1

Overview of the Second Generation Iowa Statewide Traffic Analysis Model (iTRAM)

Eric Wilke & Jeff von Brown

Office of Systems Planning

Iowa Department of Transportation

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Model Development Team

2

PARSONS BRINCKERHOFF

CDM Smith
listen. think. deliver.

IOWA DOT

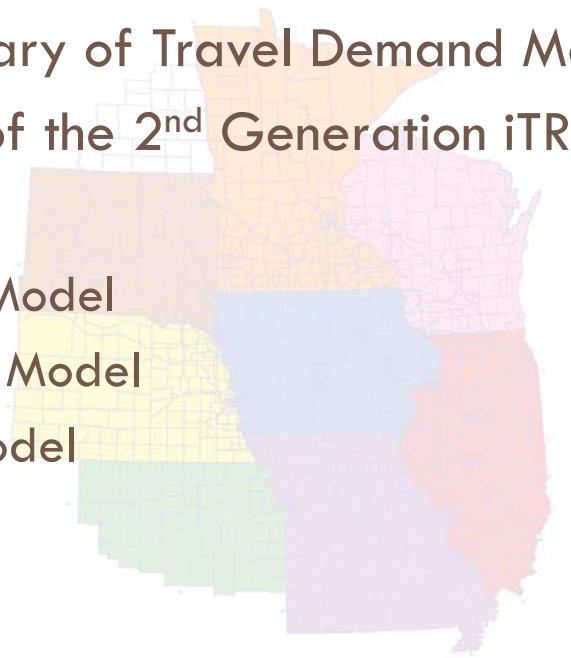
Baker

RSG
the science of insight

Presentation Overview

3

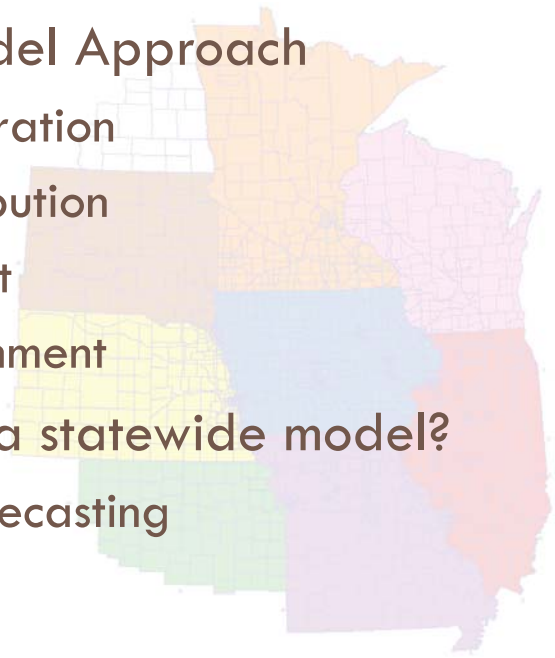
- Brief summary of Travel Demand Modeling
- Overview of the 2nd Generation iTRAM
- Scenarios
  - Highway Model
  - Passenger Model
  - Freight Model



Brief Summary of Travel Demand Modeling

4

- 4-Step Model Approach
  - Trip Generation
  - Trip Distribution
  - Mode Split
  - Trip Assignment
- Why have a statewide model?
  - Traffic Forecasting



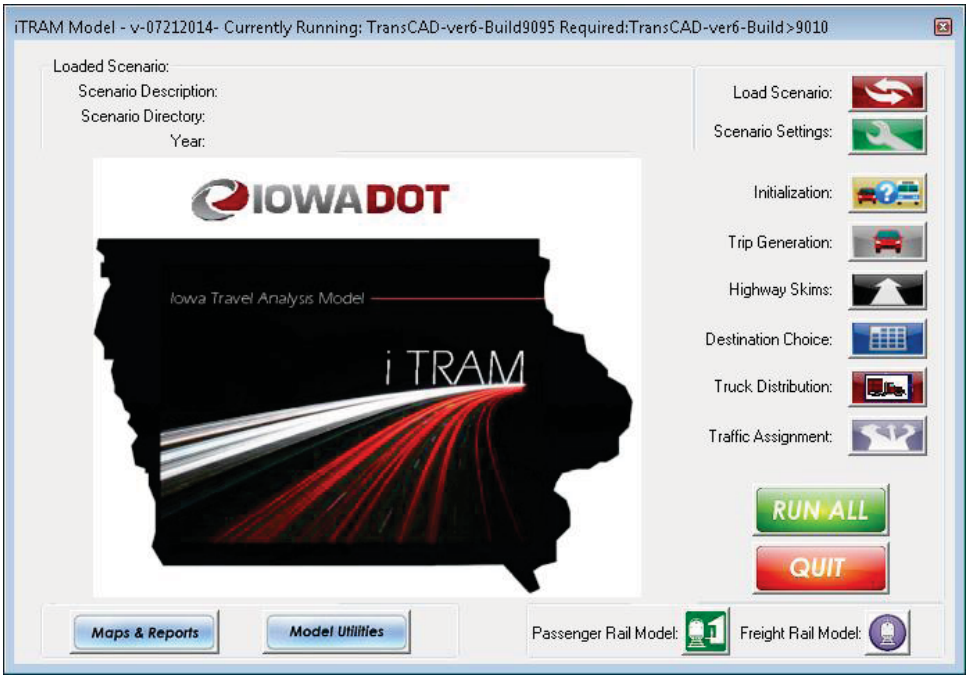
Past iTRAM Applications

5

- Supplement to Rural Forecasting Process
- Flood Detour Analysis
- Statewide and Regional Corridor Analysis
- Sub-area Analysis (MPO External Trip Analysis)
- Bypass Studies
- Rest Area Study
- Mississippi/Missouri River Bridge Out
- Interstate Closure Analysis
- Aviation Drive Time Scenarios
- Snow Run Optimization

Overview of the 2nd Generation iTRAM

6



Highway Model – TAZs

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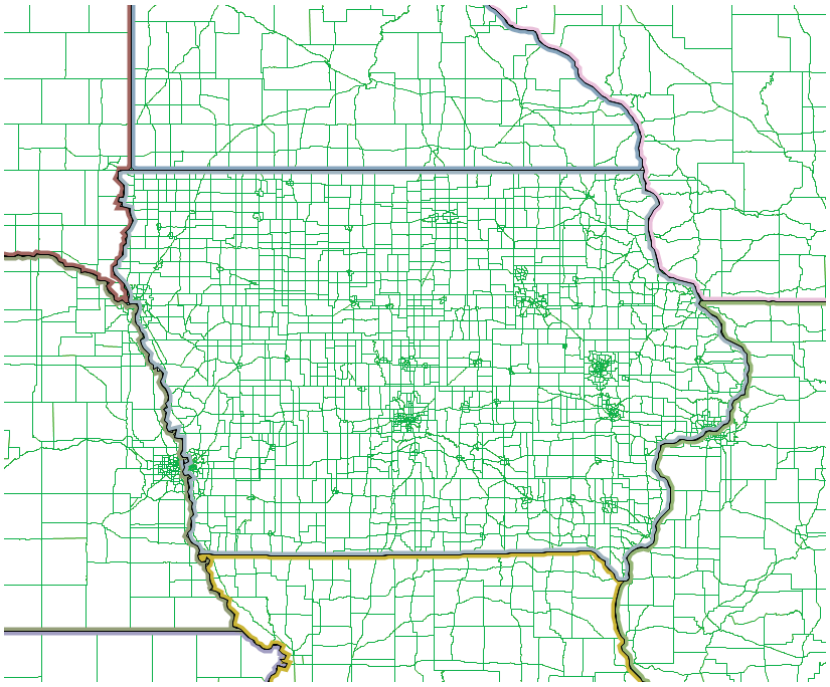

Highway Model – Road Network

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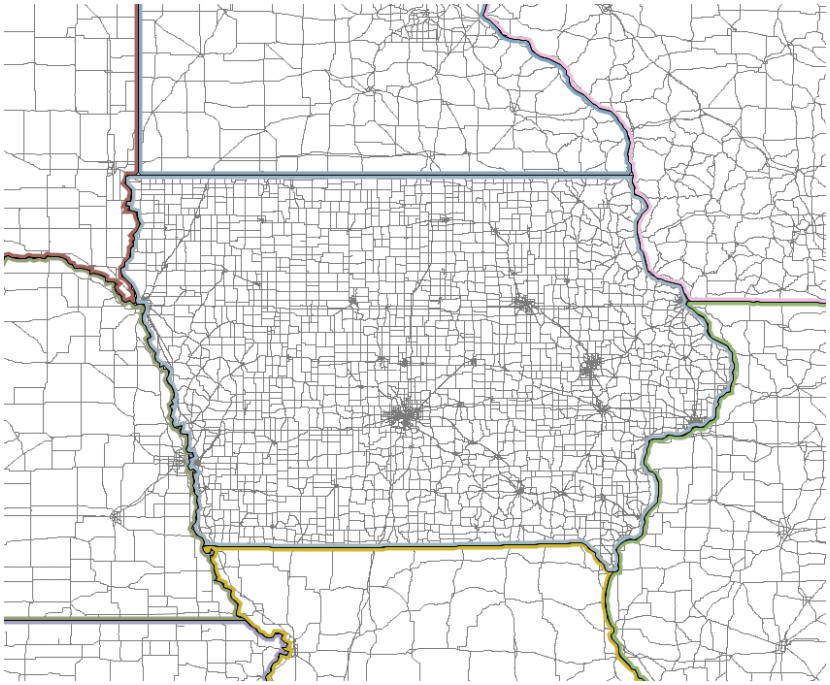

Freight Enhancement

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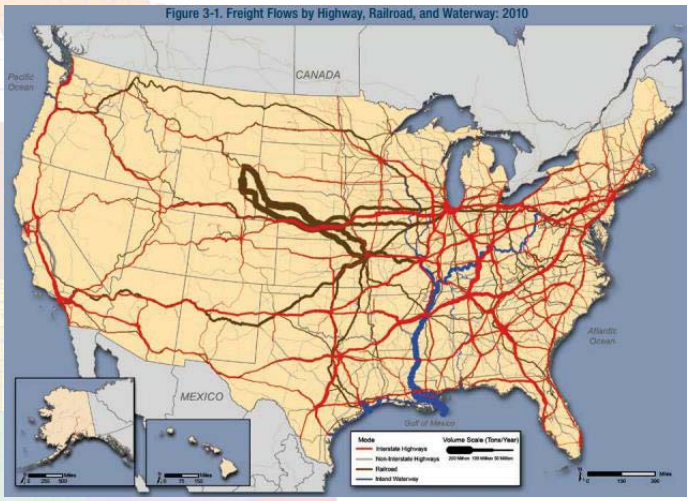
- Freight Analysis Framework (FAF)
  - Commodity Tons
  - Disaggregated by 23 employment categories (InfoGroup employment data)



Source: Freight Analysis Framework - Federal Highway Administration

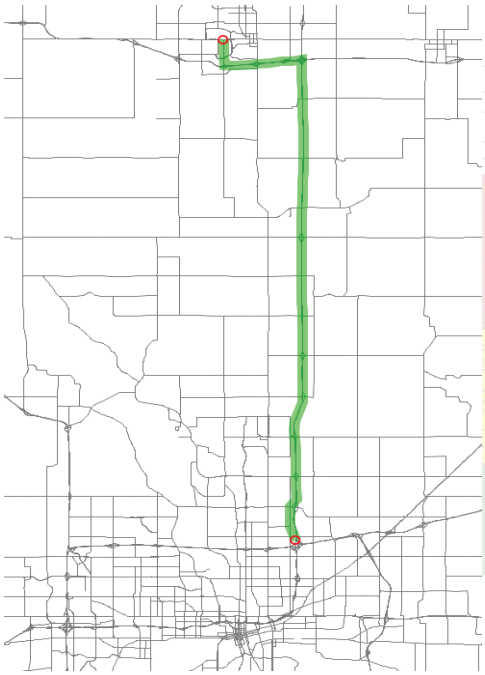
Highway Model Scenario

10

- Increase Interstate speed limits to 75 mph
  - Travel time between Des Moines and Ames
  - Quantity of traffic increase in 2015

Highway Model Scenario

11



- Original Speeds = 32.55 minutes
- New Speeds = 29.81 minutes
- Time Savings = 2.74 minutes

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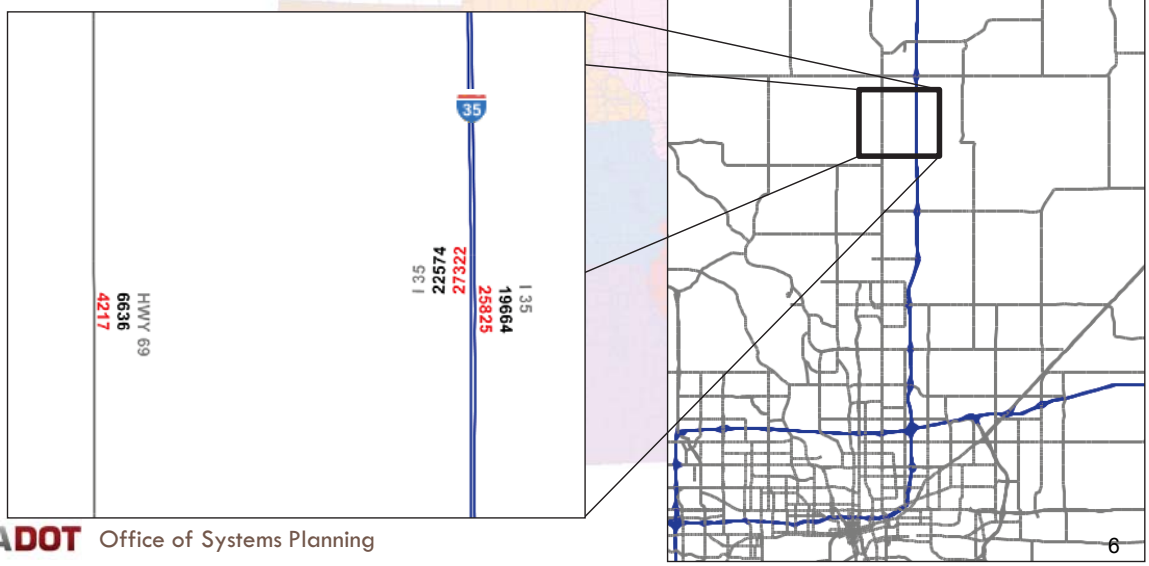
Highway Model Scenario

12

- Black = Original Speed Volumes
- Red = New Speed Volumes



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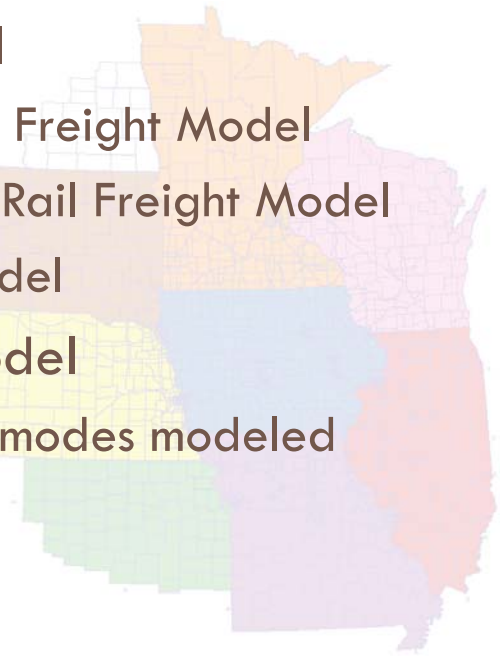
New Components

13

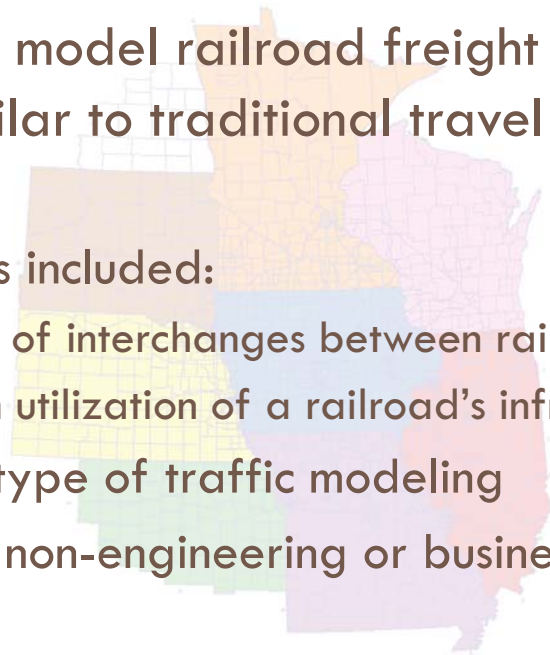
- Freight Model
  - National Rail Freight Model
  - Iowa Centric Rail Freight Model
  - FAF Flow Model
- Passenger Model
  - Rail, Bus, Air modes modeled



Freight Model

14

- Purpose: To model railroad freight flows in a manner similar to traditional travel demand modeling
  - Challenges included:
    - Modeling of interchanges between railroads
    - Maximum utilization of a railroad's infrastructure
  - Emerging type of traffic modeling
  - Meant for non-engineering or business level analysis

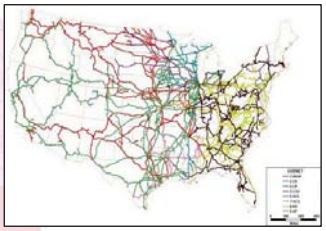


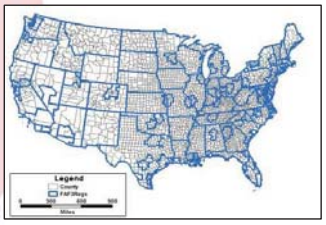
Freight Model

15

- Overview of Model Components:

Inputs	Summary	Data Type
Network	All Class I railroads plus select regional and terminal railroads	Line
Impedance	Rail links based on class, track type and signal system, and number of tracks variables	Line Data
Centroids	County geographic centroid connections to rail sub-network	Point
Demand	FAF Rail Freight Commodity Flows (county-to-county)	Point Data
Commodity Classification Scheme	Standard Classification of Transported Goods (SCTG) - 43 categories	Data Detail





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Freight Model - National

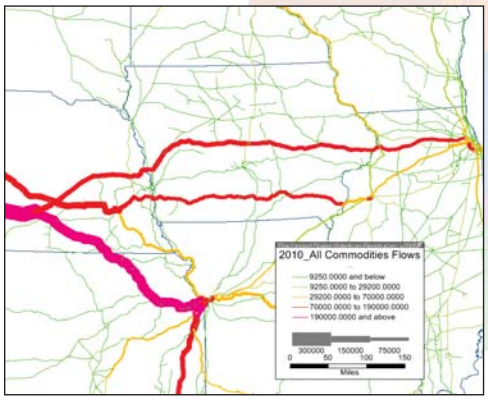
16

- Graphical User Interface [GUI] driven analysis tool allows selections of:
  - Year [2010 to 2040]
  - Market [Domestic, Foreign]
  - County/Region [if Foreign]
  - Commodity(s)

Freight Model - National

17

- Example Analysis: 2010 Domestic Shipments of all Commodities
  - Output similar to reported flows

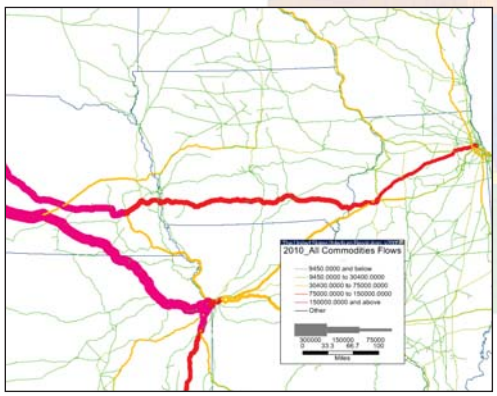


Class I + IAIS	Observed 2010	Estimated
Rail Operator	Annual thousands of Tons	
BNSF	23,228,480	22,966,333
Canadian National	1,812,384	358,033
Canadian Pacific	3,395,700	388,139
Iowa Interstate Railroad	1,093,359	27,248
Norfolk Southern	96,976	26,941
Union Pacific	44,862,791	35,759,489
Within Iowa	74,489,690	59,526,184

Freight Model - National

18

- Example Analysis: Same Scenario in 2010 – Union Pacific Bridge Out
  - Results:
    - Iowa -22% in ton-miles
    - Union Pacific suffers a 67% of ton-miles in Iowa

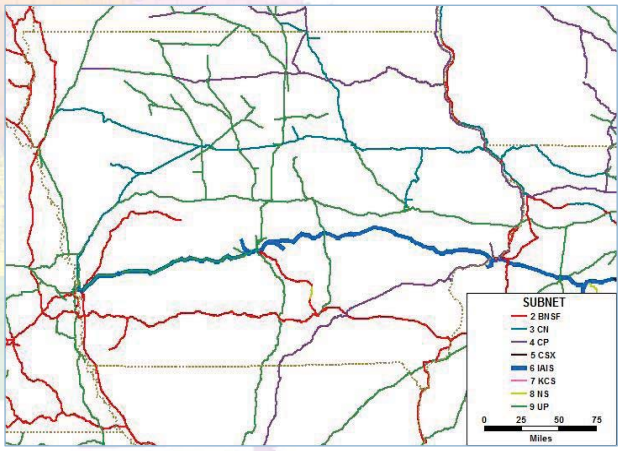


	DIFFERENCE		% DIFFERENCE	
Railroad Name	Annual Ton Miles	Annual Ton Hours	Annual Ton Miles	Annual Ton Hours
BNSF	33,202,515	636,329	45%	44%
Canadian National	775,273	29,589	111%	110%
Canadian Pacific	459,150	15,523	18%	23%
Iowa Interstate Railroad	50,801	2,036	86%	86%
Norfolk Southern	33,116	904	23%	22%
Union Pacific	11,679,981	263,287	-67%	-63%
Within Iowa	46,180,925	947,670	-22.4%	-19.5%

Freight Model – Iowa Centric

19

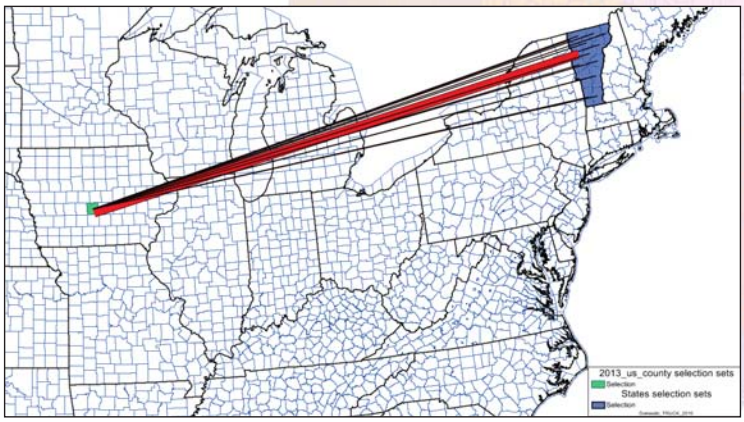
- Commodity flow is based on the Carload Waybill Sample:
  - Real Shipment Data
  - Expandable
- Allows more detailed flow analysis



Freight Model - FAF

20

- Example: Polk County IA to Vermont by Truck All Commodities in 2010
  - 0.8 thousands of tons



Passenger Model

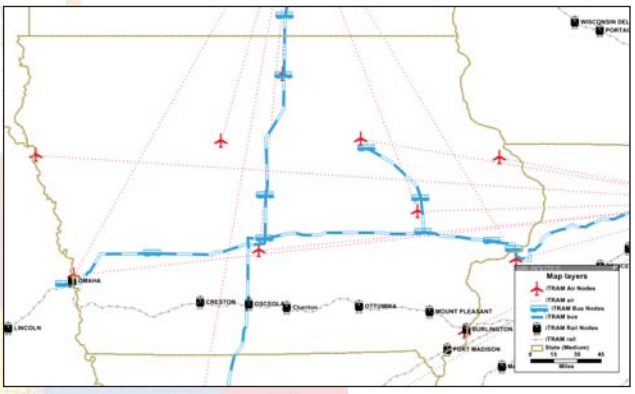
21

- Purpose: To model the mode share of non-personal vehicle passenger flows
  - Challenges included:
    - Modeling the operations of Air, Rail, and Bus services
    - Modeling the interactions of Air, Rail, and Bus services
  - Allows route viability examination:
    - Important area for Iowa DOT
    - Potentially a bigger topic in the future

Passenger Model

22

- 2010 Base Network
- Chicago to Omaha trips only
  - Air, Rail, Bus, Auto
- Results:
  - Similar to RITA proportions

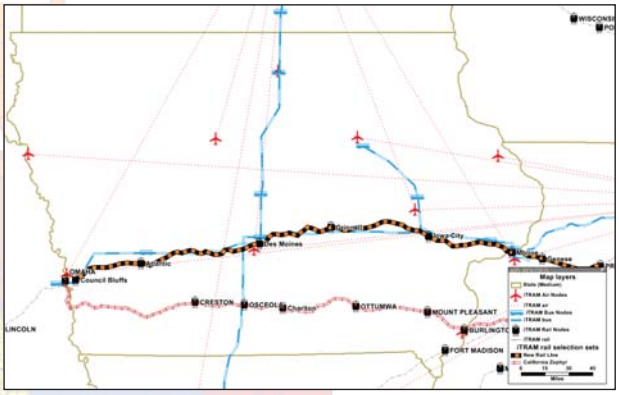


Chicago to Omaha	Mode	Share	RITA Comparison
	Air	4.1%	7.4%
	Bus	0.5%	2.1%
	Rail – Amtrak	3.0%	0.8%
	Auto	92.5%	89.3%

Passenger Model

23

- Expanded Network:
  - State Sponsored Chicago to Omaha rail service
- Results:
  - Shift from other modes
  - Slight increase for rail overall



	Mode	Share	Scenario Change
Chicago to Omaha	Air	4.0%	-0.24%
	Bus	0.5%	-1.06%
	Rail – Current Amtrak	0.4%	-87.35%
	Rail – New Service	2.7%	-
	Auto	92.4%	0.17%

Summary

24

- The second generation iTRAM Model;
  - Allows more freight based modeling, satisfying national and state level initiatives
  - Adds long distance passenger mode split and route viability analysis
  - Enhancements to the GUI allows for more efficient model management
  - Updates first generation data and highway modeling methods

Summary

25

Thank you for your attention

Eric.wilke@dot.iowa.gov

Jeff.vonbrown@dot.iowa.gov