



Precision Systems, Inc.

Memorandum

TO: Mr. Thomas Haines

FROM: Allen Y. Yang, P.E.
Precision Systems, Inc.

DATE: May 14, 2009

SUBJECT: Investigation on Table A.2 from Institute of Transportation Engineers
(ITE) Trip Generation Handbook 2nd Edition

In addition to the memo prepared on May 1, 2009 regarding *Clarification of Estimate of Number of Trucks for Giant Grocery Store, as well as Retails and Flex/Office Space at South Parcel*, Precision Systems, Inc. (PSI) wishes to provide the following additional information regarding the Table A.2 from ITE Trip Generation Handbook 2nd Edition. This table was used in the *Friendship Shopping Center Traffic Study Peer Review* to estimate number of daily trucks for the retail and office space at the south parcel.

Table A.2 was developed based on a Baltimore Truck Attraction Report prepared by Mr. Larry Reich (former director of City of Baltimore Department of Planning) et al. in the year 1987.

The title of the table, "Daily Truck Stops by Land Use (Suburban Baltimore)", clearly indicates that it provides estimates for numbers of trucks, but not truck trips. However, the title for the third column of this table is "Daily Truck Trips Per 1,000 GSF". A trip is a journey from an origin to a destination; therefore a truck-stop-and-go is counted as two trips. Obviously this table is self-conflicting.

To clarify the content of this table, PSI managed to obtain the original data records from the 1987 Baltimore Truck Attraction Report. Comparing these data with Table A.2, it is clear that these data are the data used for Table A.2. Also, unlike Table A.2, the source data are discussing trucks stops, but not truck trips. Therefore the source data tell us the meaning of the numbers in Table A.2: despite the mislabeling by ITE of the column in the table, the numbers indeed refer to stops, not trips. In fact the title of the table is correct, and the title of the column within the table is the misleading part.

The source data are attached to this memo for your reference.

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CASE NO.

EXHIBIT NO.

ZONING COMMISSION

District of Columbia

08-15

246

ZONING COMMISSION

District of Columbia

CASE NO. 08-15

EXHIBIT NO. 246

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FAX

Baltimore Metropolitan Council
2700 Lighthouse Point East, Suite 310
Baltimore, MD 21224-4774

DATE 5/13/09Number of pages including cover sheet 17

TO:

John Karsel

FROM:

[X] Mary Logan

Regional Information Center

COMPANY: _____

Phone: 410-732-9570

Fax Phone: 410-732-9489

Phone: _____

Fax Phone: 1-866-613-5936

OO: _____

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Per your request.X Sending again - Pages got stuck in machine

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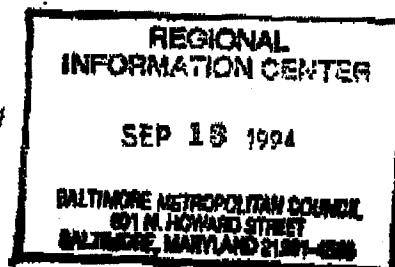
Selected Findings from the
Baltimore Trip Attraction Study:
Trucks and Other Delivery Vehicles
to Retail, Office, and Residential
Land Uses

for the 1988 Annual Meeting
of the
Transportation Research Board

Peggy Drake
City Planner III
Baltimore City Department of
Planning

January 1988

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1. Overview

Planners in Baltimore recognized the need to document trips made by trucks and other delivery vehicle in terms of trip ends, or more specifically where vehicles stopped during their daily rounds. From completing simulation models of truck traffic to reviewing site plans and analyzing existing problem situations involving trucks, the need was evident for information at the retail and residential end of trips. Origin data seemed more readily available. Data related to stops less so.

In the fall of 1986 the Baltimore City Department of Planning, in conjunction with the Regional Planning Council, undertook a brief but thorough study of stops made by trucks and other delivery vehicles at retail, office, and residential locations in the Baltimore City area. The month of November was chosen as representative of near maximum travel, short of the Christmas holiday peak. With staffing from one person full-time and a second part-time, 33 one-day observations were completed and truck trips to 110 destinations recorded.

This report offers highlights from the results of over 1600 stops. Daily rates, peak accumulation, stop duration, variations by type of stop (delivery, customer, other), trips by large vehicles, geographic location in the city (inner or outer city, and downtown), and site context (free-standing structure to commercial area) are provided for seven basic land uses:

- * Retail food establishments
- * Prepared food businesses (restaurants, carry-outs)
- * Pharmacy and variety stores
- * "Soft" retailers (florists, card shops, book and clothing stores, etc.)
- * Personal service providers (banks, dry cleaners, travel agencies, etc.)
- * General offices
- * Housing (high-rise to single family detached).

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2. Logistics

Gathering the needed data focussed on the seven types of land uses. Ultimately 8 to 24 places were observed for each type, distributed by geographic location and site context. The accompanying map notes the locations throughout Baltimore. One additional controlling factor was the ability to observe a site with no more than two staff. Through telephone and field surveys we found locations that were representative of the various businesses and housing of interest, covered the location/site criteria, and were feasible for one or two person field work. The phone survey also determined the peak day of the week at this time of year for deliveries, hours deliveries were accepted, and an estimate of their number (that number typically lower than what we found). Given the limited staff available for the fieldwork, we chose the peak day of the week that came out in the surveys to observe truck movement to a given place.

Once situated in a spot within sight of the loading area/s, staff identified for each truck or other delivery vehicle its size (one of seven sketched across the top row of the observation sheet) and noted the time in and out under that heading and the license plate number at the beginning of the row. In a comments column ownership, trip purpose, and further detail on the type of vehicle were added.

The data base created from the field notes covered for each destination a record of every truck or other vehicle making a delivery, its size, time in and out, and trip purpose. From this information we derived daily rates, numbers of observed vehicles present at the peak hour, length of stop, the reason for making the stop, and variations by area and type of site.

The following charts offer results for the seven land use types of interest. They are standardized in terms of size: for every 1000 square feet of gross floor space for businesses and for each 50 housing units within the building, development, or neighborhood. The charts also note the specific businesses/locations observed to obtain the information.

With the charts are two tables that offer samples of land use categories within those seven types. Their findings represent a smaller sample size.

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3. Findings on the number of stops

Clearly retailers of food, for immediate consumption or use later, generate the highest numbers of trips in proportion to their size. Restaurants, delicatessens, and carryouts attracted nearly 4 stops per day per 1000 square feet, while food retailers had stops averaging 5.2 on a peak day.

One perhaps unexpected factor involved was the use of trucks for customer trips. Certain locations attracted upwards of 50 customers in trucks per 1000 square feet --both for prepared food and retail. Convenience stores and carryouts conveniently situated en route to employers, delivery destinations, and offering ease of parking we found attracting large numbers of trucks not for delivery but for customer purchases. That parking need not be on site, but be nearby. Even in downtown Baltimore, a donut shop attracted a brisk trucker business before the morning peak hour restrictions set in. Planning for truck movement would do well to consider the attractiveness of a business to customers in trucks.

Averaging in the range of 2 trips per day per 1000 square feet were providers of personal services and soft retail. They vary in the range of under 1 trip to over 5, higher in commercial areas.

One soft retailer attracted and generated a higher number of truck stops -- florists. A small business that can play the role of distributor as well as source, floral shops displayed stop rates of over 16 per day per 1000 square feet.

The lowest numbers of stops appeared at pharmacies, variety stores, and general offices. Conducting administrative matters at an office attracted an average of only 0.2 stops per 1000 square feet; drug and variety stores received a rate of only 0.6. The telephone survey indicated that many of the larger, chain stores receive bulk deliveries on a weekly basis, frequently in the evening.

A look at housing reveals an average of 7 trips per 50 dwelling units observed. Note that there are some constant factors -- mail deliveries, etc. -- that may not markedly vary by the numbers of units in a development. What we did find was that neighborhoods we observed of primarily single family detached housing in affluent areas attracted the higher rates of truck stops -- upwards of 14 or more per 50 units. High-rise buildings attracted the least, from 3 to 8 per day per 50 dwelling units. The sample chart for single family housing shows this finding above that for a more moderate income neighborhood, where far fewer truck trips were observed.

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4. Duration of stop

Stops among the sites we observed varied less than we expected in terms of duration: 17 to 24 minutes were the norm. Stops under ten minutes varied from 40% to 60% of the trips. They were the largest shares of stops at offices, drug and variety stores, and sources of personal services. Half of the stops for at prepared food establishments took less than 10 minutes.

5. Variations by setting

The downtown, inner and outer city areas of Baltimore each attracted a predominance of stops among the land uses sampled.

There were more stops at retail food establishments, per 1000 square feet, in downtown than elsewhere. Retailers tend to be smaller in downtown areas, and perhaps require a greater variety of sources of food than elsewhere; their very smaller size may increase the rate per 1000 square feet where similar sales take place at larger stores elsewhere. Their peak accumulation rates were nearly twice those found in other inner city or outer city areas.

The inner city was slightly higher in attracting truck trips to soft retail uses, offices, drug and variety stores, while the outer city was stronger in terms of trips to providers of prepared foods.

6. Stops by large vehicles

Only sources of prepared foods average as many as one large vehicle per day for every 1000 square feet of space. Among them large vehicles are also the largest proportion of all those used for delivery trips: 31%.

Only drug and variety stores had a similar proportion of larger vehicles among those observed -- 27%. Per 1000 square feet, however, only @ 0.2 made stops there per day.

Most of the businesses and offices we observed attracted that number of larger vehicles. The vast majority of truck and other delivery vehicles are under 45 feet in length.

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7. Stops by customers

We mentioned under the discussion of food retailers the phenomenon of customers coming by truck. These trucks are often sources of personal transportation, but also were business vehicles. Where they could be parked easily and were along a business trip, food establishments can attract numbers of trucks far beyond those that come to make deliveries or provide service.

No other business we observed attracted even 0.1 customer stop in a truck per 1000 square feet.

Not every food-related business attracts truck customers, but the factors of convenient parking (even along the adjacent street as well as on-site) and location on a frequently-travelled route would appear to predict significant amounts of customer truck traffic.

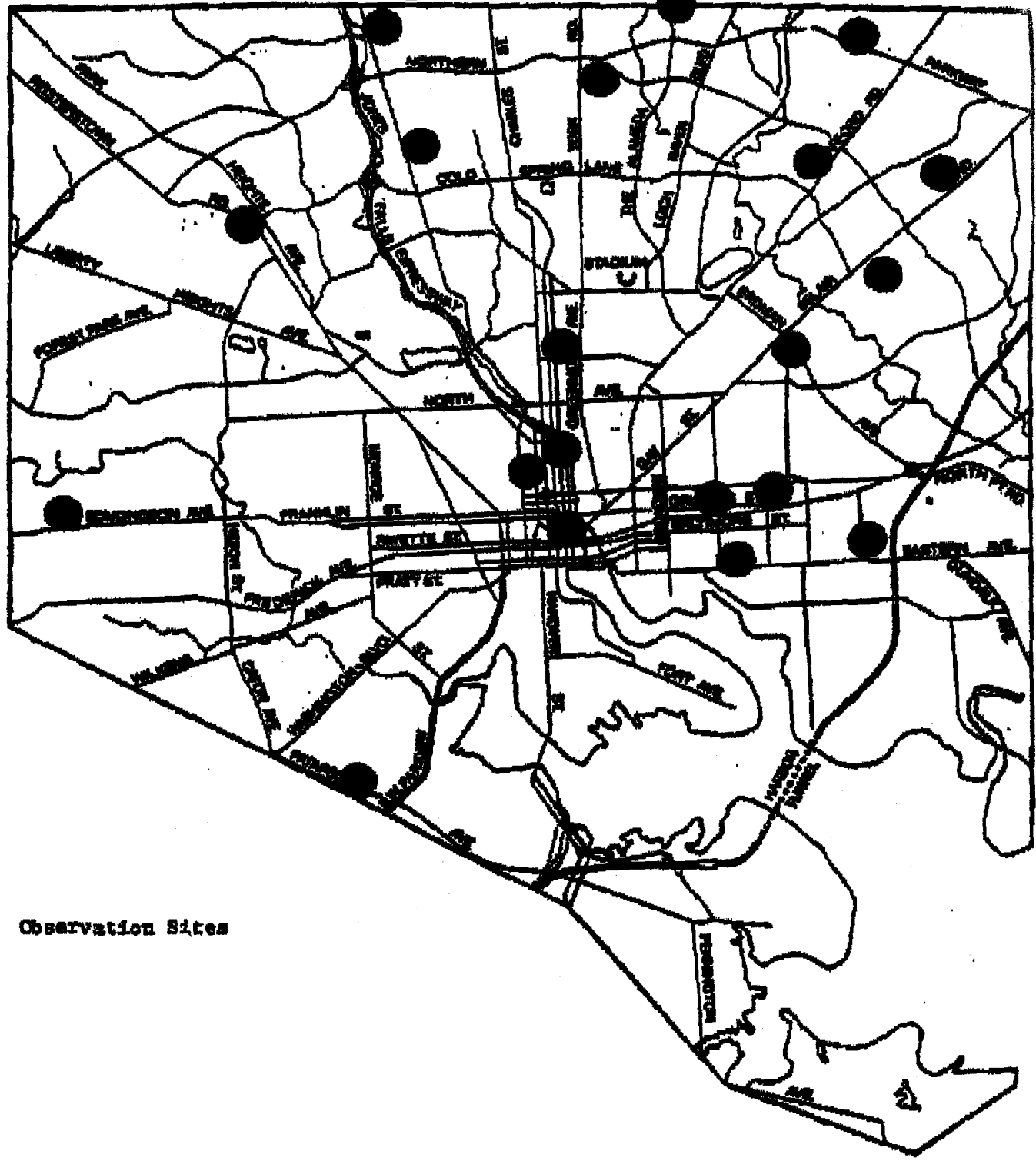
8. Use of the results

These results, along with further details for land use categories, will be integrated into models that will predict truck trip generation. They will aid in ascertaining the need for design features and facilities needed to accommodate the truck traffic a new development will generate, with the credibility the public sees associated with locally-based data.

They are also intended for use in other cities as needed for comparison and their own use to predict truck traffic to retail and service providers, administrative offices, and housing developments.

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles



Observation Sites

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**

Land Use Type/Category B.11

Independent Variable -- Stops per 1000 square feet

Retail Food

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	5.2	0.5	49.8*	0.8 (10am hour)	20.9 minutes (22% < 30 min. 43% < 10 min.)
Type of Stop					
Delivery	3.0	1.0	10.6		
Other Non-Customer	0.4	-0-	1.7		
Customer	1.8	-0-	44.4*		
All Non-Customer	3.4	1.0	12.3		
Vehicle Size					
Large	0.1 (2%)	<0.1 (-0-)	1.1 (9%)		
Area Context					
Downtown	8.1	5.6	12.3	2.0 (10am hr)	
Inner City	3.1	1.5	6.9	1.2 (9am)	
Outer City	5.7	0.5	44.4* (20.9)	1.1 (noon)	
Development Context					
Commercial Area	5.7	4.7	6.9	0.8 - not incl. (9am) 4:00-4:30pm	
Shopping Center	1.1	0.5	1.4		
Individual w/out on-site loading complete	5.7	2.5	12.3		2.0 (9/10am)
Individual w/on-site loading zone	8.2	1.5	49.8* (21.5)		2.5 (noon)

PLACES OBSERVED : 7 Supermarkets
 4 Convenience Stores
 4 Liquor Stores
 3 Specialty Food Stores
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* One had an extraordinarily high number of customers in trucks.

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**Land Use Type/Category All Prepared Food

Independent Variable -- Stops per 1000 square feet (gross)

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	3.9	1.3	61.4*	0.8 (1 am hr.) Peak: 0.8 Carryover: 1.3	22.3 Minutes (21% 2.50 min.) (50% 4.10 min.)
Type of Stop					
Delivery	2.4	0.4	9.6		
Other Non-Customer	0.2	-0-	0.3		
Customer	1.3	-0-	52.5*		
All Non-Customer	2.6	0.7	9.6		
Vehicle Size					
Large	1.2 (31%)	-0-	8.1* (13% 2.3) (71% 3.2)		
Area Context					
Downtown	3.4	0.7	9.6	0.7 (2 am hour)	
Inner City	2.7	1.7	4.9	0.8 (9 am hour)	
Outer City	5.1	1.3	61.4* (8.3)	0.9 (10 am hour)	
Development Context					
Commercial Area	2.3	0.7	8.1	0.9 (9 am hour)	
Shopping Center	0.9	←	←	0.5 (10 am hour)	
Individual- w/out on-site loading	2.0	1.7	4.9	0.8 (noon hour)	
Individual- w/on-site loading zone	5.3* 2.5	1.3	61.4* (4.6)	0.6 (9 am hour)	

PLACES OBSERVED = 24 Restaurants / Carry Outs / Delicatessens

12 Downtown

5 Inner City

7 Outer City

15 in Commercial Areas

1 attached to / in a Shopping Center

2 individual sites w/o on-site loading

6 individual sites w/on-site loading

* Numerous customer stops by drivers of trucks at 1 place.

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**Land Use Type/Category All Drug & Variety Stores Independent Variable -- Stops per 1000 Square Feet

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	0.6	0.1	10.9	0.1 (11am)	17.1 minutes (13% > 30mn. 54% < 10mn.)
Type of Stop					
Delivery	0.5	0.1	10.0		
Other Non-Customer	0.1	-0-	0.1		
Customer	<0.1	-0-	0.4		
All Non-Customer	0.6	0.1	10.9		
Vehicle Size					
Large	0.2 (27%)	<0.1 (17%)	0.9 (8.3%)		
			[60% of one = 0.3]		
Area Context					
Downtown	1.1	←	←	0.5 (noon hour)	
Inner City	1.9	0.6	10.9	0.5 (noon hour)	
Outer City	0.2	0.1	4.4	0.1 (11am)	
Development Context					
Commercial Area	1.2	0.4	10.9	0.9 (11am hour)	
Shopping Center	0.1	0.1	0.5	0.1 (10-11am)	
Individual- w/out on-site loading	8.9	←	←	2.2 (10am hour)	
Individual- w/on-site loading zone	0.6	←	←	0.2 (noon hour)	

PLACES OBSERVED - 6 pharmacies (1 downtown
3 inner city
2 outer city)
2 variety stores (1 inner city
1 outer city)

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Dally Rates**Land Use Type/Category Soft Retail
UsesIndependent Variable -- Stops per 1000 square
feet

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	2.0	0.4	16.7	0.6 (10am hour)	24 minutes (29% 230mn. 81% 410mn.)
Type of Stop					
Delivery	2.0	0.3	16.7		
Other Non-Customer	<0.1	-0-	0.9		
Customer	—	—	—		
All Non-Customer	2.0	0.4	16.7		
Vehicle Size					
Large	0.1 (7%)	-0-	2.0 (12%)		
Area Context					
Downtown	2.6	1.6	4.5	0.5 (10/11am)	
Inner City	3.6	1.9	4.9	1.8 (noon hour)	
Outer City	1.6	0.4	16.7	0.6 (10am hour)	
Development Context					
Commercial Area	1.8	0.4	6.7	0.4 (10am hour)	
Shopping Center	0.8	0.6	1.1	0.8 (10am hour)	
Individual— w/out on-site loading	16.6	←	←	0.9 (10am hour)	
Individual— w/on-site loading zone					

PLACES OBSERVED • 14 total, including

4 downtown
2 inner city
8 outer city

3 Florists
3 Clothing Shops
2 Bookstores
1 Tobacco, Sporting Goods,
Jewelry, Shoe Store
2 Card Shops

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**Land Use Type/Category All Personal Services Independent Variable --- Stops per 1000 Square Feet

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	2.3	0.5	5.7	0.5 (10am hour)	17.5 min. (21% 2.30 min. 54% < 10min)
Type of Stop					
Delivery	1.8	0.5	5.7		
Other Non-Customer	0.4	-0-	0.4		
Customer	<0.1	-0-	1.4		
All Non-Customer	2.2	0.5	5.7		
Vehicle Size					
Large	0.2 (10%)	-0-	1.1 (50%)		
Area Context					
Downtown	2.2	0.6	4.0		0.2 (9am)
Inner City	2.6	0.9	4.7		0.7 (9/10am)
Outer City	2.4	0.5	5.6		0.5 (10am hour)
Development Context					
Commercial Area	2.9	0.6	5.7	0.6 (10am hour)	
Shopping Center	0.7	0.5	0.9	0.3 (10am hour)	
Individual- w/out on-site loading	2.9	1.6	4.2	1.2 (9am hour)	
Individual- w/on-site loading zone	1.5	1.1	2.1	0.3 (noon hour)	

PLACES OBSERVED = 22 total: 7 Banks
 2 Dry Cleaners
 2 Public Services (library, post office)
 11 Variety (travel agency, beauty salon,
 photo developing/copying, etc.)
 (4 downtown, 3 inner city, 15 outer city)

Summary of Daily Rates					
Land Use Type/Category <u>All offices</u>			Independent Variable -- Stops per 1000 sq. ft.		
	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	0.2	0.1	4.0	0.1 (10am hour)	20.3 minutes (10% > 30m.) (60% < 10m.)
Type of Stop					
Delivery	0.2	0.1	4.0		
Other Non-Customer	<0.1	<0.1	<0.1		
Customer	<0.1	<0.1	<0.1		
All Non-Customer	0.2	0.1	4.0		
Vehicle Size					
Large	<0.1 (13%)	-0-	<0.1 (4% to 38%)		
Area Context					
Downtown	0.1	0.1	0.2	<0.1 (10am hour)	
Inner City	1.7	0.5	4.0	0.5 (9/10am)	
Outer City	0.9	0.5	1.1	0.5 (10am hour)	
Development Context					
Commercial Area	0.1	0.1	0.5	<0.1 (10am hour)	
Shopping Center					
Individual- w/out on-site loading	1.2	0.5	4.0	0.5 (9/10am)	
Individual- w/on-site loading zone	1.0	0.8	1.1	0.5 (9/10am)	
PLACES OBSERVED = 9 total: 4 downtown office buildings 3 medical office buildings (outer city) 2 smaller low-rise (2 inner city)					

Baltimore City Planning -- December 1987

Single Family Detached	8.3	8.1	12.5	1.8 (1pm hour)
Higher Income	11.3	5.4	14.5	1.8 (1pm hour)
Moderate Income	14.5	←	←	1.8 (1pm hour)
Mixed Types	15.4	←	←	1.8 (1pm hour)
	6.1	←	←	1.6 (11am hour)
PLACES OBSERVED = 7 buildings/areas with 1895 dwelling units				
Downtown - Horizon House, 214 d.u.				
Inner City - 2100 St. Paul, 8 du + Highfield House, 214 du				
Outer City - Glenmore, Glendale, Morgan Park, Hamilton Ridge, Thornleigh } 1459 du.				

Baltimore City Planning -- December 1987

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**Land Use Type/Category Single Family Detached Housing Independent Variable -- Stops per 50 dwelling units

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	11.3	5.4	14.5	2.9 (11am-1pm)	
Type of Stop					
Delivery	4.1	3.2	4.7		
Other Non-Customer	4.2	1.8	5.3		
Customer / No Commercial markings	5.9	0.5	4.4		
All Non-Customer-Commercial	8.3	5.0	10.0		
Vehicle Size					
Large	1.8 (16%)	1.7 (12%)	1.8 (33%)		
Area Context					
Downtown					
Inner City					
Outer City	11.3	5.4	14.5	2.9 (11am-1pm)	
Type of Housing Observed					
High-Rise					
Low Rise Apartments					
Single Family Detached	11.3	5.4	14.5	2.9	
Higher Income	14.5	←	←	2.5 (1pm)	
Moderate Income	5.4	←	←	3.2 (noon)	

PLACES OBSERVED

Morgan Park - 111 d.u., Outer City
 Thornleigh - 204 d.u., Outer City

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**Land Use Type/Category All HousingIndependent Variable -- Stops per 50 dwelling units

	Trip Rate			Peak Accumulation	Stop Duration
	Average	Minimum	Maximum		
All Stops Observed	7.1	3.7	14.5	1.7 (noon hour)	17.5 minutes (21% > 30 min) (49% < 10 min.)
Type of Stop					
Delivery	2.9	1.9	12.5		
Other Non-Customer	3.4	1.7	5.3		
Customer / No Commercial Marking	1.8	-0-	4.4		
All Non-Customer-Commercial	5.3	3.6	12.5		
Vehicle Size					
Large	1.2 (17%)	-0-	1.8 (33%)		
Area Context					
Downtown	6.1	←	←	1.9 (10am hour)	
Inner City	8.6	8.1	12.5	2.9 (noon hour)	
Outer City	7.4	6.1	14.5	1.7 (noon hour)	
Type of Housing Observed					
High-Rise	6.1	3.7	8.4	3.1 (noon hour)	
Low Rise Apartments	8.3	8.1	12.5	1.8 (1pm hour)	
Single Family Detached	11.3	5.4	14.5	2.9 (1pm hour)	
Higher Income	(14.5)	←	←	1.3 (1pm hour)	
Moderate Income	(5.4)	←	←	1.3 (noon hour)	
Mixed Types	6.1	←	←	1.6 (11am hour)	

PLACES OBSERVED = 7 buildings/areas with 1895 dwelling units

Downtown - Horizon House, 214 d.u.

Inner City - 3100 St. Paul, 8 du + Highfield House, 214 du

Outer City - Glenmore Glendale
Morgan Park
Hamilton Ridge
Thornleigh } 1459 du.

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Baltimore Trip Attraction Study: Trucks and Other Delivery Vehicles**Summary of Daily Rates**Land Use Type/Category Prepared food / Independent Variable -- Stops per 1000 square
Carry-out / Deli feet

	Trip Rate			Peak	Stop
	Average	Minimum	Maximum	Accumulation	Duration
All Stops Observed	8.0* (4.0)	1.3	61.4* (9.6)	1.3* (9am) 0.9 (6am)	
Type of Stop					
Delivery	3.9	1.3	9.6	/	
Other Non-Customer	6.3				
Customer	3.8*	-0-	52.5*		
All Non-Customer	8.2 (8.2)	1.3	9.6 (9.6)		
Vehicle Size	2.4* 1.5 (37%)	-0-	3.2 (71%)	/	
Large					
Area Context					
Downtown	4.1	1.3	9.6	0.6 (6am)	
Inner City	4.2	4.0	4.5	0.4 (9am)	
Outer City	61.4*	←	←	11.8 (8am)	
Development Context					
Commercial Area	4.0	1.3	9.6	0.9 (6am)	
Shopping Center					
Individual- w/out on-site loading					
Individual- w/on-site loading zone	61.4*	←	←	11.8 (8am)	

PLACES OBSERVED = 10 places: Pizze Place, Orient Express, Dunkin Donuts, Dunkin Deli, Jake's, Maggie's Place, Bagel Place - downtown, Homewood Deli and CC carry out - inner city, commercial area, Pepe's Carry Out - outer city

*Pepe's Carry Out has a preponderance of truck stops by customers.

TO: ZONING COMMISSION
FAX: 202-727-6072

FROM: PHILIP MONTALTO

RE: CASE #08-15 (WISCONSIN GIANT)

ATTACHED: PSI TRAFFIC CONSULTANT'S
RESPONSE - MAY 14, 2009

MAY 20 2009 PM 2:28