LANGAN

To: Brian Desfosses/NHDOT

From: John D Plante

Info: Justin Dunn/Hillwood
Gary Fredrick/Hillwood
John Smolack/S&V
Nate Kirschner/Langan

Date: September 22, 2020

Re: **Potential Peak Season Trip Generation**
Hudson Logistics Center
Hudson, NH
Langan Project No.: 151010101

In a memorandum, dated September 1, 2020, the NHDOT has asked the following:

Langan should provide a holiday trip generation estimate for the proposed facility and identify the extent of this peak season.

Introduction

The Hudson Logistics Center (HLC) will support the e-commerce supply chain and Amazon has been identified as the tenant of two of the buildings (Lot A & B). These facilities are planned to be non-sort fulfillment centers, with a very specific function in the supply chain. These specific functions are detailed in the Project Description section below.

Very similar to retailers and holiday sensitive commercial uses, the e-commerce supply chain will experience an increase in year-end holiday season activities, and thus an increase in trip generation related to employment to support this increase in shopping activity. Trip generation related to retailers and commercial uses increase around the holidays, resulting from additional customers and employees increases. The e-commerce facilities proposed for HLC will have a similar increase in holiday shopping season; however it is not related to customers, but is primarily related to the hiring of additional employees to support the increase in product processing.

MEMO

Potential Peak Season Trip Generation
Hudson Logistics Center
Langan Project No.: 151010101
September 22, 2020- Page 2 of 8

Peak Holiday Season Duration

As with all seasonal shopping activities, the holiday peak shopping season can vary based on location and demographics. In general, for e-commerce fulfillment centers, like proposed in the HLC, the peak holiday season is approximately 14 non-sequential days, spread out from Thanksgiving and Christmas. Therefore, for 351 out of 365 days a year this facility should operate with the average trip generation previously approved by the NHDOT and utilized in the Traffic Impact Study and supplemental analyses.

Project Description

The Hudson Logistics Center includes the construction of the following facilities:

- **Lot A** – Fulfillment Center Warehouse - ±1.08M square-foot building footprint,±100 loading docks, ±404 trailer parking stalls, ±1,008 car parking stalls, 683 employees
- **Lot B** – Fulfillment Center Warehouse - ±1.00M square-foot building footprint, ±135 loading docks, ±250 trailer parking stalls, ±417 car parking stalls, 346 employees
- **Lot C** – Fulfillment Center Warehouse - ±522,000 square-foot building footprint,±130 loading docks, ±188 trailer parking stalls, ±420 car parking stalls.

Both Lots A and B are proposed to be the same tenant – Amazon, however, the two facilities have different functions in the e-commerce supply chain. The tenant develops specific programming for each of their facilities, including the anticipated number of employees, shift changes and delivery schedules for the facility.

Lot A – The e-commerce facility on Lot A will receive bulk products brought in by tractor trailer truck, from non-affiliated vendors; called the inbound side. This product is of a scale that can be handled by employees, but are larger than can be completely automated and packaged with additional items. Employees breakdown the bulk product and separate it for storage and shipping; called the outbound side, by tenant tractor trailer trucks to the next facility in supply chain. The scale of the products requires more storage area, thus impacting the size of the facility. The inbound and outbound trucks are spread fairly evenly throughout the day.

The facility has a day shift that generally starts around 7:00 to 7:30 a.m. and generally ends around 5:30 to 6:00 p.m., and a night shift that generally starts around 6:00 to 6:30 p.m. and generally ends around 4:30 to 5:00 a.m. There are groups of employees on both shifts that carry out various tasks and functions and may report to the facilities and leave the facilities outside of these general

LANGAN

MEMO

Potential Peak Season Trip Generation
Hudson Logistics Center
Langan Project No.: 151010101
September 22, 2020- Page 3 of 8

shift times; therefore not 100% of day shift and night shift employees all begin and end their shifts at the same times and there is some volume of traffic in and out the facilities throughout the day.

Lot B – This e-commerce facility receives tractor trailer deliveries of bulk product from manufacturers and vendors of extra-large products, such as appliances and furniture, which require mechanical means, such as forklifts, to maneuver the product for storage within the building and eventual delivery to customers, via box trucks. The outgoing box trucks operate during the day shift, departing the facility prior to both the morning generator and roadway peak hours and return prior to the evening peak hour. The size and type of product results in a larger facility to store and process the product and in less trips than that you will see with the smaller, multi-product e-commerce last-mile facility.

The employee shifts operate in the same manner as those of the Lot A facility, with staggered arrivals and departures of the day and night shifts. This facility has numerous onsite amenities for the employees.

The ITE land use that the Amazon facilities are most closely associated with is High-Cube Fulfillment Center Warehouse (LUC 155) Non-Sort. Both buildings on Lot A and B are part of the e-commerce supply chain as non-sort fulfillment centers, as they handle inbound bulk products from manufacturer or vendors and separated for the next step in the tenant's supply chain. These products are larger and not combined with other consumer products and transported to the next step in the supply chain.

Lot C – For developing impacts for the proposed development, the current assumption is that the Lot C facility land use would be a general warehouse (LUC 150) or non-sort fulfillment center warehouse (LUC 155).

Approved Trip Generation

Lot A and Lot B –

Although two of the known tenant buildings in the HLC fall within the LUC 155 Non-Sort definition, facilities within this category can vary as to specific operations. The trip generation for the specific facilities on Lot A and B were provided by the tenant, based on the number of employees and trucks anticipated for the facilities. Table 1 provides the anticipated trip generation for Lot A and B, based on the tenant provided data. These volumes represent the anticipated 100% trip generation with no credits taken for multi-occupancy vehicles (mass transit, carpooling and ridesharing).

LANGAN

MEMO

TABLE 1
ITE LUC 155 – FULFILLMENT CENTER (NON-SORT) – LOT A AND LOT B ANTICIPATED TRIP GENERATION BY EMPLOYEES

LOCATION	LAND USE CODE	PEAK HOUR SCENARIO	Independent Variable		AM Peak-Hour			PM Peak-Hour			ADT	No. of Studies
			Amount	Unit	IN	OUT	TOTAL	IN	OUT	TOTAL		
Lot A	Fulfillment Ctr N-S LUC 155	Generator	683	Employees	184	54	238	187	197	384	1631	Tenant
Lot B	Fulfillment Ctr N-S LUC 155	Generator	346	Employees	90	24	114	94	99	193	821	Tenant

A review of the LUC 155 ITE data and the tenant data for Lot A indicates that the tenant data estimates higher trip generation volumes for use in the analysis of the traffic related impacts of the Hudson Logistics Center. To provide a conservative, or overestimation, approach to the trip generation, we have utilized the tenant provided volumes for Lot A and the ITE Generator volumes for Lot B. Although the ITE Generator volumes are based on only one study, they provide a higher volume than the tenant' anticipated volumes.

Lot C – Lot C is currently a spec building, as no tenant has been identified for the building. For the purpose of theses analyses, Lot C will be considered as a non-sort fulfillment center warehouse (LUC 155).

The trip generation approach outlined above should provide an overestimation of the projected traffic from the Hudson Logistics Center on average, throughout most of the year, resulting in a conservative analysis of the project traffic impacts. Table 2 depicts the unadjusted trip generation volumes used in the analysis to determine the potential impact of the HLC.

TABLE 2
HUDSON LOGISTIC CENTER – UNADJUSTED ANTICIPATED TRIP GENERATION

LOCATION	LAND USE CODE	PEAK HOUR SCENARIO	Independent Variable		AM Peak-Hour			PM Peak-Hour			ADT	No. of Studies
			Amount	Unit	IN	OUT	TOTAL	IN	OUT	TOTAL		
Lot A	Fulfillment Ctr N-S LUC 155	Generator	Tenant		184	54	238	187	197	384	1631	Tenant
Lot B	Fulfillment Ctr N-S LUC 155	Generator	1,001,700	GFA	110	110	220	135	135	270	1830	1/1/22
Lot C	Fulfillment Ctr N-S LUC 155	Generator	522,000	GFA	58	57	115	71	70	141	870	1/1/22
UNADJUSTED TOTAL					**352**	**221**	**571**	**393**	**402**	**795**	**4331**	

It should be pointed out that the ADT for Lot B is significantly higher than the tenant specific trip generation; over 1000 vehicle-per-day greater. The ITE LUC overestimates the trip generation of this specific facility.

LANGAN

MEMO

Multi-Occupancy Vehicle Credit

The tenant of Lot A and Lot B has experience an increased trend of employees utilizing multi-occupancy vehicles. The tenant's employees have been utilizing self-created carpooling, ridesharing (Uber, Lyft) and mass transit. In the empirical data of the tenant's Massachusetts facility previously provided), indicates as much as 25% of the employee vehicle trips are multi-occupancy. The developer has discussed with the Nashua Transit System about providing mass transit (bus or shuttle) service to HLC and the area businesses. They have indicated that they would be interested in providing this service and it has been planned for in the past, but there was no mechanism to do so. The developer and tenant will continue those discussion with the intent on provide mass transit service to HLC.

For these types of land uses, ITE estimates an average vehicle occupancy of 1.3 persons per vehicle, with a range of 1.2 – 1.8 person per vehicle. A 1.3 person per vehicle translates to a 23% reduction in trip generation. This information can be found in Table B.3 of the ITE Trip Generation Handbook, 3rd Edition.

Despite the ITE trip generation guidance and the empirical experience of the tenant indicating a larger multi-occupancy vehicle credit, for the purposes of evaluating the project's trip generation, a credit to 5% credit for multi-occupancy vehicles will be used.

Table 3 below represents the trip generation volumes approved by NHDOT for use in the traffic impact study.

TABLE 3
HUDSON LOGISTIC CENTER –ADJUSTED ANTICIPATED TRIP GENERATION

LOCATION	LAND USE CODE	PEAK HOUR SCENARIO	Independent Variable		AM Peak-Hour			PM Peak-Hour			ADT	No. of Studies
			Amount	Unit	IN	OUT	TOTAL	IN	OUT	TOTAL		
Lot A	Fulfillment Ctr N-S	Generator	Tenant		184	54	238	187	197	384	1631	Tenant
Lot B	Fulfillment Ctr N-S LUC 155	Generator	1,001,700	GFA	110	110	220	135	135	270	1830	1/1/22
Lot C	Fulfillment Ctr N-S LUC 155	Generator	522,000	GFA	58	57	115	71	70	141	870	1/1/22
			UNADJUSTED TOTAL		**352**	**221**	**573**	**393**	**402**	**795**	**4331**	
			M-O Credit (5%)		-18	-11	-29	-20	-20	-40	-217	
			TOTAL		**334**	**210**	**544**	**373**	**382**	**755**	**4114**	

Potential Peak Shopping Season Trip Generation

The Amazon non-sort fulfillment center planned for the HLC are expected to increase activity and employment to support the consumer demand during the peak holiday shopping season. The

LANGAN

MEMO

Potential Peak Season Trip Generation
Hudson Logistics Center
Langan Project No.: 151010101
September 22, 2020- Page 6 of 8

magnitude of the employment and trip generation increases varies with the completeness of the e-commerce supply chain and in different geographic regions. Based on their experience and expectations for this market, Amazon anticipates that the average trip generation during the majority of the year will increase approximately 60 percent.

The ITE 10th Edition Supplement, which includes the data for this land use code (LUC 155) for non-sort fulfillment center warehouse used in the development of the trip generation utilized in the Traffic Impact Study and supplemental analyses, does not provide data related to seasonal adjustments in trip generation. As we know the tenant for the two larger facilities on Lot A & B in HLC, it would be appropriate to also utilize the anticipated season increase for Lot C.

For the Amazon facilities it is expected that the employees will have similar multi-occupancy vehicle characteristics as other Amazon facilities and as presented in the empirical data from the Massachusetts facility; approximately 25% multi-occupancy vehicle use. However, for the purpose of this analyses, the 5% multi-occupancy vehicle credit approved by NHDOT will be used. We believe this results in an over-estimation of the trip generation for the project.

Utilizing the total trip generation volumes in Table 3 as a basis from which to develop the peak shopping season trip generation results in the potential volumes shown in Table 4.

TABLE 4 HUDSON LOGISTICS CENTER – POTENTIAL PEAK SHOPPING SEASON TRIP GENERATION						
AM Peak Hour			PM Peak Hour			ADT
Enter	Exit	Total	Enter	Exit	Total	
334	210	544	373	382	755	4114
Peak Shopping Season Adjustment x 1.6 (60%)						
534	**336**	**870**	**597**	**627**	**1,208**	**6,582**

A comparison of the tenant's anticipated trip generation depicted in Table 1 and the approved trip generation for the project depicted in Table 3 indicates that for Lot B, the ITE trip generation is generally 2 times greater than the anticipated tenant trip generation, over 1000 trips more during an average day. Utilizing the Lot B trip generation depicted in Table 3 as a basis for the season peak will result in a significant larger than expected volume.

It is also appropriate to understand what the peak shopping season trip generation based on the actual tenant non-peak season trip generation volumes indicated in Table 1. Utilizing those volumes for Lot A and B, and ITE volumes for Lot C results in the peak shopping season trip generation depicted in Table 5.

LANGAN

MEMO

Potential Peak Season Trip Generation
Hudson Logistics Center
Langan Project No.: 151010101
September 22, 2020- Page 7 of 8

TABLE 5
POTENTIAL PEAK SHOPPING SEASON TRIP GENERATION USING TENANT AND ITE VOLUMES

LOCATION	AM Peak-Hour			PM Peak-Hour			ADT	Source
	IN	OUT	TOTAL	IN	OUT	TOTAL		
Lot A	184	54	238	187	197	384	1631	Tenant
Lot B	90	24	114	94	99	193	821	Tenant
Lot C	58	57	115	71	70	141	870	ITE
Unadjusted Total	332	135	467	352	366	718	3,322	
M-O Credit (5%)	-17	-7	-24	-18	-18	-36	-166	
Non-Peak Season Subtotal	315	128	443	334	348	682	3,156	
Peak Season Adjustment (x 60%)	+189	+77	+266	+200	+209	+409	+1,894	
Peak Season Total	**504**	**205**	**709**	**534**	**557**	**1,091**	**5,050**	

Table 6 provides a comparison of Tables 3 and 5 and indicates that utilizing the tenant anticipated trip generation volumes to determine the peak shopping season volumes, results in an additional 165 trips in the morning peak hour, an additional 336 trips in the evening peak hour and only approximately an additional 1000 vehicle-trips-per-day as compared to the volumes used in the Traffic Impact Study.

TABLE 6
HLC TRIP GENERATION COMPARISON
TYPICAL OPERATIONS VS. PEAK SHOPPING SEASON OPERATIONS

CONDITION	AM Peak-Hour			PM Peak-Hour			ADT
	IN	OUT	TOTAL	IN	OUT	TOTAL	
Anticipated Trip Generation during Typical Operations [1]	334	210	544	373	382	755	4114
Anticipated Trip Generation during Peak Shopping Season Operations [2]	504	205	709	534	557	1,091	5,050
Anticipated Peak Shopping Season Trip Generation Increase	**+170**	**-5**	**+165**	**+161**	**+175**	**+336**	**+936**

[1] Trip Generation approved by NHDOT for use in the Traffic Impact Study

[2] Anticipated Peak Shopping Season trip generation based on tenant provided data for Lots A & B and ITE data for Lot C

Parking

Although there is not a direct correlation between trip generation and parking counts, however, one of the items brought up previously is the number of parking spaces verses the anticipated number of employees at the two tenant facilities. Several reasons for the amount of parking spaces provided is discussed in the Traffic Impact Study; one of those reasons is to provide adequate parking during peak seasonal shopping season.

LANGAN

MEMO

Potential Peak Season Trip Generation
Hudson Logistics Center
Langan Project No.: 151010101
September 22, 2020- Page 8 of 8

Although the approximate 60 percent increase in peak shopping season trip generation does not equate directly to employee count, as the peak season can include both full-time and part-time/partial shift employees. However, as an approximation, if the 60 percent factor is applied to the average anticipated tenant employee counts, the amount of parking provided in the design is justified, as depicted in Table 7.

TABLE 7 APPROXIMATE PEAK SHOPPING SEASON PARKING				
LOCATION	AVERAGE EMPLOYEES		PEAK SEASON EMPLOYEES	PARKING PROVIDED
Lot A	683	x 60%	1093	1008
Lot B	346	X 60%	553	417

LANGAN