

# **Develop External Trip Table/Model Using Statewide Model - Other States' Experience**

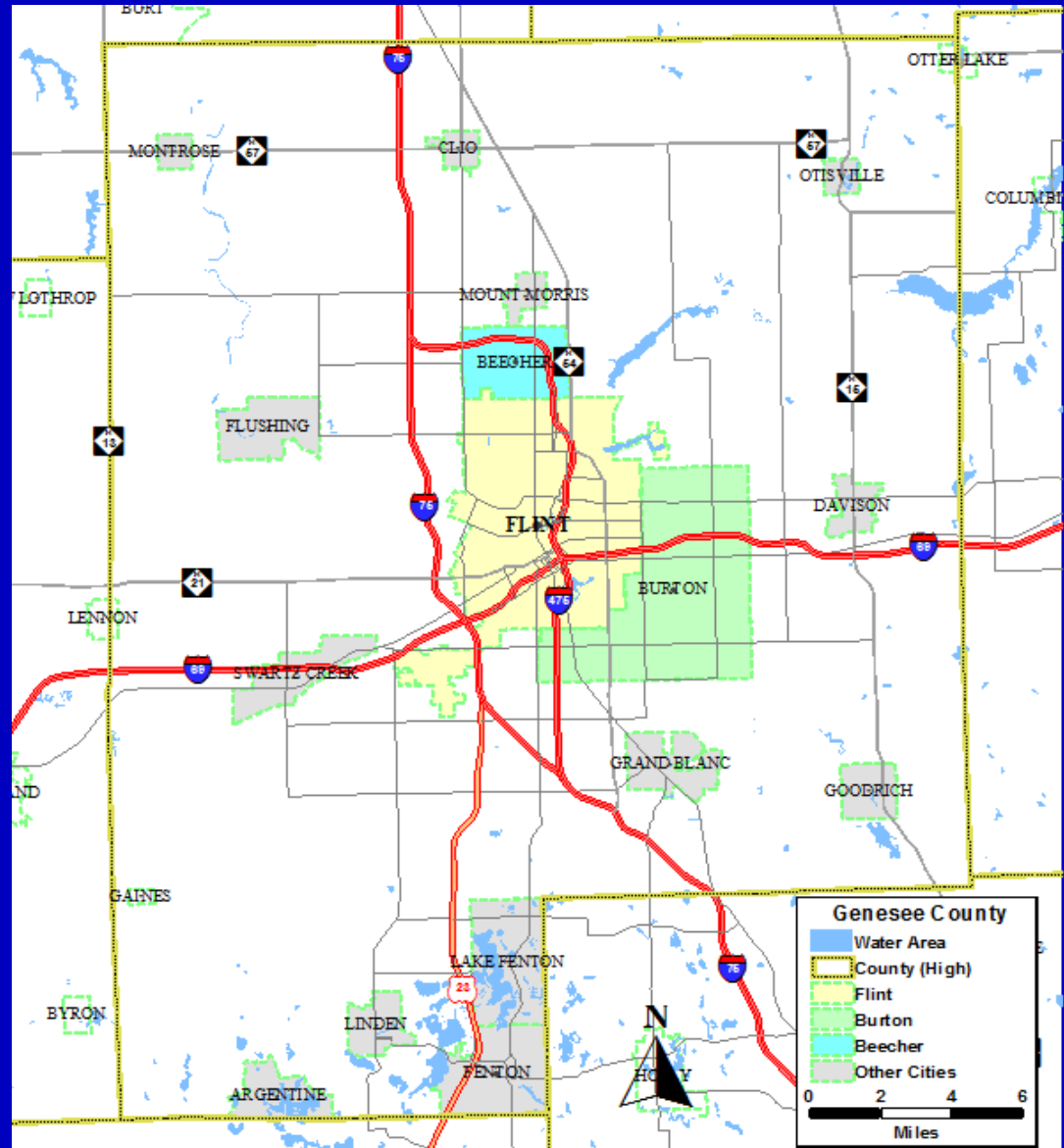
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*Durham-Chapel Hill-Carrboro MPO/City of Durham*

# External Trip Model of Genesee County MI

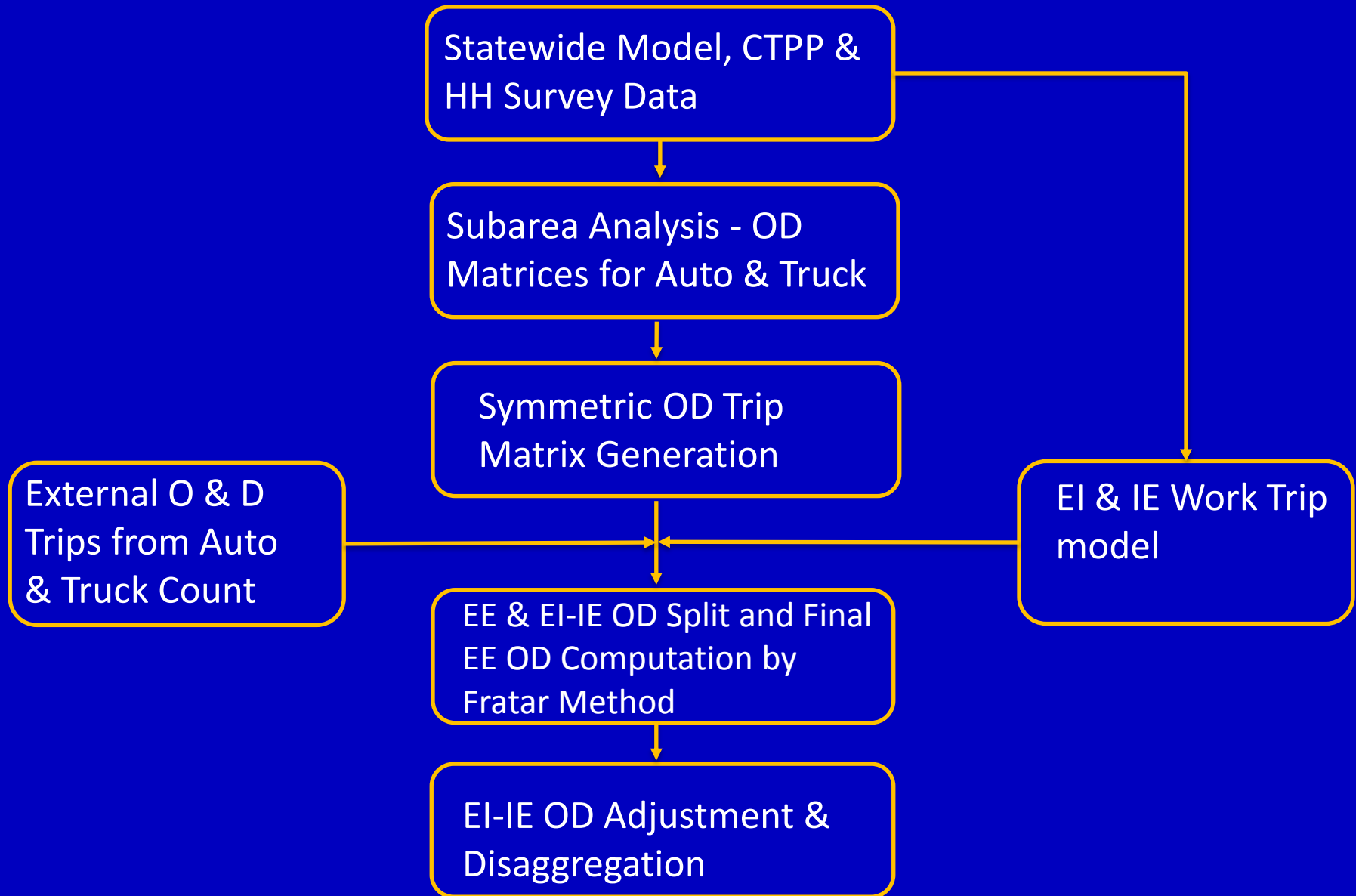
## Overview

- Population  
447,189
- Employment  
211,662
- 653 Sq Miles & 676 TAZs
- 30 Bus lines
- I-69 and I-75





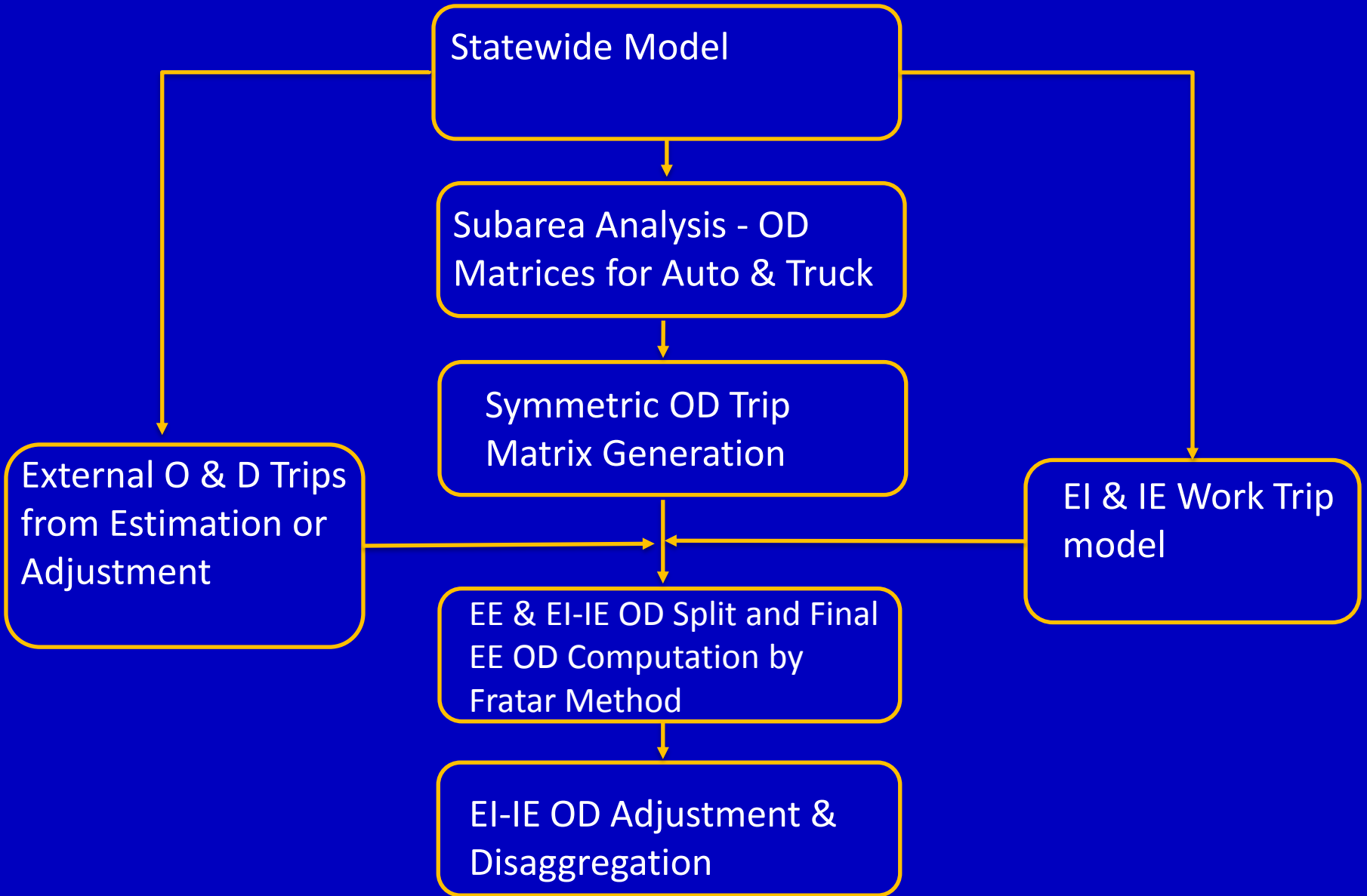
# Base Year Genesee External Trip Model



# EE OD Adjustment by Fratar Method

- (i) Splitting the EE and EI-IE trips from the statewide model
- (ii) Factoring the preliminary EE and EI-IE O & D trips to counts
- (iii) Balancing the factored EE O & D trips by the *Weighted Sum* (50% O to 50% D) *method in TransCAD*. Balance process makes total EE O trips are equal to total EE D trips of all external stations
- (iv) finalizing EE O-D table by applying the balanced EE O & D to the preliminary EE O-D table using the Fratar model. This is the process to adjust the preliminary EE O-D matrix got from the statewide model to replicate the current local traffic conditions
- (v) Obtaining the EI-IE (O+D) by total (O+D) - EE (O+D) .

# Future Year Genesee External Trip Model



# Future Year External Trip Adjustment

2030 External Trips =  
2030 SW Model Trips + (2005 ADT Count – 2005 SW  
Model Trips)

And

$$\text{Vol}_{2035} = \text{Vol}_{2005} * (1+r)^{(2035-2005)}$$

$$r = \exp\{[\text{Ln}(\text{Vol}_{2030}) - \text{Ln}(\text{Vol}_{2005})]/25\} - 1$$

# Genesee External Trip Table

ID	NAME	2005 Auto ADT Count	2005 SW Model Auto Volume	2005 Auto External Trip Results				
				O	D	EE O	EE D	EI-IE O+D
640	Sheridan Ave	4,562	6,358	2,281	2,281	1,549	1,549	1,464
641	Nichols Rd	592	0	296	296	0	0	592
642	Elms Rd	2,042	0	1,021	1,021	0	0	2,042
643	I 75 North	45,434	53,596	22,717	22,717	13,468	13,468	18,498
644	Saginaw Rd	5,460	0	2,730	2,730	0	0	5,460
645	Clio Rd	3,676	6,238	1,838	1,838	556	556	2,564
646	Bray Rd	2,644	3,272	1,322	1,322	13	13	2,618
647	Irish Rd	964	0	482	482	0	0	964
648	State Rd	8,016	7,376	4,008	4,008	1,186	1,186	5,644
649	Henderson Rd	766	0	383	383	0	0	766
650	Lake Rd	2,514	2,122	1,257	1,257	526	526	1,462
651	Columbiaville Rd	2,764	2,226	1,382	1,382	1,051	1,051	662
652	E Mount Morris Rd	3,886	1,038	1,943	1,943	18	18	3,850
653	Davison Rd	3,856	0	1,928	1,928	0	0	3,856
654	Lapeer Rd	2,016	0	1,008	1,008	0	0	2,016
655	I 69 East	32,128	44,798	16,064	16,064	7,914	7,914	16,300
656	Hill Rd	2,128	3,686	1,064	1,064	94	94	1,940
657	Hegel Rd	1,680	0	840	840	0	0	1,680
658	Ortonville RD	14,102	11,328	7,051	7,051	613	613	12,876
659	Dixie Hwy	13,404	0	6,702	6,702	0	0	13,404
660	I 75 South	38,828	55,428	19,414	19,414	3,865	3,865	31,098
661	N Holly Rd	8,768	826	4,384	4,384	2,388	2,388	3,992
662	Main St	12,230	162	6,115	6,115	3,170	3,170	5,890
663	S Holly Rd	6,436	0	3,218	3,218	0	0	6,436
664	Adelaide St	3,168	0	1,584	1,584	0	0	3,168
665	S US 23	39,056	50,618	19,528	19,528	5,865	5,865	27,326
666	Linden Rd	7,634	0	3,817	3,817	0	0	7,634
667	Seymour Rd	4,032	2,028	2,016	2,016	96	96	3,840
668	Silver Lake Rd	3,762	4,148	1,881	1,881	96	96	3,570
669	Lansing Rd	3,472	0	1,736	1,736	0	0	3,472
670	I 69 West	24,100	33,442	12,050	12,050	6,346	6,346	11,408
671	M 21	8,566	8,268	4,283	4,283	831	831	6,904
672	Pierson Rd	1,154	0	577	577	0	0	1,154
673	W Mount Morris Rd	2,042	1,970	1,021	1,021	208	208	1,626
674	Vienna Rd	4,144	7,200	2,072	2,072	981	981	2,182
675	Grand Blanc Rd	3,500	0	1,750	1,750	0	0	3,500
676	Thompson Rd	650	0	325	325	0	0	650
	<b>Total</b>	324,176	306,128	162,088	162,088	50,834	50,834	222,508



# Genesee External Trip Table

ID	NAME	Location	2005 AUTO EI-IE P+A	Percent			EI_W	IE_W	E_NW
				EI_W P	IE_W A	E_NW P	Production	Attraction	Production
640	Sheridan Ave	North of Study Area	1,464	20%	9%	71%	293	132	1,039
641	Nichols Rd	North of Study Area	592	20%	9%	71%	118	53	420
642	Elms Rd	North of Study Area	2,042	20%	9%	71%	408	184	1,450
643	I 75 North	North of Study Area	18,498	20%	9%	71%	3,700	1,665	13,134
644	Saginaw Rd	North of Study Area	5,460	20%	9%	71%	1,092	491	3,877
645	Clio Rd	North of Study Area	2,564	20%	9%	71%	513	231	1,820
646	Bray Rd	North of Study Area	2,618	20%	9%	71%	524	236	1,859
647	Irish Rd	North of Study Area	964	20%	9%	71%	193	87	684
648	State Rd	North of Study Area	5,644	20%	9%	71%	1,129	508	4,007
649	Henderson Rd	North of Study Area	766	20%	9%	71%	153	69	544
650	Lake Rd	East of Study Area	1,462	20%	9%	71%	292	132	1,038
651	Columbiaville Rd	East of Study Area	662	20%	9%	71%	132	60	470
652	E Mount Morris Rd	East of Study Area	3,850	20%	9%	71%	770	347	2,734
653	Davison Rd	East of Study Area	3,856	20%	9%	71%	771	347	2,738
654	Lapeer Rd	East of Study Area	2,016	20%	9%	71%	403	181	1,431
655	I 69 East	East of Study Area	16,300	20%	9%	71%	3,260	1,467	11,573
656	Hill Rd	East of Study Area	1,940	20%	9%	71%	388	175	1,377
657	Hegel Rd	East of Study Area	1,680	20%	9%	71%	336	151	1,193
658	Ortonville RD	South of Study Area	12,876	10%	54%	36%	1,288	6,953	4,635
659	Dixie Hwy	South of Study Area	13,404	10%	54%	36%	1,340	7,238	4,825
660	I 75 South	South of Study Area	31,098	10%	54%	36%	3,110	16,793	11,195
661	N Holly Rd	South of Study Area	3,992	10%	54%	36%	399	2,156	1,437
662	Main St	South of Study Area	5,890	10%	54%	36%	589	3,181	2,120
663	S Holly Rd	South of Study Area	6,436	10%	54%	36%	644	3,475	2,317
664	Adelaide St	SW of Study Area	3,167	18%	33%	49%	570	1,045	1,552
665	S US 23	SW of Study Area	27,326	18%	33%	49%	4,919	9,018	13,390
666	Linden Rd	South of Study Area	7,634	10%	54%	36%	763	4,122	2,748
667	Seymour Rd	SW of Study Area	3,840	18%	33%	49%	691	1,267	1,882
668	Silver Lake Rd	West of Study Area	3,570	27%	11%	62%	964	393	2,213
669	Lansing Rd	West of Study Area	3,472	27%	11%	62%	937	382	2,153
670	I 69 West	West of Study Area	11,408	27%	11%	62%	3,080	1,255	7,073
671	M 21	West of Study Area	6,904	27%	11%	62%	1,864	759	4,280
672	Pierson Rd	West of Study Area	1,154	27%	11%	62%	312	127	715
673	W Mount Morris Rd	West of Study Area	1,626	27%	11%	62%	439	179	1,008
674	Vienna Rd	West of Study Area	2,182	27%	11%	62%	589	240	1,353
675	Grand Blanc Rd	West of Study Area	3,500	27%	11%	62%	945	385	2,170
676	Thompson Rd	South of Study Area	650	10%	54%	36%	65	351	234
	Total		222,507				37,984	65,833	118,690

# Genesee External Trip Table

	640	643	645	646	648	650	651	652	655	656	658	660	661	662	665	667	668	670	671	673	674	Sum	
640	--	--	--	--	--	1.9	0.7	--	11.1	0.1	0.0	19.5	1.0	--	16.0	--	--	879.6	311.5	106.2	201.4	1549.0	
643	--	--	--	--	--	--	--	--	3718.5	56.9	16.7	3293.4	1315.3	--	2261.2	--	--	2348.0	250.4	36.5	171.2	13468.0	
645	--	--	--	--	--	--	511.9	--	31.2	0.8	12.1	--	--	--	--	--	--	--	--	--	--	556.0	
646	--	--	--	--	--	--	--	--	--	--	--	10.7	2.3	--	--	--	--	--	--	--	--	13.0	
648	--	--	--	--	--	459.0	449.3	--	79.4	10.7	46.1	0.4	16.7	--	10.9	--	--	88.9	2.3	0.7	21.5	1186.0	
650	1.9	--	--	--	459.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5	2.7	61.8	526.0
651	0.7	--	511.9	--	449.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0	89.0	1051.0
652	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18.0	--	18.0
655	11.1	3718.5	31.2	--	79.4	--	--	--	--	--	515.7	13.7	722.1	--	236.1	--	--	2298.6	68.8	16.4	203.5	7915.0	
656	0.1	56.9	0.8	--	10.7	--	--	--	--	--	--	--	--	--	4.4	--	0.0	17.4	0.6	0.1	3.0	94.0	
658	0.0	16.7	12.1	--	46.1	--	--	--	515.7	--	--	--	--	--	--	--	--	22.1	0.0	0.0	0.2	613.0	
660	19.5	3293.4	--	10.7	0.4	--	--	--	13.7	--	--	--	--	--	--	--	--	322.4	108.2	12.2	84.6	3865.0	
661	1.0	1315.3	--	2.3	16.7	--	--	--	722.1	--	--	--	--	--	--	--	--	268.6	11.6	1.1	49.4	2388.0	
662	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3170.0	--	0.0	--	--	--	--	3170.0	
665	16.0	2261.2	--	--	10.9	--	--	--	236.1	4.4	--	--	--	3170.0	--	--	--	40.7	77.0	14.2	34.7	5865.0	
667	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	96.0	--	--	--	--	96.0	
668	--	--	--	--	--	--	--	--	--	0.0	--	--	--	0.0	--	96.0	--	--	--	--	--	96.0	
670	879.6	2348.0	--	--	88.9	--	--	--	2298.6	17.4	22.1	322.4	268.6	--	40.7	--	--	--	--	--	--	60.7	6347.0
671	311.5	250.4	--	--	2.3	0.5	--	--	68.8	0.6	0.0	108.2	11.6	--	77.0	--	--	--	--	--	--	--	831.0
673	106.2	36.5	--	--	0.7	2.7	0.0	18.0	16.4	0.1	0.0	12.2	1.1	--	14.2	--	--	--	--	--	--	--	208.0
674	201.4	171.2	--	--	21.5	61.8	89.0	--	203.5	3.0	0.2	84.6	49.4	--	34.7	--	--	60.7	--	--	--	--	981.0
Sum	1549.0	13468.0	556.0	13.0	1186.0	526.0	1051.0	18.0	7915.0	94.0	613.0	3865.0	2388.0	3170.0	5865.0	96.0	96.0	6347.0	831.0	208.0	981.0	50836.0	

# A Simplified Method For Kentucky

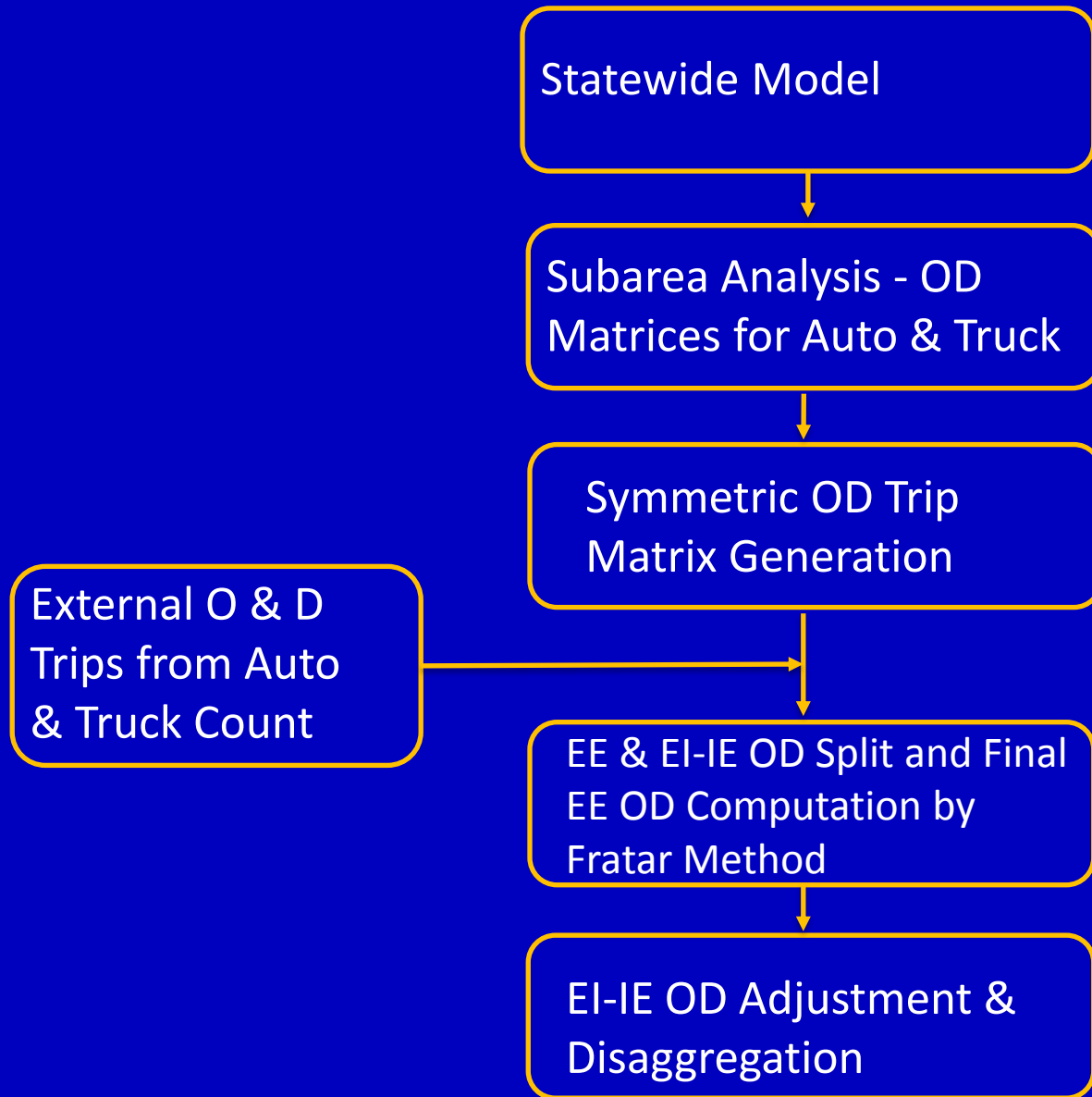
- Madison County Model



- Bowling Green Model

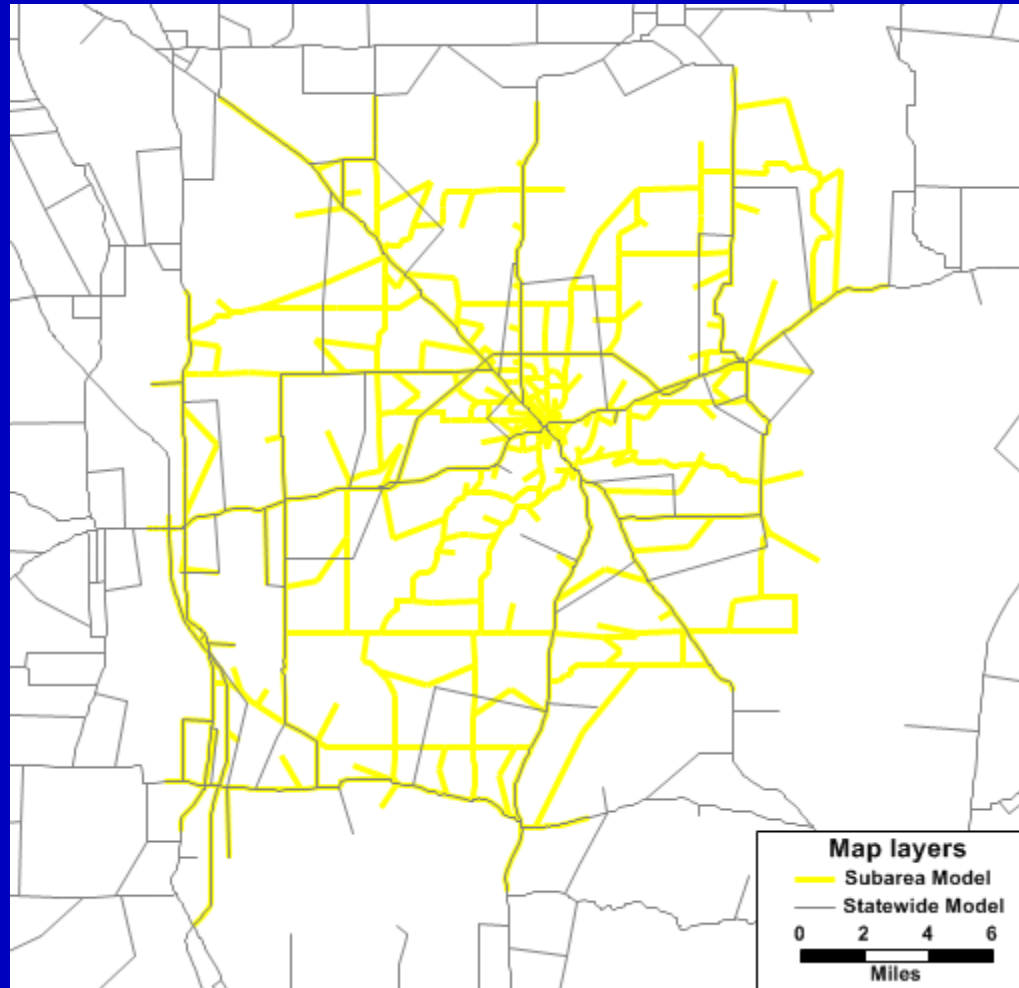


# Base Year External Trip Model



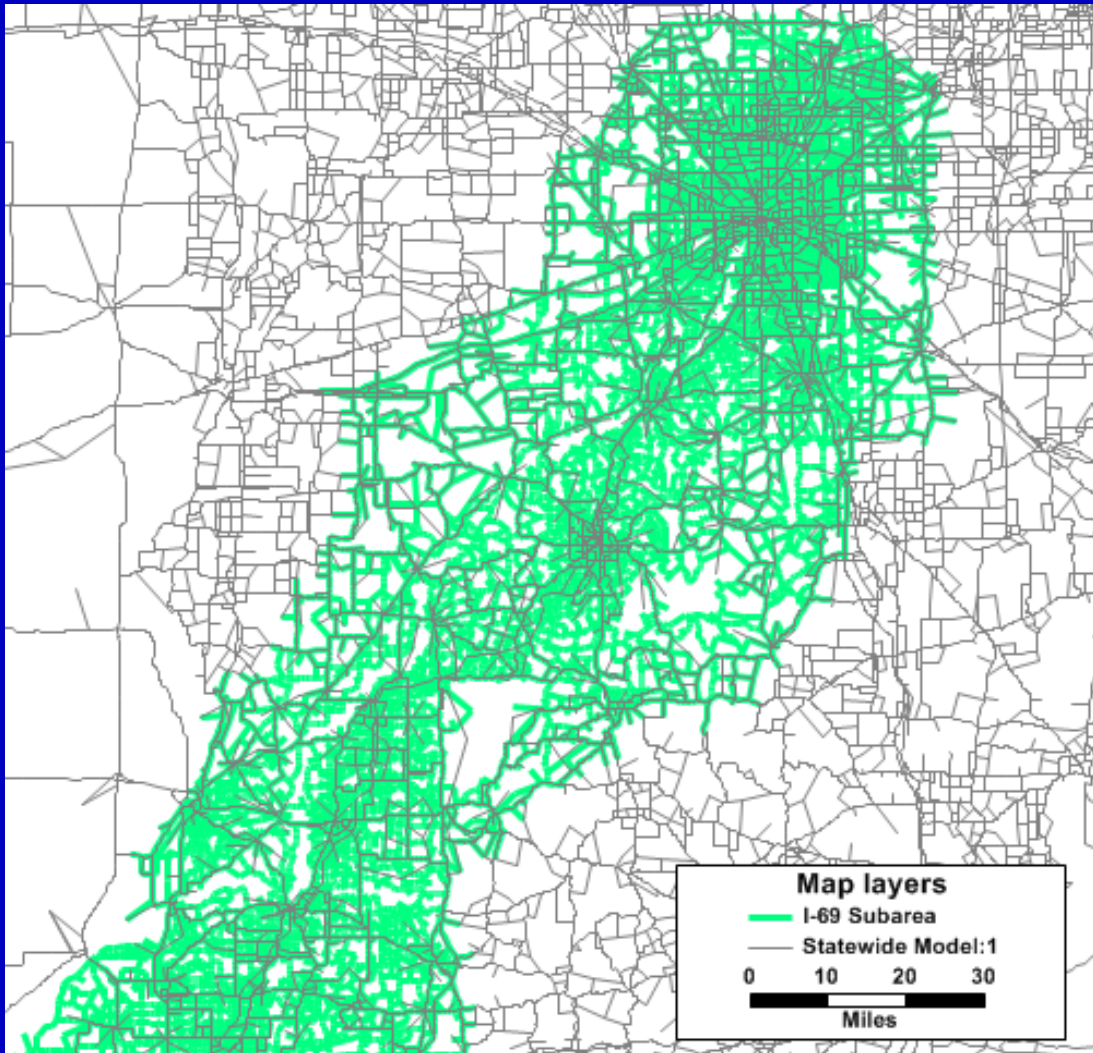
# ODME Approach in Indiana

- US 50 Subarea Study

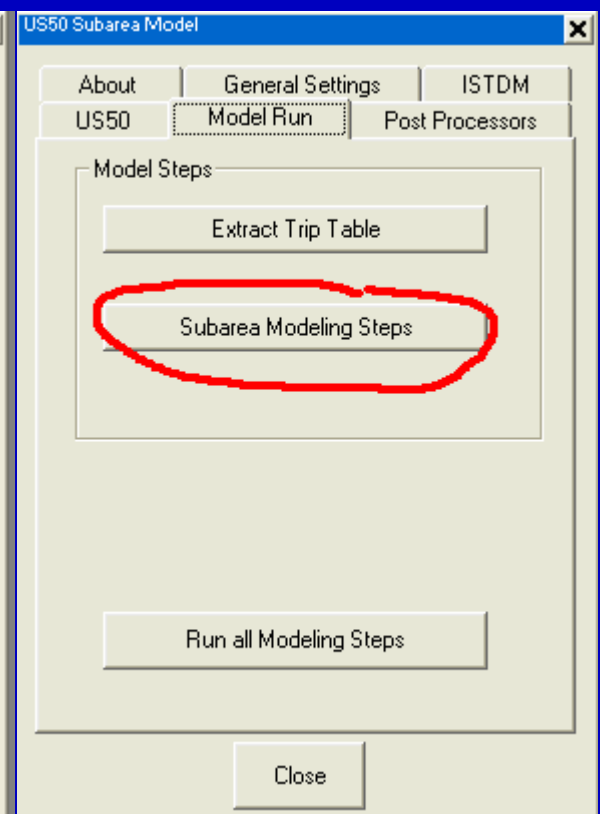
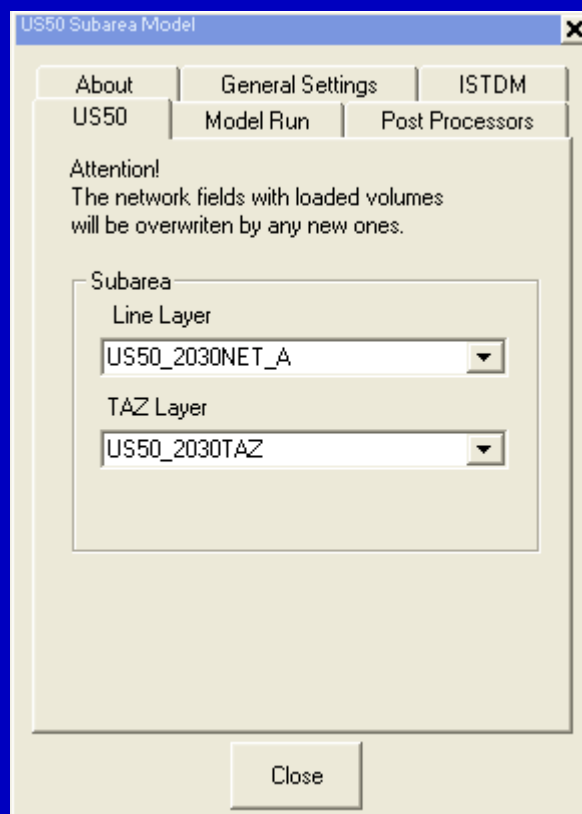
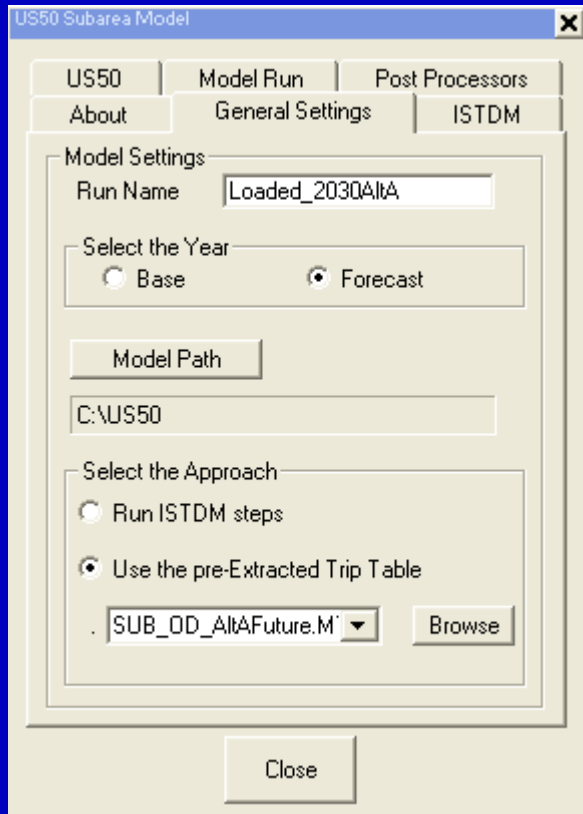


# ODME Approach in Indiana

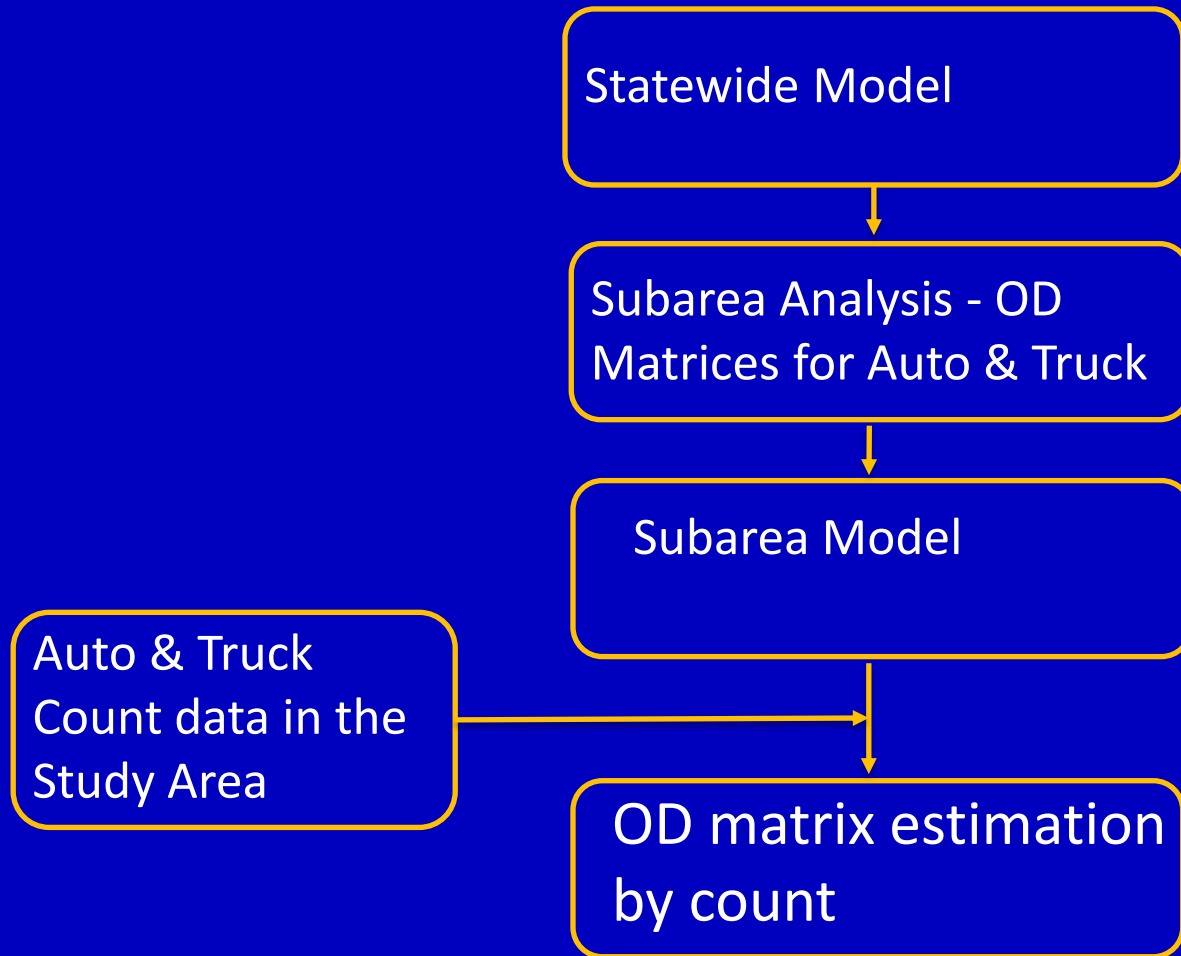
- I-69 Extension Study



# Interface



# Base Year OD Method





# **Future Year Adjustment – Using Factor vs Difference**

- High volume issue of the factor approach
- Difference adjustment
- Individual volume check needed especially for key external stations

# Conclusion

- Three Methods for different purposes
- Adjustment by factor or difference