Midwest Travel Model Users Group

Fall 2016 Meeting
Wednesday, October 26th, 2016

Agenda

- Project Status Update
- Land Use/Trip Generation Update
- User Interface/Scripting Update
- Intermediate Stop Model Update
- Roles/Responsibilities Discussion
- Next Steps

Project Status Update

Land Use/Trip Generation

Develop Prototype Model

- Prepare updated input data
- Tabulate/calibrate revised model parameters
- Modify TransCAD GISDK scripts to incorporate new procedures
- Apply model in Ames test case
- Identify features that are most promising

Prototype Model Features

- New trip purposes
  - Home-based work by income level
  - Special generator purposes (university, hospital, airport, regional recreation, hotel)
- Parcel-based trip generation
  - Trip attraction rates by land use with building area as predictive variable
  - Develop weekday/weekend and time-of-day rates that vary by land use
- Intersection delay
  - Delay assumptions vary by intersection control type, intersecting functional classifications, turn movement
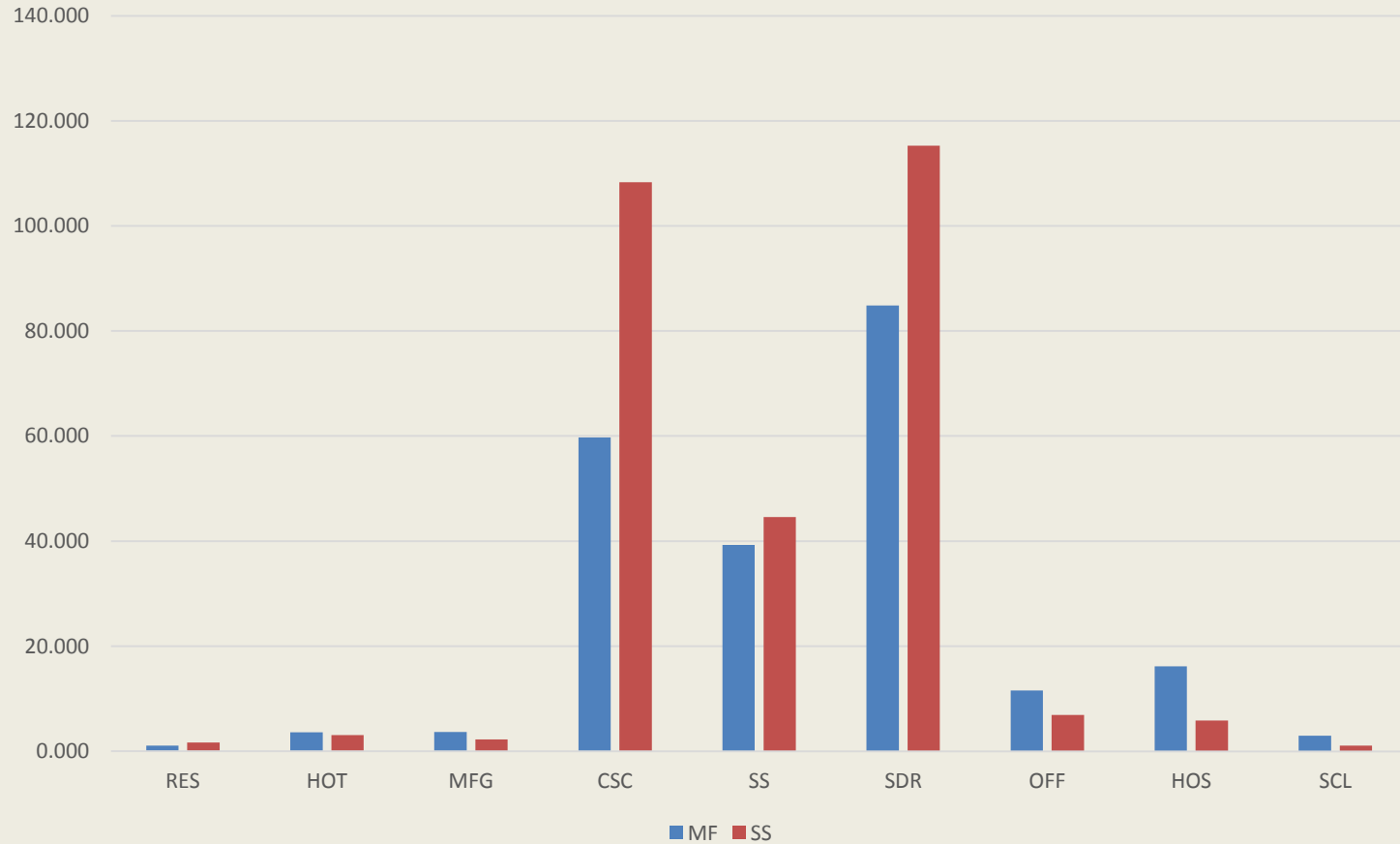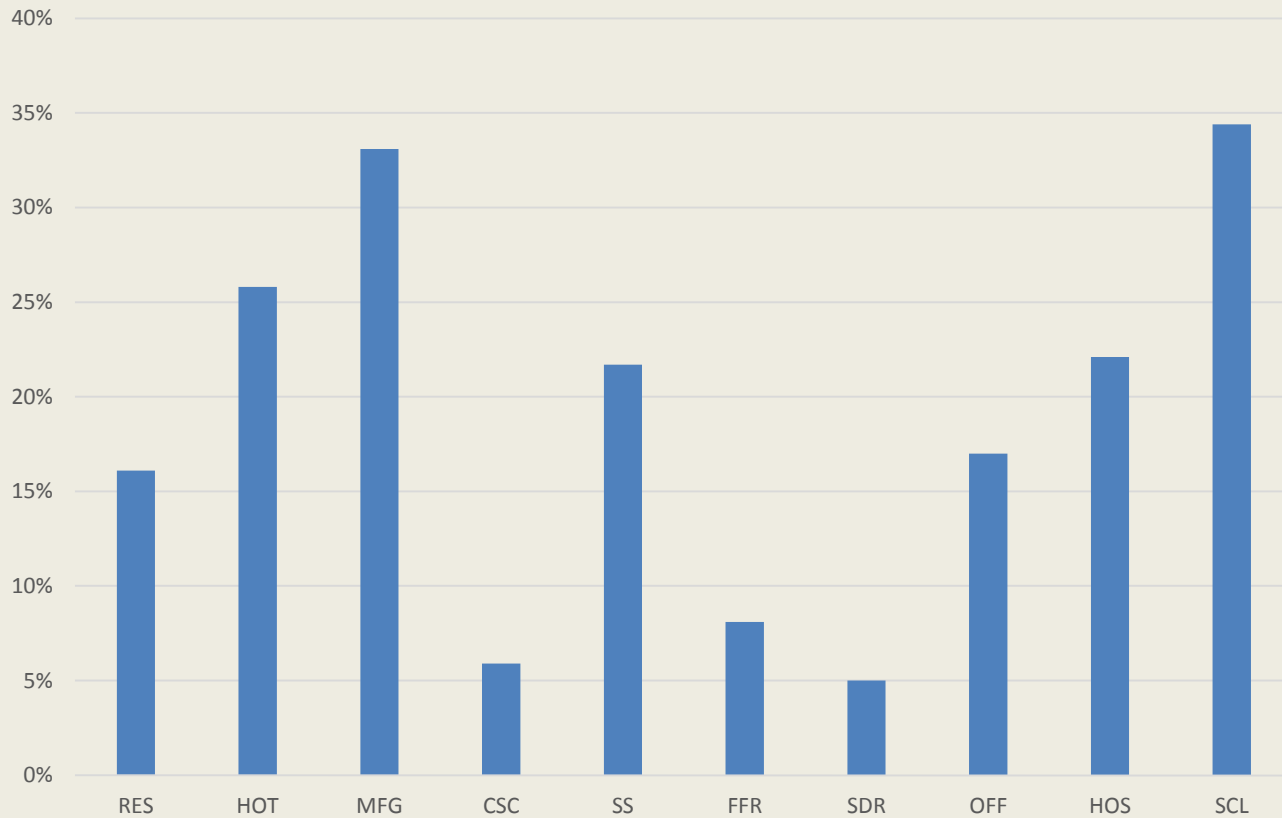
Parcel File
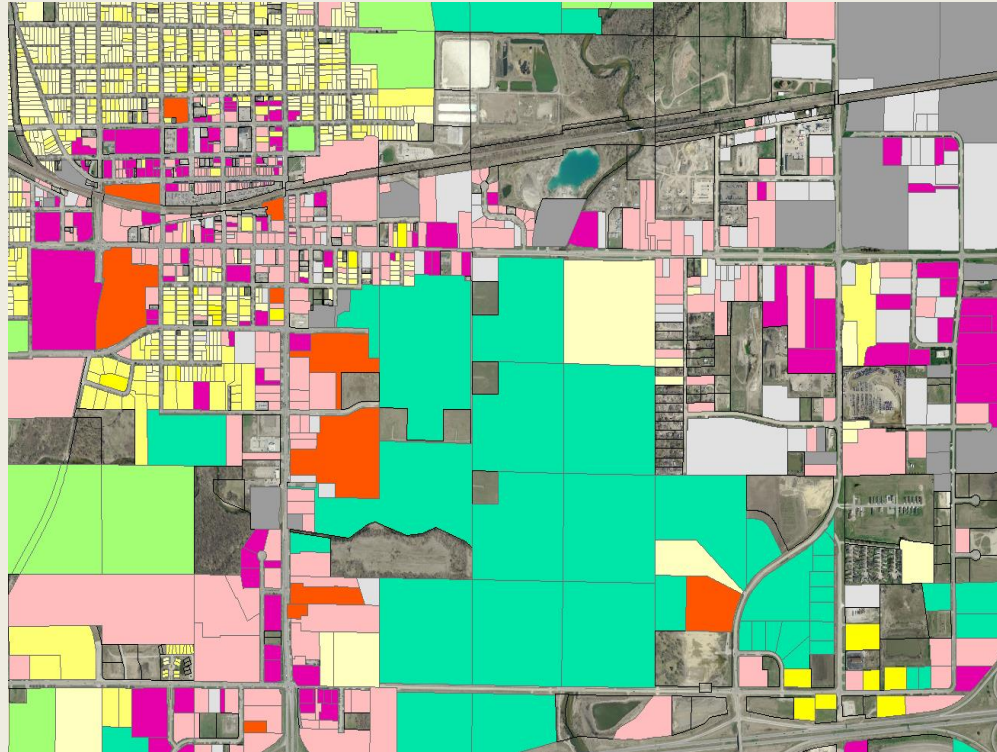
HBW Low Income Percent by Land Use
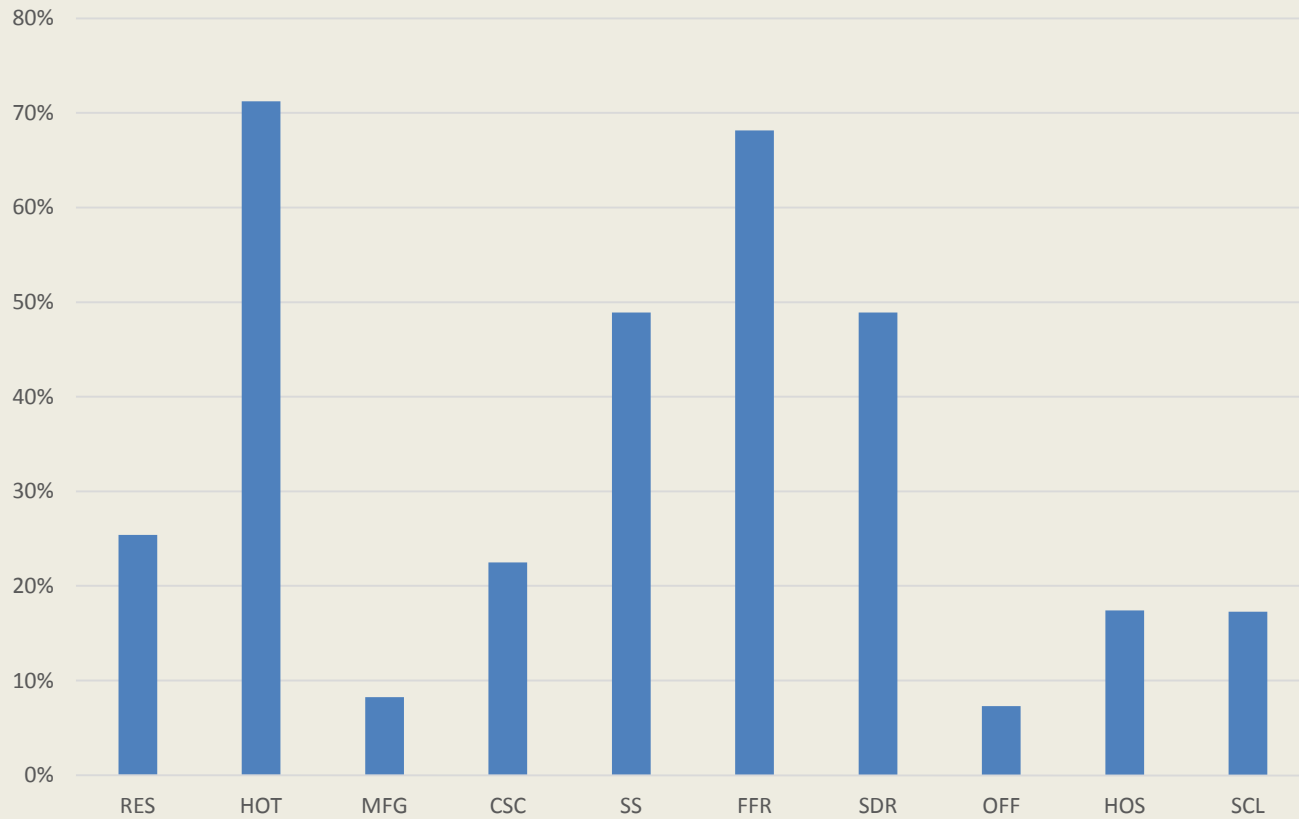
Attraction Rates by Land Use

HBO Weekday AM Percent by Land Use

Ames Trip Generation Report

TAZ	LU	AMOUNT	PAS/MFAM	PAS/MFPM	PAS/MFOP	PAS/SSAM	PAS/SSPM	PAS/SSOP
118	Warehousing	1	1	2	2	0	0	1
118	Community Shopping Center/Big Box	50	59	495	1242	53	600	1755
118	Fast Food	5	43	217	794	26	179	759
119	Neighborhood Shopping Center	16	62	250	604	47	221	594
119	Community Shopping Center/Big Box	190	224	1869	4693	201	2268	6631
120	Hotel/Motel	47	137	183	350	36	89	266
120	Warehousing	46	32	52	53	8	16	40
120	Street Front Commercial	12	55	155	326	27	129	364
120	Neighborhood Shopping Center	10	41	165	397	31	145	390
120	Auto Dealership	33	156	139	618	62	95	639
120	Restaurant	23	47	337	1446	33	299	1451
120	General Office	24	47	65	128	11	26	86
120	Other Health Care	13	70	102	302	29	77	376
120	Recreational Use	50	34	46	158	6	21	99
121	Residential	48	164	362	790	85	419	1311
121	General Office	121	235	327	641	54	129	430

# Intersection Delay

- Assumes ~LOS C delays for Peak condition

From Linktype	To Linktype	Minutes of Delay per Turn (Peak)			
		Left	Right	Thru	UTurn
Limited Access	Ramps	0.15	0.15	0.15	99
	All Others	0.15	0.15	0.00	99
Signalized Arterial/ Ramp	Arterial/Ramp	0.50	0.15	0.25	0.50
	Collector	0.50	0.15	0.25	0.50
	Local/CC	0.35	0.10	0.15	0.40
AWSC Arterial / Ramp	Arterial/Ramp	0.30	0.10	0.30	0.30
	Collector	0.25	0.10	0.25	0.25
	Local/CC	0.20	0.07	0.20	0.20
TWSC Arterial / Ramp	Arterial/Ramp	0.45	0.15	0.35	0.45
	Collector	0.30	0.10	0.25	0.30
	Local/CC	0.25	0.10	0.20	0.25
Uncontrolled Arterial / Ramp	All Types	0.25	0.05	0	0.25

- LOS B for Off-Peak
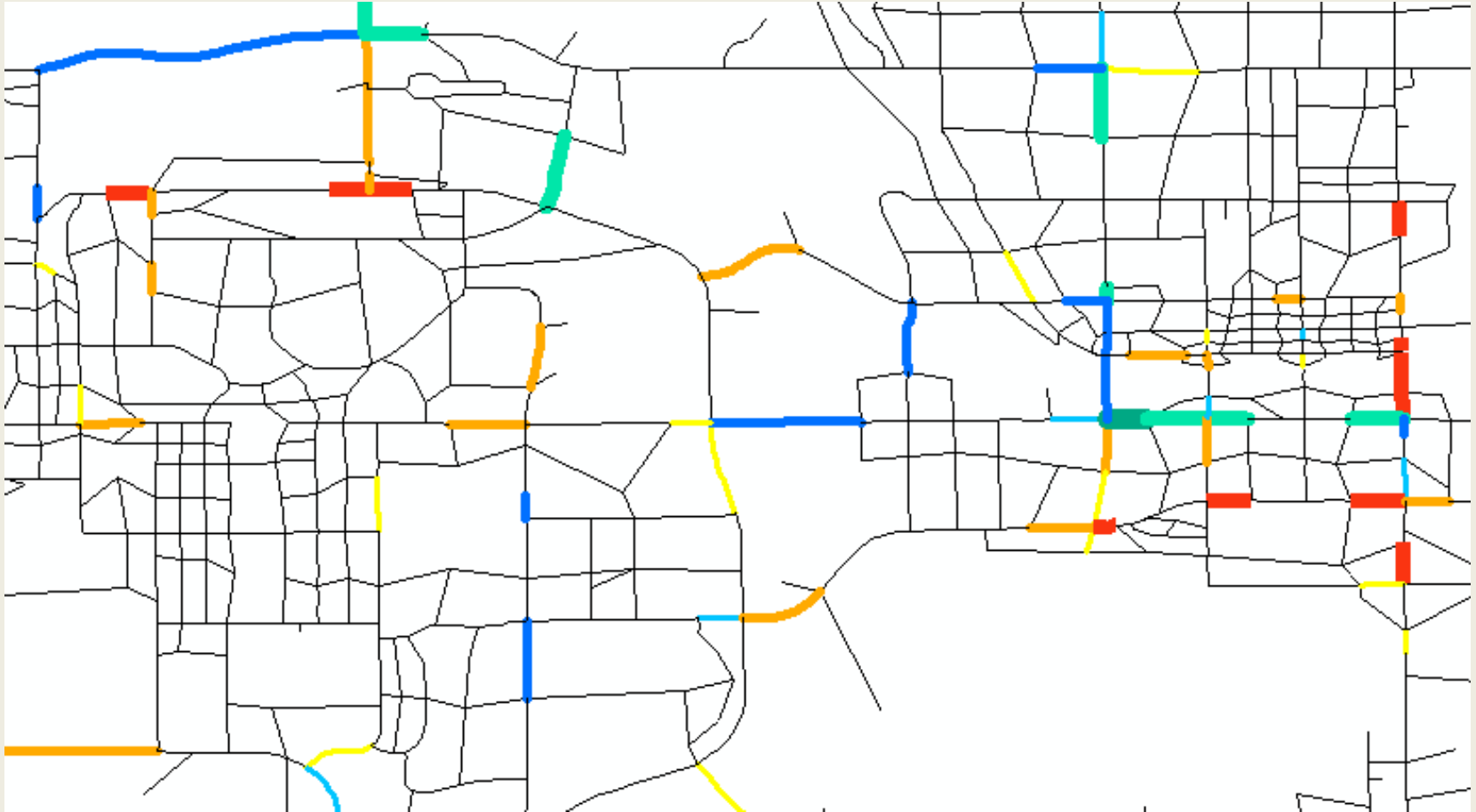- All defaults can be modified during calibration

# Average Trip Lengths (Minutes)
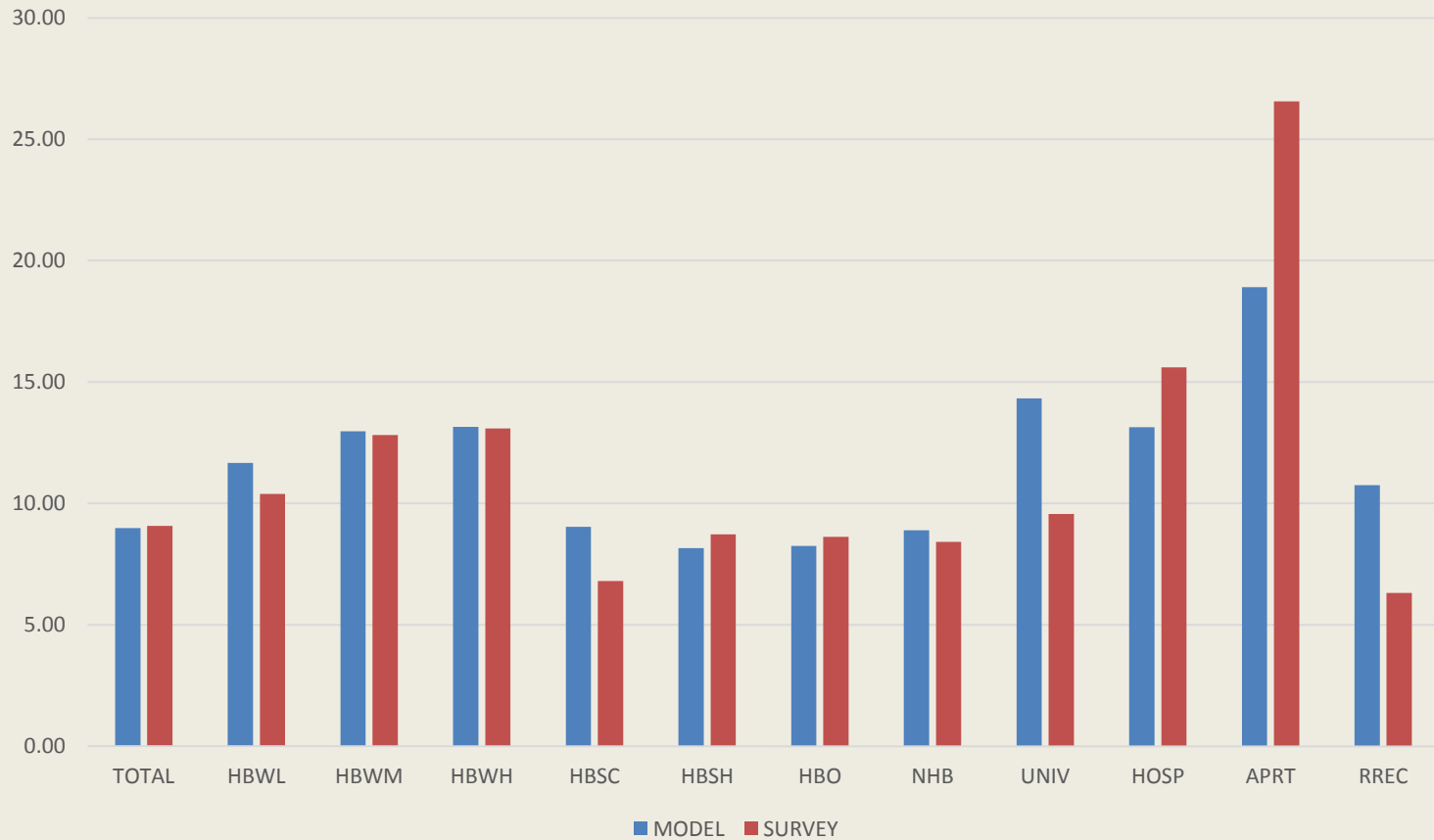
Intra-zonal Percentages
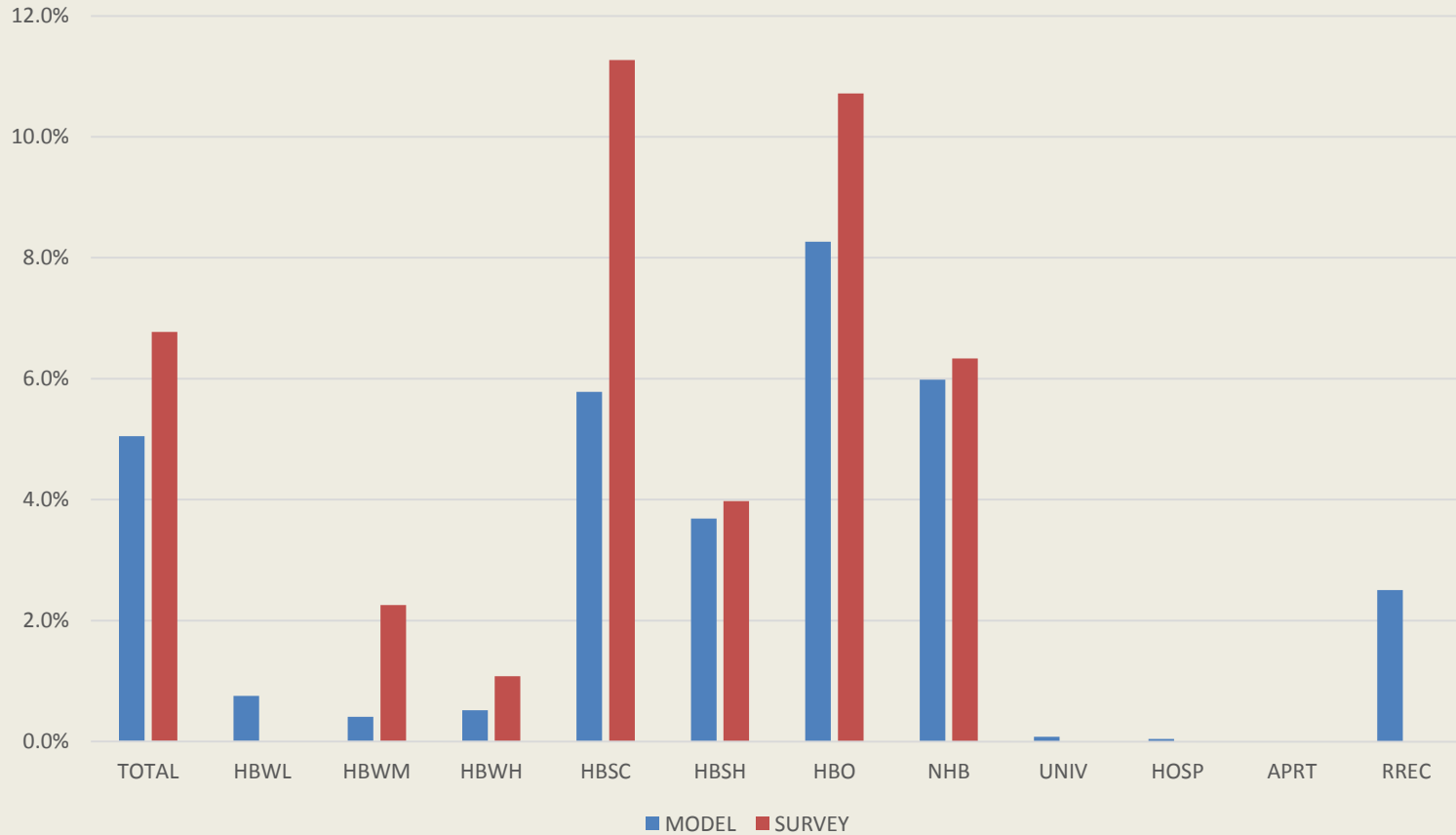
Ames Model Validation

Ames Model Validation

LAND USE	OBSERVATIONS	COUNT	ESTIMATE	DIFFERENCE
Residential	134	6330	6260	-1%
Hotel/Motel	7	6275	6221	-1%
Manufacturing	6	5690	6030	6%
Warehousing	5	5886	5813	-1%
Street Front Commercial	29	9321	8296	-11%
Neighborhood Shopping Center	10	9406	8092	-14%
Community Shopping Center/Big Box	7	14160	13582	-4%
Regional Shopping Center	1	7500	5116	-32%
Auto Dealership	2	12150	11204	-8%
Fast Food	15	12353	12477	1%
Restaurant	17	9158	7365	-20%
Other Commercial	6	8939	9236	3%
General Office	9	7183	7004	-2%
Government Office	1	6500	6258	-4%
Bank	7	7104	5258	-26%
Religious Facility	5	4753	4244	-11%
Hospital	3	8263	6716	-19%

Ames ATR Locations
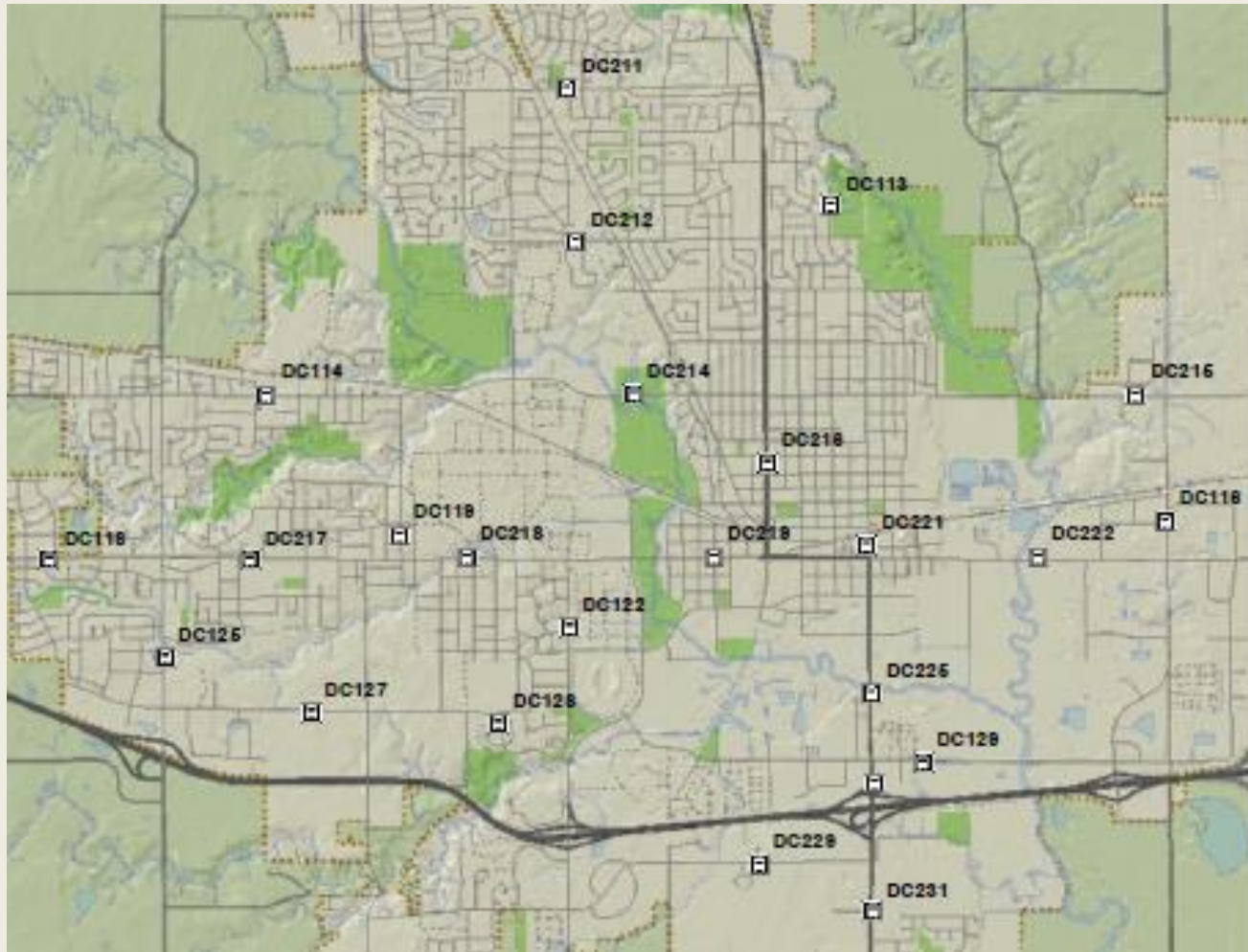
Ames Sample ATR Data

| ATR#	LOCATION	ATR/MF	ATR/SS	ATR/AADT	DOT/ AADT	MODEL/MF	MODEL/SS
225	Duff Near Skunk	29089	29387	29174	26400	25202	26308
228	Duff S/O S 16th	27200	25773	26822	25400	30629	31021
218	Lincoln @ Welch	14657	13723	14390	13500	12104	10287

GUI/Scripting Updates

Main Interface & Scripting

- Added "basic" and "advanced" execution options

- "Plug in" model step scripts

- Trip Generation nearing completion

- Work Tour script underway

- Others
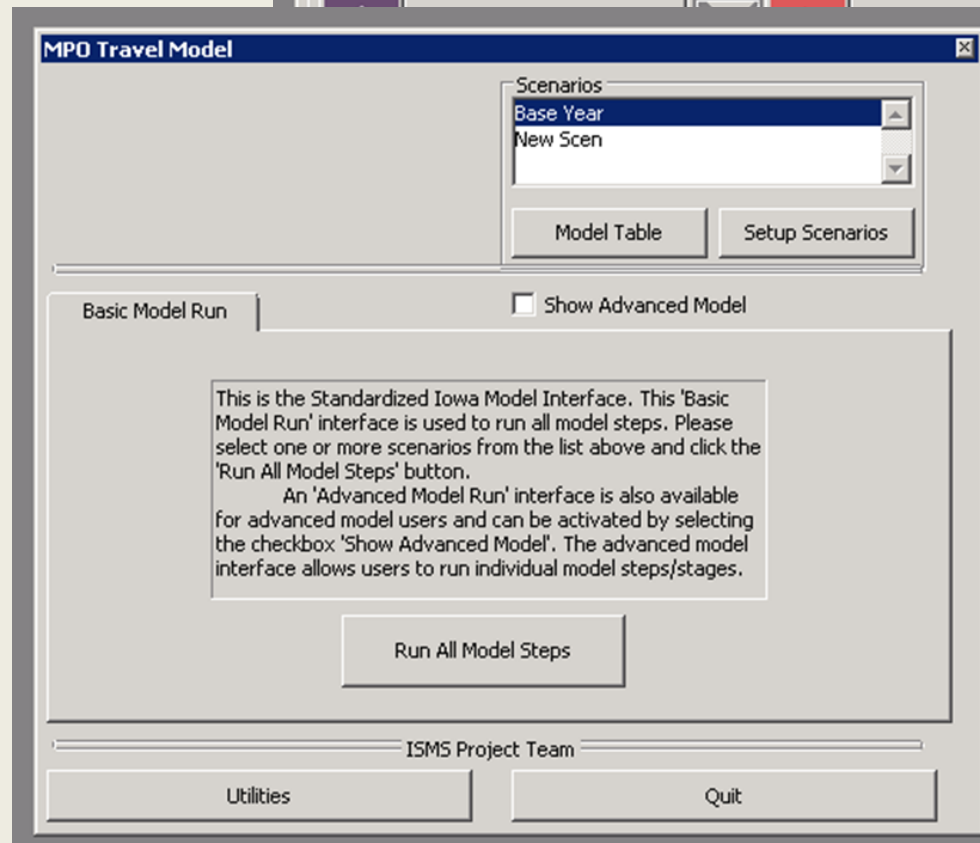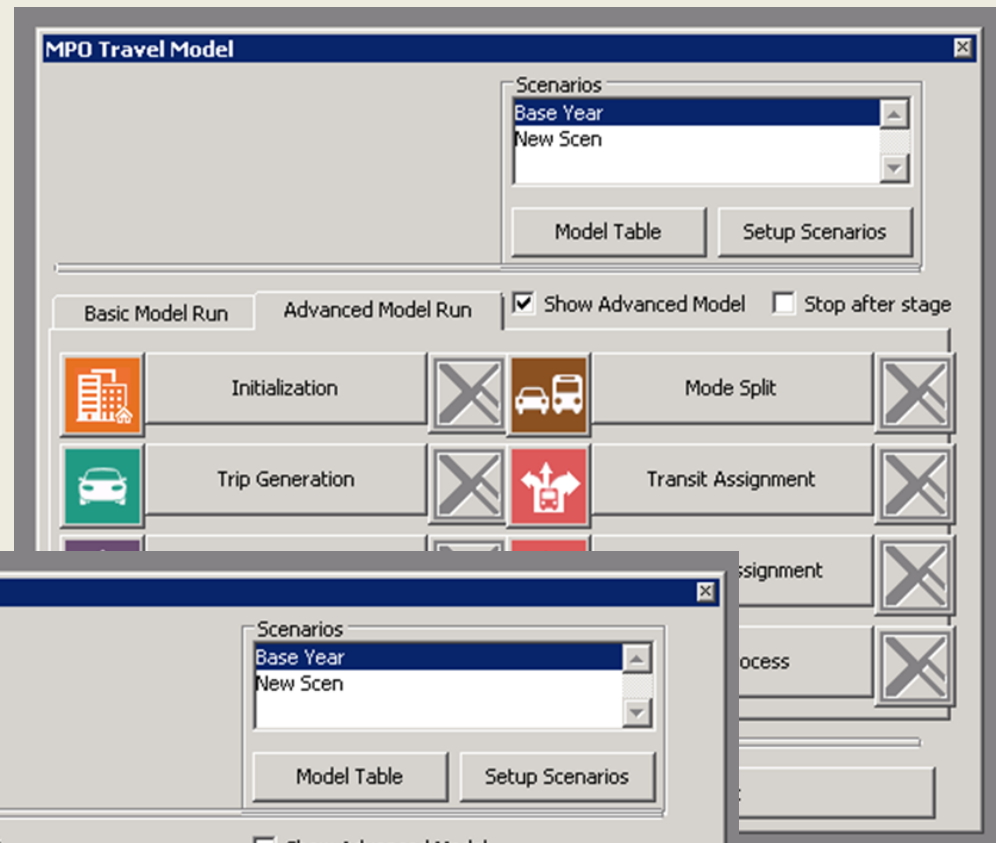
Proposed Main Interface

- Performance report in HTML format (under development)

- Create Maps button to create model performance maps

- Comparison maps to compare two scenarios (volumes)

- Remove progress bar button to model progress bar if it's frozen

- Close all open files running in background from a model run
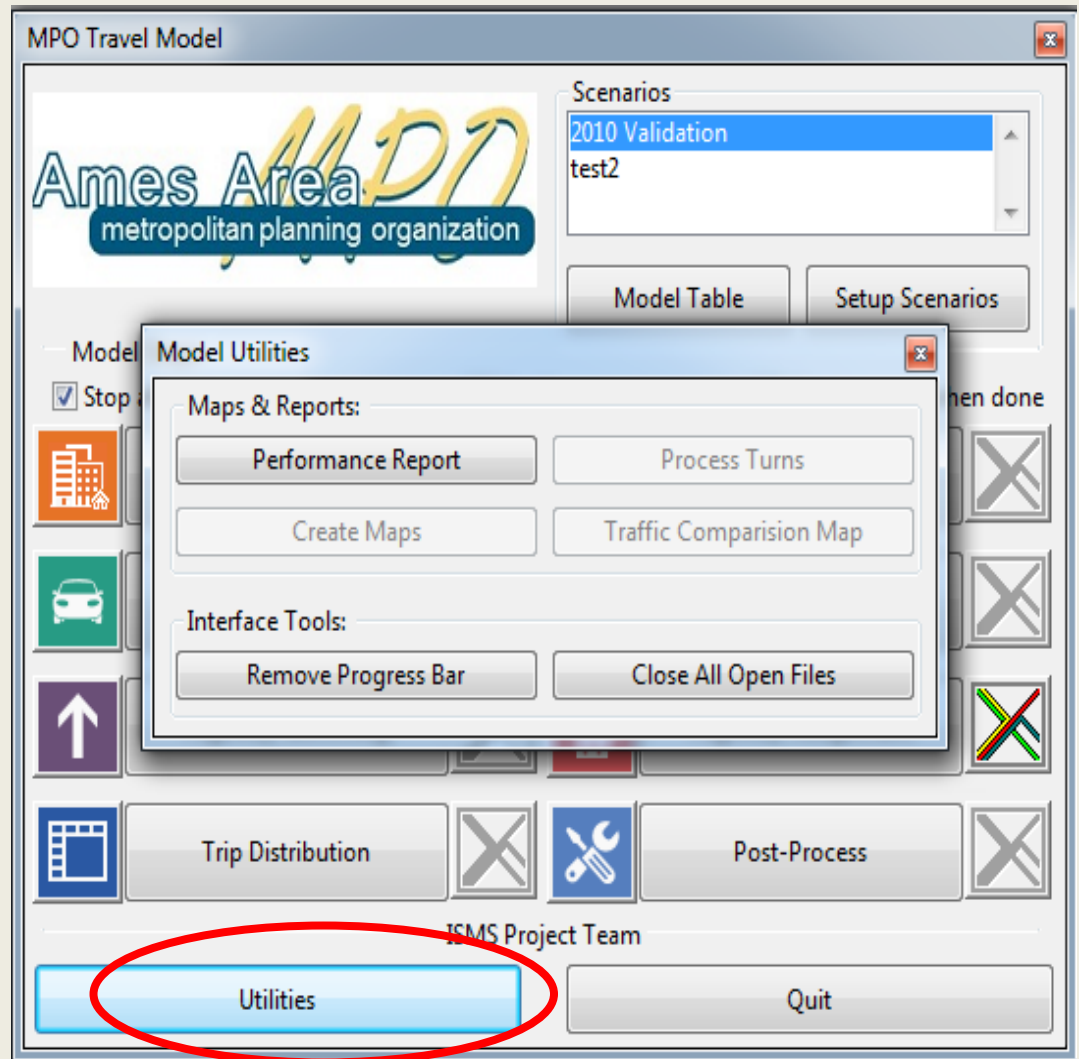
Work Tour File

- Captures tour/intermediate stop results from previous run

- Allows an abbreviated run through the interface when touring behavior not expected to change
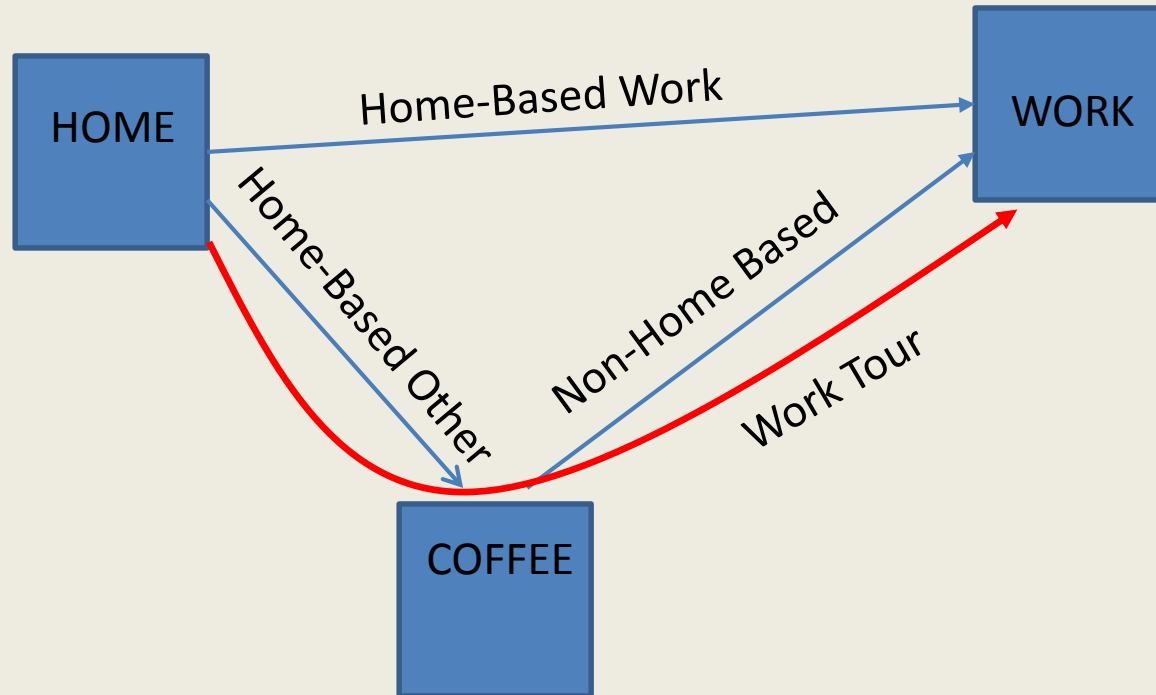
- Reduces execution time
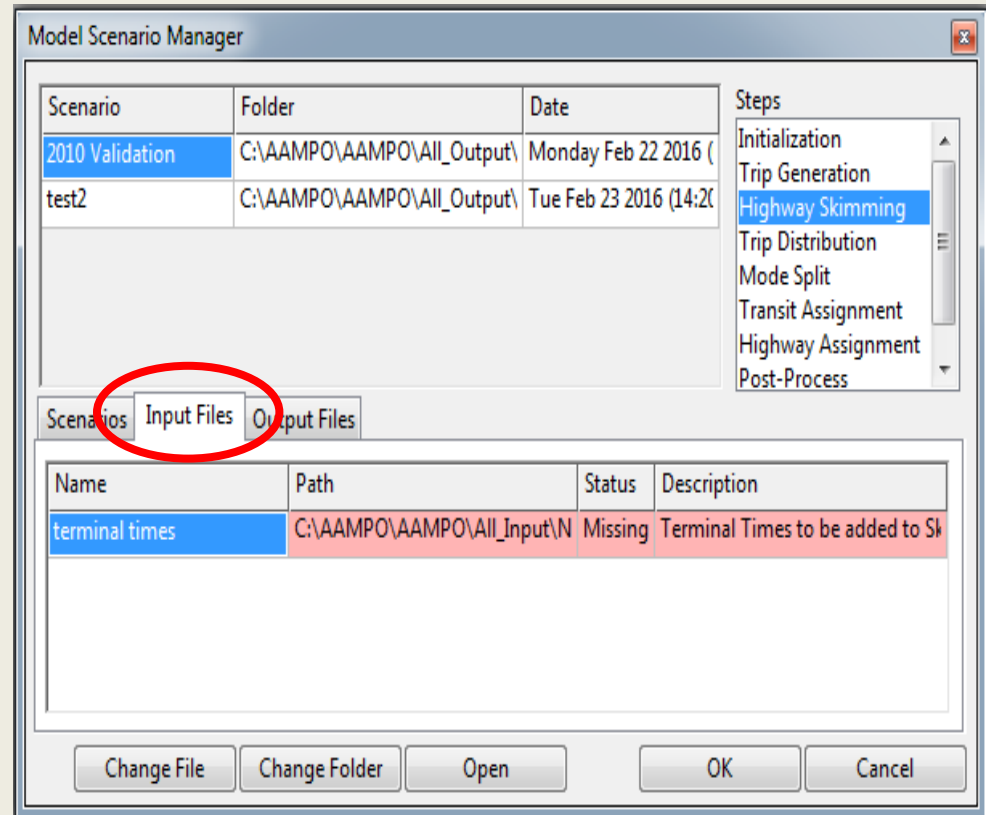
Intermediate Stop Model

Problem Statement

- Attempt to model Journey to Work tours rather than Home-Based Work tours

- Intermediate stop results in trip no longer meeting definition of HBW

- Traditionally resulted in HBO-NHB rather than HBW

- Maintain the characteristics of a Work trip despite stopping along the way
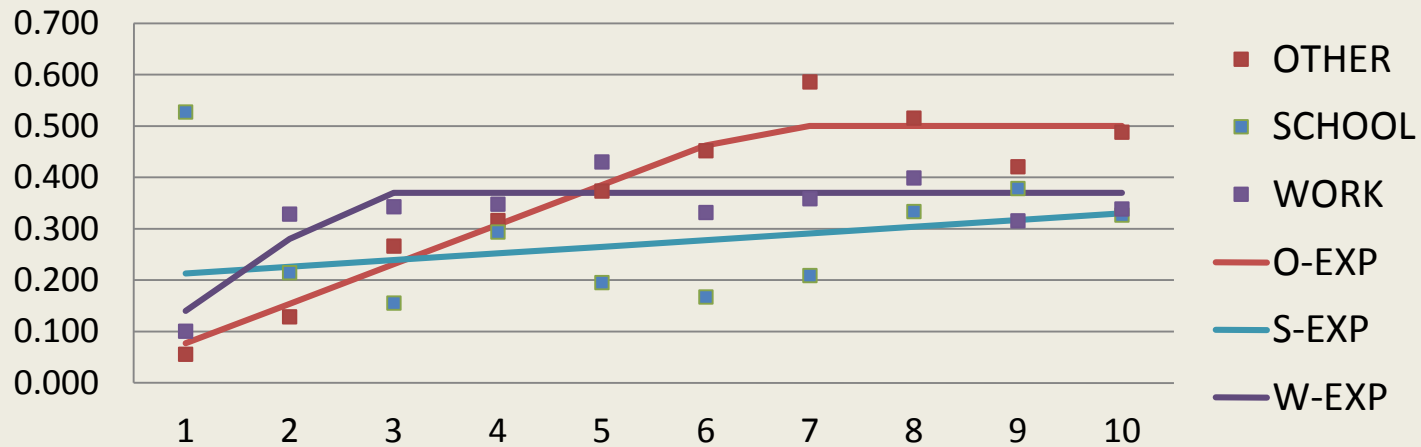
Intermediate Stops

Distribute HBW, then determine likelihood and location of intermediate stop in Tour

Survey Data

Likelihood of Intermediate Trip by Purpose and Length of Trip

Methodology

- Develop trip rates for JTW P&A rather than HBW
- Distribute JTW as normal to establish O&D
- Portion of JTW has no I, stays HBW
- Develop trip rates for JTW Intermediate stops
- Develop skims for O-I-D combinations
- Distribute I's for each O-I-D set based on increased skim to I and attractions at I
- Repeat process for tours with 2 stops, using I as new origin

TransCAD Application

- Tested multi-dimension array function
  - Required aggregating zones into <150 districts

- TransCAD 7 Activity Based Model (ABM) engine
  - Creates asymmetrical matrix
    - Each row is OD pair
    - Each column in intermediate zone
    - VERY LARGE FILE

Process

- ABM engine calculates increase in skim by stopping at intermediate zone

Delta	A	B	C
A-A	0	6	10
A-B	0	0	5
A-C	0	1	0
B-A	0	0	5
B-B	6	0	6
B-C	5	0	0
C-A	0	5	0
C-B	5	0	0
C-C	10	6	0
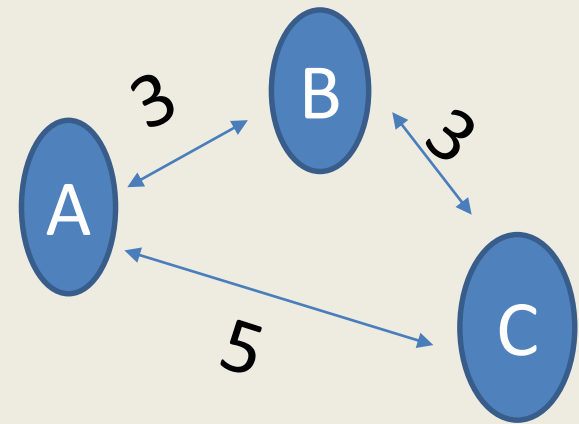
Process

- Attractiveness of intermediate zone (trip generation)

- Calculate OID's utility, sum for all I's for OD

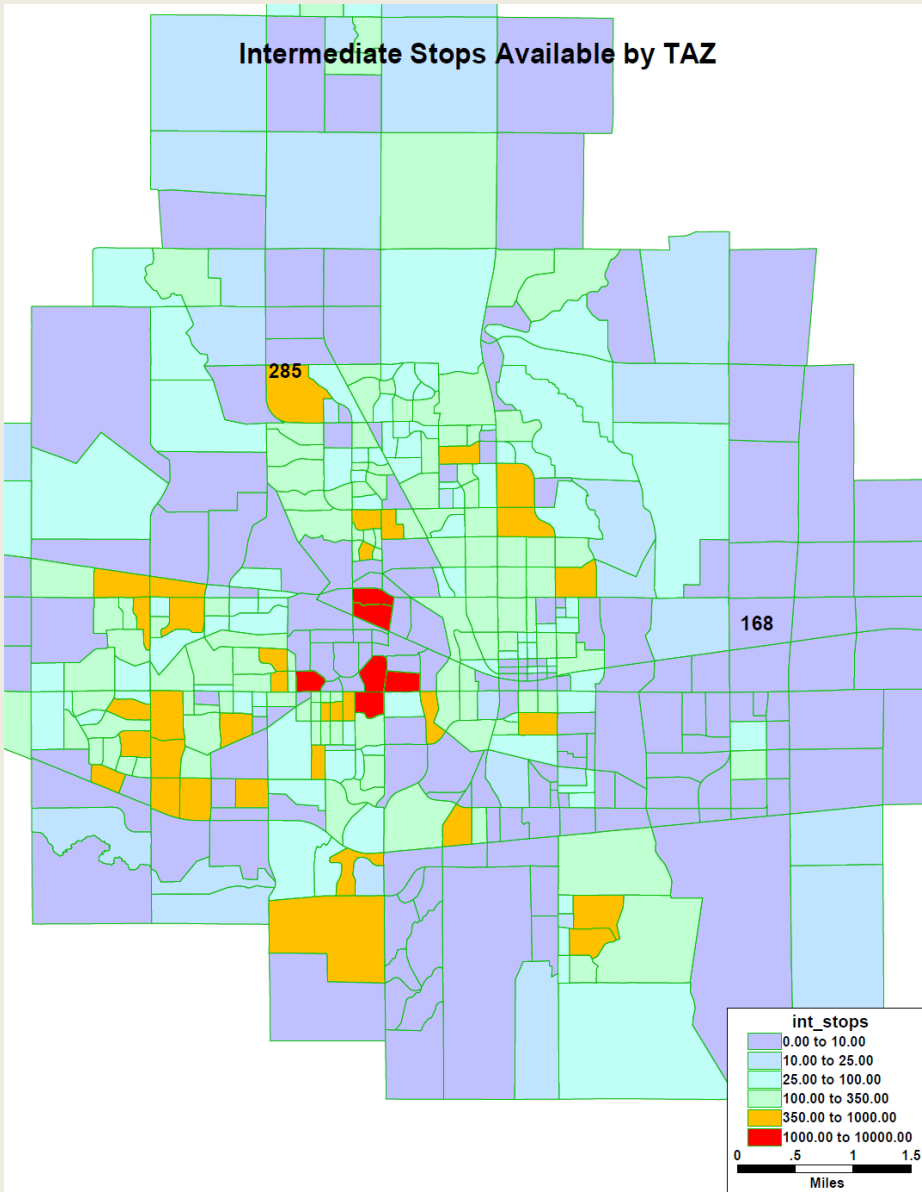Utility = A's@I *K*$(\frac{(OID\ Time)}{(OD\ Time + OID\ Time)})$^B

Where:

- A's@I is the number of intermediate trip ends at zone I
- K is the K-factor used to control intrazonal movements
- OD Time is the travel time between the origin and destination
- OID Time is the travel time between the origin and destination via the intermediate stop
- B = 4.5, subject to calibration

Process

- Proportion the trips to all I's for OD
- Repeat for all OD's
- Calculate portion of tours that will have 2nd stop
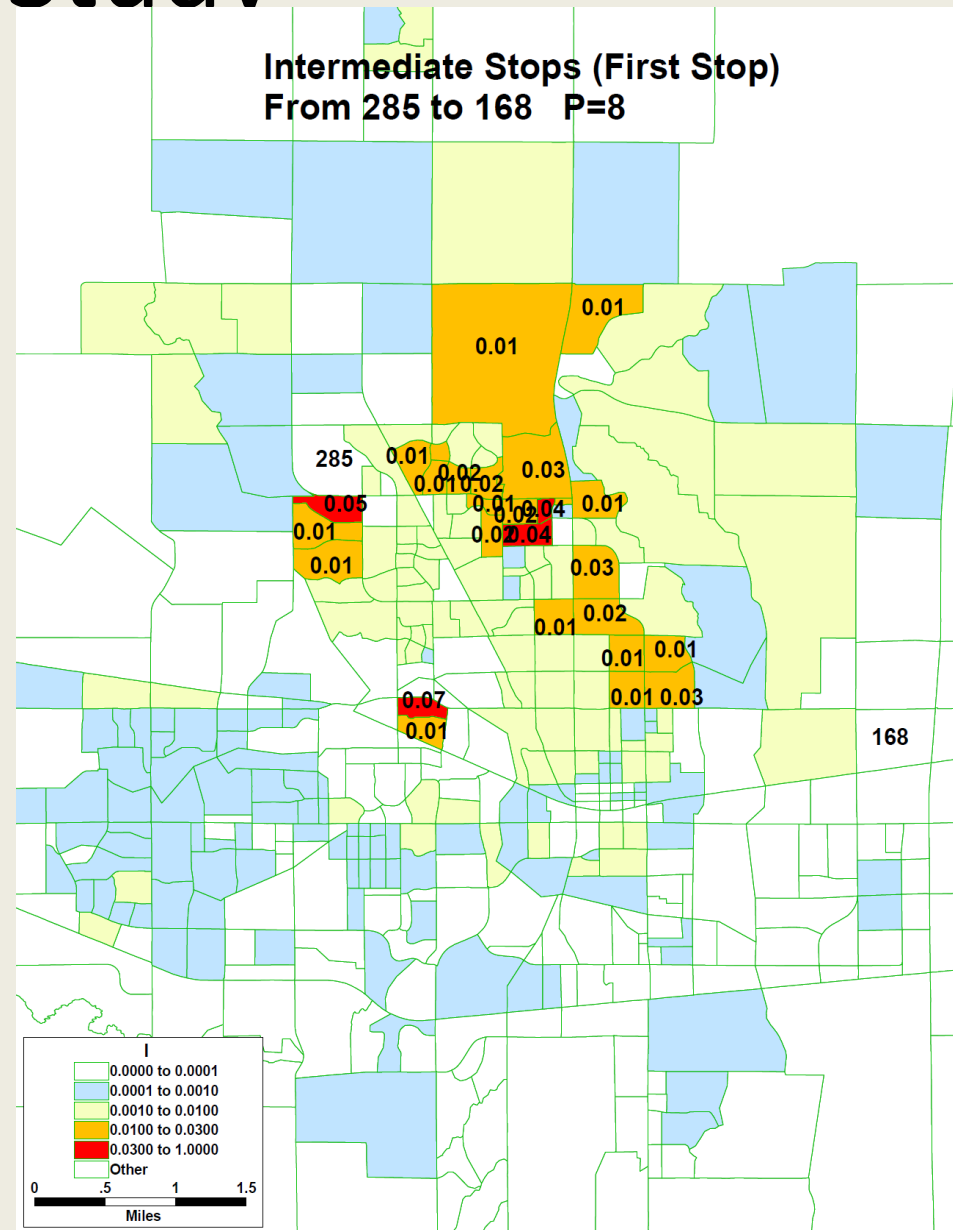- Feed tours needing 2nd stop back into model, using I as new origin

- Looping process for Weekday/Weekend and Time Periods

Case Study

Intermediate Stops Available by TAZ

285

168

int_stops
- 0.00 to 10.00
- 10.00 to 25.00
- 25.00 to 100.00
- 100.00 to 350.00
- 350.00 to 1000.00
- 1000.00 to 10000.00

0   .5   1   1.5
Miles

Case Study

- Power function = 3

Intermediate Stops (First Stop)
From 285 to 168

285

285   0.01
0.01
0.01
0.02
0.02
0.01   0.01
0.02
0.09
0.02
0.03   0.03 0.02
0.01
0.01

168

Portion of Intermediate Stops
0.0000 to 0.0001
0.0001 to 0.0010
0.0010 to 0.0100
0.0100 to 0.0300
0.0300 to 1.0000
Other

0   .5   1   1.5
August 22, 2016   Miles

Case Study

- Power function = 8

Intermediate Stops (First Stop)
From 285 to 168   P=8

ISMS Recommendation

- Incorporate intermediate stops process into standard modeling
- Provide an 'opt out' to avoid extensive run time for all model runs
  - Maintain proportion of OD's to each OID combination and apply at run time
  - Conduct full process only with major changes in land use or network
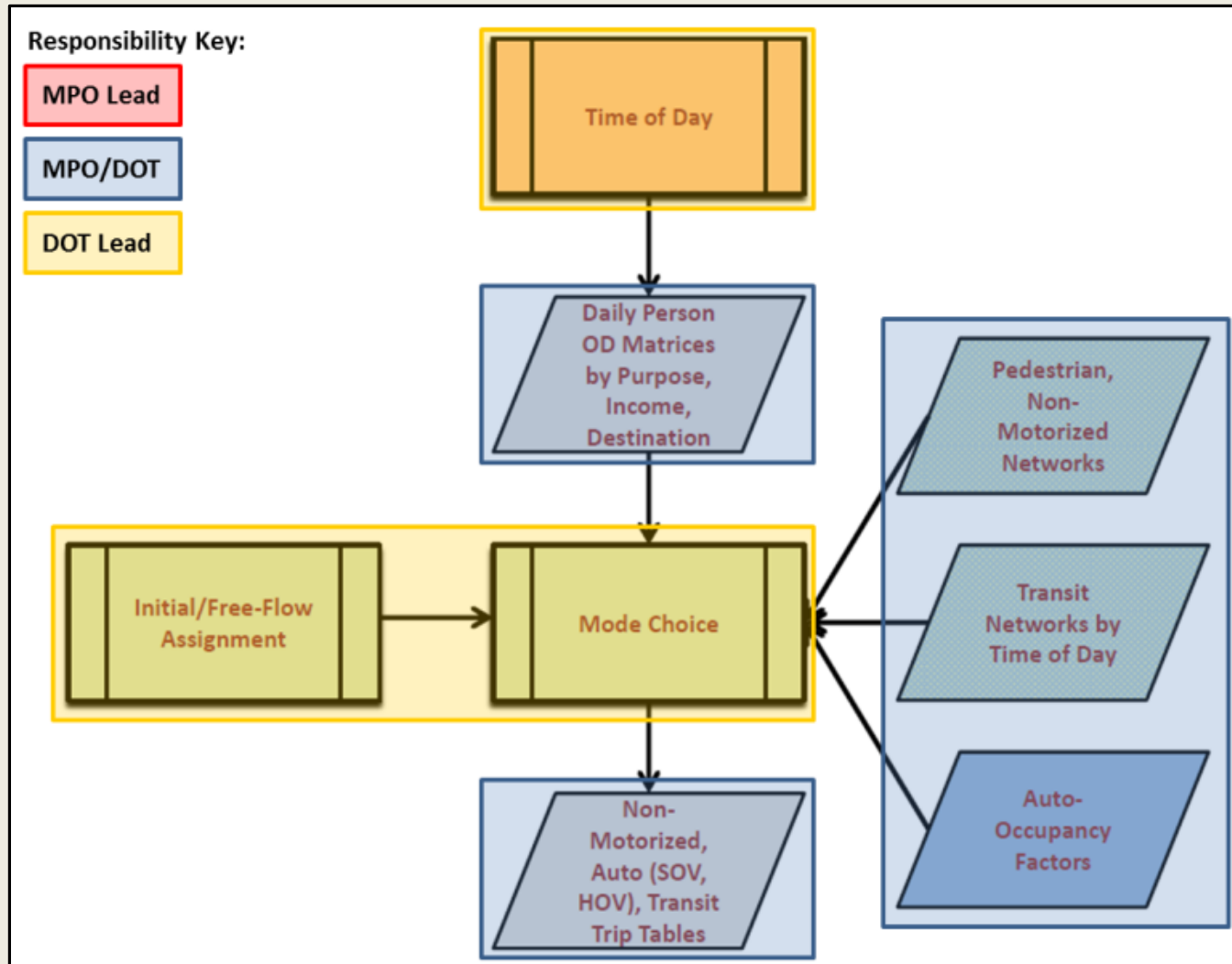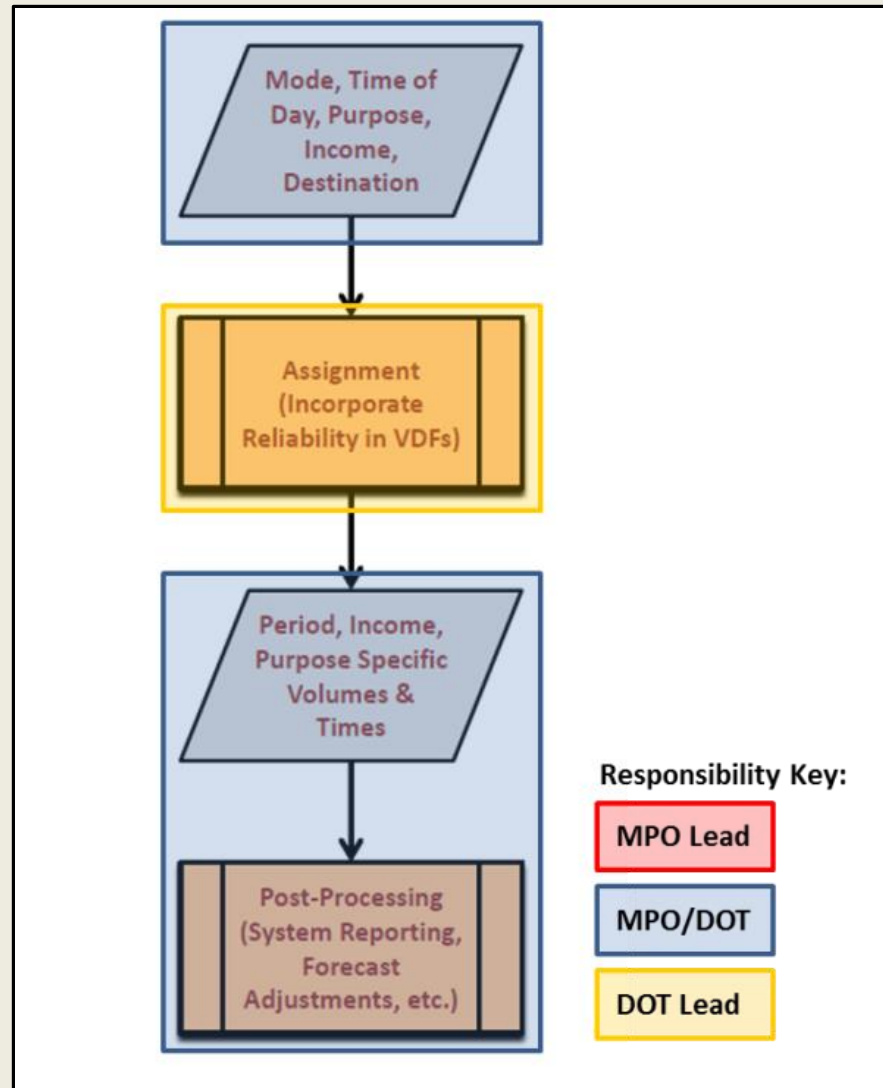
Roles/Responsibilities

Trip Generation
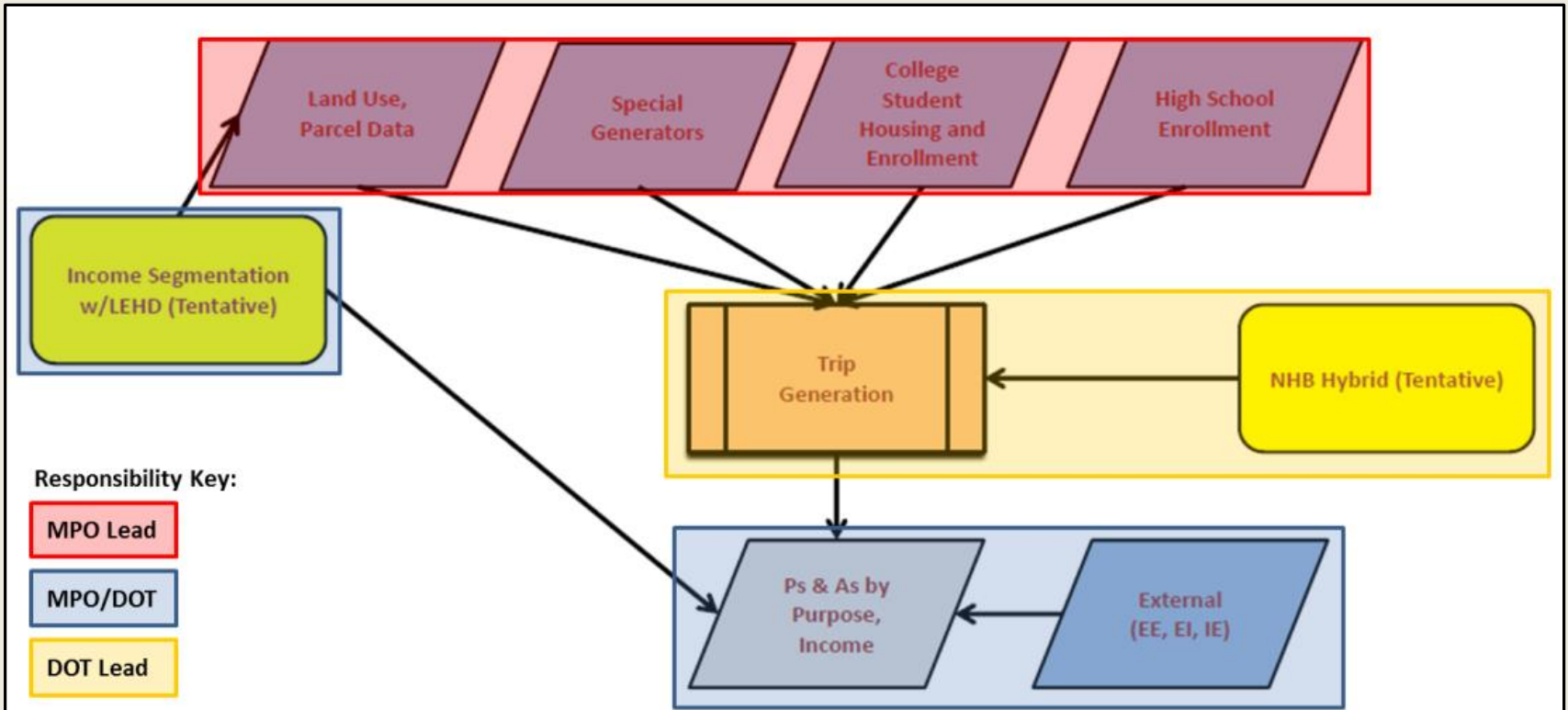
Trip Distribution
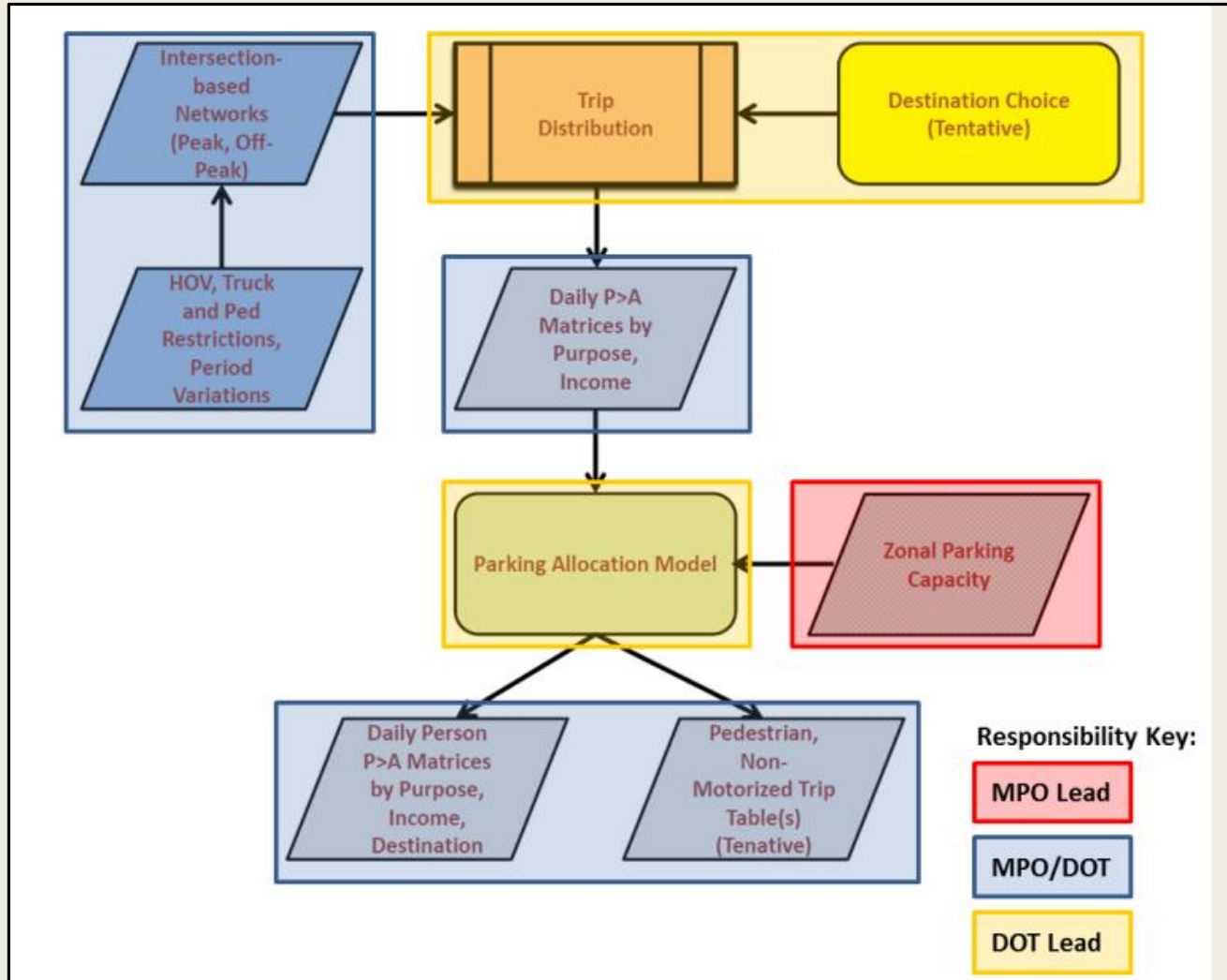
Mode Choice

Assignment

Roles/Responsibilities Discussion

Next Steps

- Finalize Open Tasks
  - GUI/Script Prototypes
  - Transit Network Guidance
  - Mode Choice Model Case Study
  - More to Come on Distribution/Destination Choice, Mode Choice/Split, Assignment
- Finalize ISMS Manual and Technical Guidance
- Schedule Workshop w/MTMUG for Rollout

Questions?