Use of FAF to Update Iowa Statewide Freight Model

Presented to:

Ohio Travel Demand Model Users Group
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Presented by:

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Metro Analytics and
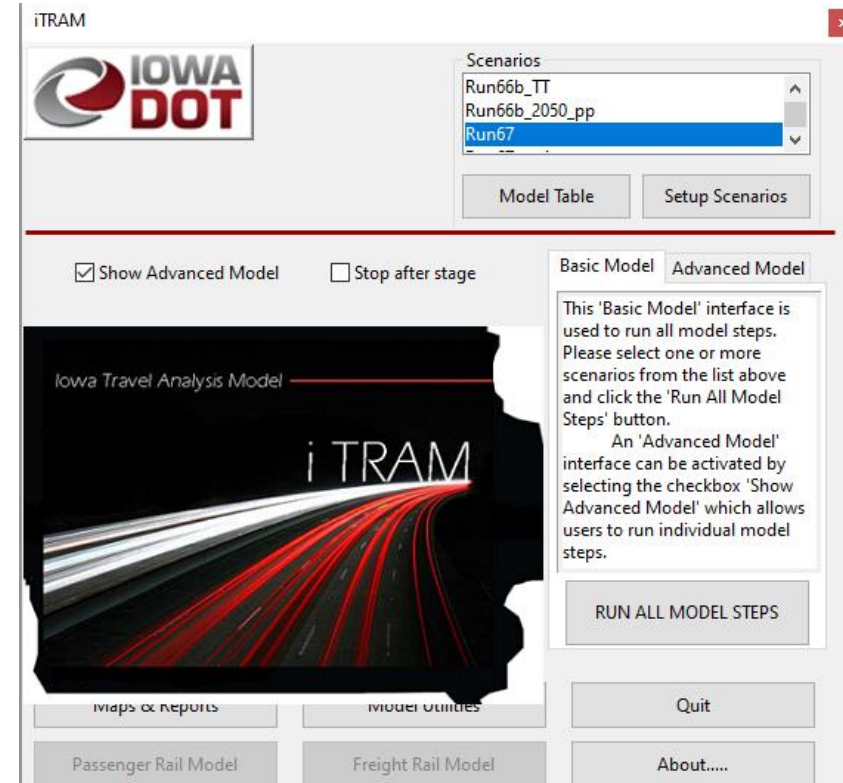*FuturePlan Consulting*

METRO ANALYTICS

Presentation Overview

- iTRAM Study Background
- FAF Network and Zone System
- FAF Disaggregation to iTRAM TAZs
- Conversion of FAF Tonnages to Trucks
- iTRAM Truck Validation
- Questions & Comments

Study Background

- Update TransCAD-based Iowa Travel Analysis Model (iTRAM)

- Previous iTRAM already included zones & network for the majority of 9 states

- Project timeline: April 2019-June 2021

- Phase I: SWOT Workshop – assess, budget and prioritize model enhancements with Iowa DOT

- Phase II: Update base year model to 2018 and horizon year model to 2050

- *Freight Update – Maximize use of FAF*
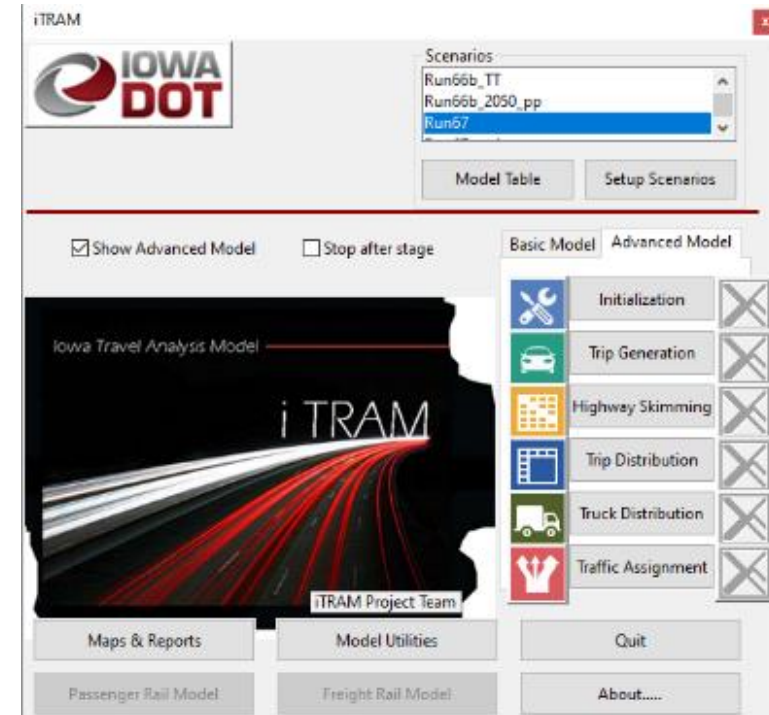
# FAF Network and Zone System

- Network
  - Append FAF4 TransCAD network attributes to iTRAM network
  - Remove FAF network links with FHWA functional class < 1
  - Window out iTRAM network area from FAF network
  - Add connecting links between the two networks
  - Adjust centroids and connectors for FAF zones in areas outside iTRAM
  - Add external truck screenline to model network

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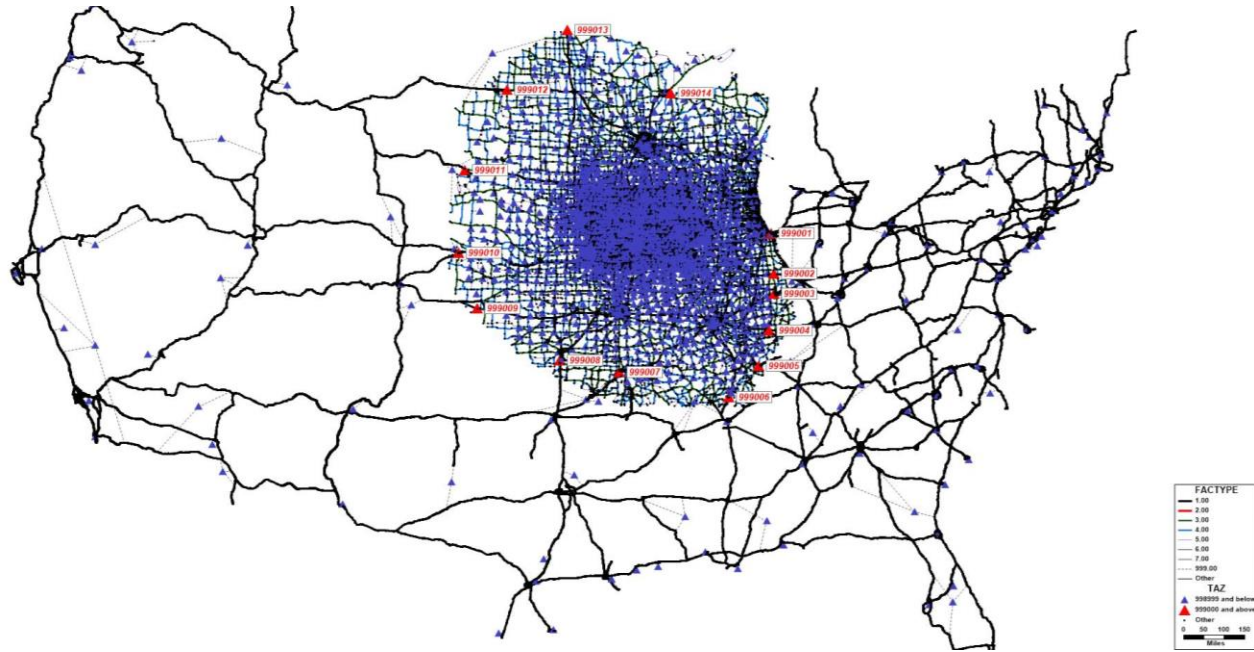
FAF Network and Zone System (Cont'd)

- Zones
  - Internal iTRAM zones use 4-to-5-digit numbering scheme that enabled FAF zone numbers outside iTRAM study area to remain unchanged
  - FAF zone map prepared in ESRI format to better visualize extent of zones and relationship to network
  - FAF only disaggregated within iTRAM study area

FAF ZONE V.2 NATIONWIDE: USING ATTRIBUTE CFS12_NAME

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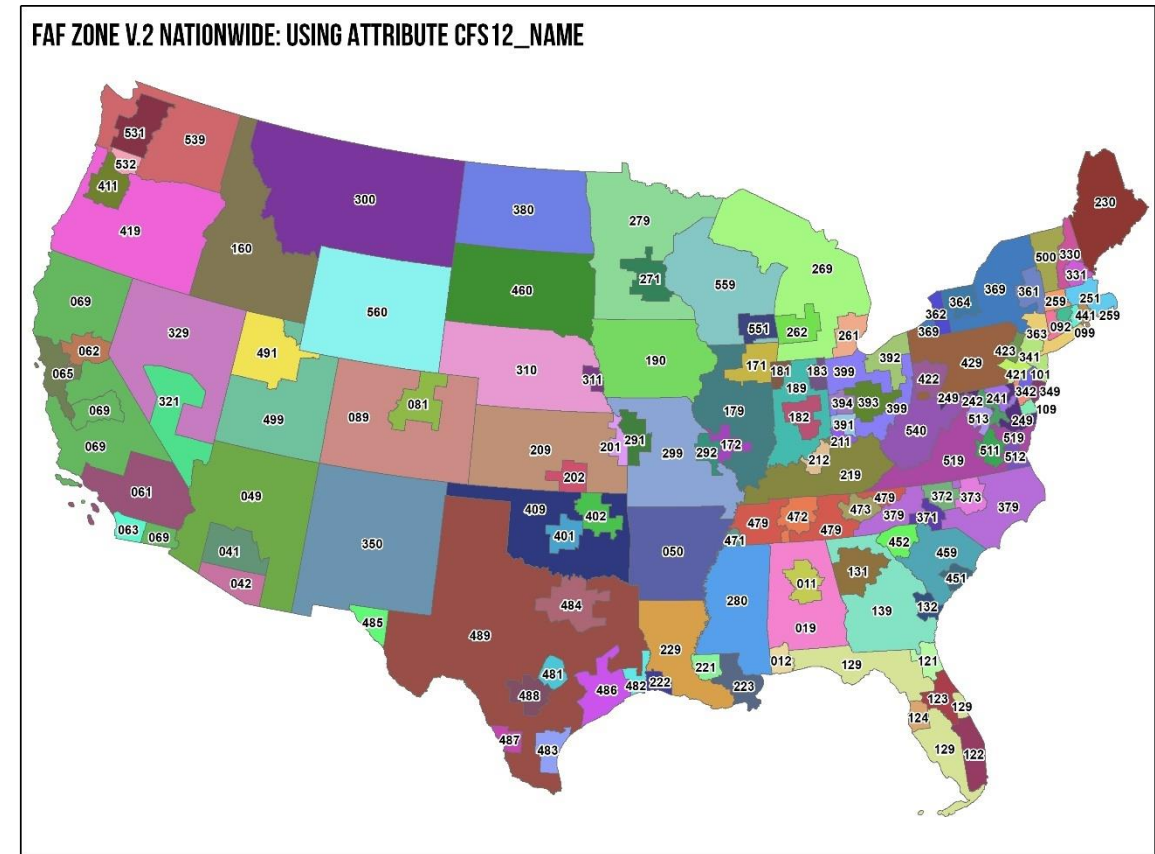
FAF Disaggregation to iTRAM TAZs

- Iowa Freight Optimization Model (iFROM) previously disaggregated FAF to county level

- County level disaggregation starting point for TAZ level disaggregation
  - regression models developed using 2018 employment & other socioeconomic data
  - 2018 commodity flow allocation table developed using regression models and base year TAZ level socioeconomic data
  - regression models developed using 2050 employment & other socioeconomic data
  - developed 2050 commodity flow allocation table using regression & SE data

NAICS Code Range	Employment Category
111 to 112	FARM
113 – 115, 211 – 339, 42, 481 – 493	MANU
441 – 454	RETAIL
511 – 562	FIRE
611 – 722	EDUC
811-814, 9A, 93, 9B	GOVT

Column Name	Description
OZone	Origin TAZ Zone ID
OFAF	Origin FAF Zone ID
DZone	Destination TAZ Zone ID
DFAF	Destination FAF Zone ID
SCTG2	Commodity code. SCTG 10 (stone) and 12 (gravel) are combined into a new code 80 (stone and gravel)
Mode	Transportation mode. 1 = Truck
Trade_Type	1 = domestic, 2 = import, 3 = export
Tonnage	Short ton in 2018 from FAF version 4.51
Value	Commodity value in USD in 2018 from FAF version 4.51

Conversion of FAF Tonnages to Trucks

- Zone-to-zone FAF tonnages prepared in csv format and converted to TransCAD trip table matrix format

- Tonnages converted to trucks using payload factors from *Quick Response Freight Methods, Third Edition* (2019)

- Tested varying factors to convert annual trucks to daily trucks

- FAF truck assignments at iTRAM external screenline iteratively compared to counts, arriving at annual factor of 260*

Updated Truck Trips Based on FHWA Payload Factors				
	FAF	**Iowa**	**Buffer**	**Grand Total**
FAF	4,177	2,896	55,071	62,145
Iowa	3,903	89,491	9,885	103,279
Buffer	54,634	6,246	241,882	302,762
Grand Total	**62,715**	**98,633**	**306,838**	**468,186**

Iowa-to-Iowa truck trips include 78,691 medium-duty trucks

260 equals number of weekdays in a year; testing with 365 factor under-estimated the number of trucks at external screenline

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iTRAM Truck Validation

- Since FAF doesn't account for trucks that do not carry freight, medium-duty truck estimates were also needed

- Validation began with only FAF trucks

- Original iTRAM truck trip production rates were then re-activated

- Series of trip production adjustment factors tested to best validate against available truck counts in Iowa

- Final validation reflects 25% reduction from original truck trip production rates

ADT Validation by Volume Class										
Volume Group	2005 iTRAM		2010 iTRAM		2018 iTRAM (ALL)		2018 iTRAM Trucks		Updated Targets (ALL)	
	Percent Error	% RMSE	Percent Error	% RMSE	Percent Error	RMSE	Percent Error	% RMSE	Percent Error	RMSE
< 1,000 (0-2k in 2005)	26.6%	168	0%	n/a	0%	0.00	-3%	115.88	+/-25%-50%	45-100
1,000 - 2,500 (2-4k in 2005)	6.4%	96	21%	86.58	20%	87.05	5%	77.55	+/-25%-50%	45-100
2,500 - 5,000 (4-6k in 2005)	-3.8%	77	12%	65.78	17%	89.07	3%	46.70	+/-25%-50%	45-100
5,000 - 10,000 (6-10k in 2005)	1.1%	60-71	-5%	48.05	-2%	54.59	-38%	54.91	+/-25%-50%	35-45
10,000 - 25,000	0.5%--9.2%	38-49	-2%	35.51	0%	38.73	0%	n/a	+/-20%-30%	15-35
25,000 - 50,000	0.6%-7.6%	13-28	-6%	24.16	-18%	26.80	n/a	n/a	+/-15%-25%	15-27
> 50,000	4.3%	38	6%	17.95	1%	20.37	n/a	n/a	+/-5%-20%	10-20
Overall	1.3%	92	1%	56%	-1%	52.6%	-4%	95.6%	+/-5%	35-45

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Questions & Comments