TILGHMAN GROUP
TRANSPORTATION PLANNING

MEMO

To: Melissa Stoker, Save Madison Valley

From: Ross Tilghman

Date: 1 May 2017

Subject: 2925 E. Madison -- Existing Site Driveway Counts, Intersection Queues and PCC Truck Volumes

This memo provides analysis of specific traffic concerns related to development of the proposed mixed-use project at 2925 E. Madison. I raised those concerns in my previous Sept. 9, 2016 memo commenting on the applicant's traffic study, which included:

- No count of existing site driveway volumes
- Inadequate identification of current traffic queues at the intersection of E. Madison/Lake Washington Blvd.
- Insufficient information about delivery truck volumes for the proposed PCC grocery store.

1. Existing Site Driveway Counts

Counts of City People's driveway were made on three consecutive weekday afternoons (Wednesday, March 29 to Friday, March 31, 2017) between 4:00 p.m. and 6:00 p.m. The counts were done to test whether the assumption used in the project's Traffic Impact Analysis about current site traffic generation reasonably reflects actual volumes of site traffic. Rather than counting driveway movements, the TIA used ITE Trip Generation data to estimate traffic from the existing City People's store, showing 78 net vehicle trips after assuming a 25% pass-by rate, or 104 gross trips. Based on the counts, the TIA estimated twice as many trips as the site actually generates.

Not only was the driveway counted over three afternoons, but seasonal business patterns were identified, and current business volume was compared to last year's volume to identify changes in store activity due to its recent sale, closure and re-opening.

Table 1 shows results of the driveway counts. A Friday was deliberately included in the event that it might show a higher volume than other weekdays as customers stock up on weekend planting needs. On each of the three count days, the weather was mild and clear.

Table 1. City People's Driveway Counts Afternoon Peak Period

Wednesday 29 March 2017

	Inbound		Outbound			
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly
4:00	3	3	3	8	17	
4:20	1	3	1	8	13	
4:40	3	2	4	6	15	45
5:00	0	3	2	7	12	40
5:20	1	4	4	2	11	38
5:40	0	2	0	5	7	30
2-Hour Total	8	17	14	36	75	

Thursday 30 March 2017

	Inbound		Outbound			
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly
4:00	1	1	5	2	9	
4:20	2	7	1	4	14	
4:40	2	1	3	4	10	33
5:00	2	3	1	5	11	35
5:20	2	3	0	1	6	27
5:40	0	3	0	5	8	25
2-Hour Total	9	18	10	21	58	

Friday 31 March 2017

	Inbound		Outbound			
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly
4:00	3	5	3	9	20	
4:20	0	7	1	4	12	
4:40	2	4	5	5	16	48
5:00	2	1	2	4	9	37
5:20	0	1	1	1	3	28
5:40	1	2	0	3	6	18
2-Hour Total	8	20	12	26	66	

Three Day Average

	Inbound		Outbound			
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly
4:00	2.3	3.0	3.7	6.3	15	
4:20	1.0	5.7	1.0	5.3	13	
4:40	2.3	2.3	4.0	5.0	14	**42**
5:00	1.3	2.3	1.7	5.3	11	37
5:20	1.0	2.7	1.7	1.3	7	31
5:40	0.3	2.3	0.0	4.3	7	24
2-Hour Total	8	18	12	28	66	

Directional Split:

To/from West	*46%*
To/from East	*54%*

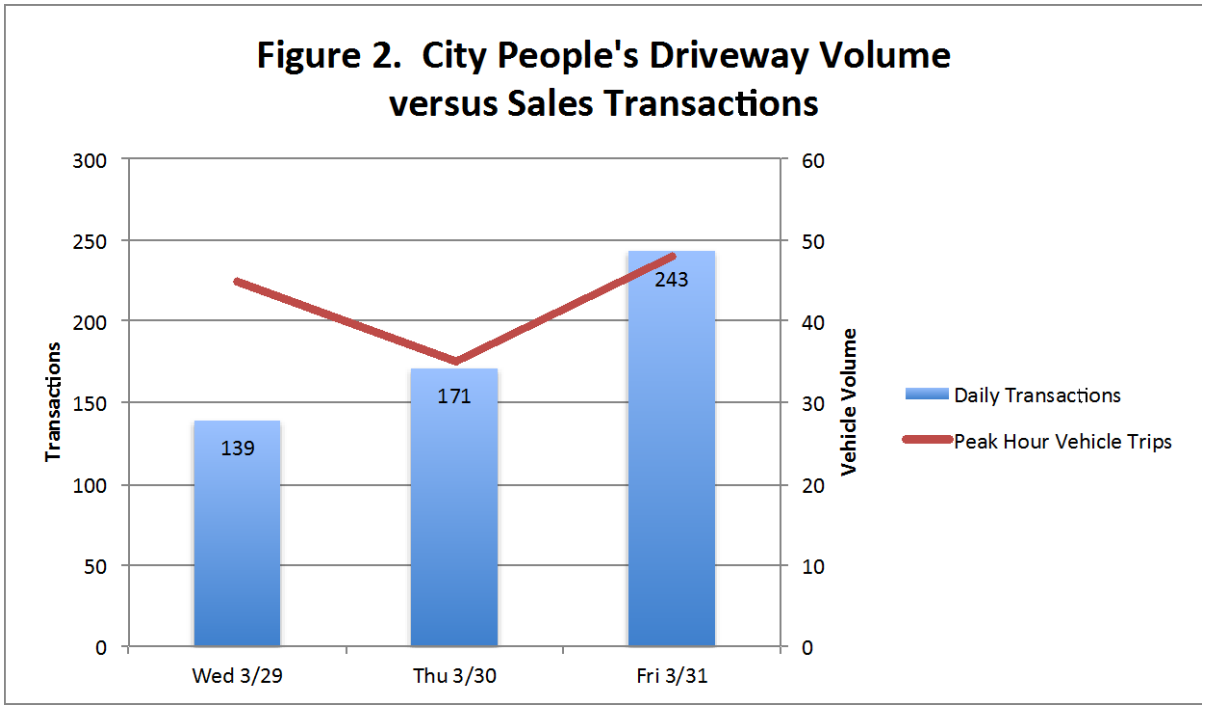
Source: Tilghman Group

Key observations:

- Wednesday yielded the highest volume for the two-hour count period with 75 vehicles.
- The average peak hour volume was 42 vehicles.
- The peak hour was typically 4:00 to 5:00 p.m. Volumes tended to drop after 5:00 p.m., as the store closes at 6:00 p.m.
- Some drivers exiting the site wanted to turn left, but eventually chose to turn right due to delays from on-coming traffic.
- Pedestrian trips (see Attachment A for hourly counts for each day) appear to account for 20% of customer traffic over the three afternoons, with 80% driving.

Peak Hour Traffic and Daily Business Volume

The owner's new accounting system tracks the number of transactions as well as total sales, and those figures were provided for the three count days. Figure 2 compares driveway volumes to daily transactions.

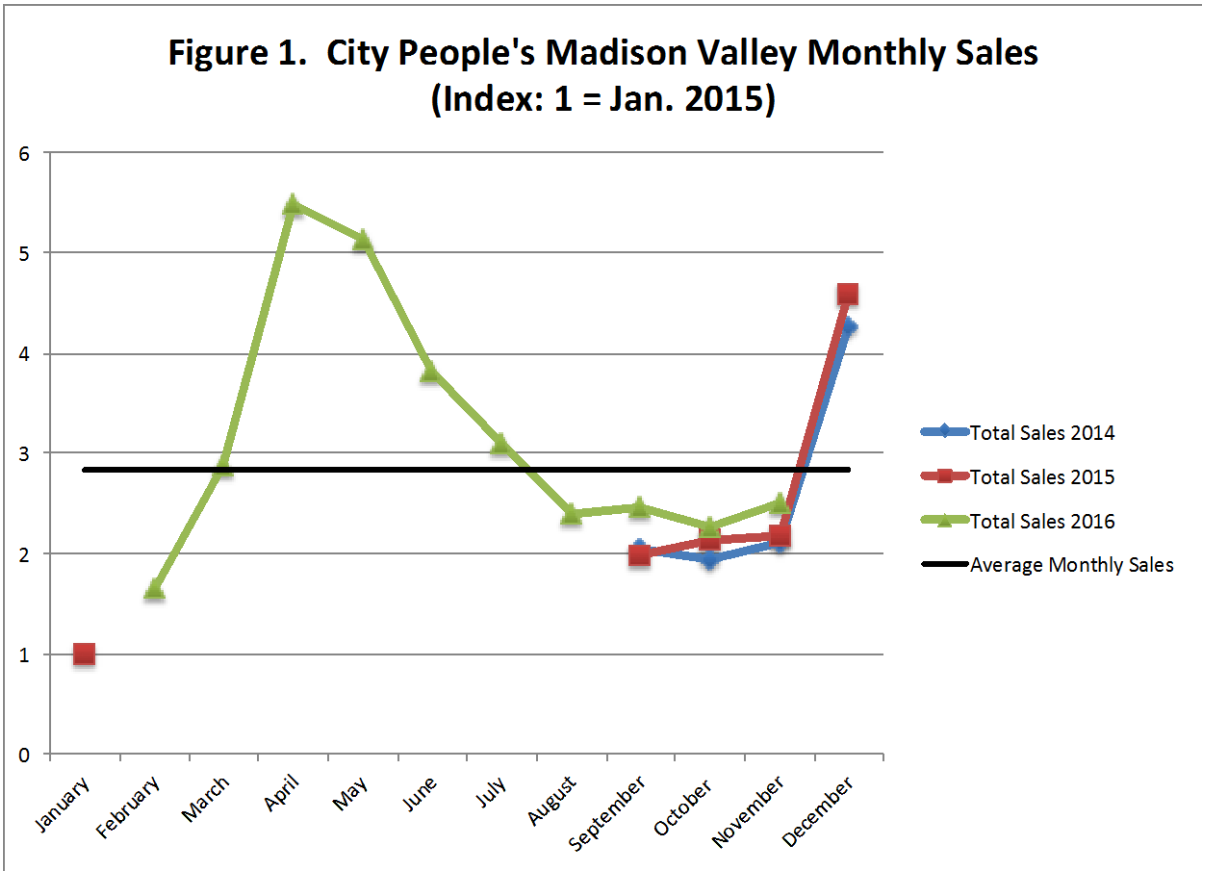


Source: City People's; Tilghman Group

This result demonstrates that the relationship between daily transactions and peak hour vehicle trips is highly variable. That is, Wednesday had the fewest transactions but nearly the highest peak hour volume, whereas Friday had the most transactions but hardly any more peak hour traffic than Wednesday. What this pattern indicates is that peak hour traffic volume is relatively stable, and that busier sales days mean much more traffic earlier in the day, before the 4-5pm peak.

Seasonal Business Patterns

Figure 1 shows the store's seasonal pattern of business expressed in monthly sales. The owner notes that weather strongly influences business day to day with warmer, drier days bringing more business than colder, rainier days in any given month.



Source: City People's; Tilghman Group

The garden/nursery store does it highest business in the Spring with a second peak leading up to Christmas. Despite the pending closure at the end of 2016, business in the fall was slightly ahead of the same periods in the prior two years. Based on these data, March sales represented an average month.

Accounting for Changes in the Business in the Last Year

It is important to recognize that in the last year the store has changed owners, announced its closure for the end of 2016, closed and then re-opened in February 2017.

So how would traffic volumes in late March 2017 compare to March 2016, prior to the change of ownership and year-end closure? To answer that question, I worked with the owner to obtain available sales information. Both sales and transaction data were requested. Changes in accounting systems implemented in 2017 allow the new owner to track the number of transactions as well as total sales. Before this year, only total sales were recorded. While the former owners declined to release specific sales information, an estimate of the number of transactions for the same days in

March 2016 was made based on the current owner's review of last year's sales and the dollar value of current transactions. Table 2-A shows the derivation of peak hour transactions from daily transactions. Table 2-B provides the estimate of transactions and resulting peak hour vehicle trips for comparable dates in March 2016 (data for only 30th and 31st were provided).

Table 2-A. Calculation of Peak Hour Transactions

Day	Daily Transactions	Vehicle Trips	Pedestrian Trips	Veh Trip + Ped Trip (Peak Hour)	% Browse, don't buy	Est'd Peak Hour Transactions	% of Daily Transactions in Peak Hour
Wed 3/29/2017	139	45	19	64	10%	29	21%
Thu 3/30/2017	171	35	7	42	10%	19	11%
Fri 3/31/2017	243	48	8	56	10%	25	10%
Totals	553			162		73	13%

Table 2-B. Estimation of 2016 Trips on Comparable Dates

Date in 2016	Est'd Daily Transactions 2016	% Daily Transactions in Peak Hour	Est'd Peak Hour Transactions	Est'd Vehicle Trips in 2016 *(Note1)*
Wed 3/30/2016	194	13%	26	45
Thu 3/31/2016	232	13%	31	54
			Average:	**50**
			TIA Net Trip Gen:	78
			Pass-by Rate:	25%
			TIA Gross Trip Gen:	**104**

Note 1: Accounts for mode split (80% drive) and browsing (10% of visitors do not produce a sale)

Source: City People's; Tilghman Group

It is likely that similar dates in March 2016 had higher traffic volumes than on the observed count days this year. Weather records show that March 30 and 31, 2016, were 10 to 15 degrees warmer than in 2017, so weather may have enhanced business somewhat. Given that March represents an average month in sales, it is assumed that these traffic levels reflect average traffic volumes over the year for the afternoon peak hour.

By comparison, the TIA calculated a total of 104 vehicle trips for the existing site (yielding 78 net new trips after applying the pass-by rate). That is more than double the number counted and estimated for 2016. It is important to note that trips counted at the driveway include any pass-by trips since by definition they must turn in and out of the driveway. Such a high projection also does not square with the size of the parking lot, holding 12 vehicles at best. Achieving 104 vehicle trips from such a small lot requires a high rate of turnover, resulting in an average stay of less than 14 minutes per vehicle. For a garden/nursery store, that seems unreasonable.

The consequence of this overestimation of existing site trips is that the TIA underestimates new trips from the mixed-use development by approximately 54 peak hour trips.

2. QUEUING AT INTERSECTIONS

Lake Washington Blvd. Southbound at Madison

The TIA did not accurately describe the occurrence and extent of queues that build from the intersection of Madison/Lake Washington Blvd. To demonstrate existing patterns, I commissioned a traffic count firm, All Traffic Data, to conduct a queuing study on Lake Washington Blvd. north of that intersection. This effort measured queues for southbound traffic. The study was done over two days between 7:30 and 8:30 a.m., and 4:00 p.m. and 6:00 p.m. Study dates were Tuesday, March 28 and Wednesday, March 29, 2017.

Cameras were used to measure queue length, the start and stop times of queue movement, and the number of vehicles clearing the intersection. Measurements were taken in 5-minute intervals. One camera was placed at the intersection with Madison, while the other camera was located approximately 1,200 feet north of the intersection, a distance sufficient to hold over 40 vehicles.

Findings from that study are summarized in Table 3.

Table 3. Queues on Lake Washington Blvd. (Southbound to Madison)

	Morning -- 7:30 - 8:30 a.m.	
	Tuesday 28 March	Wednesday 29 March
# Queues Observed	12	12
Queues Extending to/beyond 1200'	1	4
% Queues that clear once traffic starts	42%	33%
% Lost Green Time	25%	9%
	Afternoon -- 4:00 - 6:00 p.m.	
	Tuesday 28 March	Wednesday 29 March
# Queues Observed	24	24
Queues Extending to/beyond 1200'	8	15
% Queues that clear once traffic starts	58%	17%
% Lost Green Time	6%	9%

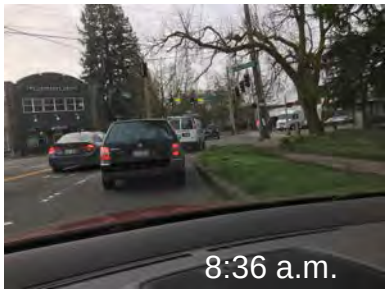
Source: All Traffic Data, Inc.; Tilghman Group

Key points:

- Considerable variation occurs in the number of very long queues. Wednesday morning had 4 times as many as Tuesday had, while Wednesday afternoon had nearly double Tuesday's.
- It is fair to say that queues routinely back up 1,200 feet or more in the afternoon, since 33% did on Tuesday and 63% did on Wednesday, and on some mornings.
- Queues can be difficult to clear when signal green time cannot be fully utilized. Poor utilization occurs when left-turning vehicles exceed the storage capacity of the short left-turn lane and thereby restrict or even block through traffic. Trucks and large SUVs contribute to those blockages. During 3 cycles Wednesday morning, only 3 vehicles cleared.
- The majority of queued vehicles wait through multiple signal cycles before clearing the intersection. With a cycle time of 165 seconds, delays can be extreme.

I had personal experience of queues on this segment of Lake Washington Blvd (my wife works at the University of Washington and I occasionally drive her to work) on March 30th and March 31st. Here is what I experienced in those two instances:

- 30 March 2017 at 8:34 a.m. – driving south through Arboretum I joined the queue at the speed cushion beside the Japanese Garden. The queue grew behind me by at least 6 vehicles. It took 13 minutes to clear the intersection with Madison.
- 31 March 2017 at 8:24 a.m. – I joined the queue just south of E. Interlaken. The queue grew past Interlaken. I cleared the intersection at Madison after 12.25 minutes. The photos below illustrate the conditions.



In both instances, the stopped traffic extended well past the point used to monitor the queues. At least 4 signal cycles passed before clearing the intersection.

Queue Blockages of Site Driveway

Traffic queues on Madison building from either the intersection with 29th Ave. or with Lake Washington Blvd. can extend far enough to block movements from the site's driveway. The proposed project locates its Madison driveway at the same location as the existing City People's driveway. Therefore, queues that block the existing driveway have the potential to block the future driveway.

Observations of queues were done at the same time as the driveway counts. Table 3 summarizes queue blockages of the driveway.

Table 3. Queues Blocking Site Driveway

Eastbound Madison	Wed 3/29	Thu 3/30	Fri 3/31	3-Day Average
# Blocking Queues	5	7	8	6.7
Avg. Duration (minutes:seconds)	00:44.8	00:43.6	00:41.7	00:43.2
Max. Duration	01:20.0	01:30.0	01:14.0	01:21.3
Westbound Madison	Wed 3/29	Thu 3/30	Fri 3/31	3-Day Average
# Blocking Queues	9	8	4	7.0
Avg. Duration (minutes:seconds)	00:41.9	00:33.0	02:16.5	00:56.5
Max. Duration	01:59.0	00:50.0	06:47.0	03:12.0
Total Blockage Time	10:01	9:29	14:40	11:23
% of 2-Hr Period Blocked	8%	8%	12%	9.5%

Source: Tilghman Group

Key observations:

- On average, the queues blocked the driveway about 10% of the time. That effectively reduces driveway capacity by about 10%.
- The longest lasting queue westbound (lasting 6:47) was effectively a series of queues where one queue was just about to clear when it began to build again. This lasted through multiple signal cycles before eventually clearing.
- Eastbound and westbound queues rarely occurred simultaneously. Only two instances were observed, each lasting approximately 20 seconds.
- There were 8 occasions when eastbound queues came close to blocking (within 2 to 4 vehicles) but didn't.
- The site's driveway is approximately 665 feet west of the intersection with Lake Washington Blvd. Assuming an average space of 25 feet per vehicle, 26 to 27 vehicles fill that distance.
- The driveway is approximately 500 feet east of the signal-controlled intersection with 32nd Ave. It is only 125 feet east of the crosswalk at 28th Ave.

3. PCC Truck Volumes

PCC has built comparably sized new stores in mixed-use projects throughout Seattle, most recently in Columbia City where a 26,000 gsf grocery plus another 6,000 gsf of retail sit below 193 apartments. According to the PCC manager, from 25 to 35 daily truck deliveries occur Mondays through Saturdays, with Friday typically the busiest day. Most deliveries occur between 6:00 a.m. and noon. Truck access occurs on Edmonds Street, a 30-feet wide neighborhood access street.

Observations were made over parts of four weekday mornings, including a Friday. Time-lapse photography was used to record truck activity with the camera set to take a photo every minute. Table 4 summarizes the findings from those observations.

Table 4. PCC Columbia City Truck Delivery Observations

	Tue 11 April	Wed 12 April	Fri 14 April	Mon 17 April
Observation Period	10:42 - 11:30	9:00 - 10:16	8:00 - 10:48	7:35 - 11:18
Length of Period (minutes)	49	77	169	224
Count of Trucks by Type:				
Semis	0	1	4	3
Single-Unit	1	1	10	8
Vans	2	0	5	6
Garbage Trucks	1	0	2	0
Number of Trucks Observed	4	2	21	17
Max. Trucks Present at One Time	2	1	7	6
Avg. Duration (minutes)	2.5	2.0	22	30
Max. Duration (minutes)	34	31	75	67
Duration by Type (minutes):				
Semis	0	31	46	37
Single-Unit	5	10	21	33
Vans	23	0	11	23
Garbage Trucks	3	0	4	0

Source: Tilghman Group

Key findings:

- Virtually all trucks parked at the curb to make their deliveries. Only a few vans and UPS trucks parked in the loading bay.
- Trucks used both sides of the street to unload. This became necessary when more than three or four trucks were present at one time since the project's frontage has only about 170 feet of curb space including the loading bay driveway.

Three trucks fill frontage curb space

A fourth truck uses opposite side of street

Trucks spill past frontage curb line and across street; then the garbage truck arrives

- At the busiest times, trucks used approximately 300 feet of curb space.
- Two semis were present simultaneously on two different days.
- On two occasions, a semi delivering beverages used the parking lot of an adjacent bank rather than the crowded curb.
- Semis and single-unit trucks typically used a lift gate and a motorized pallet dolly to bring their goods into the store through the loading bay. Some trucks used a ramp.
- Larger trucks stayed longer than smaller trucks. The average duration for semis was double that for other types of trucks.
- Garbage collection occurred in the street. Two sets of dumpsters were observed: one set in the loading bay; and one placed in the street at the opposite end of the project. Traffic cones were used around that dumpster to highlight its presence in the street. The garbage truck remained in the traffic lane to empty the dumpster when other trucks were parked at the curb.

Implications for 2925 E. Madison

The volume and overlap of PCC truck deliveries implies that the E. Madison site does not have sufficient curb space to accommodate all trucks during the busier delivery times. The site has approximately 200 feet of curb line, well short of the 300 feet observed in use in Columbia City. It is also apparent that few trucks other than some vans will use the loading bay. Unlike Edmonds Street in Columbia City, Madison is an arterial street, significantly wider with far higher traffic volumes across the day, making it unlikely that trucks can safely use the far curb when making deliveries to the site. These circumstances raise a number of challenges for the applicant, including:

- Demonstrating a realistic curbside plan to accommodate a portion of expected delivery trucks along the project's frontage
- Showing where additional trucks will unload in a safe manner on Madison
- Documenting the impact of curb-side parking losses on the neighborhood's parking conditions.
- Demonstrating how adequate driveway sight-lines will be preserved when delivery trucks are parked at the adjacent curb.

SUMMARY OF CONCERNS

The site presents a difficult challenge for access and deliveries: unlike many commercial properties with a high volume retail use like a grocery store that front on at least two streets, this site fronts on just one street effectively, since Dewey cannot realistically handle commercial volumes, let alone large scale residential volumes. Thus, the site must seek solutions to pedestrian, auto and truck access from Madison alone. It is clear that delivery demands will outstrip frontage curb capacity and it is not yet obvious what configuration an appropriate delivery solution involves. Driveway blockages will be frequent, recurring events without any improvements to nearby intersections.

Based on the counts and observations described above, the project and its TIA should:

1. Sharpen the description of existing traffic conditions in order to provide an accurate basis from which to measure the project's impacts and identify appropriate mitigation measures. Those descriptions should include more accurate information about queues at the Madison/Lake Washington intersection. I have shown two legs experiencing recurring long queues, so the TIA should fully investigate queuing on all legs and the effects on traffic on cross streets including 32nd Ave. E. at Lake Washington Blvd. and at Madison. That more accurate information would also address blockages of the site's driveway now and in the future with its redevelopment.

2. Revise calculations of net new trips due to the project. I have provided a three-day observation to identify existing site trips and I encourage the applicant to do its own counts of driveway traffic volumes, including appropriate seasonal adjustments, to verify existing site volumes.

3. Develop a realistic plan for accommodating delivery trucks safely. It is likely that a delivery solution would be closely tied to an access solution. Many complexities attend such a solution; my point is to highlight the seriousness of the access and delivery issues and to give a clearer sense of the volumes of cars and trucks involved. It may be necessary to consider alternate on-site loading designs including below-grade loading options.

4. Acknowledge that a secondary access for residents on Dewey is not only out of scale for Dewey, but provides little reduction in volume on Madison. This point has been made previously to the Design Review Board. If more accurate calculations of net new trips determine that delay is too great at the project's driveway, then reducing the size of the project or altering the mix of uses to reduce traffic volumes should be seriously considered.

2925 E. Madison

24-Apr-17

Tilghman Group

ATTACHMENT A

Driveway Counts for City People's

Assumed Retail AVO = 1.2 persons per vehicle

Wed 29 March 2017

	Inbound		Outbound					Pedestrians					
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly	Est'd Person Trips @ AVO=1.2	In	Out	Total	Hourly	Total Hourly Person Trips	% Auto
4:00	3	3	3	8	17			3	2	5			
4:20	1	3	1	8	13			4	3	7			
4:40	3	2	4	6	15	45	54	4	3	7	19	73	74%
5:00	0	3	2	7	12	40	48	1	0	1	15	63	76%
5:20	1	4	4	2	11	38	46	4	3	7	15	61	75%
5:40	0	2	0	5	7	30	36	0	5	5	13	49	73%
2-Hour Total	8	17	14	36	75		90	16	16	32		122	74%

Thu 30 March 2017

	Inbound		Outbound					Pedestrians					
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly	Est'd Person Trips @ AVO=1.2	In	Out	Total	Hourly	Total Hourly Person Trips	% Auto
4:00	1	1	5	2	9			4	0	4			
4:20	2	7	1	4	14			4	2	6			
4:40	2	1	3	4	10	33	40	0	0	0	10	50	80%
5:00	2	3	1	5	11	35	42	1	0	1	7	49	86%
5:20	2	3	0	1	6	27	32	1	0	1	2	34	94%
5:40	0	3	0	5	8	25	30	0	0	0	2	32	94%
2-Hour Total	9	18	10	21	58		70	10	2	12		82	85%

Fri 31 March 2017

	Inbound		Outbound					Pedestrians					
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly	Est'd Person Trips @ AVO=1.2	In	Out	Total	Hourly	Total Hourly Person Trips	% Auto
4:00	3	5	3	9	20			0	0	0			
4:20	0	7	1	4	12			2	0	2			
4:40	2	4	5	5	16	48	58	0	6	6	8	66	88%
5:00	2	1	2	4	9	37	44	0	1	1	9	53	83%
5:20	0	1	1	1	3	28	34	6	0	6	13	47	72%
5:40	1	2	0	3	6	18	22	0	1	1	8	30	73%
2-Hour Total	8	20	12	26	66		79	8	8	16		95	83%

Three Day Average

	Inbound		Outbound					Pedestrians					
Time	Left-In	Right-In	Left Out	Right Out	Totals	Hourly	Est'd Person Trips @ AVO=1.2	In	Out	Total	Hourly	Total Hourly Person Trips	% Auto
4:00	2.3	3.0	3.7	6.3	15			2.3	0.7	3			
4:20	1.0	5.7	1.0	5.3	13			3.3	1.7	5			
4:40	2.3	2.3	4.0	5.0	14	42	50	1.3	3.0	4	12	63	80%
5:00	1.3	2.3	1.7	5.3	11	37	45	0.7	0.3	1	10	55	81%
5:20	1.0	2.7	1.7	1.3	7	31	37	3.7	1.0	5	10	47	79%
5:40	0.3	2.3	0.0	4.3	7	24	29	0.0	2.0	2	8	37	79%
2-Hour Total	8	18	12	28	66		80	11	9	20		100	80%

Directional Split:

To/from West *46%*

To/from East *54%*