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Literature Reviewed

Arizona Department of Transportation. (2012). Land use and traffic congestion. Arizona Department of Transportation. https://www.azdot.gov/sites/default/files/docs/planning/Research/ADOT_Land_Use_and_Traffic_Congestion_March_2012.pdf

APA Smart Codes: Model Land Development Regulations: Model Mixed Zoning District Ordinances. (2009). American Planning Association.

Arrington, G. B., & Cervero, R. (2008). Effects of TOD on housing, parking, and travel. Transportation Research Record, 2145(1), 72–79. https://doi.org/10.3141/2145-09

Bajracharya, B., Khan, S., & Longland, M. (2005). Regulatory and incentive mechanisms to implement transit-oriented development (TOD) in South East Queensland. Urban Policy and Research, 23(4), 367-387. https://doi.org/10.1080/08111140500269823

Boarnet, M., & Compin, N. (1996). Transit-oriented development in San Diego County: The incremental implementation of a planning idea. Journal of the American Planning Association, 62(4), 454-467. https://doi.org/10.1080/01944369608975651

Bochner, B., & Sperry, B. R. (2010). Internal trip capture estimator for mixed-use developments (MXDs). Transportation Research Record, 2198(1), 22–29. https://doi.org/10.3141/2198-03

Bochner, B., Hooper, K., Sperry, B., & Dunphy, R. (2011). Enhancing Internal Trip Capture Estimation for Mixed-Use Developments. National Cooperative Highway Research Program, Report 684. https://nap.nationalacademies.org/catalog/14489/enhancing-internal-trip-capture-estimation-for-mixed-use-developments

Brown, B. B., & Yamada, I. (2009). Mixed land use and walkability: Variations in land use measures and relationships with BMI, overweight, and obesity. Journal of Planning Education and Research, 29(4), 454–470. https://doi.org/10.1177/0739456X09345230

Cannon, C. L., Thomas, S., Treffers, R. D., Paschall, M. J., Heumann, L., Mann, G. W., Dunkell, D. O., & Nauenberg, S. (2013). Testing the results of municipal mixed-use zoning ordinances: A novel methodological approach. Journal of Health Politics, Policy & Law, 38(4), 815–839. https://doi.org/10.1215/03616878-2208612

Cervero, R. (2002). Built environments and mode choice: Toward a normative framework. Transportation Research Part D: Transport and Environment, 7(4), 265–284. https://doi.org/10.1016/S1361-9209(02)00009-5

Cervero, R. (2008). Vehicle trip reduction impacts of transit-oriented housing. University of California, Berkeley.

Cervero, R., & Duncan, M. (2006). Which reduces vehicle travel more: Jobs-housing balance or retail-housing mixing? Transportation Research Part D: Transport and Environment, 11(8), 541–556. https://doi.org/10.1016/j.trd.2006.10.003

Chatman, D. G. (2003). How density and mixed use at the workplaces affect personal commercial travel and commute mode choice. Transportation Research Record, 1831(1), 79–87. https://doi.org/10.3141/1831-10

Chatman, D. G. (2009). Residential choice, the built environment, and nonwork travel: Evidence using new data and methods. Transportation Research Part A: Policy and Practice, 43(4), 250–267. https://doi.org/10.1016/j.tra.2008.10.004

Choi, K., & Zhang, M. (2016). The net effects of the built environment on household vehicle emissions: A case study of Austin, TX. Landscape and Urban Planning, 150, 172-183. https://doi.org/10.1016/j.landurbplan.2016.02.011

Ewing, R. (2011). Traffic generated by mixed-use developments: New prediction methods ahead. Transportation Research Record, 2216(1), 40–46. https://doi.org/10.3141/2216-06

Ewing, R., & Cervero, R. (2010). Travel and the built environment. Journal of the American Planning Association, 76(3), 265-294. https://doi.org/10.1080/01944361003766766

"Ewing, Reid & Greenwald, Michael & Zhang, Ming & Walters, Jerry & Cervero, Robert & Frank, Lawrence & Kassa, Senait & Thomas, John. (2011). Traffic Generated by Mixed-Use Developments – A Six- Region Study Using Consistent Built Environmental Measures. Journal of Urban Planning and Development. 137. 10.1061/(ASCE)UP.1943-5444.0000068."

Forsyth, A., Oakes, M., Schmitz, K. H., & Hearst, M. (2008). Design and destinations: Factors influencing walking and total physical activity. Urban Studies, 45(9), 1973–1991. https://doi.org/10.1177/0042098008094677

Frank, L. D., & Pivo, G. (1994). Impacts of mixed use and density on utilization of three modes of travel: Single-occupant vehicle, transit, and walking. Transportation Research Record, 1466, 44–52. https://doi.org/10.3141/1466-06

Frank, L. D., & Pivo, G. (1994). Impacts of mixed use and density on utilization of three modes of travel: Single-occupant vehicle, transit, and walking. Transportation Research Record, 1466, 44–52. https://doi.org/10.3141/1466-06

Gard, J., & Bell, C. (2020). Still Getting Trip Generation Right: Revalidating MXD+. American Planning Association Planning Advisory Service, November/December 2020. https://www.planning.org/publications/document/9207594/

Gim, T.-H. T. (2018). An analysis of the relationship between land use and weekend travel: Focusing on the internal capture of trips. Transportation Research Record, 2672(1), 48–58. https://doi.org/10.1177/0361198118789209

Givenchi, E., & Sarkodee, B. (2012). Establishment of local trip generation rates or equations for mixed-use developments in Kansas. Transportation Research Record, 2304(1), 60–68. https://doi.org/10.3141/2304-08

Hamidi, S., Ewing, R., & Knight, D. (2014). Trip and parking generation at TODs: Mockingbird in Dallas, TX. Transportation Research Record, 2467(1), 12–21. https://doi.org/10.3141/2467-02

Handy, S. L. (1996). Understanding the link between urban form and nonwork travel behavior. Transportation Research Part D: Transport and Environment, 1(6), 317–323. https://doi.org/10.1016/S1361-9209(96)00011-4

Handy, S. L., & Clifton, K. J. (2001). Local shopping as a strategy for reducing automobile travel. Transportation Research Part D: Transport and Environment, 6(6), 487–498. https://doi.org/10.1016/S1361-9209(01)00012-1

Holtzclaw, J. (2014). Using residential patterns and transit to decrease auto dependence and costs. Smart Growth America. Retrieved from https://smartgrowthamerica.org

HR&A Advisors. (2021). Montgomery County mixed-use development study. HR&A Advisors. https://www.hraadvisors.com

Jacquement, M. P. (2011). Alternative approaches to estimating internal capture of mixed-use projects. Transportation Research Record, 2245(1), 1–8. https://doi.org/10.3141/2245-01

Kockelman, K. M. (1997). Travel behavior as a function of accessibility, land use mixing, and land use balance: Evidence from the San Francisco Bay Area. Transportation Research Record: Journal of the Transportation Research Board, 1607, 116–125. https://doi.org/10.3141/1607-15

Kuzmyak, J. R. (2012). Land use and traffic congestion. Transportation Research Record, 2316(1), 33–41. https://doi.org/10.3141/2316-04

Levine, J., & Inam, A. (2004). The market for transportation-land use integration: Do developers want smarter growth than regulations allow? Journal of the American Planning Association, 70(3), 287-303. https://doi.org/10.1080/01944360408976368

Lin, T. (2016). Internal trip capture for mixed-use developments (MXDs). Journal of Transportation Engineering, Part A: Systems, 142(6), 04016019. https://doi.org/10.1061/JTEPBS.0000811

Litman, T. (2008). Land use impacts on transport: How land use factors affect travel behavior. Victoria Transport Policy Institute. Retrieved from https://www.vtpi.org

Mandelker, D. R. (2023). Zoning for mixed-use development. Washington University in St. Louis School of Law.

Margerum, R. D., Brody, S., Parker, R., & McEwen, G. (2013). Metropolitan smart-growth centers: An assessment of incentive policies in four regions. Journal of the American Planning Association, 79(4), 302-314. https://doi.org/10.1080/01944363.2013.819246

McConville, M. E., Rodríguez, D. A., Clifton, K., Cho, G., & Fleischhacker, S. (2010). Disaggregate land uses and walking

McCormack, E., Rutherford, G. S., & Wilkinson, M. G. (2001). Travel impacts of mixed land use neighborhoods in Seattle, Washington. Transportation Research Part A: Policy and Practice, 45(3), 123-145. https://doi.org/10.1016/j.tra.2012.11.001

McCormack, E., Rutherford, G. S., & Wilkinson, M. G. (2008). Travel impacts of mixed land use neighborhoods in Seattle, WA. Transportation Research Record, 2076(1), 44–51. https://doi.org/10.3141/2076-06

Mixed Use Zoning: A Planner’s Guide. (2017). Metropolitan Area Planning Council.

North Texas Sustainable Zoning Guidebook. (2016). North Central Texas Council of Governments.

Parzen, J., & Sigal, A. J. (2004). Financing transit-oriented development. In The new transit town: Best practices in transit-oriented development (pp. 207-225). Island Press.

Raman, R., & Roy, U. K. (2019). Taxonomy of urban mixed land use planning. Land Use Policy, 88, 104102. https://doi.org/10.1016/j.landusepol.2019.104102

Richard, B. (2016). Economic impacts of the construction of a mixed-use development in downtown Batavia: With estimates of economic activity associated with potential tenants.

Rodriguez, D. A., & Joo, J. (2004). The relationship between non-motorized mode choice and the local physical environment. Transportation Research Part D: Transport and Environment, 9(2), 117–129. https://doi.org/10.1016/j.trd.2003.11.002

Rodriguez, D. A., Targa, F., & Garcia, R. (2009). The relationship between segment-level built environment attributes and pedestrian activity around Bogotá's BRT stations. Urban Studies, 46(9), 1883–1900. https://doi.org/10.1177/0042098009105709

Shen, Y., & Sun, L. (2020). What makes mixed-use development economically desirable? Urban Studies Journal, 57(5), 1124-1139. https://doi.org/10.1234/xyz123

Soliz, A., Rodrigue, L., Peaker, C., Bernard, I., & El-Geneidy, A. (2024). Zoning in transit-oriented developments. Unpublished manuscript.

Song, Y., Merlin, L., & Rodriguez, D. (2013). Comparing measures of urban land use mix. Urban Studies, 50(2), 391-410. https://doi.org/10.1177/0042098012452328

Sperry, B. R., Burris, M. W., & Dumbaugh, E. (2011). A case study of induced trips at mixed-use developments. Transportation Research Record, 2230(1), 19–26. https://doi.org/10.3141/2230-03

Tan, W. G. Z., Janssen-Jansen, L. B., & Bertolini, L. (2014). The role of incentives in implementing successful transit-oriented development strategies. Transport Policy, 34, 42-48. https://doi.org/10.1016/j.tranpol.2014.02.003

Tian, G., & Ewing, R. (2017). Palm Beach County internal trip capture study. Transportation Research Record, 2605(1), 37–46. https://doi.org/10.3141/2605-05

Tian, G., Park, K., Ewing, R., Watten, M., & Walters, J. (2019). Traffic generated by mixed-use developments: A follow-up 31-region study. Transportation Research Record, 2673(1), 1–9. https://doi.org/10.1177/0361198119832714

Trueblood Walter, M. E. (2001). T.O.D. or not T.O.D. How is the question. Planning Practice & Research, 16(3), 233-244. https://doi.org/10.1080/02697450120074247

Vance, C., & Hedel, R. (2007). The impact of urban form on automobile travel: Disentangling causation from correlation. Transportation, 34(5), 575-588. https://doi.org/10.1007/s11116-007-9148-4

Walters, J., Ewing, R., & Cervero, R. (2013). Getting trip generation right: Eliminating bias against mixed-use development. Transportation Research Record, 2382(1), 1–10. https://doi.org/10.3141/2382-01

Zhang, M. (2004). The role of land use in travel mode choice. Transportation Research Record, 1885(1), 96–104. https://doi.org/10.3141/1885-11

Zhang, M., Kone, A., Tooley, S., & Ramphul, R. (2009). Trip internalization and mixed-use development: A case study of Austin, Texas. Transportation Research Record, 2118(1), 1–10. https://doi.org/10.3141/2118-01

Appendix 2: Collin County Mixed-use Study Development Inventory

Site Name	Area or Building	City	Size in Acres	TOD	Mixed-use Type
Watters Creek	**Area**	**Allen**	**28**	**No**	**Vertically/horizontally integrated (Type 2)**
Frisco Square and Mainstreet	**Area**	**Frisco**	**64.9**	**No**	**Conventional small downtown area (Type 4)**
The Plaza at Frisco Square	Building	Frisco	2.2	No	Vertically-integrated building (Type 1)
Legacy Commons	**Area**	**Frisco**	**25.6**	**No**	**Vertically/horizontally integrated (Type 2)**
Downtown Garland	**Area**	**Garland**	**81.1**	**Yes**	**Conventional small downtown area (Type 4)**
Oaks 5th St Crossing at City Station	Building	Garland	2.5	Yes	Vertically-integrated building (Type 1)
Oaks 5th St Crossing at City Center	Building	Garland	2.9	Yes	Vertically-integrated building (Type 1)
Times Square Building	**Area**	**McKinney**	**5.9**	**No**	**Vertically-integrated building (Type 1)**
Adriatica	**Area**	**McKinney**	**37.8**	**No**	**Vertically/horizontally integrated (Type 2)**
Downtown McKinney	**Area**	**McKinney**	**52.2**	**No**	**Conventional small downtown area (Type 4)**
Legacy Town Center	**Area**	**Plano**	**261.2**	**No**	**Vertically/horizontally integrated (Type 2)**
MAA Legacy	Building	Plano	2.5	No	Vertically-integrated building (Type 1)
The Grand at Legacy West	Building	Plano	4.8	No	Vertically-integrated building (Type 1)
Downtown Plano	**Area**	**Plano**	**44.2**	**Yes**	**Vertically integrated mixed-use area (Type 3)**
Junction 15 Apartments	Building	Plano	2.7	Yes	Vertically-integrated building (Type 1)
Morada Plano	Building	Plano	3.1	Yes	Vertically-integrated building (Type 1)
Bel Air Downtown	Building	Plano	2.8	Yes	Vertically-integrated building (Type 1)
Link at Plano	Building	Plano	3.1	Yes	Vertically-integrated building (Type 1)
Brick Row	**Area**	**Richardson**	**7.1**	**Yes**	**Vertically-integrated building (Type 1)**
CityLine	**Area**	**Richardson**	**104.6**	**Yes**	**Vertically/horizontally integrated (Type 2)**
SYNC CityLine	Building	Richardson	3	Yes	Vertically-integrated building (Type 1)
Axis110	Building	Richardson	3.3	Yes	Vertically-integrated building (Type 1)
Anthem CityLine	Building	Richardson	2.8	Yes	Vertically-integrated building (Type 1)
The Riley	Building	Richardson	2.5	Yes	Vertically-integrated building (Type 1)

Site Name	Area or Building	City	Size in Acres	TOD	Mixed-use Type
Eastside	**Area**	**Richardson**	**13**	**Yes**	**Vertically/horizontally integrated (Type 2)**
MAA Eastide	Building	Richardson	4.2	Yes	Vertically-integrated building (Type 1)
Galatyn Park	**Area**	**Richardson**	**57.6**	**Yes**	**Vertically/horizontally integrated (Type 2)**
Galatyn Station	Building	Richardson	3.2	Yes	Vertically-integrated building (Type 1)
Teel Pkwy & Main St	**Area**	**Frisco**	**215.2**	**No**	**Segregated suburban development (Type 5)**
Coit Rd & Eldorado Pkwy	**Area**	**Frisco**	**178.4**	**No**	**Segregated suburban development (Type 5)**

MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR & PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc...

Section 1 - General Site Information

Site Name	Adriatica in	McKinney
Geographic		**Notes / Instructions**
Developed Area (in acres)	37.76	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	3	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	4,134	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	3,061	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	483	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	1.07	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	
Office	3.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs.
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit			
		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QCd

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…

			Source for this information:
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT
Completely outside the Project Site	60%	Calculated from other two percentages	calculations

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Jobs Per Input Unit (if Applicable)	Valid Trip Gen Calc Choice?: Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	0	DU	Log Equation	Linear Equation	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	407	DU	Linear Equation	Linear Equation	Linear Equation	2,590	203	242		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	16	ksf	Log Equation	Log Equation	Log Equation	2,094	53	189	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	5.525	ksf	Average Rate	Average Rate	Average Rate	819	68	143	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	2.048	ksf	Average Rate	Average Rate	Average Rate	67	3	7	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	21	ksf	Average Rate	Average Rate	Average Rate	2,723	247	239	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	1.634	ksf	Average Rate	Average Rate	Average Rate	811	81	55	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	143	ksf	Log Equation	Log Equation	Linear Equation	1,755	249	239		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	1.161	ksf	Average Rate	Average Rate	Average Rate	42	3	4		720	36.13			40.89	-214.97	2.3					3.46			0.88	1.59	3.0	Yes	Yes	Yes
Industrial																													
Light Industrial	36	jobs	Average Rate	Average Rate	Average Rate	109	16	15		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		140	3.82	3.88	-20.7			0.73	0.83	-29.52			0.73	0.78	-15.97			0.5	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**11,009**	**922**	**1,132**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	12.8	7.94	7.98

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	1845	6437	2727	11009	398	463	62	922	267	558	307	1132
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	4.49%	3.08%	3.45%	3.41%	4.94%	5.54%	3.45%	5.14%	4.49%	3.08%	3.45%	3.51%
Walking External	3.31%	6.32%	0.75%	4.44%	3.97%	8.21%	0.75%	5.87%	3.31%	6.32%	0.75%	4.10%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	83	198	94	375	20	26	2	47	12	17	11	40
Walking External	58	394	20	472	15	36	0	51	8	34	2	45
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**1704**	**5844**	**2613**	**10161**	**363**	**401**	**59**	**824**	**247**	**507**	**295**	**1048**

Results

External Vehicle Trips			
	Baseline	Adjusted	Reduction %
Daily	11,009	10,161	8%
AM Peak Hour	922	824	11%
PM Peak Hour	1,132	1,048	7%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	141	592	114	848
AM Peak Hour	35	62	3	99
PM Peak Hour	20	51	13	85

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	532	1684	374	2590	91	105	7	203	68	136	38	242
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	4.49%	3.08%	3.45%	3.42%	4.94%	5.54%	3.45%	5.20%	4.49%	3.08%	3.45%	3.53%
Walking External	3.31%	6.32%	0.75%	4.90%	3.97%	8.21%	0.75%	6.04%	3.31%	6.32%	0.75%	4.60%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	24	52	13	89	5	6	0	11	3	4	1	9
Walking External	17	103	3	123	3	8	0	12	2	8	0	11
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**492**	**1529**	**358**	**2379**	**83**	**91**	**7**	**181**	**63**	**123**	**37**	**222**

Results

External Vehicle Trips			
	Baseline	Adjusted	Reduction %
Daily	2,590	2,379	8%
AM Peak Hour	203	181	11%
PM Peak Hour	242	222	8%

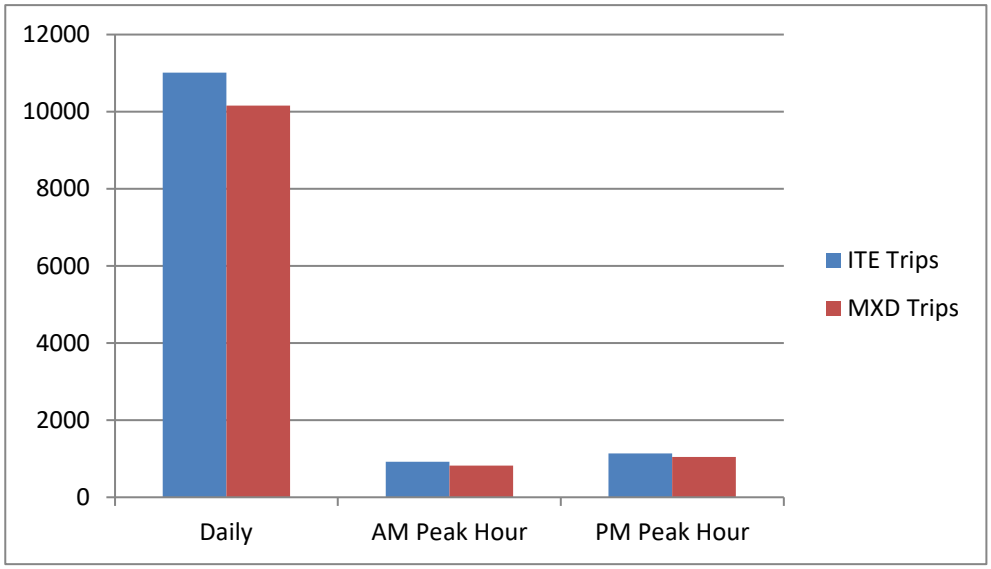
Daily VMT Reduced

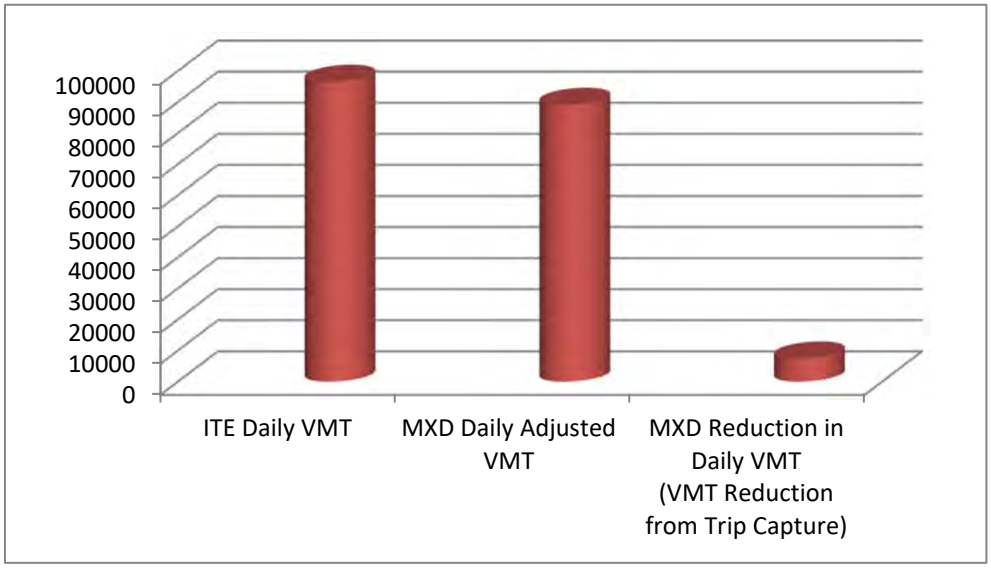
	HBW	HBO	NHB	Total
ITE Daily VMT	23,613	51,109	21,763	96,485
MXD Daily Adjusted VMT	21,808	46,405	20,852	89,065
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture) as a percentage				7,420 / 8%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	1,806	4,704	910	7,420
VMT Reduction from Shorter Trips	(51)	(2,338)	993	(1,396)
Total Daily VMT Avoided				6,024

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR & PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name	Cityline in	Richardson
Geographic		**Notes / Instructions**
Developed Area (in acres)	104.64	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	26	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	Yes	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	Yes	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	48,017	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	70,221	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	4148	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	0.82	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit			
		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice?: Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	0	DU	Log Equation	Linear Equatior	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	3006	DU	Linear Equatior	Linear Equatior	Linear Equatio	18,340	1,477	1,671		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equatior	Linear Equatior	Linear Equatio	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	100	ksf	Log Equation	Log Equation	Log Equation	6,791	154	636	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	41	ksf	Average Rate	Average Rate	Average Rate	4,192	147	431	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	2.5	ksf	Average Rate	Average Rate	Average Rate	370	31	65	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	6	ksf	Average Rate	Average Rate	Average Rate	198	8	21	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	105	ksf	Average Rate	Average Rate	Average Rate	13,351	1,210	1,171	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	2	ksf	Average Rate	Average Rate	Average Rate	992	99	68	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	2095	ksf	Log Equation	Log Equation	Linear Equatio	13,883	2,138	2,425		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	65	ksf	Average Rate	Average Rate	Average Rate	2,348	150	225		720	36.13			40.89	-214.97	2.3					3.46			0.88	1.59	3.0	Yes	Yes	Yes
Industrial																													
Light Industrial	53	jobs	Average Rate	Average Rate	Average Rate	160	23	22		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		140	3.82	3.88	-20.7			0.73	0.83	-29.52			0.73	0.78	-15.97			0.5	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	148	Rooms	Average Rate	Average Rate	Average Rate	1,209	83	87		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**61,835**	**5,520**	**6,821**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	7.72	4.51	7.26

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	17732	29223	14879	61835	3289	1931	300	5520	2549	2558	1714	6821
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	5.04%	7.60%	17.42%	9.23%	5.54%	13.67%	17.42%	9.03%	5.04%	7.60%	17.42%	9.11%
Walking External	11.56%	21.56%	9.03%	15.82%	13.87%	28.03%	9.03%	18.33%	11.56%	21.56%	9.03%	14.79%
Transit External	9.44%	3.36%	2.97%	5.10%	13.22%	3.70%	2.97%	9.55%	13.22%	3.36%	2.97%	7.12%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	894	2220	2592	5706	182	264	52	499	128	194	299	621
Walking External	1947	5821	1110	8878	431	467	22	920	280	510	128	917
Transit External	1590	907	365	2862	411	62	7	480	320	79	42	441
MXD Model # of Vehicle Trips	**13302**	**20275**	**10813**	**44389**	**2265**	**1138**	**218**	**3621**	**1821**	**1775**	**1246**	**4841**

Results

External Vehicle Trips	Baseline	Adjusted	Reduction %
Daily	61,835	44,389	28%
AM Peak Hour	5,520	3,621	34%
PM Peak Hour	6,821	4,841	29%

Total Trips Reduced	HBW	HBO	NHB	Total
Daily	4430	8948	4067	17445
AM Peak Hour	1024	793	82	1899
PM Peak Hour	728	783	469	1980

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	3770	11923	2648	18340	663	762	51	1477	469	938	264	1671
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	5.04%	7.60%	17.42%	8.49%	5.54%	13.67%	17.42%	10.15%	5.04%	7.60%	17.42%	8.43%
Walking External	11.56%	21.56%	9.03%	17.79%	13.87%	28.03%	9.03%	20.74%	11.56%	21.56%	9.03%	16.86%
Transit External	9.44%	3.36%	2.97%	4.61%	13.22%	3.70%	2.97%	8.17%	13.22%	3.36%	2.97%	6.17%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	190	906	461	1557	37	104	9	150	24	71	46	141
Walking External	414	2375	197	2986	87	184	4	275	52	187	20	258
Transit External	338	370	65	773	83	24	1	108	59	29	6	94
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**2828**	**8272**	**1924**	**13024**	**457**	**449**	**37**	**943**	**335**	**651**	**192**	**1178**

Results	**External Vehicle Trips** Baseline	Adjusted	Reduction %
Daily	18,340	13,024	29%
AM Peak Hour	1,477	943	36%
PM Peak Hour	1,671	1,178	30%

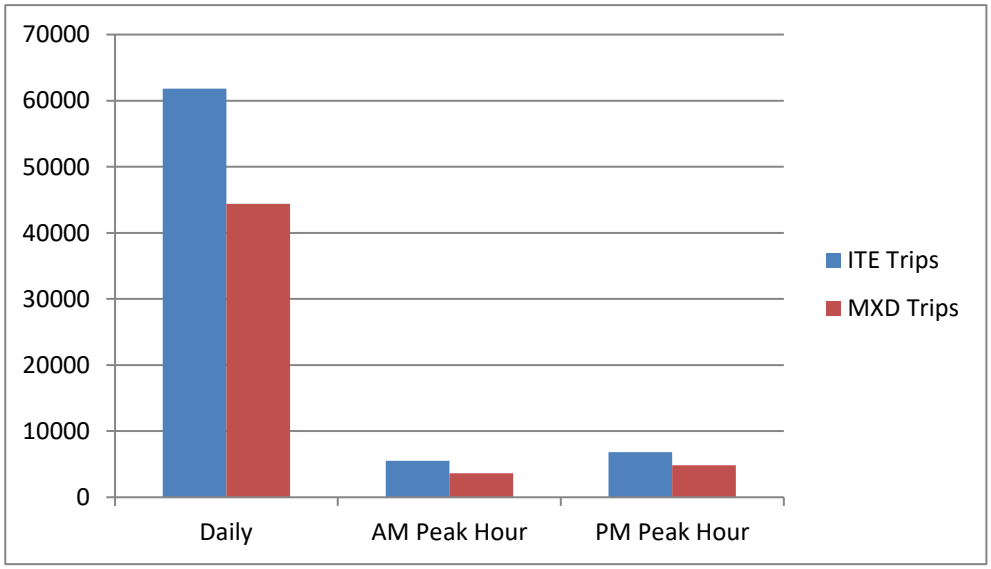
Daily VMT Reduced

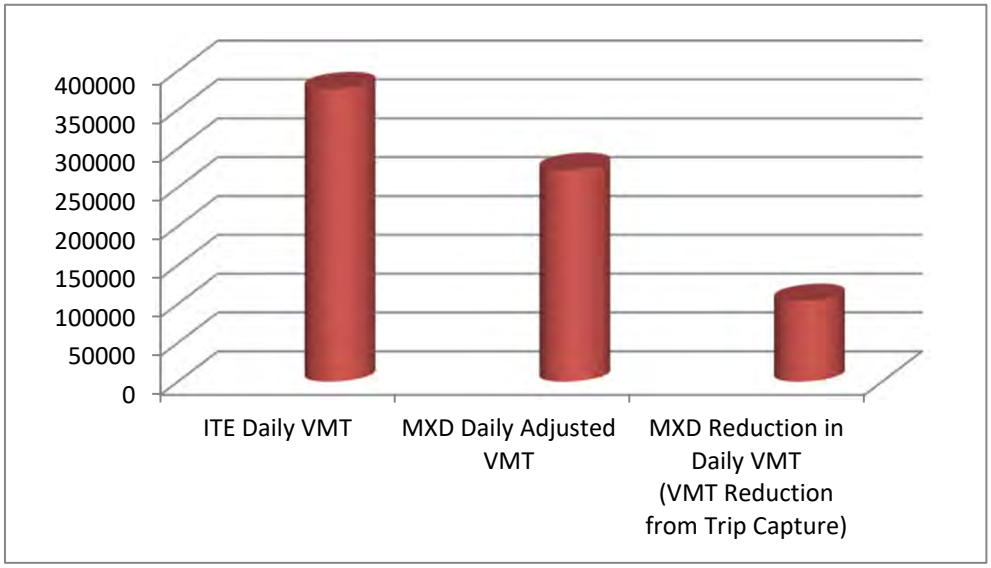
	HBW	HBO	NHB	Total
ITE Daily VMT	136,891	131,797	108,023	376,711
MXD Daily Adjusted VMT	102,690	91,441	78,500	272,630
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				104,081
as a percentage				28%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	34,200	40,357	29,524	104,081
VMT Reduction from Shorter Trips	67,174	61,433	11,894	140,502
Total Daily VMT Avoided				244,583

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name	Coit Rd and Eldorado Pkwy (Frisco)	
Geographic		**Notes / Instructions**
Developed Area (in acres)	171.5	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	50	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	6,197	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	3,195	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	2004	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	0.27	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice?: Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	496	DU	Log Equation	Linear Equatior	Log Equation	4,537	357	444		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	0	DU	Linear Equatior	Linear Equatior	Linear Equatic	0	0	0		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equatior	Linear Equatior	Linear Equatic	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	276	ksf	Log Equation	Log Equation	Log Equation	13,131	280	1,255	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	72.61	ksf	Average Rate	Average Rate	Average Rate	2,294	213	245	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	49	ksf	Log Equation	Log Equation	Linear Equatic	768	106	133		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	181.44	ksf	Average Rate	Average Rate	Average Rate	6,555	417	628		720	36.13			40.89	-214.97	2.3					3.46			0.88	1.59	3.0	Yes	Yes	Yes
Industrial																													
Light Industrial	24.6	jobs	Average Rate	Average Rate	Average Rate	74	11	10		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		140	3.82	3.88	-20.7			0.73	0.83	-29.52			0.73	0.78	-15.97			0.5	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**27,360**	**1,384**	**2,716**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	11.3	9.39	9.83

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

FEHR & PEERS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	4955	15368	7037	27360	653	645	87	1384	657	1304	755	2716
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	16.48%	21.29%	19.85%	20.05%	18.12%	38.32%	19.85%	27.64%	16.48%	21.29%	19.85%	19.73%
Walking External	36.97%	10.03%	3.05%	13.33%	44.36%	13.04%	3.05%	29.06%	36.97%	10.03%	3.05%	14.87%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	816	3272	1397	5485	118	247	17	383	108	278	150	536
Walking External	1530	1213	172	2915	237	52	2	291	203	103	18	324
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**2609**	**10883**	**5468**	**18960**	**297**	**346**	**68**	**711**	**346**	**924**	**587**	**1856**

Results

External Vehicle Trips			
	Baseline	Adjusted	Reduction %
Daily	27,360	18,960	31%
AM Peak Hour	1,384	711	49%
PM Peak Hour	2,716	1,856	32%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	2346	4485	1569	8400
AM Peak Hour	355	299	19	674
PM Peak Hour	311	381	168	860

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	933	2950	655	4537	160	184	12	357	125	249	70	444
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	16.48%	21.29%	19.85%	20.09%	18.12%	38.32%	19.85%	28.61%	16.48%	21.29%	19.85%	19.71%
Walking External	36.97%	10.03%	3.05%	14.81%	44.36%	13.04%	3.05%	28.79%	36.97%	10.03%	3.05%	16.80%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	154	628	130	912	29	71	2	102	21	53	14	88
Walking External	288	233	16	537	58	15	0	73	39	20	2	60
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**491**	**2089**	**509**	**3089**	**73**	**99**	**10**	**181**	**66**	**176**	**55**	**297**

Results	**External Vehicle Trips**		
	Baseline	Adjusted	Reduction %
Daily	4,537	3,089	32%
AM Peak Hour	357	181	49%
PM Peak Hour	444	297	33%

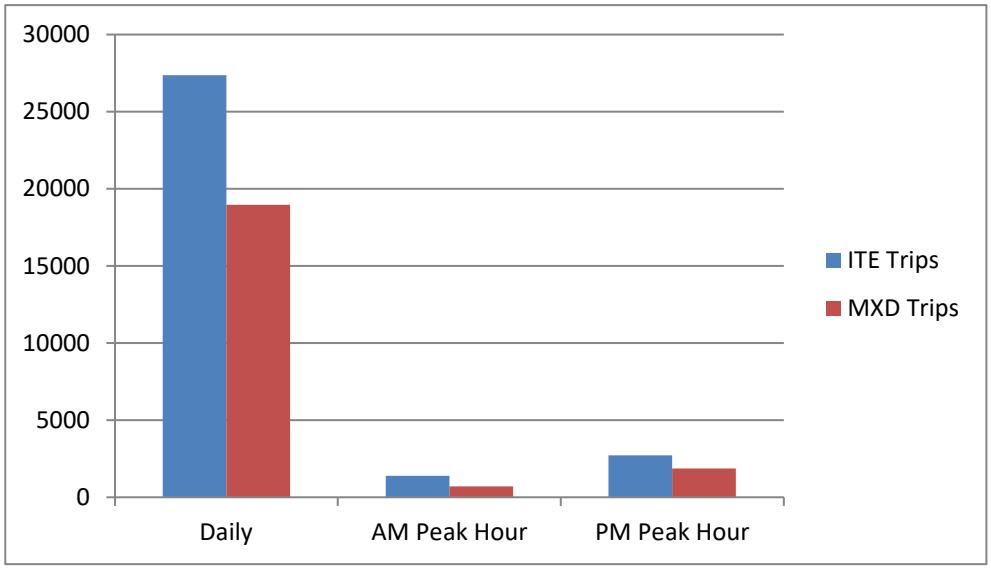
Daily VMT Reduced

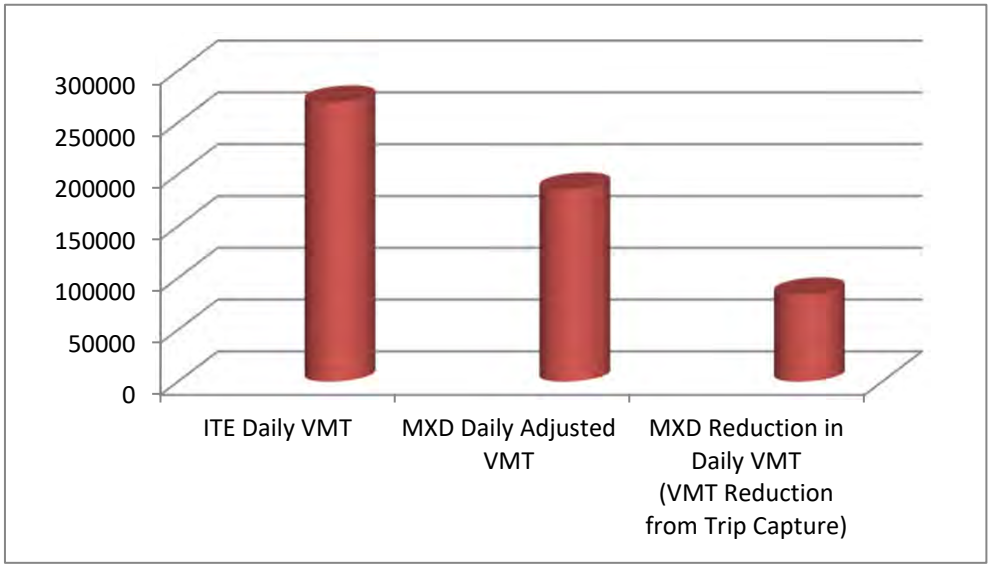
	HBW	HBO	NHB	Total
ITE Daily VMT	55,990	144,308	69,175	269,473
MXD Daily Adjusted VMT	29,477	102,193	53,752	185,422
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				84,051
as a percentage				31%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	26,513	42,116	15,423	84,051
VMT Reduction from Shorter Trips	3,835	(20,134)	(8,038)	(24,337)
Total Daily VMT Avoided				59,714

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name	Downtown	Garland
Geographic		**Notes / Instructions**
Developed Area (in acres)	81.09	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	21	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	Yes	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	Yes	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	14,330	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	93,295	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	741	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	0.92	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice?: Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family		DU	Log Equation	Linear Equation	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	467	DU	Linear Equation	Linear Equation	Linear Equation	2,954	233	275		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo		DU	Linear Equation	Linear Equation	Linear Equation	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	105	ksf	Log Equation	Log Equation	Log Equation	7,031	159	659	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	6.122	ksf	Average Rate	Average Rate	Average Rate	907	76	158	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	3.026	ksf	Average Rate	Average Rate	Average Rate	100	4	11	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	45	ksf	Average Rate	Average Rate	Average Rate	5,696	516	500	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	12.037	ksf	Average Rate	Average Rate	Average Rate	380	35	41	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	201	ksf	Log Equation	Log Equation	Linear Equation	2,286	328	304		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		720	36.13			40.89	-214.97	2.3					3.46			0.88	1.59	3.0	Yes	Yes	Yes
Industrial																													
Light Industrial	14.6	ksf	Average Rate	Average Rate	Average Rate	102	13	14		110	6.97	7.47	-101.92			0.92	1.18	-89.28			0.97	1.43	-157.36			1.0	Yes	Yes	Yes
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		140	3.82	3.88	-20.7			0.73	0.83	-29.52			0.73	0.78	-15.97			0.5	Yes	Yes	Yes
Warehousing / Self-Storage	0.448	ksf	Average Rate	Average Rate	Average Rate	1	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	1	Screens	Average Rate	Average Rate	Average Rate	175	0	14		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	860	Students	Average Rate	Average Rate	Average Rate	2,047	181	181		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**21,679**	**1,545**	**2,156**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	10.1	5.33	7.81

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

FEHR & PEERS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	6470	9919	5291	21679	887	569	89	1545	803	811	542	2156
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	4.64%	6.62%	11.50%	7.22%	5.11%	11.91%	11.50%	7.98%	4.64%	6.62%	11.50%	7.11%
Walking External	6.33%	7.34%	3.21%	6.07%	7.60%	9.54%	3.21%	8.04%	6.33%	7.34%	3.21%	5.97%
Transit External	5.77%	3.25%	3.09%	3.98%	8.08%	3.57%	3.09%	6.22%	8.08%	3.25%	3.09%	5.06%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	300	656	608	1565	45	68	10	123	37	54	62	153
Walking External	391	680	150	1221	64	48	3	114	48	56	15	119
Transit External	356	301	145	801	68	18	2	88	62	25	15	101
MXD Model # of Vehicle Trips	**5423**	**8282**	**4388**	**18093**	**710**	**435**	**74**	**1219**	**655**	**677**	**449**	**1782**

Results

External Vehicle Trips	Baseline	Adjusted	Reduction %
Daily	21,679	18,093	17%
AM Peak Hour	1,545	1,219	21%
PM Peak Hour	2,156	1,782	17%

Total Trips Reduced	HBW	HBO	NHB	Total
Daily	1047	1637	903	3587
AM Peak Hour	177	133	15	326
PM Peak Hour	148	134	92	374

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	607	1920	426	2954	104	120	8	233	77	154	43	275
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	4.64%	6.62%	11.50%	6.91%	5.11%	11.91%	11.50%	8.84%	4.64%	6.62%	11.50%	6.83%
Walking External	6.33%	7.34%	3.21%	6.56%	7.60%	9.54%	3.21%	8.42%	6.33%	7.34%	3.21%	6.43%
Transit External	5.77%	3.25%	3.09%	3.76%	8.08%	3.57%	3.09%	5.66%	8.08%	3.25%	3.09%	4.61%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	28	127	49	204	5	14	1	21	4	10	5	19
Walking External	37	132	12	180	8	10	0	18	5	11	1	16
Transit External	33	58	12	103	8	4	0	12	6	5	1	12
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**509**	**1603**	**354**	**2466**	**84**	**92**	**7**	**182**	**63**	**129**	**36**	**228**

Results	**External Vehicle Trips** Baseline	Adjusted	Reduction %
Daily	2,954	2,466	17%
AM Peak Hour	233	182	22%
PM Peak Hour	275	228	17%

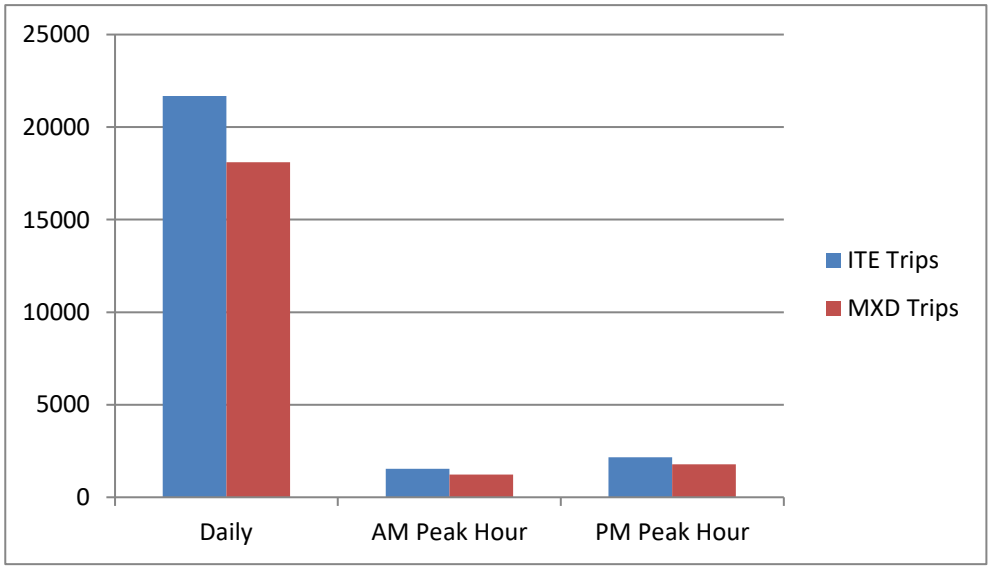
Daily VMT Reduced

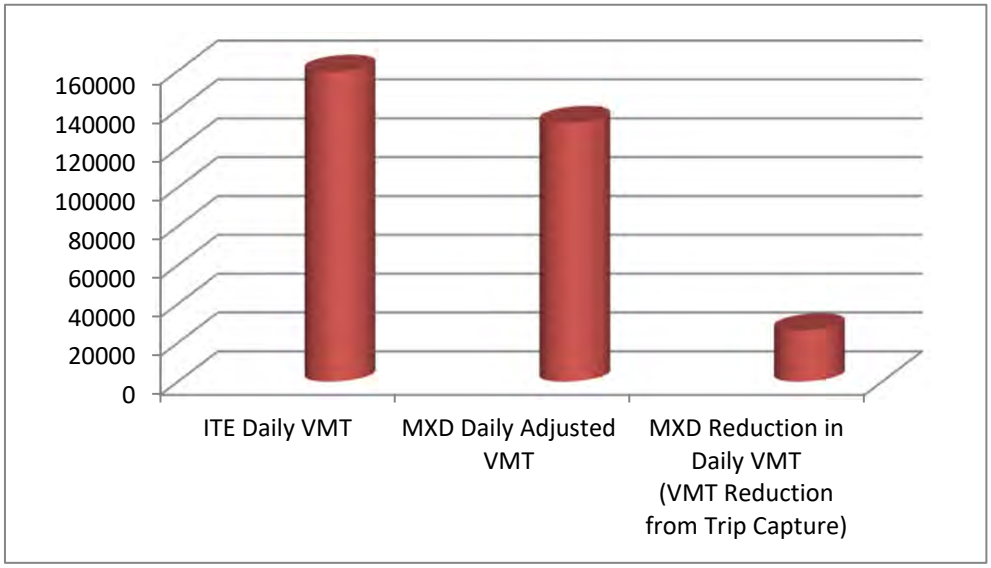
	HBW	HBO	NHB	Total
ITE Daily VMT	65,347	52,868	41,319	159,534
MXD Daily Adjusted VMT	54,771	44,144	34,267	133,182
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				26,351
as a percentage				17%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	10,576	8,723	7,052	26,351
VMT Reduction from Shorter Trips	14,479	18,304	2,413	35,196
Total Daily VMT Avoided				61,547

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name	Downtown	Plano
Geographic		**Notes / Instructions**
Developed Area (in acres)	44.16	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	14	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	Yes	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	Yes	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	35,168	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	44,829	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	1100	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	0.69	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice?: Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	0	DU	Log Equation	Linear Equatior	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	1421	DU	Linear Equatior	Linear Equatior	Linear Equatio	8,735	700	799		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equatior	Linear Equatior	Linear Equatio	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	228	ksf	Log Equation	Log Equation	Log Equation	11,607	251	1,105	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	102	ksf	Average Rate	Average Rate	Average Rate	12,957	1,174	1,136	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	72.4	ksf	Average Rate	Average Rate	Average Rate	2,288	213	245	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	456	ksf	Log Equation	Log Equation	Linear Equatio	4,294	632	590		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		720	8.91			0.67	3.76	0.53					1.06			1.06	-0.32	1.0	Yes	Yes	Yes
Industrial																													
Light Industrial	81.77	jobs	Average Rate	Average Rate	Average Rate	247	36	34		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		140	2.13	1.75	245.96			0.4			0.85	0.07	0.36			0.78	0.48	1.0	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**40,127**	**3,005**	**3,910**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	7.91	4.38	7.21

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	11401	18480	10247	40127	1781	1053	171	3005	1433	1454	1022	3910
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	5.60%	5.82%	11.77%	7.28%	6.16%	10.47%	11.77%	7.99%	5.60%	5.82%	11.77%	7.29%
Walking External	13.39%	20.09%	8.79%	15.41%	16.07%	26.12%	8.79%	19.10%	13.39%	20.09%	8.79%	14.78%
Transit External	11.99%	3.54%	2.79%	5.80%	16.79%	3.89%	2.79%	11.62%	16.79%	3.54%	2.79%	8.30%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	639	1075	1206	2920	110	110	20	240	80	85	120	285
Walking External	1441	3497	794	5732	269	246	13	528	181	275	79	536
Transit External	1290	615	253	2158	281	37	4	321	227	48	25	301
MXD Model # of Vehicle Trips	**8030**	**13293**	**7994**	**29317**	**1122**	**660**	**133**	**1916**	**944**	**1046**	**798**	**2788**

Results

External Vehicle Trips			
	Baseline	Adjusted	Reduction %
Daily	40,127	29,317	27%
AM Peak Hour	3,005	1,916	36%
PM Peak Hour	3,910	2,788	29%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	3370	5187	2253	10810
AM Peak Hour	659	393	38	1090
PM Peak Hour	488	408	225	1121

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	1795	5678	1261	8735	314	361	24	700	224	448	126	799
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	5.60%	5.82%	11.77%	6.63%	6.16%	10.47%	11.77%	8.58%	5.60%	5.82%	11.77%	6.70%
Walking External	13.39%	20.09%	8.79%	17.16%	16.07%	26.12%	8.79%	20.91%	13.39%	20.09%	8.79%	16.50%
Transit External	11.99%	3.54%	2.79%	5.19%	16.79%	3.89%	2.79%	9.80%	16.79%	3.54%	2.79%	7.19%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	101	330	148	579	19	38	3	60	13	26	15	54
Walking External	227	1074	98	1399	47	85	2	134	28	85	10	123
Transit External	203	189	31	423	50	13	1	63	36	15	3	54
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**1265**	**4085**	**984**	**6333**	**198**	**226**	**19**	**443**	**148**	**323**	**99**	**569**

Results	**External Vehicle Trips**		
	Baseline	Adjusted	Reduction %
Daily	8,735	6,333	27%
AM Peak Hour	700	443	37%
PM Peak Hour	799	569	29%

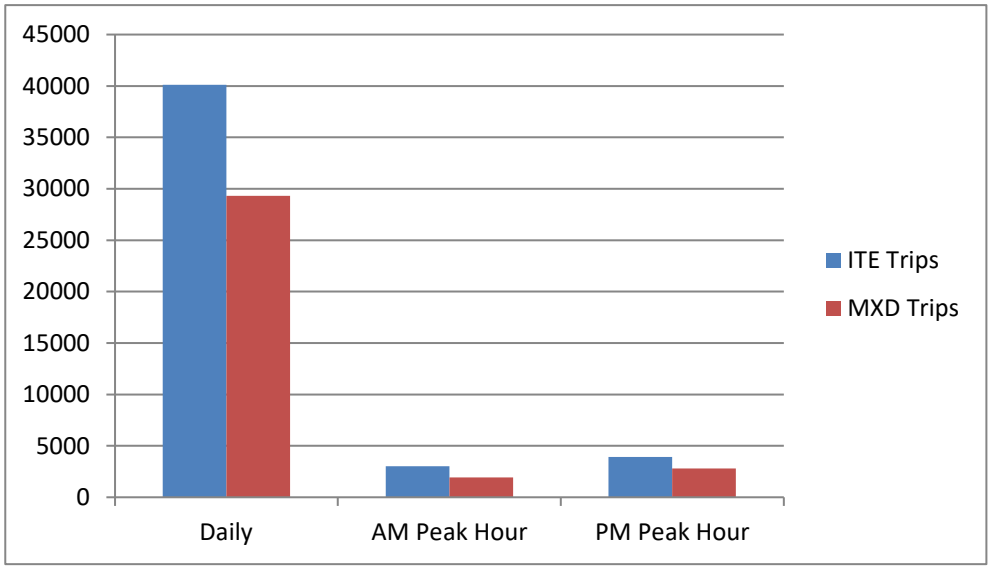
Daily VMT Reduced

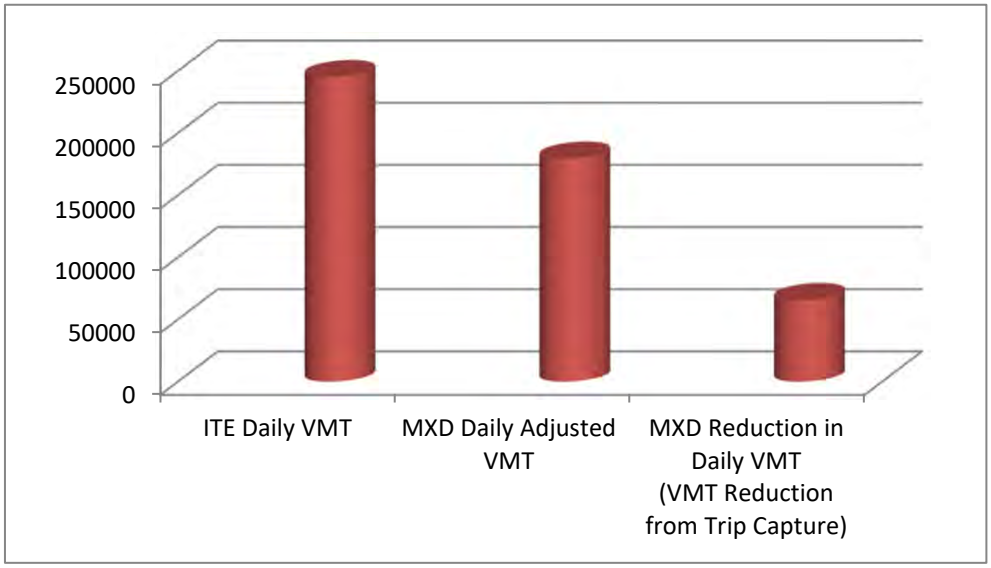
	HBW	HBO	NHB	Total
ITE Daily VMT	90,179	80,941	73,880	245,000
MXD Daily Adjusted VMT	63,521	58,221	57,639	179,381
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				65,619
as a percentage				27%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	26,658	22,720	16,241	65,619
VMT Reduction from Shorter Trips	39,028	42,004	9,193	90,226
Total Daily VMT Avoided				155,845

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR & PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name	Frisco Square	
Geographic		**Notes / Instructions**
Developed Area (in acres)	64.86	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	19	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	Yes	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	12,380	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	10,969	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	1792	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	1.05	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	
Office	3.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice?: Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	0	DU	Log Equation	Linear Equatior	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	114	DU	Linear Equatior	Linear Equatior	Linear Equatic	814	60	80		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equatior	Linear Equatior	Linear Equatic	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	134	ksf	Log Equation	Log Equation	Log Equation	8,230	183	776	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	41.92	ksf	Average Rate	Average Rate	Average Rate	6,210	518	1,082	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	2	ksf	Average Rate	Average Rate	Average Rate	254	23	22	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	15.17	ksf	Average Rate	Average Rate	Average Rate	7,526	749	513	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	43.12	ksf	Average Rate	Average Rate	Average Rate	50,928	3,419	4,186	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	143	ksf	Log Equation	Log Equation	Linear Equatic	1,754	249	239		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	699.56	ksf	Average Rate	Average Rate	Average Rate	25,275	1,609	2,420		720	36.13			40.89	-214.97	2.3					3.46			0.88	1.59	3.0	Yes	Yes	Yes
Industrial																													
Light Industrial	107.91	jobs	Average Rate	Average Rate	Average Rate	326	47	45		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		140	3.82	3.88	-20.7			0.73	0.83	-29.52			0.73	0.78	-15.97			0.5	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	12	Screens	Average Rate	Average Rate	Average Rate	2,104	0	164		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**103,421**	**6,857**	**9,528**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	9.53	6.55	7.78

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

FEHR & PEERS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	32484	41753	29185	103421	4337	2084	437	6857	3756	3063	2709	9528
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	3.96%	5.62%	13.19%	7.24%	4.36%	10.11%	13.19%	6.67%	3.96%	5.62%	13.19%	7.12%
Walking External	4.68%	10.63%	4.91%	7.19%	5.62%	13.82%	4.91%	7.98%	4.68%	10.63%	4.91%	6.69%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	1287	2345	3850	7483	189	211	58	457	149	172	357	678
Walking External	1461	4188	1244	6893	233	259	19	511	169	307	115	592
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**29735**	**35219**	**24091**	**89045**	**3915**	**1614**	**361**	**5890**	**3439**	**2583**	**2236**	**8258**

Results

	External Vehicle Trips		
	Baseline	Adjusted	Reduction %
Daily	103,421	89,045	14%
AM Peak Hour	6,857	5,890	14%
PM Peak Hour	9,528	8,258	13%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	2749	6533	5094	14376
AM Peak Hour	422	469	76	968
PM Peak Hour	318	479	473	1270

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	167	529	118	814	27	31	2	60	23	45	13	80
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	3.96%	5.62%	13.19%	6.37%	4.36%	10.11%	13.19%	7.63%	3.96%	5.62%	13.19%	6.35%
Walking External	4.68%	10.63%	4.91%	8.61%	5.62%	13.82%	4.91%	9.72%	4.68%	10.63%	4.91%	8.08%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	7	30	16	52	1	3	0	5	1	3	2	5
Walking External	8	53	5	66	1	4	0	5	1	5	1	6
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**153**	**447**	**97**	**697**	**24**	**24**	**2**	**50**	**21**	**38**	**10**	**69**

Results	External Vehicle Trips		
	Baseline	Adjusted	Reduction %
Daily	814	697	14%
AM Peak Hour	60	50	17%
PM Peak Hour	80	69	14%

Daily VMT Reduced

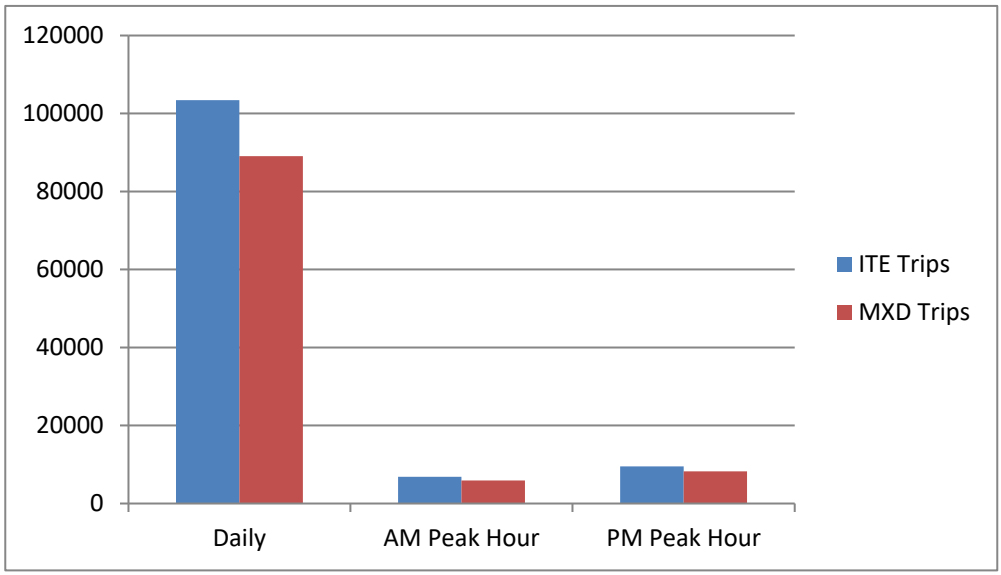
	HBW	HBO	NHB	Total
ITE Daily VMT	309,572	273,479	227,056	810,108
MXD Daily Adjusted VMT	283,374	230,686	187,425	701,485
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				108,623
as a percentage				13%

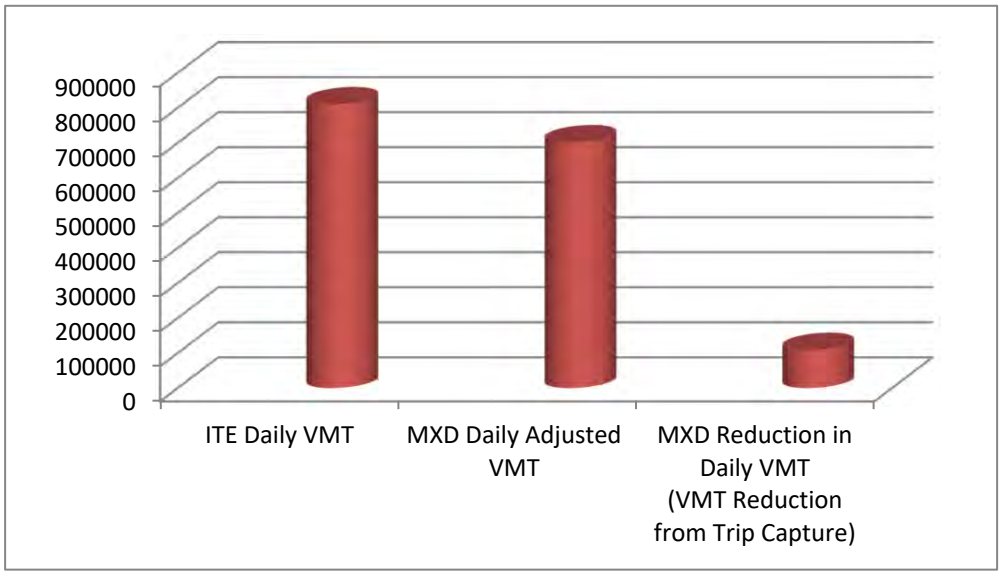
391.4537

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	26,198	42,793	39,632	108,623
VMT Reduction from Shorter Trips	96,341	34,867	13,973	145,181
Total Daily VMT Avoided				253,803

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc...

Section 1 - General Site Information

Site Name	Legacy Commons	
Geographic		**Notes / Instructions**
Developed Area (in acres)	25.56	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	8	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	32,534	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	31,117	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	879	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	0.59	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit			
		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice?: Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	0	DU	Log Equation	Linear Equation	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	611	DU	Linear Equation	Linear Equation	Linear Equation	3,826	303	354		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	530	ksf	Log Equation	Log Equation	Log Equation	20,071	412	1,944	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	151	ksf	Average Rate	Average Rate	Average Rate	19,170	1,737	1,681	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	56	ksf	Log Equation	Log Equation	Linear Equation	857	118	142		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		720	8.91			0.67	3.76	0.53					1.06			1.06	-0.32	1.0	Yes	Yes	Yes
Industrial																													
Light Industrial	7.96	jobs	Average Rate	Average Rate	Average Rate	24	4	3		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		140	2.13	1.75	245.96			0.4			0.85	0.07	0.36			0.78	0.48	1.0	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	220	Rooms	Average Rate	Average Rate	Average Rate	1,797	123	130		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel		Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater		Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University		Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School		Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School		Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary		Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**45,746**	**2,697**	**4,254**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	8.12	5.79	8.06

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	6061	27467	12218	45746	926	1563	208	2697	752	2240	1262	4254
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	6.64%	5.05%	8.95%	6.31%	7.31%	9.10%	8.95%	8.47%	6.64%	5.05%	8.95%	6.49%
Walking External	16.80%	24.13%	9.54%	19.38%	20.15%	31.37%	9.54%	25.79%	16.80%	24.13%	9.54%	18.62%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	403	1388	1094	2884	68	142	19	228	50	113	113	276
Walking External	950	6293	1062	8306	173	446	18	637	118	513	110	741
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**4708**	**19786**	**10063**	**34556**	**685**	**975**	**172**	**1832**	**584**	**1613**	**1040**	**3237**

Results

	External Vehicle Trips		
	Baseline	Adjusted	Reduction %
Daily	45,746	34,556	24%
AM Peak Hour	2,697	1,832	32%
PM Peak Hour	4,254	3,237	24%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	1353	7681	2156	11190
AM Peak Hour	241	588	37	865
PM Peak Hour	168	626	223	1017

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	786	2487	552	3826	136	156	10	303	99	198	56	354
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	6.64%	5.05%	8.95%	5.94%	7.31%	9.10%	8.95%	8.29%	6.64%	5.05%	8.95%	6.12%
Walking External	16.80%	24.13%	9.54%	20.60%	20.15%	31.37%	9.54%	25.53%	16.80%	24.13%	9.54%	19.85%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	52	126	49	227	10	14	1	25	7	10	5	22
Walking External	123	570	48	741	25	45	1	71	16	45	5	66
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**611**	**1792**	**455**	**2858**	**101**	**98**	**9**	**207**	**77**	**143**	**46**	**266**

Results	External Vehicle Trips		
	Baseline	Adjusted	Reduction %
Daily	3,826	2,858	25%
AM Peak Hour	303	207	32%
PM Peak Hour	354	266	25%

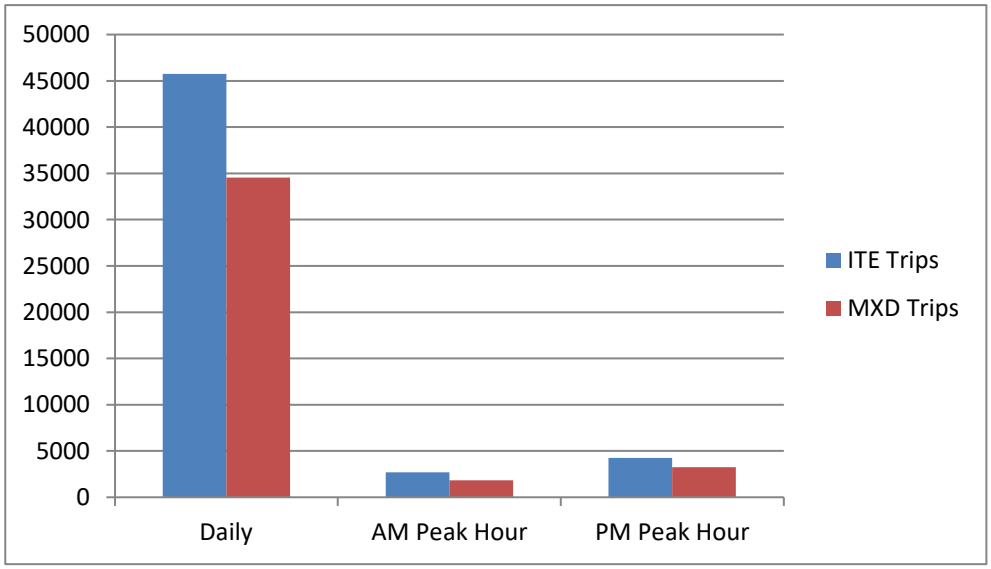
Daily VMT Reduced

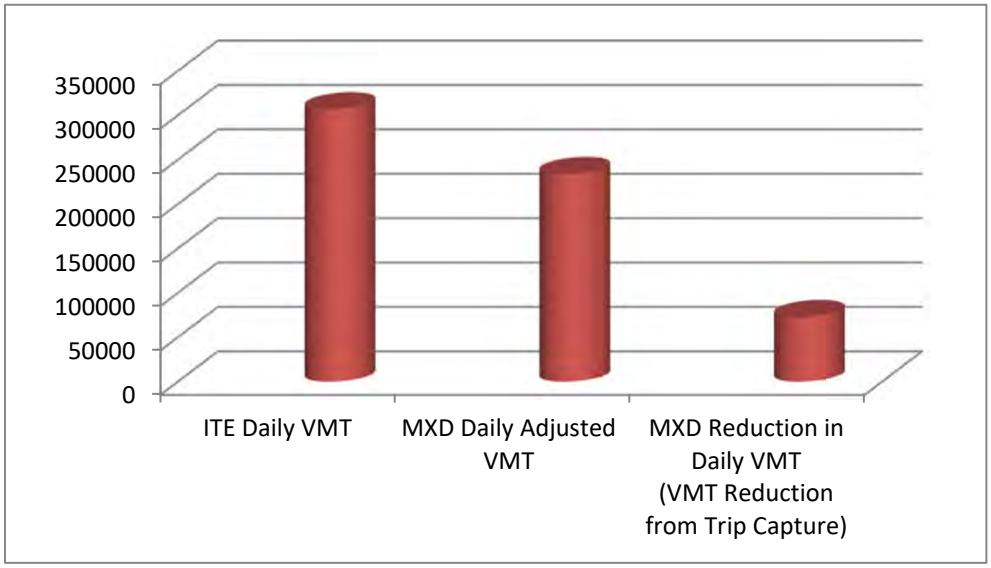
	HBW	HBO	NHB	Total
ITE Daily VMT	49,214	159,035	98,479	306,728
MXD Daily Adjusted VMT	38,228	114,559	81,105	233,892
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				72,836
as a percentage				24%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	10,986	44,476	17,374	72,836
VMT Reduction from Shorter Trips	21,892	34,625	3,019	59,535
Total Daily VMT Avoided				132,371

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name	Legacy Town Center	
Geographic		**Notes / Instructions**
Developed Area (in acres)	261.21	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	62	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	96,714	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	77,114	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	6435	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	1.03	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Jobs Per Input Unit (if Applicable)	Valid Trip Gen Calc Choice?: Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																												
Single Family	0	DU	Log Equation	Linear Equatior	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	4770	DU	Linear Equatior	Linear Equatior	Linear Equatio	29,030	2,341	2,641		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equatior	Linear Equatior	Linear Equatio	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																												
General Retail other than those listed below	2910	ksf	Log Equation	Log Equation	Log Equation	60,735	1,125	6,086	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																												
Non-Medical	2698	ksf	Log Equation	Log Equation	Linear Equatio	16,867	2,618	3,100		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		720	8.91			0.67	3.76	0.53					1.06			1.06	-0.32	1.0	Yes	Yes	Yes
Industrial																												
Light Industrial	2310.28	jobs	Average Rate	Average Rate	Average Rate	6,977	1,017	970		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		140	2.13	1.75	245.96			0.4			0.85	0.07	0.36			0.78	0.48	1.0	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	124.6	Rooms	Average Rate	Average Rate	Average Rate	1,018	70	74		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																												
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**114,627**	**7,170**	**12,871**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	7.11	4.92	7.47

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	22374	64663	27590	114627	4027	2773	371	7170	3577	5910	3384	12871
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	3.58%	8.75%	26.48%	12.01%	3.94%	15.76%	26.48%	9.67%	3.58%	8.75%	26.48%	11.98%
Walking External	9.50%	12.69%	10.22%	11.51%	11.40%	16.50%	10.22%	13.19%	9.50%	12.69%	10.22%	11.18%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	801	5661	7305	13767	159	437	98	694	128	517	896	1541
Walking External	2050	7489	2073	11612	441	385	28	854	328	685	254	1267
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**19523**	**51513**	**18211**	**89247**	**3428**	**1950**	**245**	**5622**	**3121**	**4708**	**2234**	**10063**

Results

	External Vehicle Trips		
	Baseline	Adjusted	Reduction %
Daily	114,627	89,247	22%
AM Peak Hour	7,170	5,622	22%
PM Peak Hour	12,871	10,063	22%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	2851	13150	9379	25380
AM Peak Hour	600	822	126	1548
PM Peak Hour	456	1202	1150	2808

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	5967	18872	4191	29030	1052	1208	81	2341	742	1482	417	2641
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	3.58%	8.75%	26.48%	10.25%	3.94%	15.76%	26.48%	10.82%	3.58%	8.75%	26.48%	10.10%
Walking External	9.50%	12.69%	10.22%	11.70%	11.40%	16.50%	10.22%	13.85%	9.50%	12.69%	10.22%	11.41%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	214	1652	1110	2975	41	190	21	253	27	130	111	267
Walking External	547	2186	315	3047	115	168	6	289	68	172	31	271
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**5207**	**15034**	**2766**	**23007**	**895**	**850**	**53**	**1798**	**647**	**1181**	**275**	**2103**

Results

	External Vehicle Trips		
	Baseline	Adjusted	Reduction %
Daily	29,030	23,007	21%
AM Peak Hour	2,341	1,798	23%
PM Peak Hour	2,641	2,103	20%

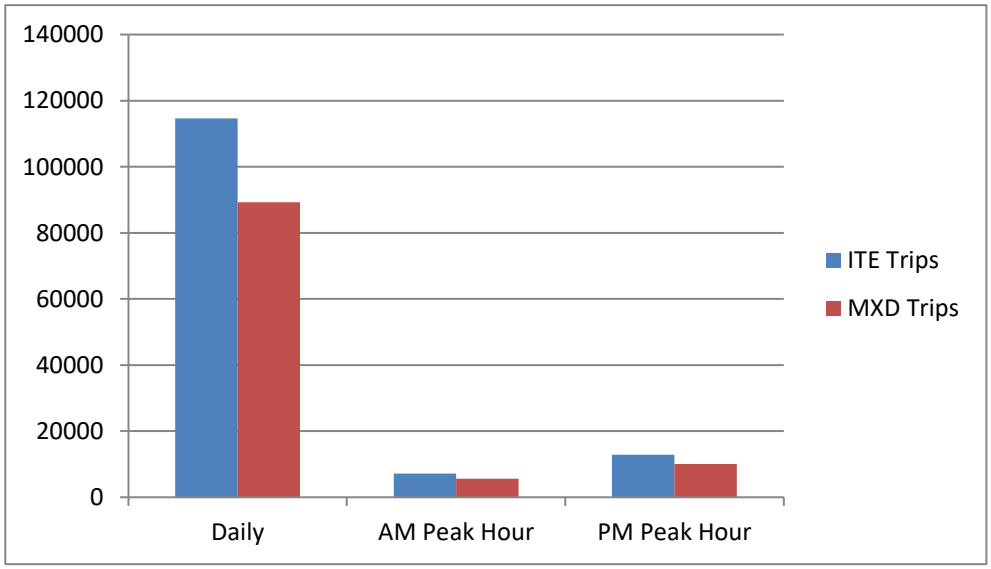
Daily VMT Reduced

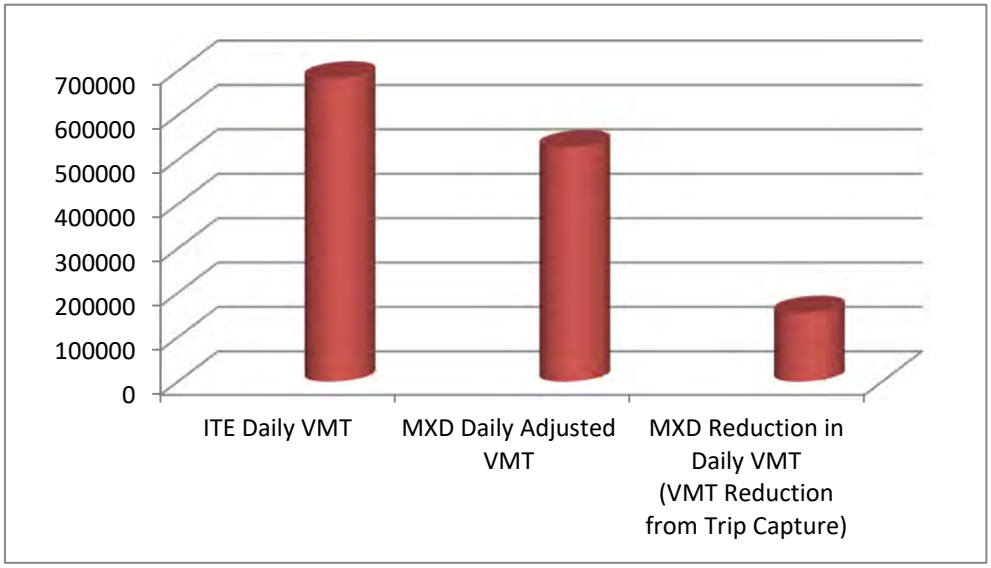
	HBW	HBO	NHB	Total
ITE Daily VMT	159,076	318,144	206,096	683,316
MXD Daily Adjusted VMT	138,808	253,444	136,038	528,290
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				155,026
as a percentage				23%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	20,268	64,700	70,058	155,026
VMT Reduction from Shorter Trips	110,500	134,964	16,208	261,672
Total Daily VMT Avoided				416,698

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc…

Section 1 - General Site Information

Site Name: Teel Pkwy & Main St (Frisco)

Geographic		**Notes / Instructions**
Developed Area (in acres)	209.2	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	50	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	1,799	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	523	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	1759	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	2.01	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
Completely Within the Project Site	25%		
With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

SITE-SPECIFIC INTERNALIZATION

This should only be used in unique situations such as if the project is isolated from surrounding communities or contains a school that primarily serves local residents

This section of input is for when you have specific trips you want to EXCLUDE from the MXD process. These trips will be counted as internal, and subtracted from the "baseline" trips before applying the model. The overall trip reduction percentage will still take these trips into account, and thus be a higher reduction than if you were just letting the model work on all the "baseline" trips. An experienced transportation engineer or planner should be consulted to determine the appropriate assumptions and calculations.

Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	AM Peak Hour	PM Peak Hour	Trips: Daily	AM Peak Hour	PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice? Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																												
Single Family	671	DU	Log Equation	Linear Equatior	Log Equation	5,991	479	583		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	0	DU	Linear Equatior	Linear Equatior	Linear Equatic	0	0	0		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equatior	Linear Equatior	Linear Equatic	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																												
General Retail other than those listed below	778	ksf	Log Equation	Log Equation	Log Equation	25,759	517	2,514	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	56.47	ksf	Average Rate	Average Rate	Average Rate	8,366	697	1,458	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	160.72	ksf	Average Rate	Average Rate	Average Rate	5,079	473	543	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																												
Non-Medical	17	ksf	Log Equation	Log Equation	Linear Equatic	344	46	98		710	11.01			0.77	3.65	1.55			0.8	1.55	1.49	1.12	78.81			3.0	Yes	Yes	Yes
Medical	32.36	ksf	Average Rate	Average Rate	Average Rate	1,169	74	112		720	36.13			40.89	-214.97	2.3					3.46			0.88	1.59	3.0	Yes	Yes	Yes
Industrial																												
Light Industrial	2.6	jobs	Average Rate	Average Rate	Average Rate	8	1	1		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		140	3.82	3.88	-20.7			0.73	0.83	-29.52			0.73	0.78	-15.97			0.5	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																												
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	942.99	Students	Average Rate	Average Rate	Average Rate	1,528	509	151		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**48,243**	**2,797**	**5,460**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	13.31	11.3	10.26

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	6182	29654	12407	48243	947	1654	196	2797	933	2946	1581	5460
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	2.19%	6.50%	15.96%	8.38%	2.41%	11.71%	15.96%	8.85%	2.19%	6.50%	15.96%	8.50%
Walking External	0.81%	1.00%	0.93%	0.96%	0.97%	1.30%	0.93%	1.15%	0.81%	1.00%	0.93%	0.95%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	135	1928	1980	4044	23	194	31	248	20	192	252	464
Walking External	49	277	97	423	9	19	2	29	7	27	12	47
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**5998**	**27449**	**10330**	**43777**	**915**	**1441**	**163**	**2520**	**905**	**2727**	**1316**	**4949**

Results

External Vehicle Trips	Baseline	Adjusted	Reduction %
Daily	48,243	43,777	9%
AM Peak Hour	2,797	2,520	10%
PM Peak Hour	5,460	4,949	9%

Total Trips Reduced	HBW	HBO	NHB	Total
Daily	184	2205	2078	4466
AM Peak Hour	32	213	33	277
PM Peak Hour	28	219	265	512

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	1231	3895	865	5991	215	247	17	479	164	327	92	583
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	2.19%	6.50%	15.96%	6.98%	2.41%	11.71%	15.96%	7.68%	2.19%	6.50%	15.96%	6.79%
Walking External	0.81%	1.00%	0.93%	0.95%	0.97%	1.30%	0.93%	1.13%	0.81%	1.00%	0.93%	0.93%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	27	253	138	418	5	29	3	37	4	21	15	40
Walking External	10	36	7	53	2	3	0	5	1	3	1	5
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**1195**	**3605**	**720**	**5520**	**208**	**216**	**14**	**438**	**159**	**303**	**77**	**538**

Results	**External Vehicle Trips** Baseline	Adjusted	Reduction %
Daily	5,991	5,520	8%
AM Peak Hour	479	438	9%
PM Peak Hour	583	538	8%

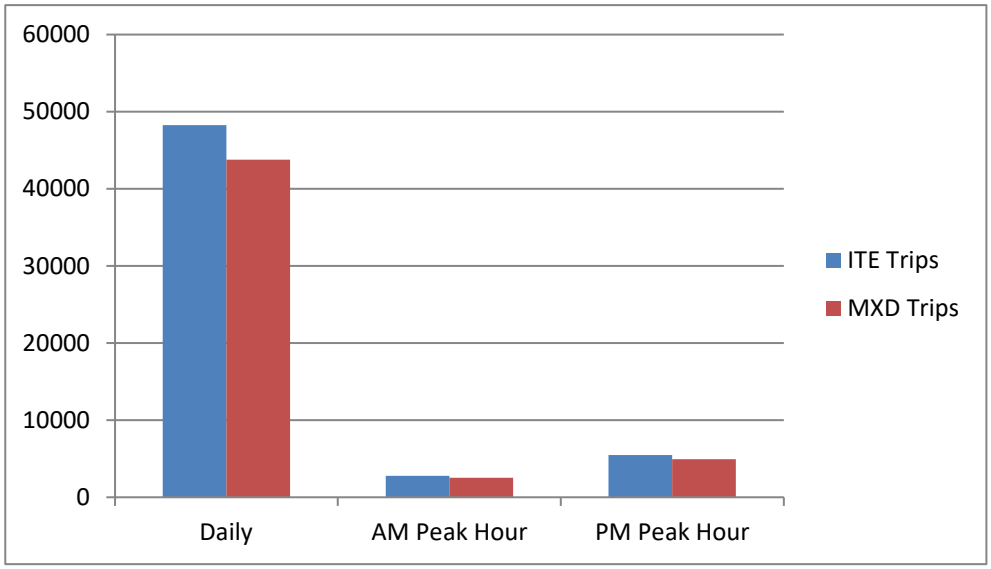
Daily VMT Reduced

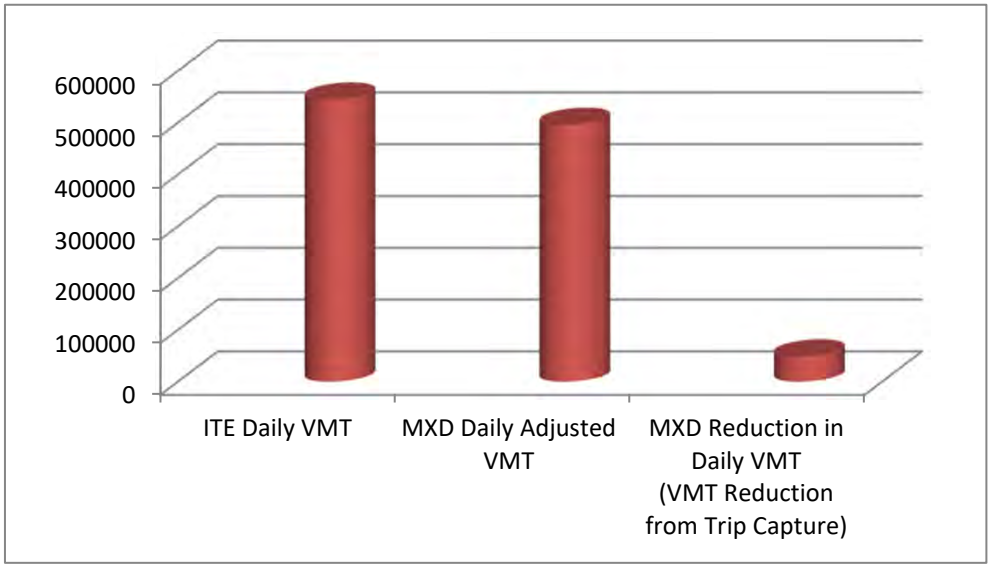
	HBW	HBO	NHB	Total
ITE Daily VMT	82,282	335,089	127,299	544,670
MXD Daily Adjusted VMT	79,833	310,174	105,983	495,990
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				48,680
as a percentage				9%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	2,449	24,915	21,315	48,680
VMT Reduction from Shorter Trips	(3,239)	(103,208)	(19,627)	(126,074)
Total Daily VMT Avoided				(77,394)

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips





MIXED USE TRIP GENERATION MODEL V4 - INPUT

FEHR & PEERS

All shaded cells are inputs
Project / Scenario Specific Inputs
Default National Factors - Can be changed for project based on site specific data, or regional values from census data, travel demand model, etc...

Section 1 - General Site Information

Site Name	Watters Creek in Allen	
Geographic		**Notes / Instructions**
Developed Area (in acres)	27.96	Include streets, ROW, parking lots, pocket parks. Do not include open space, vacant lots.
Number of Intersections	7	Count intersections either within or on the perimeter of the MXD. Do not count most unsignalized driveways or alleys, but DO count major entrances to shopping areas or residential developments.
Is Transit (bus or rail) present within the site or across the street?	No	Note: This is only used as a way to zero out the probability of external trips if no transit is present.
Land Use - Surrounding Area		
Is the site in a Central Business District or TOD?	No	Answering "Yes" will reduce the HBO and NHB purpose splits for retail use to those found in smaller stores. The nature of the stores (large vs. small) should be the primary factor in the selection here.
Employment within one mile of the MXD	19,718	Do not include employment within the MXD itself
Employment within a 30 minute Transit Trip (Door-to-door)	12,891	Include employment within the MXD itself This can be a difficult number to get - some suggestions are in the instructions tab in "Instructions."
Site Demographics		
Enter Population Directly?	Yes	If "No", will apply average HH size factors (in section 2) to dwelling units below
Population	531	Enter Population Here. You still need to enter dwelling units below.
Average Vehicles Owned per Dwelling Unit	1.65	The U.S. Census American Community Survey is likely a good source. Go to the link at right, and search "Community Facts" for your community. The vehicles per household data is within the housing statistics of the ACS. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

Section 2 - Variable Modeling Parameters

Conversion Factors

		Source:	What does this input affect?
Average Household Size			
Single Family	3.2		Directly affects trip internalization and mode splits. Also used to compute site population if population isn't entered directly.
Multi-Family	2.5		
High Rise Condo	2.5		
Jobs per ksf			
Retail	2.0	ITE Trip Generation Manual	Used to compute site employment for any land uses which are entered in ksf rather than jobs. For retail, if land uses are entered in jobs, it's used to convert back to ksf for trip generation calculations.
Office	3.0	ITE Trip Generation Manual	
Light Industrial	1.0	ITE Trip Generation Manual	
Manufacturing	0.5	ITE Trip Generation Manual	
Warehousing	2.0	ITE Trip Generation Manual	
Misc. Uses	2.0	ITE Trip Generation Manual	
Jobs from ITE rates per other unit		Source	
Jobs per Hotel Room	0.50	ITE Trip Generation Manual	Used to compute site employment for these land uses which are typically expressed in other units
Jobs per Movie Screen	4.00	ITE Trip Generation Manual	
Grade School Jobs per student	0.10	ITE Trip Generation Manual	
High School / Middle School Jobs per Student	0.10	ITE Trip Generation Manual	
College Jobs per student	0.25	ITE Trip Generation Manual	

Trip Purpose Splits by Land Use Type
This will affect the final results significantly. Keep "Use NCHRP" on "Yes" unless you have reliable splits which have been QA/QC

For each land use type, choose whether to use NCHRP 365 splits as outlined on the Mode Parameters tab.
If "Yes" is chosen, the percentages will not affect the results. If "No," then enter the splits.

NOTE: For residences, the NHB Attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: For all other purposes, the NHB attractions are automatically set equal to the NHB productions, and the HBO attractions are automatically calculated as the remainder to ensure the total is 100%
NOTE: There is no NCHRP split defined for schools, so the split has to be entered below.

		Productions			Attractions			
DAILY	**Use NCHRP?**	**HBW**	**HBO**	**NHB**	**HBW**	**HBO**	**NHB**	**Source (if not using NCHRP):**
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
AM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	
PM PEAK HOUR								
Residences	Yes	15%	50%	10%	7%	8%	10%	
Retail	Yes	0%	0%	15%	10%	60%	15%	
Office	Yes	0%	0%	15%	35%	35%	15%	
Other non-residential (excluding schools)	Yes	0%	0%	10%	60%	20%	10%	
Schools	No	0%	0%	2.5%	35%	60%	3%	

NON-HOME BASED TRIPS GENERATED BY PROJECT HOUSEHOLDS

Enter the percent of these that occur…		Source for this information:	
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With one trip end external to the Project Site	15%		This only affects VMT calculations
Completely outside the Project Site	60%	Calculated from other two percentages	

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Section 3 - Land Use Inputs

	Quantity	Units	Trip Equation Method: Daily	Trip Equation Method: AM Peak Hour	Trip Equation Method: PM Peak Hour	Trips: Daily	Trips: AM Peak Hour	Trips: PM Peak Hour		ITE Daily Parameters: Code	Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	AM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	PM PEAK HOUR TRIP RATES: Average Rate	Linear Multiplier	Linear Constant	Log Multipler	Log Constant	Valid Trip Gen Calc Choice? Jobs Per Input Unit (if Applicable)	Daily	AM Peak Hour	PM Peak Hour
Number of Dwelling Units																													
Single Family	0	DU	Log Equation	Linear Equation	Log Equation	0	0	0		210	9.57			0.92	2.71	0.75	0.7	9.74			1.01			0.9	0.51		Yes	Yes	Yes
Multi-Family	233	DU	Linear Equation	Linear Equation	Linear Equation	1,536	118	146		220	6.65	6.06	123.56			0.51	0.49	3.73			0.62	0.55	17.65				Yes	Yes	Yes
High Rise Condo	0	DU	Linear Equation	Linear Equation	Linear Equation	0	0	0		232	4.18	3.77	223.66			0.34	0.29	28.86			0.38	0.34	15.47				Yes	Yes	Yes
Retail (note: if you use job units for retail, the spreadsheet will convert before applying trip rates, using the rate in section 2 which you can change)																													
General Retail other than those listed below	120	ksf	Log Equation	Log Equation	Log Equation	7,631	171	717	Note the	820	42.94			0.65	5.83	1			0.59	2.32	3.73			0.67	3.37	2.0	Yes	Yes	Yes
Supermarket	73.61	ksf	Average Rate	Average Rate	Average Rate	7,526	264	773	formulas	850	102.24	66.95	1391.56			3.59					10.5			0.61	3.95	2.0	Yes	Yes	Yes
Bank	4.03	ksf	Average Rate	Average Rate	Average Rate	597	50	104	are	912	148.15					12.35					25.82					2.0	Yes	Yes	Yes
Health Club	8.807	ksf	Average Rate	Average Rate	Average Rate	290	12	31	slightly	492	32.93					1.38					3.53			0.95	1.43	2.0	Yes	Yes	Yes
Restaurant (non-fast food)	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	different	932	127.15					11.52					11.15					2.0	Yes	Yes	Yes
Fast-Food Restaurant	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	in this	934	496.12					49.35					33.84					2.0	Yes	Yes	Yes
Gas Station	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	section	945	1181.07					79.3					97.08					2.0	Yes	Yes	Yes
Auto Repair	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0	<====	942	31.6					2.94					3.38			0.94	1.33	2.0	Yes	Yes	Yes
Office																													
Non-Medical	103	jobs	Log Equation	Log Equation	Linear Equation	456	68	98		710	3.32			0.84	2.23	0.48			0.86	0.24	0.46	0.37	60.08			1.0	Yes	Yes	Yes
Medical	4	jobs	Average Rate	Average Rate	Average Rate	36	2	4		720	8.91			0.67	3.76	0.53					1.06			1.06	-0.32	1.0	Yes	Yes	Yes
Industrial																													
Light Industrial	12	jobs	Average Rate	Average Rate	Average Rate	36	5	5		110	3.02	2.95	30.57			0.44	0.27	70.47			0.42	0.29	58.03			1.0	Yes	Yes	Yes
Manufacturing	0	jobs	Average Rate	Average Rate	Average Rate	0	0	0		140	2.13	1.75	245.96			0.4			0.85	0.07	0.36			0.78	0.48	1.0	Yes	Yes	Yes
Warehousing / Self-Storage	0	ksf	Average Rate	Average Rate	Average Rate	0	0	0		151	2.5			1.01	0.82	0.15					0.26			1.02	1.49	2.0	Yes	Yes	Yes
Hotel (including restaurant, facilities, etc…)	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		310	8.17	8.95	-373.16			0.56			1.24	-2	0.59					0.50	Yes	Yes	Yes
Motel	0	Rooms	Average Rate	Average Rate	Average Rate	0	0	0		320	5.63			0.92	2.11	0.45			0.92	-0.46	0.47			0.94	-0.51	0.50	Yes	Yes	Yes
Movie Theater	0	Screens	Average Rate	Average Rate	Average Rate	0	0	0		445	175.29					0					13.64					4.00	Yes	Yes	Yes
School																													
University	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		550	2.38	2.23	440			0.21	0.21	-69.14			0.21	0.19	118.58			0.25	Yes	Yes	Yes
High School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		530	1.71			0.81	1.86	0.42					0.13					0.10	Yes	Yes	Yes
Middle School	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		522	1.62					0.54					0.16					0.10	Yes	Yes	Yes
Elementary	0	Students	Average Rate	Average Rate	Average Rate	0	0	0		520	1.29					0.45			1.14	-1.86	0.15					0.10	Yes	Yes	Yes

	Daily	AM Peak Hour	PM Peak Hour
Trips from Land uses not covered above ==>	0	0	0
Jobs in those Land Uses	0		

	Daily	AM Peak Hour	PM Peak Hour
Total "Baseline" ITE Trips	**18,108**	**691**	**1,879**

Section 4 - VMT Inputs

	HBW	HBO	NHB
Average Trip Length in the Region	12.77	7.54	8.36
Average Trip Length in the Traffic Analysis Zone	11.68	8.26	7.98

Source:

region's Metropolitan Planning Organization

MIXED USE TRIP GENERATION MODEL V4 - RESULTS

MODEL APPLICATION - ALL TRIPS

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	2100	11122	4886	18108	244	396	52	691	313	1001	565	1879
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	3.10%	3.35%	5.61%	3.93%	3.41%	6.04%	5.61%	5.08%	3.10%	3.35%	5.61%	3.99%
Walking External	2.79%	8.57%	3.71%	6.61%	3.35%	11.15%	3.71%	7.80%	2.79%	8.57%	3.71%	6.16%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	65	373	274	712	8	24	3	35	10	34	32	75
Walking External	57	922	171	1149	8	41	2	51	8	83	20	111
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
MXD Model # of Vehicle Trips	**1978**	**9828**	**4441**	**16246**	**227**	**331**	**47**	**605**	**295**	**885**	**513**	**1693**

Results

External Vehicle Trips			
	Baseline	Adjusted	Reduction %
Daily	18,108	16,246	10%
AM Peak Hour	691	605	12%
PM Peak Hour	1,879	1,693	10%

Total Trips Reduced				
	HBW	HBO	NHB	Total
Daily	122	1295	445	1862
AM Peak Hour	16	65	5	86
PM Peak Hour	18	117	51	186

MODEL APPLICATION - TRIP ENDS ASSOCIATED WITH HOUSES IN THE PROJECT ONLY

	Daily				AM Peak Hour				PM Peak Hour			
	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total	HBW	HBO	NHB	Total
Baseline # of External Trips (ITE Model)	316	998	222	1536	53	61	4	118	41	82	23	146
% External Trip Reduction (predicted by MXD Model)												
Internal Capture	3.10%	3.35%	5.61%	3.63%	3.41%	6.04%	5.61%	4.84%	3.10%	3.35%	5.61%	3.64%
Walking External	2.79%	8.57%	3.71%	6.69%	3.35%	11.15%	3.71%	7.33%	2.79%	8.57%	3.71%	6.19%
Transit External	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
# of Trips Reduced (predicted by MXD Model)												
Internal Capture	10	33	12	56	2	4	0	6	1	3	1	5
Walking External	9	83	8	99	2	6	0	8	1	7	1	9
Transit External	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted # (MXD Model) of Vehicle Trips generated by Project Residences	**297**	**882**	**201**	**1381**	**49**	**51**	**4**	**104**	**39**	**72**	**21**	**132**

Results	**External Vehicle Trips**		
	Baseline	Adjusted	Reduction %
Daily	1,536	1,381	10%
AM Peak Hour	118	104	12%
PM Peak Hour	146	132	10%

Daily VMT Reduced

	HBW	HBO	NHB	Total
ITE Daily VMT	24,528	91,870	38,989	155,387
MXD Daily Adjusted VMT	23,105	81,176	35,436	139,716
MXD Reduction in Daily VMT (VMT Reduction from Trip Capture)				15,671
as a percentage				10%

	HBW	HBO	NHB	Total
VMT Reduction from Trip Capture	1,423	10,694	3,554	15,671
VMT Reduction from Shorter Trips	2,156	(7,076)	1,687	(3,232)
Total Daily VMT Avoided				12,439

MXD Peak Hour Factors by Trip Purpose						
Module	AM			PM		
	HBW	HBO	NHB	HBW	HBO	NHB
Internal Capture	1.10	1.80	1.00	1.00	1.00	1.00
Walking External	1.20	1.30	1.00	1.00	1.00	1.00
Transit External	1.40	1.10	1.00	1.40	1.00	1.00

Comparison of MXD forecasted daily trips to ITE forecasted daily trips