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Memo

To:	Deerfield Plan Commission
Cc:	Jeffrey Ryckaert, Daniel Nakahara
From:	David Meek
Date:	June 1, 2023
Re:	1 Baxter Parkway – Bridge Industrial

On behalf of the Thorngate Owners Association I am filing the attached memorandum concerning traffic issues at the proposed Bridge Industrial development and the Traffic Impact Study prepared by KLOA (March 23, 2023). The May 31, 2023 memorandum was prepared by John A. Nawn, P.E., PTOE, FNSPE.

Mr. Nawn critiques the KLOA study's methodology and scope and challenges many of its conclusions.

Among the observations and conclusions to be drawn from Mr. Nawn's report:

● The KLOA study did not use the most appropriate land use category to model and analyze the traffic generation potential of this development. Consequently, the KLOA study significantly undercounts the traffic generation potential from this development which calls into question the sufficiency of the traffic analysis.

● Because this is a speculative development, the KLOA study should have analyzed the traffic impacts using the traffic projections generated by the most intensive warehouse distribution businesses that this project is designed to service. When the traffic generation is evaluated using the more intensive land uses, it is clear that the Bridge development generates significantly more traffic:

- The development can be expected to generate 4 times more daily vehicle traffic (and 6 times to 8 times more vehicle traffic in the peak hours) than as modeled by KLOA.
- Heavy vehicle (truck) traffic would be greater than as modeled by KLOA and the 24-hour distribution of truck traffic could mean 200 truck movements on Saunders Road between 7:00PM and 7:00AM.

● The scope of KLOA's study was too narrow to give the Village a full picture of the potentially significant implications of truck traffic on traffic conditions in the vicinity beyond Saunders Road. The KLOA study did not look at traffic data and level of service analysis at the 3 signalized intersections between Saunders Road and the Tri-State interchange. It also failed to evaluate the impact of truck access to and from I-94 at the Deerfield Road interchange and along Lake Cook Road to Route 41.

May 31, 2023

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RE: **Traffic analysis, Midwest RE Acquisitions, LLC/Bridge Industrial – Baxter Property, Lake County**

Per you request, I have reviewed the material listed below, available from the Village of Deerfield, IL website, regarding the Annexation, Re-zoning, Special Use Permit and associated relief and approvals sought for the proposed Bridge Industrial warehouse facilities, located at 1 Baxter Parkway, east of Saunders Road in Lake County, IL and offer the following findings and opinions.

REVIEWED MATERIAL

1. 1 Baxter Parkway Bridge Industrial Public Hearing Staff Memo 04/27/23
2. Tetra Tech Limited Emissions Assessment Dated 5/11/23
3. Bridge Industrial: Property Value Research 5/10/23
4. Bridge Industrial Plans 1 of 8 Narrative, Tax Analysis, Traffic Study
5. Bridge Industrial Plans 2 of 8 Site Architecture
6. Bridge Industrial Plans 3 of 8 Landscape and Tree Survey
7. Bridge Industrial Plans 4 of 8 Photometrics/Lighting
8. Bridge Industrial Plans 5 of 8 Building height, schedule, and signage
9. Bridge Industrial Plans 6 of 8 Survey Plats and Truck Turn Radius
10. Bridge Industrial Plans 7 of 8 Engineering
11. Bridge Industrial Plans 8 of 8 Stormwater Report
12. Thorngate Owners Association Request for Continuation 05/05/23
13. Thorngate Owners Association Letter to Plan Commission 4/25/23
14. Public Comment, various dates 04/21/23 through 5/19/23
15. 1 Baxter Parkway Bridge Industrial Prefiling Conference - Supplemental Memo 03/01/23
16. 1 Baxter Parkway Bridge Industrial Prefiling Conference Staff Memo 02/23/23
17. 1 Baxter Parkway Bridge Industrial Prefiling Conference Petitioner's Plans 02/23/23
18. Hearing Transcript from the May 11, 2023, Plan Commission Meeting
19. Draft Minutes from the May 11, 2023, Plan Commission Meeting

Analysis

The Trip Generation report prepared by KLOA, dated March 23, 2023, utilized ITE Land Use Code 150, Warehousing, to generate the trips for the proposed 1,124,931 SF combined warehouses. The ITE Trip Generation Manual (10th Edition, September 2017) defines a 'warehouse' as follows:

> A warehouse is primarily devoted to the storage of materials, but it may also include office and maintenance areas. High-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related uses.

It is noted that the data for the generation of trips for LU 150 in the ITE Trip Generation Manual (11th Edition) is based on an average size of 292,000 SF or 26% of the size of the proposed warehouse. The largest size warehouse that comprises the data set was 560,000 SF or 50% of the size of the proposed, combined warehouses. *It is noted that these analyses are limited to a review of and comment on the use of the proposed warehousing facilities. No comments are provided regarding the proposed 155,940 SF sports facility.*

As presented within the traffic study and the reviewed plans, the proposed warehousing facilities consist of two proposed warehouse type buildings: a 896,562 SF warehouse, with a total of 177 loading dock locations situated on the east and west sides of the proposed building, with 90 docks on the west side and 87 docks on the east side respectively; and, a 228,369 SF warehouse with 50 loading docks located along the east side of the building.

Cross dock facilities, such as the larger of the two proposed warehouse buildings, are generally associated with types of facilities where storage of materials is less important than within a strict warehouse which exists primarily for storage and or light industrial use. A cross dock transfer is typically unnecessary in a traditional warehouse. The Trip Generation Manual provides additional definition for such related facilities, as noted in the warehouse definition above including: "*High-cube transload and short-term storage warehouse (Land Use 154), high-cube fulfillment center warehouse (Land Use 155), and high-cube parcel hub warehouse (Land Use 156)*." An Amazon warehouse would be an example of a *high-cube fulfillment center warehouse*. As defined by ITE, a fulfillment center warehouse includes "*storage and direct distribution of e-commerce product to end users*".

The ITE Trip Generation Manual (11h Edition), defined a High-Cube Transload and Short-Term Storage Warehouse (Land Use 154) as follows:

> A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.
>
> The HCWs included in this land use include transload and short-term storage facilities. A

> transload facility has the primary function of consolidation and distribution of pallet loads (or larger) for manufacturers, wholesalers, or retailers. A transload facility typically has little storage duration, high throughput, and its operations are high efficiency. A short-term HCW is a distribution facility often with custom/special features built into the structure for the movement of large volumes of freight with only short-term storage of products.
>
> Some limited assembly and repackaging may occur within the facility.
>
> A high-cube warehouse may contain a mezzanine. In a HCW setting, a mezzanine is a freestanding, semi-permanent structure that is commonly supported by structural steel columns and that is lined with racks or shelves. The gross floor area (GFA) values for the study sites in the database for this land use do NOT include the floor area of the mezzanine. The GFA values represent only the permanent ground-floor square footage.

With regards to LU154, High-Cube Transload and Short-Term Storage Warehouse, the ITE Trip Generation Manual (11th Edition) noted that the average study size was 798,000 SF, like the size of the proposed Building C. LU154 is more representative of the proposed development than LU150.

The ITE Trip Generation Manual (11h Edition), defined a <u>High-Cube Fulfillment Center Warehouse</u> (Land Use 155) as follows:

> A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/ or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.
>
> Warehousing (Land Use 150), high-cube transload and short-term storage warehouse (Land Use 154), high-cube parcel hub warehouse (Land Use 156), and high-cube cold storage warehouse (Land Use 157) are related land uses.
>
> Each fulfillment center in the ITE database has been categorized as either a sort or non-sort facility. A sort facility is a fulfillment center that ships out smaller items, requiring extensive sorting, typically by manual means. A non-sort facility is a fulfillment center that ships large box items that are processed primarily with automation rather than through manual means. Separate sets of data plots are presented for the sort and non-sort fulfillment centers. Some limited assembly and repackaging may occur within the facility.

The description for LU155 also included the following additional data:

> The High-Cube Warehouse/Distribution Center-related land uses underwent specialized consideration through a commissioned study titled "High-Cube Warehouse Vehicle Trip Generation Analysis," published in October 2016. The results of this study are posted on the ITE website…

With regards to LU155, High-Cube Fulfillment Center Warehouse, the ITE Trip Generation Manual (11th Edition) noted that the average study size for a non-sort facility, was 886,000 SF, similar to the size to the proposed larger warehouse (building C), with the average study size for a sort facility at 1,360,000 SF, similar in size to the combined size for both warehouses. LU155 is much more representative of the proposed warehouse development than LU150.

The ITE Trip Generation Manual (11h Edition), defined a High-Cube Parcel Hub Warehouse (Land Use 156) as follows:

> A high-cube warehouse (HCW) is a building that typically has at least 200,000 gross square feet of floor area, has a ceiling height of 24 feet or more, and is used primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management. The automation and logistics enable highly-efficient processing of goods through the HCW. A high-cube warehouse can be free-standing or located in an industrial park.
>
> A high-cube parcel hub warehouses typically serves as a regional and local freight-forwarder facility for time sensitive shipments via airfreight and ground carriers. A site can also include truck maintenance, wash, or fueling facilities. Some limited assembly and repackaging may occur within the facility.

With regards to LU156, High-Cube Parcel Hub Warehouse, the ITE Trip Generation Manual (11th Edition) noted that the average study size was 543,000 SF. In all cases, the sizes of the studied warehouses for high-cube warehouse were much closer in size to that of the proposed warehouse size than the land use code used in the applicant's Traffic Impact Study. The ITE High-Cube Warehouse Vehicle Trip Generation Analysis (October 2016) described the typical uses for warehouses as summarized in the following table.

	Standard Warehouse/ Storage LU 150	Transload Facility LU154	Short-Term Storage LU 154	Fulfillment Center LU 155	Parcel Hub LU 156	*Proposed*
Typical Function	Products stored on-site typically for more than one month	Focus on consolidation and distribution of pallet loads (or larger) of manufacturers, wholesalers, or retailers; little storage duration; high throughput and high efficiency	Focus on warehousing/ distribution with distribution space operated at high efficiency; often with custom/special features built into structure for movement of large volumes of freight	Storage and direct distribution of e-commerce product to end users; smaller packages and quantities than for other types of HCW; often multiple mezzanine levels for product storage and picking	Regional and local freight-forwarder facility for time-sensitive shipments via air freight and ground (e.g., UPS, FedEx, USPS); site often includes truck maintenance, wash, or fueling facilities	*Undefined, no commitment made by applicant.*
Location	Typically, in an industrial area within urban area or urban periphery	Typically, in an area with convenient freeway access; often in rural or urban periphery area	Typically, in an area with convenient freeway access	Often near a parcel hub or USPS facility, due to time sensitivity of freight	Typically in close proximity to airport; often stand-alone	*Suburban (R1)/Industrial area (L1) near freeway access*
Loading Dock Location	Either on one side or on two adjacent sides	Minimum of two sides (adjacent or opposite); can be on four sides	On either one or two sides	No information provided	Usually on both long sides of building; can be on four sides	*Two, opposite sides (larger warehouse)*
Number of Docks	Low number of dock positions to overall facility, 1:20,000 square feet or lower	Typical dock-high loading door ratio is 1:10,000 square feet; common range between 1:5,000 & 1:15,000 square feet	Typically, 1:10,000 square feet or lower	No information provided	No information provided	*177 docks 896,562 SF =* ***1:5,100 SF*** *50 docks 228,369 SF =* ***1:4,600 SF***

In comparing the features of the proposed facilities to the ITE criteria, it is evident that the proposed warehouses are best described as High Cube Warehouses and not simply a 'warehouse' as proposed in the KLOA report. The ITE High-Cube Warehouse Vehicle Trip Generation Analysis (October 2016) also noted that among the required information necessary for a proper analysis of the traffic impacts for a warehouse includes the NAICS Industrial Code and the "*Commodity type (retail, manufacturing, other)*", neither of which were provided for the proposed facility. Regarding this, the testimony from the May 11, 2023 Plan Commission Meeting offered the following: "*So in addition to the design of the building, there's a lot of discussion of who is going to be in this building at the end of the day. So Bridge as an institutional leading investor of the industrial, we are designing this building specifically to garner to higher end tenants that would look to locate a corporate campus here, maybe a higher finish of office, a little bit less truck use at the end of the day is what we envision here. Ultimately we want to build it and we designed it to be as leasable and marketable as possible and we wanted to be successful for the project in the long term.*" [Jerry Callahan.30] "*So we are planning to build this building on a speculative basis, so we don't know the tenant or type of operation that is going to be there at the end of the day.*" [Jon Pozerycki.37]

The undefined, speculative nature of the proposed use fundamentally violates proper engineering practice related to the preparation of the submitted Traffic Impact Study. To be credible, a traffic study must be representative of the proposed use which, in this case, would require more definition of the use on the part of the applicant, as noted and supported by ITE. If the applicant wishes to develop the proposed warehouses for a future speculative use, than the Traffic Impact Study should reflect the most intensive use that could be accommodated by the proposed construction.

Using the same, combined 1,124,931 SF proposed building size as used in the KLOA analysis, trips were generated according to the ITE Trip Generation Manual (11th Edition) as follows in the table below.

LAND USE CODE ---->	Existing	150	154	155-nonsort	155-sort	156
AVERAGE WEEKDAY		1816	1575	2076	7245	5209
Enter		908	788	1083	3623	2604
Exit		908	787	1083	3622	2605
AM PEAK	216	159	90	169	979	788
Enter	200	**122**	**69**	**137**	**793**	**394**
Exit	16	**37**	**21**	**32**	**186**	**394**
PM PEAK	179	161	113	180	1350	720
Enter	15	**45**	**32**	**70**	**527**	**490**
Exit	164	**116**	**81**	**110**	**823**	**230**

As can be seen from the table above, the traffic generated by a High-Cube Fulfillment Center Warehouse can be expected to generate 4 times more daily traffic, and 6 to 8 times more traffic in the peak hours than as reported in the KLOA analyses using land use 150. The traffic resulting from a potential high-cube parcel hub warehouse, characterized as a cross-dock facility, is 3 times greater for the average weekday and 4 to 5 times greater in the peak hour than that attributable to a typical warehouse, as calculated within the KLOA analysis. Similarly, the number of heavy vehicle trips were generated as noted in the table below.

LAND USE CODE ---->	150	154	155-nonsort	155-sort	156
AVERAGE WEEKDAY	615	248	259	214	653
Enter	307	124	129	107	326
Exit	308	124	130	107	327
AM PEAK	34	23	23	23	101
Enter	**13**	**11**	**11**	**11**	**51**
Exit	**21**	**12**	**12**	**12**	**50**
PM PEAK	42	11	11	23	68
Enter	**23**	**5**	**5**	**10**	**36**
Exit	**19**	**6**	**6**	**13**	**32**

The reviewed testimony from the May 11, 2023, hearing also indicated that the proposed warehouses were expected to operate 24 hours per day, 7 days a week. Accordingly, a breakdown of the 24-hour heavy vehicle volumes is presented for each of the High Cube warehouse types following this report.

The ITE terminology for 'trucks' typically represents what would be considered heavy vehicles, that is, large, single and tandem axle, single unit box trucks and tractor trailers. Accordingly, the ITE High-Cube Warehouse Vehicle Trip Generation Analysis (October 2016) provided data on the percentage of passenger cars that were typical of the various high-cube warehouse uses. By multiplying the percentage of passenger cars with the total generated trips, and subtracting the number of generated heavy vehicles, the remaining, non-passenger car, non-heavy vehicles can be calculated as presented in the table below:

Land Use	Total Vehicles Weekday	ITE 2016 % Cars	Cars Weekday	Heavy Vehicles Weekday	Other Weekday
150	1816	67.8%	1231	615	*n/a*
154	1575	67.8%	1068	248	**259**
155-nonsort	2076	92.1%	1912	259	*n/a*
155-sort	7245	92.1%	6673	214	**358**
156	5209	62.3%	3245	653	**1311**
Land Use	**AM Peak**	**AM Peak**	**AM Peak**	**AM Peak**	**AM Peak**
150	159	69.2%	110	34	**15**
154	90	69.2%	62	23	**5**
155-nonsort	169	97.2%	164	23	*n/a*
155-sort	979	97.2%	952	23	**4**
156	788	50.3%	396	101	**291**
Land Use	**PM Peak**	**PM Peak**	**PM Peak**	**PM Peak**	**PM Peak**
150	161	78.3%	126	42	*n/a*
154	113	78.3%	88	11	**14**
155-nonsort	180	98.2%	177	11	*n/a*
155-sort	1350	98.2%	1326	23	**1**
156	720	70.7%	509	68	**143**

'Other' vehicles typically include two axle, four to six wheel, trucks, not otherwise classified as heavy vehicles such as step vans, parcel vans, parcel delivery trucks. Warehouses (150) and non-sort fulfillment center warehouse (155) do not usually involve the use of smaller trucks such as step vans, parcel vans, or parcel delivery trucks.

Table 5 of the Traffic Impact Study compares the trips generated by the proposed development to that of the full office occupancy for the Baxter Corporate Headquarters, suggesting an approximately 50% reduction in daily traffic and as much as an approximately 80% reduction in peak hour traffic resultant from the proposed development. The KLOA Traffic Impact Study offered the following:

> This reduction in the number of trips will result in a significantly lower traffic impact on the area roadways, allowing for additional reserve capacity at the impacted intersections to accommodate future increases in traffic resulting from regional growth and/or other potential developments in the area.

However, the projected trips used by KLOA in making this comparison are not reflective of actual, existing conditions. In generating the projected traffic for the Baxter Corporate Headquarters, KLOA used ITE Land Use 714, Corporate Headquarters Building. the ITE Trip Generation Manual (11th Edition) offered the following regarding the use of LU 714:

> The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Connecticut, Georgia, Maryland, Minnesota, New Jersey, New York, Ohio, Oregon, Pennsylvania,

Vermont, Virginia, and Washington.

In other words, the data used on arriving at the trip generation rates for a Corporate Headquarters Building was based on pre-pandemic data. As we know, post pandemic commuter traffic volumes, transit use, etc., remain as much as 30% or more below pre-pandemic levels as many individuals continue to work from home

In support of the above, according to the traffic counts contained within the Traffic Impact Study, 200 vehicles were counted entering the Baxter Parkway from Sanders Road in November 2022 during the morning peak hour and 164 vehicles leaving the site during the afternoon peak hour. In comparison, the potential pre-pandemic trips for office building(s) as presented in the KLOA study of 732 entering (AM) peak and 712 existing (PM peak). The table below compares the volumes at the intersection of Baxter Parkway and Sanders Road for land uses 155 and 156.

		Office at Full Occupancy	Actual 11/22	Proposed KLOA	LU155 Non-Sort	LU155 Sort	LU156
AM Peak	Enter	732	200	100	137	793	394
	Exit	55	16	34	32	186	394
	Total	787	216	134	169	979	788
PM Peak	Enter	70	15	41	70	527	490
	Exit	712	164	100	110	823	230
	Total	782	179	141	180	1350	720

As can be seen from the table, while the traffic volumes proposed by KLOA, if one were to agree with their proposed land use, which, as noted above, I do not, are less than existing traffic volumes at the intersection of Sanders Road and Baxter Parkway, they are not "*significantly lower*" or the approximate 80% reduction as suggested in the KLOA study. In fact, while entering volumes in the AM peak and exiting volumes in the PM peak are lower, the exiting volumes in the AM peak and entering volumes in the PM peak are 50 to 66% higher. It is also noted that the volumes for a high-cube parcel hub warehouse are approximately equal to those for the projected, pre-pandemic, full office occupancy and the volumes generated for a high-cube fulfillment center sort warehouse exceed those for the projected, pre-pandemic, full office occupancy.

As presented, the Traffic Impact Study does not properly report the maximum number of trips that could be expected from this proposed use. With insufficient information provided as to its intended use, the Traffic Impact Study should, at the very least, document the maximum amount of vehicle traffic expected from the proposed use, otherwise, the Traffic Impact Study is deficient as presented.

Parking

The ITE Parking Generation Manual (5th Edition, 2017) provided parking generation procedures, based on square footage, for Land Use 150, the same land use as cited within the Traffic Study. For the 1,124,931 SF combined size of both proposed warehouses, between 439 and 448 parking spaces would be necessary, for all vehicles, under land sue 150, as proposed in the Traffic Impact Study, representing approximately one-third of the spaces proposed to be constructed. The number of parking spaces provided well exceeds ITE criteria for the proposed land use.

The plans propose a total of 787 employee parking spaces, including 767 to be built and 20 held in reserve, but not constructed, exclusive of the 227 truck dock spaces and 258 trailer holding spaces, for a total of 1,272 parking spaces to service the two, proposed warehouses. It's unclear why, with a projected total new vehicle count, cars, and trucks, of approximately 160 vehicles in either peak hour, why the developer would choose to construct approximately 8 times more parking than that which was projected to be needed, if, in fact, it was the developer's intention to use the warehouses consistent with the land use modeled in the Traffic Impact Study. The number of parking spaces more closely parallels the parking need consistent with a High-Cube Fulfillment Center or Parcel Hub Warehouse.

Truck Access

According to the reviewed Traffic Impact Study and hearing testimony on May 11, 2023, it is intended that all truck traffic will access the site via Saunders Road. The testimony offered: *"…we believe that the truck route from the site will be going down Saunders to Lake-Cook Road and back. That's the only place where trucks will go. We will restrict trucks from leaving the site going north along Saunders. We will also improve the exit to encourage trucks to go to the south along Saunders. And additionally, in all the leases we do we will restrict trucks from leaving the site any other way than that. And we will require it to come from Lake-Cook up Saunders.*" [Jerry Callahan.25,26] The Traffic Impact Study, however, only provides traffic data and level of service analyses for one intersection on Lake Cook Road and fails to analyze the other three, signalized intersections between Saunders Road and the interchange for the Tri-State Tollway including the intersections at Takeda Parkway/Pointe Drive and the ramp intersections east and west of the Tollway.

It is also noted that while full movement to and from the Tri-State Tollway is available at the Lake Cook Road interchange, there is no nearby access available to the Edens Spur/I-94 from Lake Cook Road. Inbound trucks using I-94 from Chicago have only two options: exit at US 41/Lake Cook Road and head west on Lake Cook Road or take the Edens Spur/I-94 to Deerfield Road (at which point they will either proceed west to Saunders Road or east to Wilmot Road and then south to Lake Cook Road). Outbound trucks using I-94 south to Chicago have only two options: proceed east on Lake Cook Road to 41 or proceed north on Saunders Road and east on Deerfield Road to the partial interchange to 294/94 south. However, the testimony from the May 11, 2023, hearing noted: "*So again there will be no trucks turning right coming out of our facility going north on Saunders. All of that traffic will head south on Saunders, then east on Lake-Cook and connects to 94 going either north or south. Same when the trucks are coming off of 94 at Lake-Cook taking that west to Saunders and coming up to the entrance and into* *the facility. As John said, we will have stipulations on the lease that they have to abide by this. Any traffic, even if it's minimal traffic, and any traffic trying to come in off the Edens and Edens spur will be directed to take 41 to Lake-Cook and Lake-Cook over. There will be some traffic because we can't control the, tenants can't control but there will be people that will try to get off at Deerfield and then go west on Deerfield to Saunders and down. But we are going to do our best to minimize that*." [Mark Houser.46] The suggested route using US Route 41 at the I-94 split would entail an additional approximately 17 traffic signals along the approximately 4 miles of Lake Cook Road between US Route 41 and Saunders Road. Furthermore, nothing would preclude trucks from continuing on the Eden Spur to the Tri-State Tollway and using the Deerfield Road interchange and Deerfield Road west to Saunders Road. Consistent with this, the Traffic Impact Study does show at least one vehicle during the AM and PM peak hour using Saunders Road north off Baxter Parkway to access the site. Accordingly, the access to and from I-94 has potentially significant implications, and the magnitude of those implications is not fully understood and should be studied further.

It was noted that while the applicant testified that the proposed truck restrictions would be put into the lease(s), there was no discussion and/or no offer of how the landlord/developer/applicant would continuously monitor the truck traffic, enforce the provisions of the lease and what the penalties for non-compliance would be. As admitted numerous times by the applicant, 'we can't control the tenants.' The testimony also noted: "*One is obviously we post signs, we put it in the leases, we do everything we can. Other is when we design it, we will make it very difficult so if they do try a turn right, they are actually crossing over and getting into the other lanes*." [Mark Houser.48,49] As it is agreed that the landlord/developer/applicant cannot control how trucks access the site, the applicant testified to the installation of signs as a possible solution and/or intersection improvements at Saunders and Baxter to discourage travel on Saunders Road north of Baxter Parkway. The traffic engineer testified "*…measures will be taken to force truck traffic to utilize Saunders Road to Lake-Cook to the extent possible*." [Luay Aboona.56], although no specific, enforceable measures were presented.

The traffic engineer also testified: "*Currently the way the intersection is designed, trucks cannot physically make a right-hand turn. So radius of that corner is small, doesn't allow a truck to make that right-hand turn. If it's necessary we can restrict it further. So the trucks will not be able to do it. And we will have to approach and it will not be physically possible for them to do. We will obviously add signs as well. And as indicated, will be part of the leases for the trucks to travel south on Saunders Road*." [Luay Aboona.57] The only way to ensure that all trucks will only use Saunders Road south of Baxter Parkway, consistent with the reviewed testimony and the applicant's acknowledgement that they cannot fundamentally control truck traffic, would be to geometrically configure the intersection of Baxter Parkway and Saunders Drive to prevent southbound left turns into the site and west bound right turns out of the site for **all** vehicles. In the alternative, the applicant should provide traffic counts and intersection analyses for all signalized intersections on Deerfield Road between and including Saunders Road and the interchange intersections at the Tollway, in addition to all signalized intersections on Lake Cook Road between and including Saunders Road and the signalized intersections at the Tollway.

Roadway Pavement Degradation

The concept of the load equivalency between trucks and cars and the impacts to the pavement surface was introduced during the May 11, 2023, hearing, but no discussion followed. There was, however, merit in the subject matter as trucks have a far higher impact on the pavement surface than cars.

Fundamentally, roadway pavement design is based on the concept of a fixed vehicle loading referred to as an equivalent single axle loads or ESALs. Structurally, the pavement is designed for a standard axle load and all vehicles are factored or described in terms of the standard axle. Consistent with the criteria and standards of the American Association of State Highway and Transportation Officials (AASHTO), the standard axle load to which all other vehicles are compared to is an 18,000-pound (18 kip) axle load. For instance, a tractor trailer combination contains 5 axles, 4 with dual wheels: the tandem duals on the trailer and the tandem duals at the rear of the tractor, plus a front steering axle with single wheels. Each dual wheel axle represents an 18,000-pound load with each single wheel axle correspondingly representing a 9,000-pound load. For a tractor-trailer, therefore, with four dual wheel axles of 18,000-pounds each plus a single wheel axle of 9,000-pounds, we achieve a load limit of approximately 80,000-pounds (40 tons), the legal load limit. Accordingly, a tractor trailer has an equivalency factor of 4.5 as compared to the standard 18,000-pound axle.

A 4,000-pound passenger car, on the other hand, has an equivalency factor of 0.0004. In other words, the load on the pavement from a tractor trailer is over 11,000 times greater than the load on the pavement from a passenger car. In other words, the passage of 11,000 passenger cars over a section of roadway is the equivalent of the passage of a single, fully loaded, 80,000-pound tractor trailer. Pavement design is based on vehicle repetitions; the number of ESALs that pass over a specific pavement section over a specific period. In pavement design, therefore, due to the disproportionate load created by heavy vehicles when compared to the load created by passenger cars, the number of passenger cars and the impact therefrom are typically not considered. Federal Highway Administration (FHWA) guidance for pavement design offered the following, accordingly:

> Because motorcycles, passenger cars, and SUV/Pick-up trucks do not significantly contribute to the 18-kip ESALs they are considered negligible and an ESAL/truck factor of 0 is assigned.

The increased number of trucks resulting from the applicants proposed use will be expected to have an adverse impact on the pavement structure of Saunders Road. The applicant’s proposal does not offer any analyses of the pavement impacts due to the increased number of trucks nor does the applicant offer any proposed remedial measures to ameliorate the negative impacts to the pavement surface.

CONCLUSIONS

1. The proposed warehouses are best described as High Cube Warehouses and not simply a 'warehouse' as proposed in the KLOA Traffic Impact Study.

2. A High-Cube Fulfillment Center Sort Warehouse (LU 155) or a Parcel Hub Warehouse (LU156) is much more representative of the proposed warehouse development as presented than a simple warehouse (LU 150) as modeled in the KLOA Traffic Impact Study.

3. The vehicular traffic generated by a High-Cube Fulfillment Center Sort Warehouse (LU 155) can be expected to generate 4 times more daily traffic, and 6 to 8 times more traffic in the peak hours than as reported in the KLOA Traffic Impact Study based on general warehouse use (LU 150).

4. The vehicular traffic generated by a High-Cube Fulfillment Center Sort Warehouse (LU 155) would exceed the traffic generated by the existing office use at full occupancy.

5. The heavy vehicle traffic generated by a Parcel Hub Warehouse (LU 156) would exceed the heavy vehicle traffic generated by the applicants proposed general warehouse use (LU 150).

6. The proposed amount of parking is approximately 3 times greater than that necessary to support the use of the site as a warehouse as modeled in the KLOA Traffic Impact Study.

OPINIONS

The following opinions are based upon a review of the materials, my education, and my experience, within a reasonable degree of engineering certainty:

- As presented, the Traffic Impact Study does not properly report the maximum number of trips that could be expected from this proposed use.

  - The size of the proposed warehouses, the configuration of the loading docks and the amount of parking provided are not consistent with the land use cited in the Traffic Impact Study.

  - Due to the speculative nature of the applicant's proposal, the Traffic Impact Study should be revised to reflect the most intensive use that could be accommodated by the applicant's proposed development.

- The heavy vehicle trip distribution and trip assignment within the Traffic Impact Study is not consistent with the local road network and how trucks would be expected to access the site with regards to access to and from the Tollway.

  - The Traffic Impact Study should be revised to provide traffic counts and intersection analyses for all signalized intersections on Deerfield Road between and including Saunders Road and the interchange intersections at the Tollway.

  - The Traffic Impact Study should be revised to provide traffic counts and intersection analyses for all signalized intersections on Lake Cook Road between and including Saunders Road and the interchange intersections at the Tollway.

- The increased number of trucks resulting from the applicants proposed use will be expected to have an adverse impact on the pavement structure of Saunders Road.

- As presented, the applicant’s Traffic Impact Study does not provide sufficient information to determine whether the proposed use will be detrimental to the health, safety, or welfare of the neighborhood with regards to vehicular traffic .

- As presented, the applicant’s Traffic Impact Study does not provide sufficient information to determine whether the peak traffic generated by the subject of the application can be accommodated in a safe and efficient manner.

COMMENTS

This report may be supplemented if additional information becomes available.

Respectfully submitted,

By: John A. Nawn

John A. Nawn

LUC 154

PEAK

1,124,931 Combined SF

Average weekday (heavy vehicles)		248
	Enter	124
	Exit	124

Time	Total	Entering	Exiting
12:00 - 1:00 AM	2	2	0
1:00 - 2:00 AM	2	2	1
2:00 - 3:00 AM	2	1	1
3:00 - 4:00 AM	2	1	1
4:00 - 5:00 AM	2	1	1
5:00 - 6:00 AM	6	3	3
6:00 - 7:00 AM	5	3	2
7:00 - 8:00 AM	13	9	5
8:00 - 9:00 AM	12	4	8
9:00 - 10:00 AM	15	7	7
10:00 - 11:00 AM	15	7	8
11:00 - 12:00 PM	23	12	11
12:00 - 1:00 PM	19	8	11
1:00 - 2:00 PM	14	5	8
2:00 - 3:00 PM	16	10	6
3:00 - 4:00 PM	14	7	7
4:00 - 5:00 PM	17	9	8
5:00 - 6:00 PM	18	7	11
6:00 - 7:00 PM	14	7	7
7:00 - 8:00 PM	12	6	6
8:00 - 9:00 PM	13	6	7
9:00 - 10:00 PM	5	2	3
10:00 - 11:00 PM	4	3	1
11:00 - 12:00 AM	3	2	2

LUC 155 Non-Sort *(using LU154 breakdown)* PEAK

1,124,931 **Combined SF**

Average weekday (heavy vehicles) **259**

Enter 129

Exit 130

Time	Total	Entering	Exiting
12:00 - 1:00 AM	2	2	0
1:00 - 2:00 AM	2	2	1
2:00 - 3:00 AM	2	1	1
3:00 - 4:00 AM	2	1	1
4:00 - 5:00 AM	2	1	1
5:00 - 6:00 AM	6	3	3
6:00 - 7:00 AM	6	3	2
7:00 - 8:00 AM	14	9	5
8:00 - 9:00 AM	12	4	8
9:00 - 10:00 AM	15	8	8
10:00 - 11:00 AM	15	7	8
11:00 - 12:00 PM	24	12	12
12:00 - 1:00 PM	20	9	11
1:00 - 2:00 PM	14	5	9
2:00 - 3:00 PM	17	10	7
3:00 - 4:00 PM	15	7	8
4:00 - 5:00 PM	18	10	8
5:00 - 6:00 PM	18	7	12
6:00 - 7:00 PM	15	8	7
7:00 - 8:00 PM	13	6	7
8:00 - 9:00 PM	13	6	7
9:00 - 10:00 PM	5	2	3
10:00 - 11:00 PM	5	4	1
11:00 - 12:00 AM	4	2	2

LUC 155 Sort *(using LU154 breakdown)* PEAK

1,124,931 **Combined SF**

Average weekday (trucks) **214**

Enter 107

Exit 107

Time	Total	Entering	Exiting
12:00 - 1:00 AM	2	2	0
1:00 - 2:00 AM	2	1	1
2:00 - 3:00 AM	2	1	1
3:00 - 4:00 AM	1	1	1
4:00 - 5:00 AM	1	1	1
5:00 - 6:00 AM	5	3	2
6:00 - 7:00 AM	5	3	2
7:00 - 8:00 AM	11	7	4
8:00 - 9:00 AM	10	4	7
9:00 - 10:00 AM	13	6	6
10:00 - 11:00 AM	13	6	7
11:00 - 12:00 PM	20	10	10
12:00 - 1:00 PM	16	7	9
1:00 - 2:00 PM	12	4	7
2:00 - 3:00 PM	14	9	5
3:00 - 4:00 PM	12	6	6
4:00 - 5:00 PM	15	8	7
5:00 - 6:00 PM	15	6	9
6:00 - 7:00 PM	12	6	6
7:00 - 8:00 PM	11	5	5
8:00 - 9:00 PM	11	5	6
9:00 - 10:00 PM	4	1	3
10:00 - 11:00 PM	4	3	1
11:00 - 12:00 AM	3	1	1

LUC 156 *(using 10th Edition LU 156 breakdown)* PEAK

1,124,931 **Combined SF**

Average weekday (trucks) **653**

Enter 326

Exit 327

Time	Entering %	Exiting %	Total	Entering	Exiting
12:00 - 1:00 AM	0.7%	1.1%	6	2	4
1:00 - 2:00 AM	0.7%	0.6%	4	2	2
2:00 - 3:00 AM	2.3%	0.8%	10	7	3
3:00 - 4:00 AM	8.4%	0.6%	29	27	2
4:00 - 5:00 AM	4.8%	0.9%	19	16	3
5:00 - 6:00 AM	1.8%	0.6%	8	6	2
6:00 - 7:00 AM	4.8%	1.0%	19	16	3
7:00 - 8:00 AM	6.9%	6.9%	45	22	23
8:00 - 9:00 AM	10.4%	12.2%	74	34	40
9:00 - 10:00 AM	2.3%	13.9%	53	7	45
10:00 - 11:00 AM	1.7%	2.9%	15	6	9
11:00 - 12:00 PM	1.7%	2.4%	13	6	8
12:00 - 1:00 PM	1.9%	2.3%	14	6	8
1:00 - 2:00 PM	2.9%	2.4%	17	9	8
2:00 - 3:00 PM	3.5%	2.7%	20	11	9
3:00 - 4:00 PM	4.4%	4.1%	28	14	13
4:00 - 5:00 PM	9.1%	4.7%	45	30	15
5:00 - 6:00 PM	13.5%	6.8%	66	44	22
6:00 - 7:00 PM	9.2%	10.0%	63	30	33
7:00 - 8:00 PM	4.0%	6.3%	34	13	21
8:00 - 9:00 PM	1.4%	4.6%	20	5	15
9:00 - 10:00 PM	1.4%	6.7%	26	5	22
10:00 - 11:00 PM	1.1%	4.2%	17	4	14
11:00 - 12:00 AM	1.1%	1.3%	8	4	4

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Over 36 years' experience in Civil and Structural Engineering, specializing in Traffic and Transportation Engineering, Highway, Bridge and Street Design and Construction, Transit Facility Design, Vehicle Accident Reconstruction and Human Factors related to the driving task, Building Damage Assessments, Utilities Construction, Storm Drainage, Pedestrian Safety, Walkway Surface Evaluations, Concrete and Asphalt Pavement Evaluations, building Codes and Standards and ADA compliance.

PROFESSIONAL ENGINEER: PA, NJ, MD, DE, OH, MI, MA, MO, and RI.

EDUCATION:
BS in Civil Engineering (1987), Drexel University, Philadelphia, PA
MS in Civil Engineering (2012), Drexel University, Philadelphia, PA
Traffic Crash Reconstruction II (2014), Northwestern University, Evanston, IL

AWARDS:
2017 Civil Engineer of the Year, American Society of Civil Engineers, Philadelphia
2017 Delaware Valley Engineer of the Year, Delaware Valley Engineers Week
2011 State Engineer of the Year, Pennsylvania Society of Professional Engineers
2011 Delaware County Engineer of the Year, PA Society of Professional Engineer
2008 Engineering Manager of the Year, American Society of Civil Engineers, Philadelphia

ADJUNCT PROFESSOR:
Temple University, Department of Civil and Environmental Engineering; professor for two Graduate level courses; Transportation Engineering and Transportation Systems Management. (2012 to 2022)

Widener University, Department of Civil Engineering; professor for the required undergraduate Highway Engineering Course, (2019 to present); professor for graduate level course in Technical Communications, (2023 to present).

PROFESSIONAL BACKGROUND:

10/2021 to Present – Independent Forensic Engineer/Expert Witness – Newtown Square, PA (part time)
Independent professional engineer providing forensic engineering analyses and expert witness services to plaintiffs and defendants on matters including highway design, highway construction, highway maintenance, work zone traffic control, traffic control devices including traffic signals, signs and markings, intersection design, pavement and road surface design and maintenance, human factors related to the driving task, accident analyses and trucking related matters, snow and ice control, parking lot design, layout, operation and pedestrian accommodation, pedestrian movement, sidewalks, ramps, crosswalks, ADA accessibility, municipal and public utilities placement, operation, and maintenance within the public right-of-way, construction management, professional engineering practice, liability, and standard of care, construction management, premises liability, stairway and means of egress analyses. Over 500 expert reports completed. Testified in deposition and/or trial over 50 times as an expert witness, in local, state, and federal court in multiple states and jurisdictions.

01/2022 to Present – Delon Hampton Associates Chartered – Silver Spring, Maryland (full time)
Team member providing Project Management Oversight (PMO) services on transit, bus, and rail projects in excess of 500M on behalf of the Federal Transit Administration (FTA). Presently assigned to the Raritan River Bridge Replacement on NJ Transit's North Jersey Coast Line (heavy rail) and MTA's 2.5B ADA Station upgrade program covering stations on NYCT, Metro North, and Long Island Railroad.

10/2021 to 12/2021– ProNet Group, Inc. – Newtown Square, Pennsylvania.
Senior Project Engineer with national Forensic Engineering and Consulting firm providing professional civil and structural engineering investigations, analyses, and evaluations to clients nationwide.

10/2012 to 9/2021 – Fleisher Forensics – Ambler, Pennsylvania.
Forensic Engineer responsible for evaluating matters involving highway and traffic engineering, including accident reconstruction, intersections; urban and rural roadways; interstate highways; parking lots; signage, pavement marking and traffic controls; codes and zoning requirements; sidewalks and crosswalks; public utilities including sanitary sewer, storm sewer and water mains. Consulting in code compliance and standards; work zone safety, construction management, claims and safety. Evaluations of ice, snow control, grading, storm water management, detention and retention basins, and soil and sedimentation control. Walkway safety and ADA compliance analyses.

8/11 to 6/12 - Czop Specter, Inc., Worcester, PA, Executive Vice President. Executive Vice President/Chief Engineer and a member of the Board of Directors

2/10 to 8/11 - KS Engineers, P.C., Philadelphia, PA, Vice President. Manager of PA operations. Responsibilities included direction of operations, marketing & business development, technical direction, project management and application of QA/QC policies.

9/08 to 2/10 - Patrick Engineering, Wayne, PA, Business Unit Leader. Group Manager for PA Transportation Team. Responsibilities included management of technical staff and providing technical direction and quality control on bridge, roadway and utility projects.

10/05 to 8/08 - GAI Consultants, Inc., Berwyn, PA, Vice President. Managing Officer (Principal) of regional operations. Oversaw staff of design and inspection professionals providing design and construction engineering services including Civil Engineering, Highway Engineering, Traffic Engineering, Structural Engineering, Geotechnical Engineering, Environmental Engineering, Materials Testing and Inspection Services.

02/02 to 10/05: URS Corp, Phila., PA, Director Transportation & Municipal Eng., Branch Manager
03/01 to 02/02: DMJM+Harris, Philadelphia, PA, Project Manager
05/94 to 03/01: Valley Forge Laboratories, Inc., Devon, PA, Director Transportation Engineering
06/89 to 05/94: Remington & Vernick Engineers., Haddonfield, NJ, Municipal Project Engineer/Manager
06/87 to 06/89: NJ Department of Transportation, Trenton, NJ, Highway Project Engineer

SELECTED PROFESSIONAL EXPERIENCE

Interstate 95 Point of Access Study, *Girard Avenue Interchange, PennDOT,* Provided traffic engineering review and guidance in the development of the Point of Access Study.

Interstate 95 Cottman Avenue Interchange, *PennDOT,* Task Manager for the preparation of the multi-phase, Maintenance and Protection of Traffic Plans to support the full reconstruction of the six-lane urban interstate highway.

Northeast Extension Widening, MP A20 to A30, *Pennsylvania Turnpike Commission*, Task Leader for local road detour route evaluation & analyses to support the replacement of four bridge structures.

Mainline Widening, Valley Forge to Norristown, *Pennsylvania Turnpike Commission,* Task Leader for the traffic control design to support full detour and staged construction alternatives.

Point of Access Study Review, *PennDOT*, Provided Traffic Engineering review services on two Point of Access Studies for interstate highway access in the Pittsburgh area.

Maintenance and Protection of Traffic, *US 202, PennDOT,* Task Leader for design of Traffic Control Plans for a section of the US 202 reconstruction and widening north of Norristown.

Philadelphia International Airport Access/I-95, *PennDOT,* Task Leader for the redesign of the traffic signal systems serving the main access points to the Philadelphia International Airport.

Interstate 95, Girard Point Bridge, *PennDOT,* Task Leader for developing and estimating the Road Users Liquidated Damages clause to reduce impact & evaluate the various traffic control measures.

South Street Bridge Detour Mitigation Project, *City of Philadelphia, PA,* Project Manager for 32-signal corridor upgrade project involving signal timing and equipment improvements.

Broad Street Ice Study, *PennDOT,* Project Manager for analyses and evaluation of detour route to support temporary closure of the Roosevelt Expressway.

Maintenance & Protection of Traffic, *Kernville Viaduct & War Memorial Bridge, PennDOT*, Project Manager for design of detour route signing including re-timings of the traffic signals

Bustleton Pike Reconstruction, *PennDOT,* Project Manager, for re-alignment and reconstruction of a two-lane urban collector, to correct geometrically deficient combination horizontal and vertical curve.

Central Business District Traffic Study & Signal Design, City of Pottsville, *PA,* Optimized and coordinated the signal timings to create better levels of service. Prepared revised signal design plans.

Montoursville Airport Access Road, *PennDOT,* Task Leader for traffic engineering for a new roadway connection from the Williamsport-Lycoming County Regional Airport to the local interstate.

Interstate 80, Open Road Tolling Conversion, *Delaware River Joint Toll Bridge Commission,* Project Manager for construction engineering services to contractor on Open Road Tolling conversion project.

Schuylkill River Bridge Rehabilitations, Penrose Avenue & George C. Platt Bridges, *PennDOT* Task Leader responsible for preparation of Maintenance and Protection of Traffic Control Plans.

SR 0196-0652, Superstructure Replacement, *Design/Build*, *PennDOT* Project Manager for single span steel beam bridge. Included preparation of TS&L plans and calculations and final plan preparation.

SR 0309 over Toby Creek, Substructure and Superstructure repairs, *Design/Build*, *PennDOT* Project Manager for two single span concrete bridges on SR 0309 in Luzerne County.

SR 0502 over Springbrook Creek, Culvert Replacement, *Design/Build*, *PennDOT,* Project Manager for culvert replacement on SR 0502 in Lackawanna County

SR 0191-01B, Ackermanville Bridge, *Design/Build*, *PennDOT,* Project Manager for design of bridge and culvert replacement on SR 0191 in Northampton County.

Delaware River Bridge Scour Remediation, *Delaware River Joint Toll Bridge Commission,* Project Manager for construction engineering services on scour remediation projects on six.

Four Bridges, Delaware County, *PennDOT,* Project Leader and QA/QC manager for four bridge replacements in Delaware County.

Jim Thorpe Bridge, SR 903, *PennDOT,* Task Leader for the preliminary engineering and final design of new bridge over the Lehigh River in Jim Thorpe.

Cameron Bridge Replacement, *PennDOT,* Led the traffic engineering efforts to support the development and consideration of 14 different alternative intersection/bridge designs.

Betzwood Bridge, *PennDOT,* Task Leader for the design of three new traffic signals to accommodate the new bridge and associated new development and access points.

SR 0082 and Marriot Drive, *Coatesville, PA,* Project Manager for the design of the reconstruction of SR 0082 to support a new signalized intersection and left turn lane.

SR 0030 and Berkeley Road, *Devon, PA,* Prepared Signal Design Study, Warrant Analyses and Traffic Signal design for new signal at this intersection.

Traffic Impact Study & Traffic Signal Design, *SR 0322 & 4017, Downingtown Area School District* Project Manager for the preparation of the Traffic Impact Study and design of a new traffic signal.

Traffic Impact Study & Traffic Signal Design, *SR 0093, SR 3026, Laurel Mall Associates****,*** *PA,* Project Manager for Traffic Impact Study and the design of two traffic signals.

North Penn Signals, *PennDOT,* Provide traffic engineering and traffic signal design services to assist the completion of the final design of six revised and 5 new traffic signal projects in the Lansdale Area.

Corridor Analyses, Central Business District Parking Study & Traffic Calming Plan, *Borough of Pottstown, PA,* Project Manager, 4-lane arterial corridor within urbanized central business district.

Statewide Traffic Impact Study Reviews, *DelDOT,* Project Manager/Traffic Task Leader for the review of traffic impact studies statewide on behalf of DelDOT.

Traffic Impact Study, *Lexus of Lehigh Valley***,** *PA,* Prepared and presented traffic study to support new automobile dealership including the re-timing of four adjacent signalized intersections.

Traffic & Parking Study, *Harrisburg International Airport,* Project Manager for the preparation of a Traffic Impact Study and Traffic Signal Plans to support the airport.

Traffic Impact Study, *Boulevard Plaza*, *PA,* Project Manager for preparation of access analysis and signal timing revisions for large shopping complex in northeast Philadelphia.

Traffic Impact Study, *Strath Haven MS*, *PA,* Project Manager to support Middle School expansion.

Traffic Study & Landside Master Plan, *Philadelphia International Airport.* Deputy Project Manager for management of data collection efforts, traffic analyses and preparation of the final report.

Transportation Master Planning, *Villanova University***,** *PA,* Project Manager for conducting data collection, traffic models and alternative analyses including design of two new traffic signal systems.

Traffic & Civil Engineering Design, *The Ohio State University*, Project Manager for traffic and civil engineering assignments to support electrical facilities upgrades at The Ohio State University.

Municipal Traffic Impact Studies, *Whitemarsh Township, PA,* Project Manager for over three dozen traffic impact studies to support and analyze various land developments and land uses.

Borough Traffic Engineer, *Narberth, PA,* provided engineering design, review and ordinance development services on a number of traffic engineering issues.

Municipal Traffic Engineer, *Penn Township, PA,* provided engineering design, review and ordinance development services on a number of traffic engineering issues including traffic signal design.

Township Traffic Engineer, *Elk Township, PA,* Provided municipal traffic engineering support for review of land development projects and developer commissioned traffic impact studies.

Township Engineer, *Marple Township, PA* Managed municipal inspections, developed capital programs, conducted planning and zoning reviews, designed and manage annual road program.

Civil & Traffic Engineering Services, Tower Bridge Complex, *Oliver Tyrone Pulver Corp.*, *PA* Project Manager for various traffic engineering tasks and civil engineering designs.

Construction Management Services, *Oliver Tyrone Pulver Corporation*, *PA,* Construction Manager for intersection reconstruction and traffic signal installation project.

Central Delaware River Waterfront Master Plan, *Delaware River Waterfront Corporation, Phila.* Project Manager, utility assessment, floodplain analysis, site assessments and pier stability assessments.

Walgreens, *Philadelphia, Pennsylvania,* Project Manager for site design and development

The Parking Spot, *Philadelphia, Pennsylvania,* Project Manager for 1000 car private parking facility

The Hickman, *Penrose Properties*, *PA,* Project Manager responsible for providing all civil, traffic, survey, and environmental engineering services for new multi-story, age restricted facility.

Vault Design, *Northeast Utilities*, *CT,* Project Manager for the design of pre-cast concrete vault covers.

Utility Coordination Research and Guidelines Development, *PennDOT,* Prepared recommendations to utility coordination procedures including recommendations for improvement to manual(s).

Dams and Lakes, Structural and Hydraulic Analyses, *Southwestern Energy Corporation, PA,* Project Manager for the structural and geotechnical investigation of two dam structures.

R-3 Line Extension, Elwyn to Media, *SEPTA,* Project Manager for 2-mile extension of rail line including track design, electrification design, communications and signaling, six bridge structures and a new ADA compliant station. Oversight of all engineering functions. (2005)

Red Rose Transit Authority, Paradise Railroad Station, Paradise, Lancaster County, PA. Project Manager responsible for the design oversight of a new rail station on Amtrak's Harrisburg Line. The project involved design of the station facilities including eastbound and westbound platforms and parking facilities for approximately 30 vehicles. Special attention was afforded for the accommodation of transit buses, ADA requirements and pedestrian facilities. Both low level and mini-high level platforms were incorporated into the design. SEPTA GEC/Warminster Station Expansion. **Signing Authority/Engineer of Record**. (2001 to 2005)

SEPTA Warminster Station. Project Manager for Transportation Impact Study to assess the impacts of the expansion of this station on the local road network. The Warminster Station is located at the northern terminus of SEPTA’s R-5 Warminster Line with the station expansion undertaken to better serve the increased patronage of the line. The expansion increased the amount of available parking by 300 spaces to create an 825-space parking facility. The work included traffic data collection, a parking utilization study, and analysis of existing traffic operations, estimation and projection of new traffic volumes resulting from the expansion, and analysis and evaluation of impacts at five, adjacent signalized intersections. Tasks also included analysis of proposed circulation patterns, parking layout and pedestrian circulation. Particular attention was paid to pedestrian and vehicle interaction, pedestrian safety and ADA compliance. (2001)

SEPTA GEC/Elm Street Station Expansion Project Manager for Transportation Impact Study to assess the impacts of the expansion of this station on the local road network. The Elm Street Station is located at the northern terminus of SEPTA’s R-6 Norristown Line with the station expansion undertaken to better serve the increased patronage of the line. The expansion increased the amount of available parking by 100 spaces to create a 260-space parking facility. The work included traffic data collection, a parking utilization study, analysis of existing traffic operations, estimation and projection of new traffic volumes resulting from the expansion, and analysis and evaluation of impacts at adjacent signalized intersections. Tasks also included analysis of proposed circulation patterns, parking layout and pedestrian circulation. Particular attention was paid to pedestrian and vehicle interaction, pedestrian safety and ADA compliance. (2001)

Scour Protection for Lieutenant River Bridge, AMTRAK, *CT*, Project Director for construction drawings and environmental permitting for the construction of rock scour protection. Oversight of all engineering functions. (2008-2009)

Reconstruction of Culvert 3.35, AMTRAK, *CT,* Project Director for construction drawings and environmental permitting for relining of Culvert 3-35, due to erosion, on Amtrak’s Northeast Corridor. Oversight of all engineering functions. (2008-2009)

Sharon Hill Train Station, *PA*, Project Manager for design of the historic reconstruction of station on SEPTA/Amtrak NEC including ADA compliance. Oversight of all engineering and architectural functions. (1995-2005)

Project Manager for the **Bernardsville Rail Station Improvement Project in Bernardsville, Somerset County, NJ**. This project included redesign of station platforms, reconfiguration and expansion of the 200-car parking lot, pedestrian and ADA improvements, along with drainage, landscaping and environmental permitting. (1993)

Conrail. Project Manager for a Conrail/pedestrian grade crossing project in Brooklawn, NJ. Project included new crossing signals/gates/protection, pedestrian route studies, and ADA compliance issues. (1993).

AFFILIATIONS:

- Institute of Transportation Engineers, c*ertified Professional Traffic Operations Engineer*
- Community Transit of Delaware County, (DELGO), *Chairman of the Board*
- National Society of Professional Engineers, *Northeast Region Managing Director*
- Pennsylvania Society of Professional Engineers, *Past President*
- Newtown Township, Delaware County, *past Township Supervisor/Chairman*