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VIA EMAIL

To:	**Cynthia Redinger, PE, PTOE** **City of Ann Arbor**
From:	**Julie Kroll, PE, PTOE** **Michael Labadie, PE** **Fleis & VandenBrink Engineering**
CC:	**Brett Lenart, City of Ann Arbor** **Alexis DiLeo, City of Ann Arbor** **Nick Hutchinson, City of Ann Arbor**
Date:	**February 10, 2017**
Re:	**Morningside Development - Ann Arbor - Multi-Modal Trip Generation Assumptions**

Included herein is a summary of the methodology and analysis used to calculate the trip generation for the proposed Morningside Development. This methodology is recommended engineering practice as published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual 9th Edition* and the ITE *Trip Generation Handbook, 3rd Edition*. Additional data published in the City of Ann Arbor *Non-Motorized Transportation Plan* was also used in the analysis in conjunction with the ITE methodology. The trip generation analysis summarized below provides the information necessary to provide a comprehensive traffic impact study considering all multi-modal impacts (vehicles, pedestrians, transit and bikes). By using the national database for the proposed development and then adjusting based the local data, we have presented a conservative approach tailored to the specific needs of the City of Ann Arbor.

VEHICULAR TRIP GENERATION ANALYSIS

The first step in evaluating the trip generation for the proposed development was to calculate the trip generation using the ITE Trip Generation Manual 9th Edition. **Table 1** shows the traditional trip generation for mixed-use Morningside development:

Table 1: Vehicular Trip Generation per *ITE Trip Generation Manual, 9th Edition*

Land Use	ITE Code	Amount	Units	Average Daily Traffic	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Apartments	220	536	D.U.	3,372	53	213	266	203	109	312
Residential Condominium/Townhouse	230	71	D.U.	477	7	32	39	30	15	45
Shopping Center	820	4,400	S.F.	892	14	9	23	36	38	74
Pass-by		*34% PM*		*152*				*12*	*13*	*25*
New Trips				4,264	67	222	289	239	147	386

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ITE MODAL SPLIT

The vehicle trips in Table 1 were then converted to person trips by using the baseline vehicle mode split and baseline vehicle occupancy rates published by ITE in Appendix C of the *Trip Generation Handbook, 3rd Edition* provided below.

Baseline Data

	AM PEAK HOUR					
	Inbound			Outbound		
	Personal Vehicle	Truck	Vehicle Occupancy	Personal Vehicle	Truck	Vehicle Occupancy
Apartments (Residential)	0.892	0.070	1.13	0.968	0.010	1.09
Shopping Center (Retail)	1.000	0.000	1.17	1.000	0.000	1.16
	PM PEAK HOUR					
	Inbound			Outbound		
	Personal Vehicle	Truck	Vehicle Occupancy	Personal Vehicle	Truck	Vehicle Occupancy
Apartments (Residential)	0.963	0.010	1.15	0.947	0.015	1.21
Shopping Center (Retail)	1.000	0.000	1.21	0.998	0.002	1.18

Applying the above factors to Table 1 provides the total number of person-trips generated by the proposed development. The total person trips are summarized in **Table 2**.

Table 2: Person-Trip Generation per *ITE Trip Generation Handbook, 3rd Edition*

Land Use	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Residential	579	D.U.	77	275	352	279	158	437
Retail	4,600	S.F.	17	10	27	44	45	89
New Trips			94	285	379	323	203	526

CITY OF ANN ARBOR MODAL SPLIT

With the trips converted to Person-Trips, a modal split was applied to determine the number of trips generated by separate mode choices. This was calculated by applying the modal splits for the City of Ann Arbor as published by the City in the *Non-Motorized Transportation Plan*:

Commuting Modal Splits in Ann Arbor

Vehicle	**0.701**
Walk	**0.144**
Bike	**0.051**
Transit	**0.104**

These factors were applied to the Person-Trips in Table 2 to calculate the modal split trip generation for the proposed development as summarized in Table 3. *Note: The values have been rounded up to the nearest whole number.* We propose to use the following trips as summarized below in the traffic impact study to evaluate the study intersections.

Table 3: Modal Split Trip Generation – Morningside Development

Vehicular Site Trip Generation

Land Use	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Residential	579	D.U.	49	176	225	178	101	279
Retail	4,600	S.F.	9	5	14	22	23	45
Pass-by	*34% PM*					*7*	*8*	*15*
New Trips			58	181	239	193	116	309

Pedestrian Site Trip Generation

Land Use	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Residential	579	D.U.	11	40	51	41	22	63
Retail	4,600	S.F.	3	1	4	7	6	13
New Trips			14	41	55	48	28	76

Cyclist Site Trip Generation

Land Use	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Residential	579	D.U.	4	14	18	15	8	23
Retail	4,600	S.F.	1	1	2	3	2	5
New Trips			5	15	20	18	10	28

Transit Person-Trip Generation

Land Use	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Residential	579	D.U.	8	29	37	29	17	46
Retail	4,600	S.F.	2	1	3	5	5	10
New Trips			10	30	40	34	22	56

END