	Ln(T) = 0.80*Ln(X) + 1.57	88%	0%		
Office	1.	10	Weekday P.M. Peak Hour	T = 1.12*(X) + 78.45	17%	0%		
Detail	0	20	Weekday A.M. Peak Hour	T = 0.96*(X)	62%	24% ¹		
Retall	0.	20	Weekday P.M. Peak Hour	48%	34%			

TABLE 1 ITE TRIP GENERATION DATA

1 = No published data, used 10% less than P.M. Peak Hour for A.M. Peak Hour

Internal Trips

For mixed-use developments, the *Trip Generation* manual recommends applying an interaction factor to the site trip generation to determine the quantity of "external trips" (trips from external roadways) and "internal capture trips" (trips between the various uses onsite that do not utilize the external roadways, in this case between the retail stores and the office buildings and vice versa). Internal capture for the mixed-use development was calculated in accordance with current ITE recommendations during the weekday evening peak period. For the analysis of the proposed mixed-used development plan, TPD utilized the NCHRP Report 684 estimator for the A.M. and P.M. peak hours to account for internal capture.

Pass-By Trips

According to the *Trip Generation* manual, not all of the trips generated by the proposed development will be new to the surrounding area. A distinction was made between "new" trips, which are trips made to/from the study area for the express purpose of visiting the site, and "pass-by" trips, which are trips made to the site by traffic passing the retail center on the adjacent roadways en route to another destination. The pass-by trips do not add any additional traffic to the study area intersections but will result in shifts in turning movement at the site driveway intersections.

By-Right Development Plan

TPD determined the following effective internal capture percentages for this scenario:

- AM Peak Hour = 1.5%
- PM Peak Hour = 1.0%

The calculated trip generation for the by-right development plan for the opening year is shown in **Table 2.**

Land Use	Size (X)	Total Trips	Int.	External Trips			Pa	ass-By Tri	ps	New Trips		
			Trips	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour												
Warehouse	470 ksf	193	0	193	152	41	0	0	0	193	152	41
Elementary School	670 students	302	0	302	166	136	0	0	0	302	166	136
Office	470 ksf	660	-9	651	578	73	0	0	0	651	578	73
Retail	30 ksf	29	-9	20	12	8	4	2	2	16	10	6
Total		1184	-18	1166	908	258	4	2	2	1162	906	256
	Weekday P.M. Peak Hour											
Warehouse	470 ksf	160	0	160	40	120	0	0	0	160	40	120
Elementary School	670 students	101	0	101	49	52	0	0	0	101	49	52
Office	470 ksf	605	-5	600	102	498	0	0	0	600	102	498
Retail	30 ksf	111	-5	106	49	57	36	18	18	70	31	39
Total		977	-10	967	240	727	36	18	18	931	222	709

TABLE 2 TRIP GENERATION – BY-RIGHT DEVELOPMENT PLAN

Proposed Mixed Use Development Plan

TPD determined the following effective internal capture percentages for this scenario:

- AM Peak Hour = 2.6%
- PM Peak Hour = 6.9%

The trip generation for the proposed development is shown below in Table 3.

	C : 00	Total	Int.	External Trips			Pass-By Trips			New Trips		
Land Use	Size (X)	Trips	Trips	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour												
Single-Family	127 du	99	-2	99	25	72	0	0	0	99	25	72
Mutli-Family Townhomes	273 du	115	-4	111	19	92	0	0	0	111	19	92
Elementary School	670 students	302	0	302	166	136	0	0	0	302	166	136
Office Space	441 ksf	627	-12	615	546	69	0	0	0	615	546	69
Shopping Center	30 ksf	29	-12	17	10	7	4	2	2	13	8	5
Total		1172	-30	1142	766	376	4	2	2	1138	764	374
			V	Veekday	P.M. Pea	k Hour						
Single-Family	127 du	130	-15	115	72	43	0	0	0	115	72	43
Mutli-Family Townhomes	273 du	137	-16	121	80	41	0	0	0	121	80	41
Elementary School	670 students	101	0	101	49	52	0	0	0	101	49	52
Office Space	441 ksf	572	-16	556	92	464	0	0	0	556	92	464
Shopping Center	30 ksf	111	-25	86	44	42	30	15	15	56	29	27
Total		1051	-72	979	337	642	30	15	15	949	322	627

TABLE 3 TRIP GENERATION – PROPOSED MIXED-USE DEVELOPMENT PLAN

Trip Generation Comparison

The total trip generation per time period per development plan is summarized in **Table 4** below.

Time Devied	Development	Ex	ternal Tri	ps	Ν	lew Trips		New Trips		
Time Period	Plan	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
	By-Right Plan	1166	908	258	4	2	2	1162	906	256
Weekday A.M. Peak	Proposed Plan	1142	766	376	4	2	2	1138	764	374
nou	Net Trips	-24	-142	+118	0	0	0	-24	-142	+118
	By-Right Plan	967	240	727	36	18	18	931	222	709
Weekday P.M. Peak	Proposed Plan	979	337	642	30	15	15	949	322	627
riodi	Net Trips	+12	+97	-85	-6	-3	-3	+18	+100	-82

TABLE 4 TRIP GENERATION COMPARISON

Based on the results in **Table 4**, the proposed mixed-use development plan will generate <u>24 less new</u> <u>trips</u> during the Weekday A.M. Peak Hour and <u>18 additional new trips</u> during the Weekday P.M. Peak Hour when compared to the By-Right plan mentioned above. **Overall however, the peak hour trip generations are very similar**.

TRAFFIC INFRASTRUCTURE ASSESSMENT

It is TPD's opinion that the roadway network shown on the plan for the proposed mixed-use development is ideal from a planning standpoint, as it provides direct connection to/from Route 100 (S.R. 0100), Route 113 (S.R. 0113), and Byers Road (S.R. 1022), with Lionville Station Road and Haywood Road as the main connector roadways. These main collector roads converge in the residential center of the proposed mixed-use development, thus providing efficient external access for a land-use types on the proposed mixed-use development. The proposed mixed-use development layout also provides a network of secondary and tertiary roads that connect individual uses/residences to the main connector roadways.

It is also TPD's opinion that the layout of the several proposed land uses is ideal from a planning standpoint. Even though the goal of a mixed-use development is to provide a mix of complimentary uses to reduce external traffic, the proposed land uses are segregated enough to ensure the residential nature of the central portion of the site, is maintained. That being said, TPD offers the following commentary on specific uses on the proposed mixed-use development:

- Residents of the proposed mixed-use development will be able to access commercial uses on the site (specifically near S.R. 0113), before continuing onto their residences. Thus, potentially reducing some external trips to the immediate area.
- Residents of the proposed mixed-use development will be able to pick-up/drop-off their children at the proposed elementary school, before continuing onto work/home. Thus, potentially reducing some external trips to the immediate area.
- Residents of the proposed mixed-use development will be able to work at the commercial uses on-site. Thus, potentially reducing some external trips to the immediate area.
- Employees of the commercial uses on-site contained on the proposed mixed-use development will be able to travel to/from work without impacting the residential uses in the middle of the site.

Based on the interaction evaluation (summarized above), the land use mix of the **Proposed mixed-use development results in greater interaction** (i.e. less external trips) when compared to the land use mix for the "By-Right" plan.

It is anticipated the majority of site-related impact will occur at the external intersections of: Route 100 (S.R. 0100) & East Township Line Road; Route 113 (S.R. 0113) & Lionville Station Road. A full TIS will be required to determine the impact and required roadway improvements associated with the proposed mixed-use development.

PEDESTRIAN ASSESSMENT

It is TPD's opinion that, mixed-use developments generally encourage multi-modal trip interaction. Specifically, it is anticipated that there will be ADA connections provided between the residential uses and the adjacent commercial/school uses. Additionally, it is anticipated that ADA facilities will be updated as needed at the external intersections with Route 100 (S.R. 0100), Route 113 (S.R. 0113), and Byers Road (S.R. 1022), which will be reviewed by PennDOT and the Municipality.

TRANSIT ASSESSMENT

Bus Service is provided in the Study Area by SEPTA Bus Route 204 along Route 113 (S.R. 0113). There is no regional rail service in the Study Area. TPD anticipates that a Proposed Development this size will warrant the need for further coordination with SEPTA in order to investigate whether expanded service should be provided in the Study Area.

CONCLUSIONS

Based on the findings of this letter, TPD offers the following conclusions:

- The proposed development plan will generate <u>24 less new trips</u> during the Weekday A.M. Peak Hour and <u>18 additional new trips</u> during the Weekday P.M. Peak Hour when compared to the By-Right plan mentioned above. **Overall however, the peak hour trip generations are very similar.**
- Based on the interaction evaluation (summarized above), the land use mix of the **proposed mixed-use development results in greater interaction** (i.e. less external trips) when compared to the land use mix for the "By-Right" plan.
- A full TIS will be required to determine the impact and required roadway improvements associated with the proposed mixed-use development.

If you have any questions, or require any additional information, please do not hesitate to contact us.

Sincerely,

TRAFFIC PLANNING AND DESIGN, INC.

Matthew I. Hammond, P.E. Executive Vice President mhammond@TrafficPD.com

cc: TPD File