Johnson City MPO
Travel Demand Model

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PLANNERS
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MOVING YOU FORWARD

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Johnson City MPO Travel Demand Model

March 6, 2008

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WSA'S Presentation Participants

- **Rob Bostrom, P.E. – Project Director**
- **W. Hollis Loveday, P.E. – Project Manager**
- **Jennifer Humphreys, AICP – Lead Modeler**
- **Liza Runey, EI – Modeler**

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Overview

- **Input Data**
- **Model Steps**
- **Base Year Model Calibration and Validation**
- **Future Year Models**
- **User Interface**

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STUDY AREA

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TRAVEL DEMAND MODEL how did we get there?

- Network Development
  - Base Year (Existing Conditions)
  - Forecast Year (E+C, LRP)

- Network Attributes
  - Lanes, Speed, Capacity, Functional Classification
  - AADT

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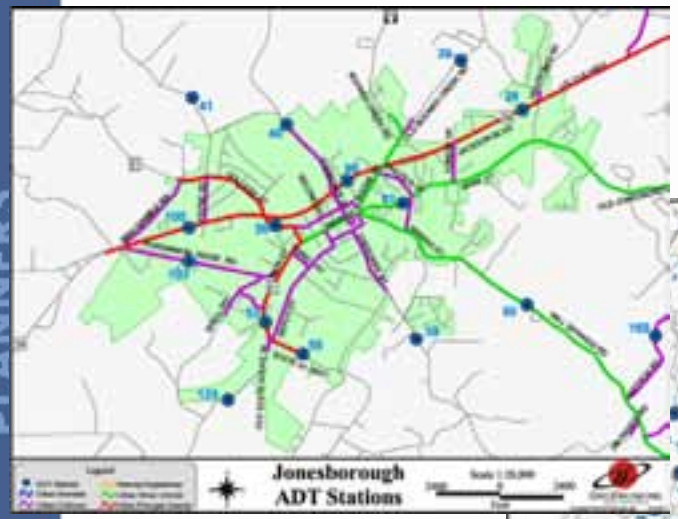
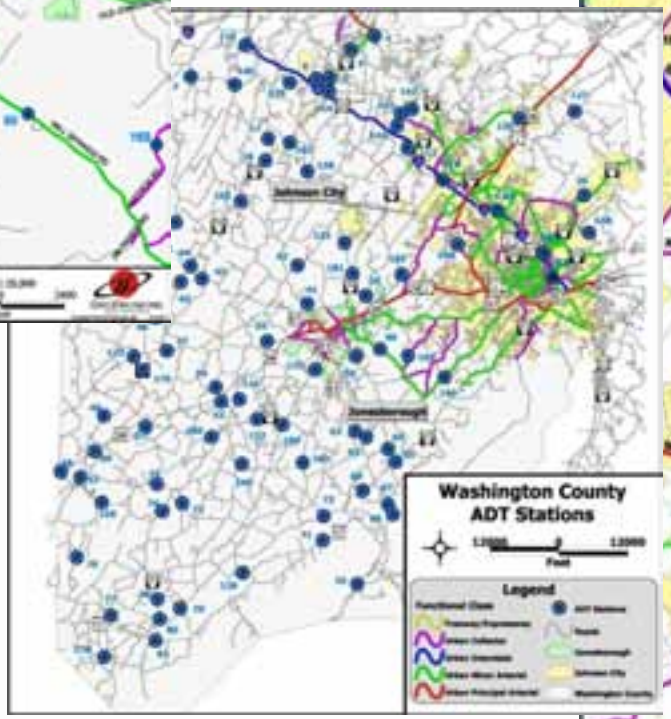
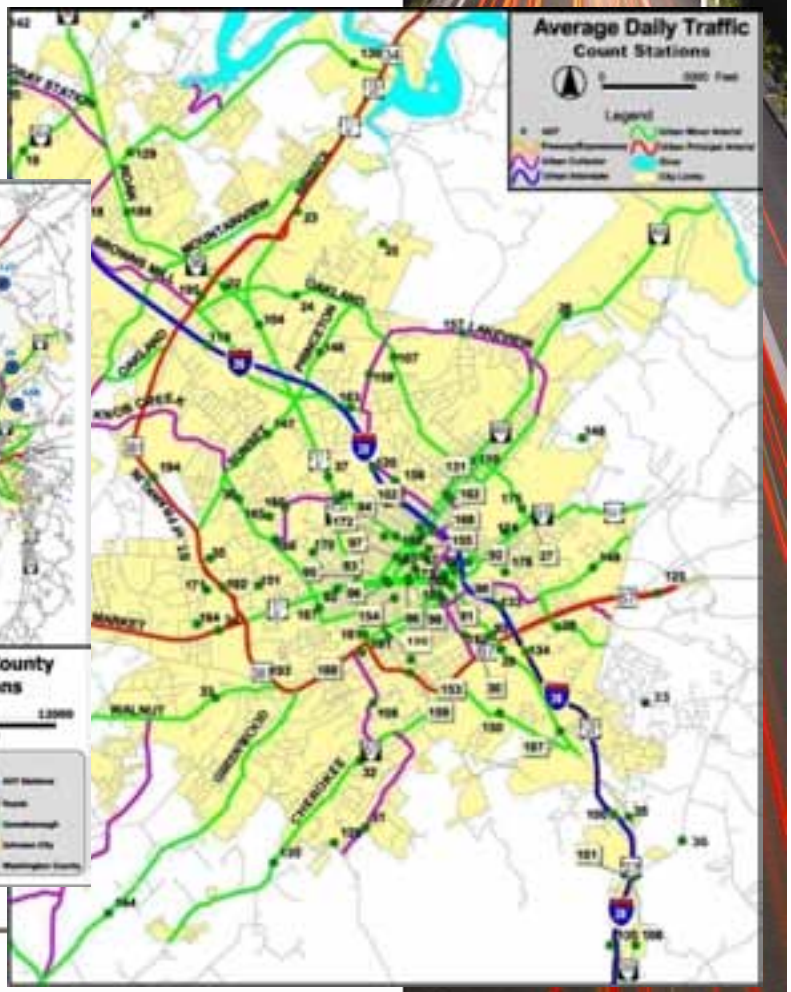
BASE YEAR NETWORK

NETWORK ATTRIBUTES







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TRAVEL DEMAND MODEL how did we get there?

- TAZ Socioeconomic Data Collection
  - Base Year **(Year 2005)**
    - ESRI and Dunn & Bradstreet
  - Forecast Year **(Year 2030)**
    - Woods & Pool and Dunn & Bradstreet

- TAZ Socioeconomic Data
  - Population and Dwelling Units
  - Retail Employment and Non-Retail Employment

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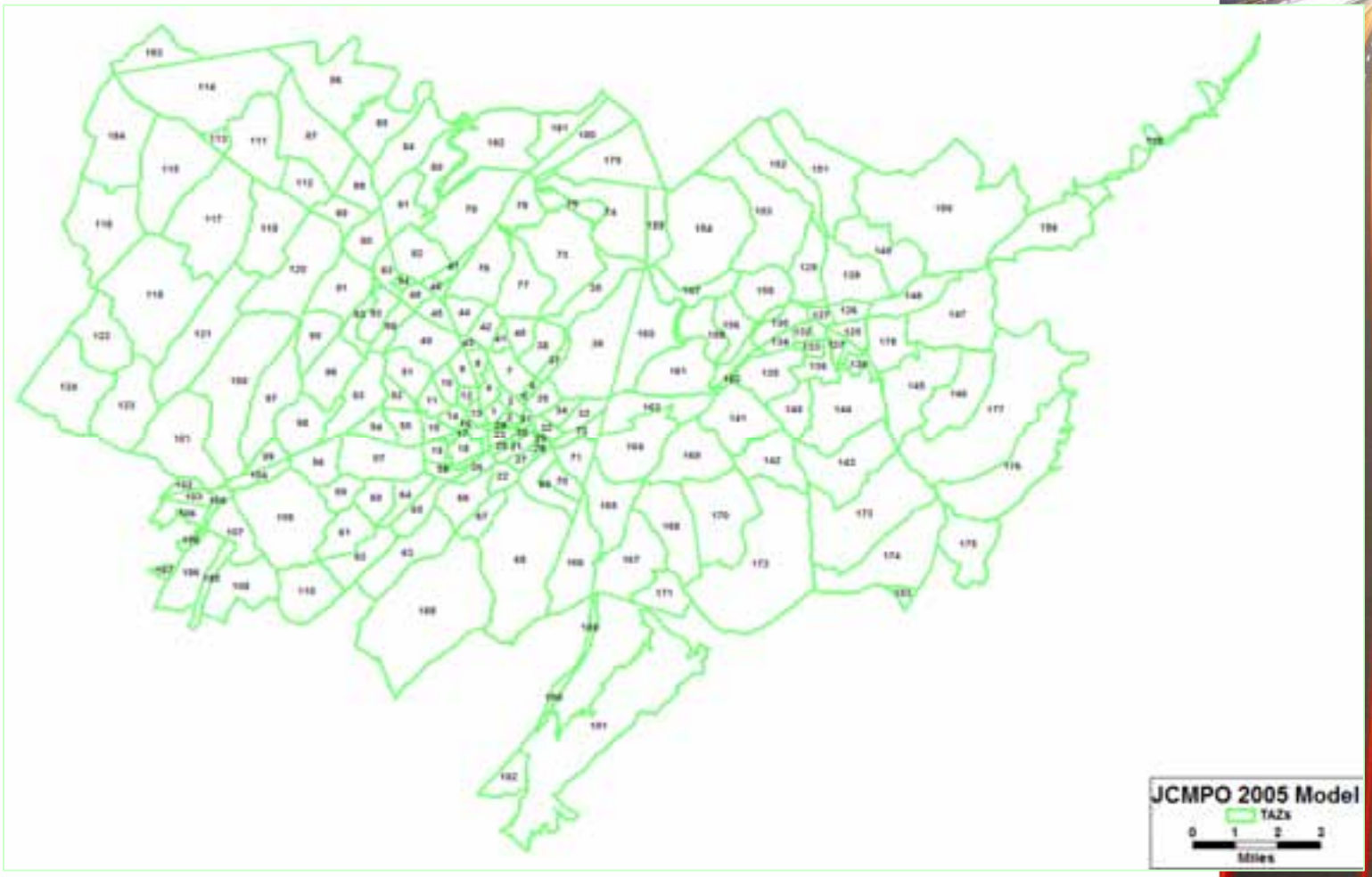
TRAFFIC ANALYSIS ZONES (TAZs)



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THREE STEP MODEL

Trip Generation Model

- Production and Attraction Rates

Trip Distribution Model

- Gravity Model
- External Trips

Traffic Assignment

- User Equilibrium

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TRIP GENERATION MODEL

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Trip Production Rates (Person Trips)

Trip Purpose	Trip Production Rate
Home Based Work	(2.04 * Dwelling Units)
Home Based Other	(6.13 * Dwelling Units)
Non-Home Based	(0.72 * Dwelling Units) + (4.48 * Retail Employment) + (0.95 * Other Employment)

Trip Attraction Rates (Person Trips)

Trip Purpose	Trip Attraction Rate
Home Based Work	(1.45 * Total Employment)
Home Based Other	(0.9 * Dwelling Units) + (9.0 * Retail Employment) + (1.20 * Other Employment)
Non-Home Based	(0.72 * Dwelling Units) + (4.48 * Retail Employment) + (0.95 * Other Employment)
External-Internal Home Based Work	(1.45 * Total Employment)
External-Internal Home Based Other	(0.9 * Dwelling Units) + (9.0 * Retail Employment) + (1.20 * Other Employment)
External-Internal Non-Home Based	(0.5 * Dwelling Units) + (4.1 * Retail Employment) + (0.95 * Other Employment)

Trip Generation Summary by Trip Purpose (Base Year 2005)

Internal Vehicle Trips

Purpose	Total Internal Trips 2005
Home Based Work	127,235
Home Based Other	382,328
Non-Home Based	154,857
TOTAL	664,420

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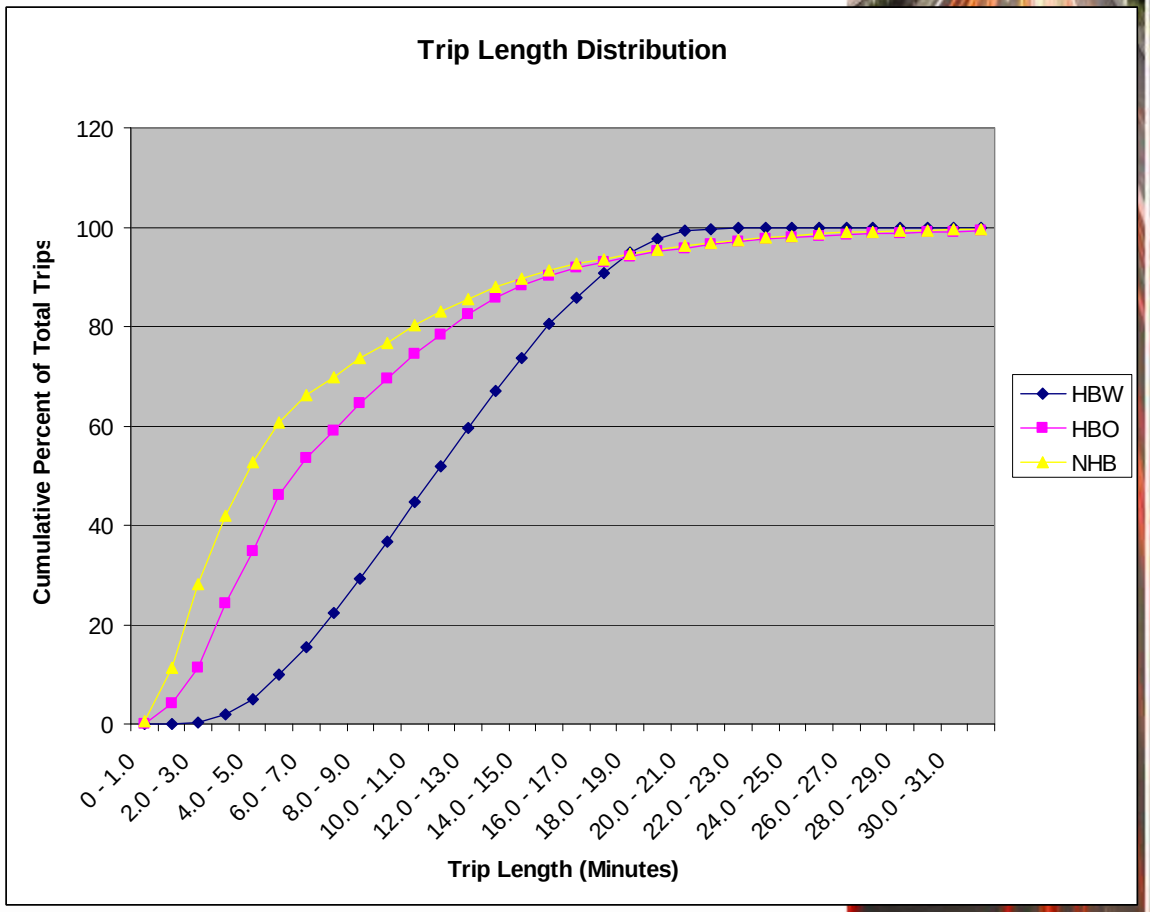
TRIP DISTRIBUTION MODEL

Average Trip Length by Trip Purpose

Purpose	Average Trip Length (Minutes)
HBW	12.26
HBO	8.47
NHB	6.87



Friction Factor Source: Kingsport Travel Demand Model

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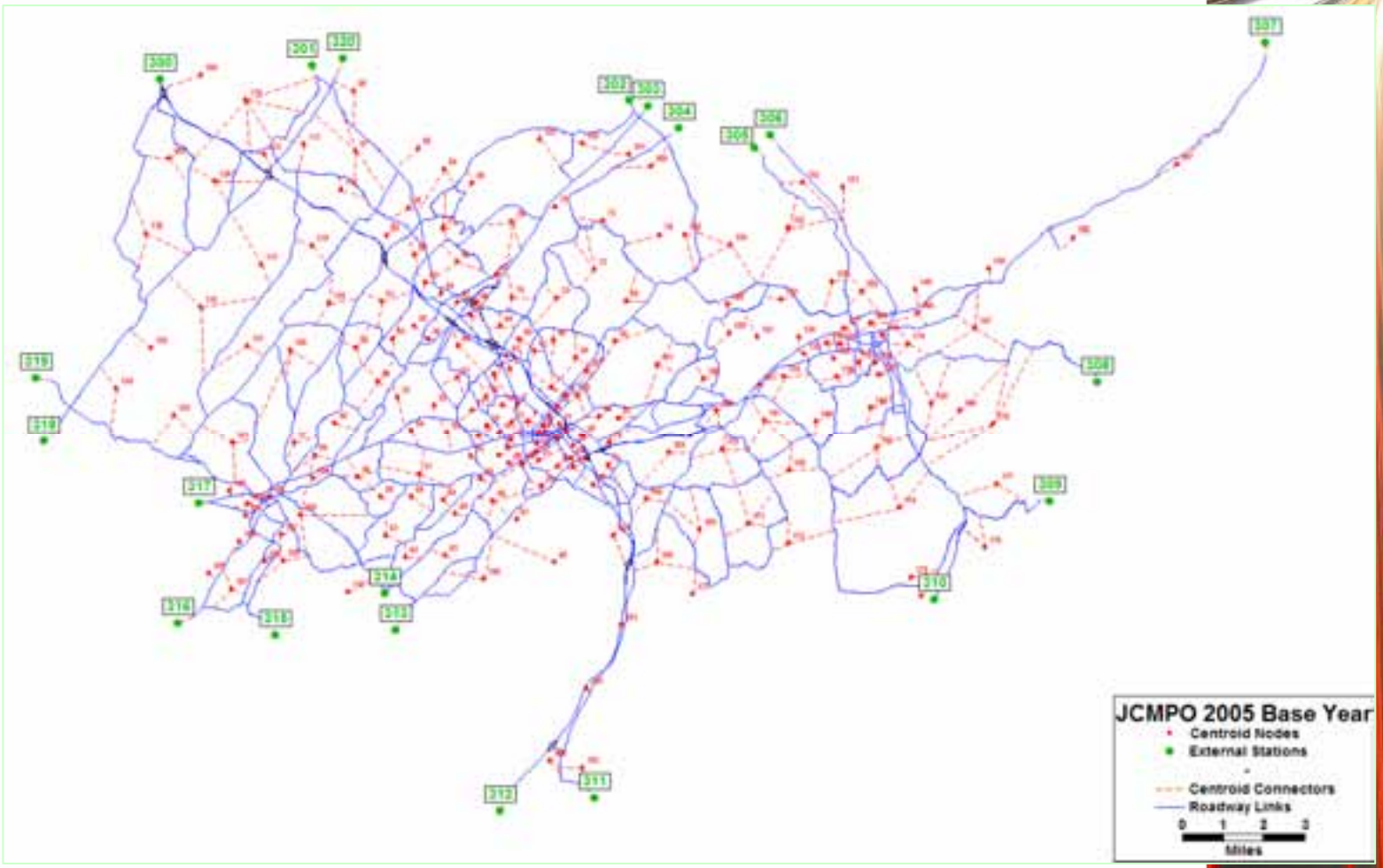
EXTERNAL TRIPS



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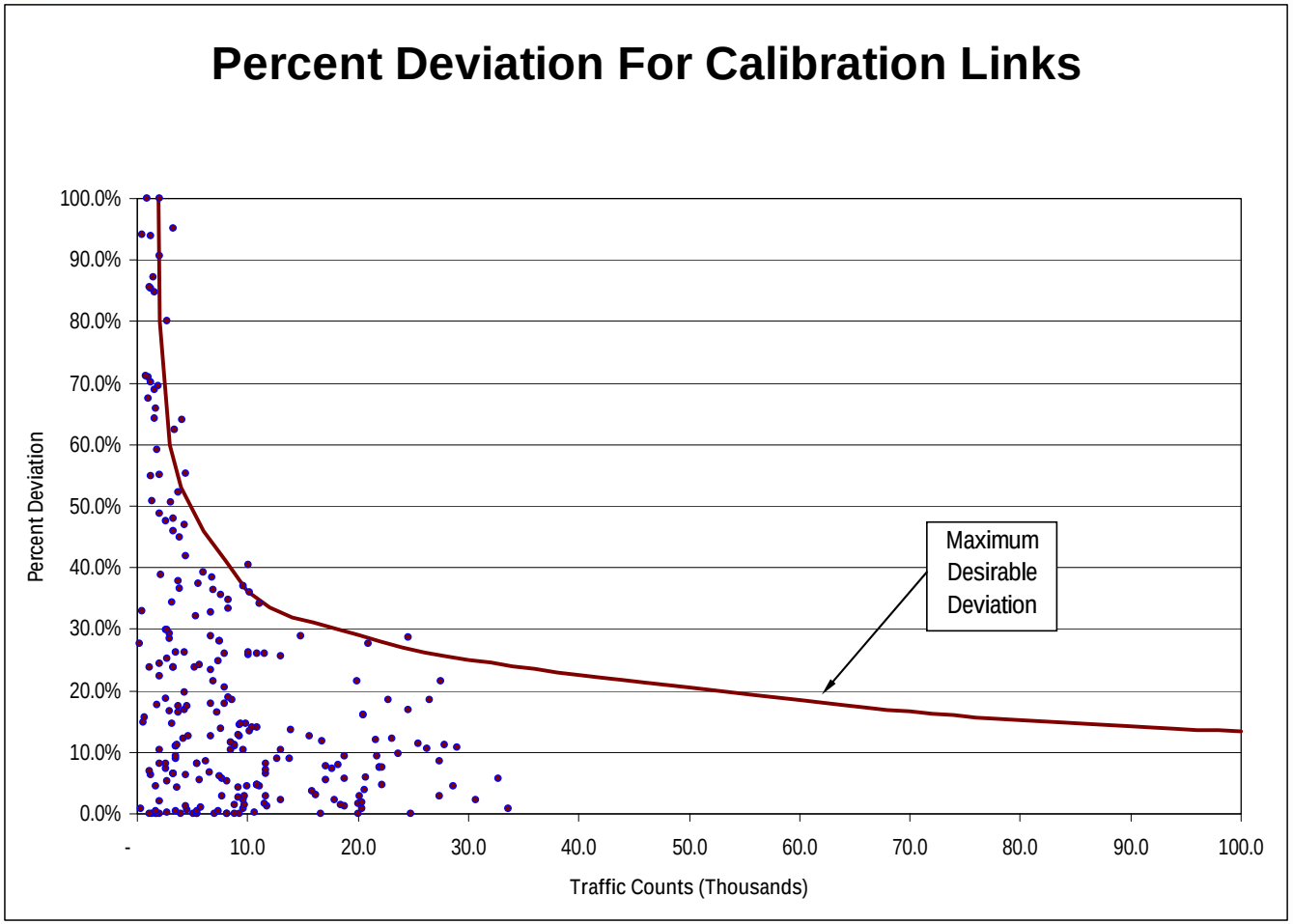
TRAFFIC ASSIGNMENT MODEL

MODEL CALIBRATION & VALIDATION



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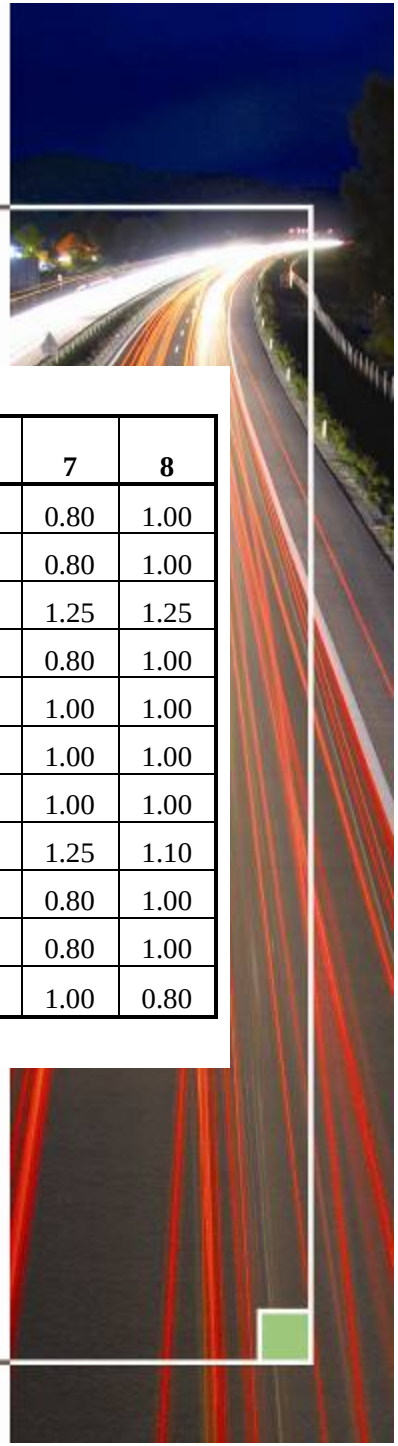
MODEL CALIBRATION & VALIDATION



Travel Time Adjustment Factors by District

District	District Number	1	2	3	4a	4b	4c	4d	5	6	7	8
Rural Johnson City	**1**	0.80	1.00	1.25	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00
Kingsport	**2**	1.00	0.90	1.25	0.70	1.00	1.00	1.00	1.10	1.00	0.80	1.00
Johnson City	**3**	1.25	1.25	0.80	1.10	1.25	1.00	1.25	1.28	1.25	1.25	1.25
Kingsport Externals	**4a**	1.00	0.70	1.10	1.00	1.00	1.00	1.00	1.00	1.00	0.80	1.00
Jonesborough Externals	**4b**	1.00	1.00	1.25	1.00	1.00	1.00	1.00	1.25	1.00	1.00	1.00
Unicoi Externals	**4c**	1.00	1.00	1.00	1.00	1.00	0.50	1.00	0.90	0.50	1.00	1.00
South Carter Externals	**4d**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.25	1.00	1.00	1.00
Elizabethton	**5**	1.00	1.10	1.28	1.00	1.25	0.90	1.25	0.80	0.90	1.25	1.10
Unicoi	**6**	1.00	1.00	1.25	1.00	1.00	0.50	1.00	0.90	0.80	0.80	1.00
Jonesborough	**7**	0.80	0.80	1.25	0.80	1.00	1.00	1.00	1.25	0.80	0.80	1.00
Rural Carter County	**8**	1.00	1.00	1.25	1.00	1.00	1.00	1.00	1.10	1.00	1.00	0.80

MODEL CALIBRATION & VALIDATION

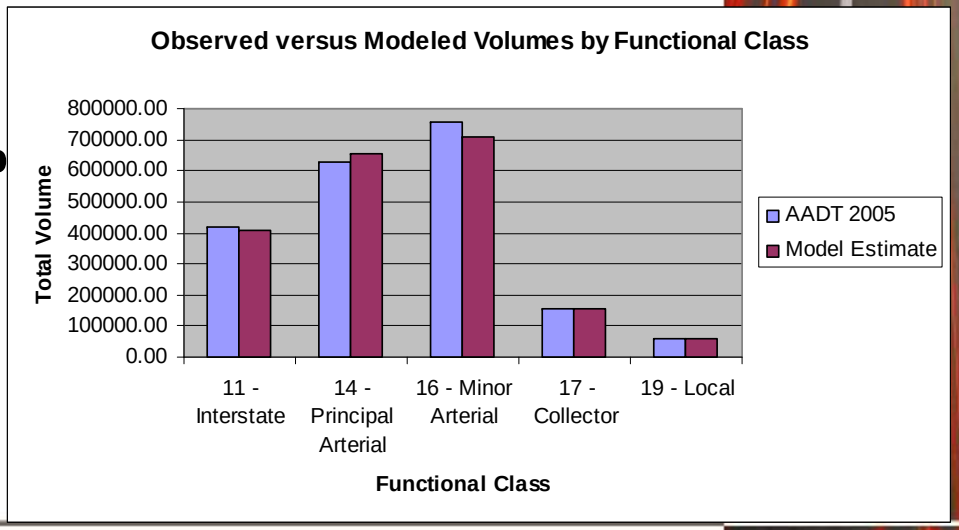
Comparison by Functional Classification

Functional Class	Observations	AADT 2005	Model Estimate	Difference	Percent Difference	FHWA Goal	Pass/Fail
11 - Interstate	22	419,631	405,727	12,904	3.08%	10%	Pass
14 - Principal Arterial	36	626,120	653,271	27,151	4.34%	10%	Pass
16 - Minor Arterial	93	754,656	710,909	43,747	5.80%	15%	Pass
17 - Collector	48	155,981	156,598	617	0.40%	25%	Pass
19 - Local	14	60,996	61,131	135	0.22%	25%	Pass

Overall RMSE – 29.34%

Assign vs. Count – 1.42%

Observations – 213



FORECAST YEAR MODEL (2030)

- Socioeconomic Data
  - Woods and Pool Complete Economics and Demographics Database Forecasts
- EE Trip Forecasts
  - TNDOT projections
  - NCHRP 365
- Traffic Assignment
  - “No Build”
  - “Existing plus Committed”
  - “Long Range Plan”

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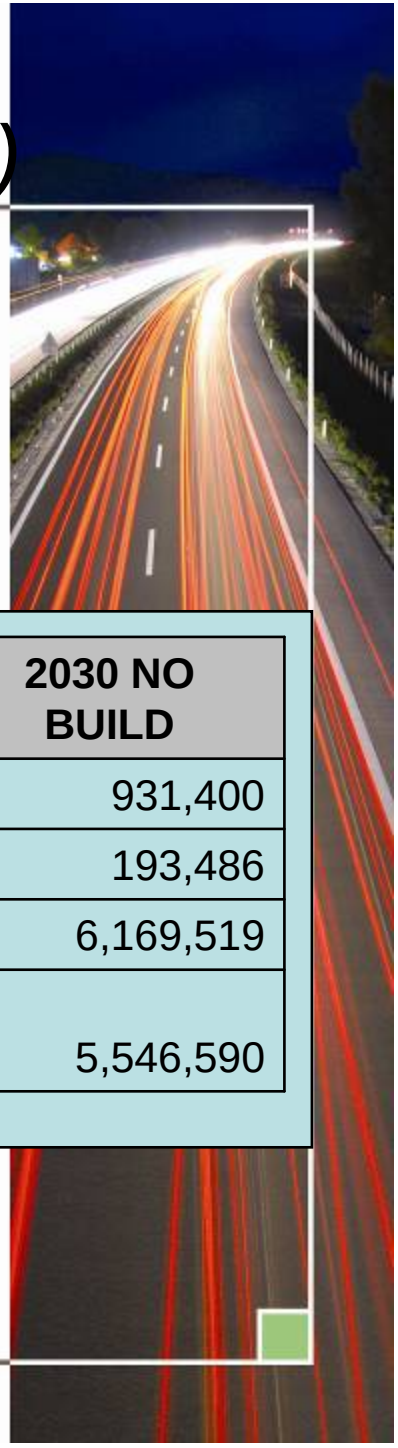
FORECAST YEAR MODEL (2030) "NO BUILD"



	2005 Calibrated Model	2030 NO BUILD
Total Demand (vph)	603,091	931,400
Vehicle Hours Traveled (VHT)	112,220	193,486
Vehicle Miles Traveled (VMT)	3,856,293	6,169,519
Network Miles Traveled (No Centroid Connectors) (VMT)	3,441,494	5,546,590

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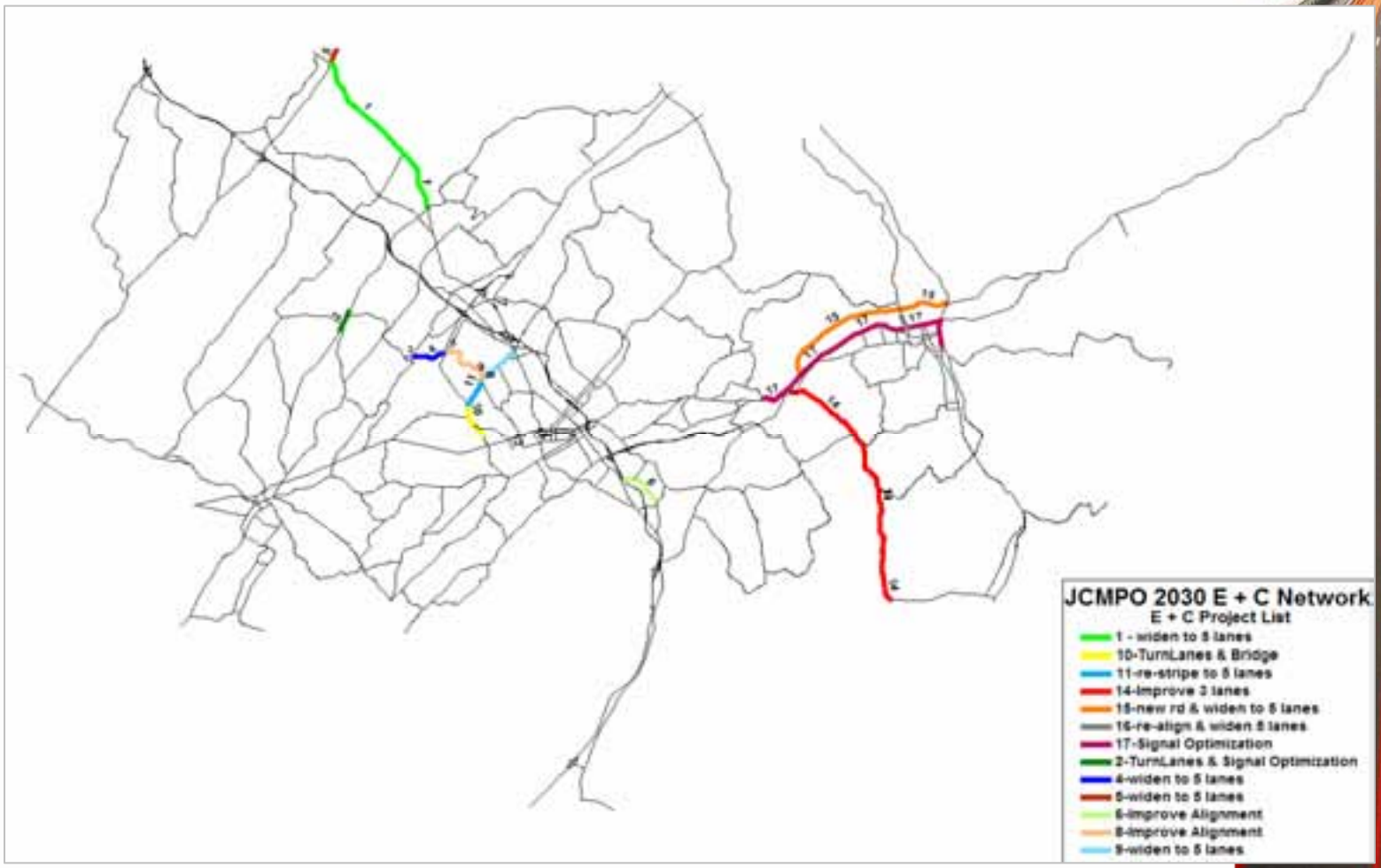
FORECAST YEAR MODEL (2030) "EXISTING PLUS COMMITTED"



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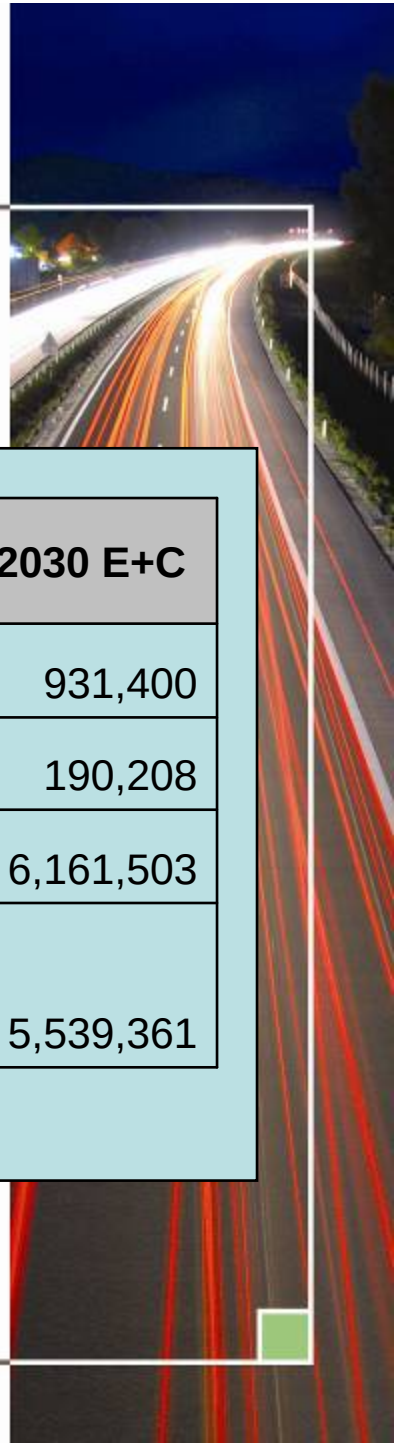
FORECAST YEAR MODEL (2030) "EXISTING PLUS COMMITTED"



	2005 Calibrated Model	2030 NO BUILD	2030 E+C
Total Demand (vpd)	603,091	931,400	931,400
Vehicle Hours Traveled (VHT)	112,220	193,486	190,208
Vehicle Miles Traveled (VMT)	3,856,293	6,169,519	6,161,503
Network Miles Traveled (No Centroid Connectors) (VMT)	3,441,494	5,546,590	5,539,361

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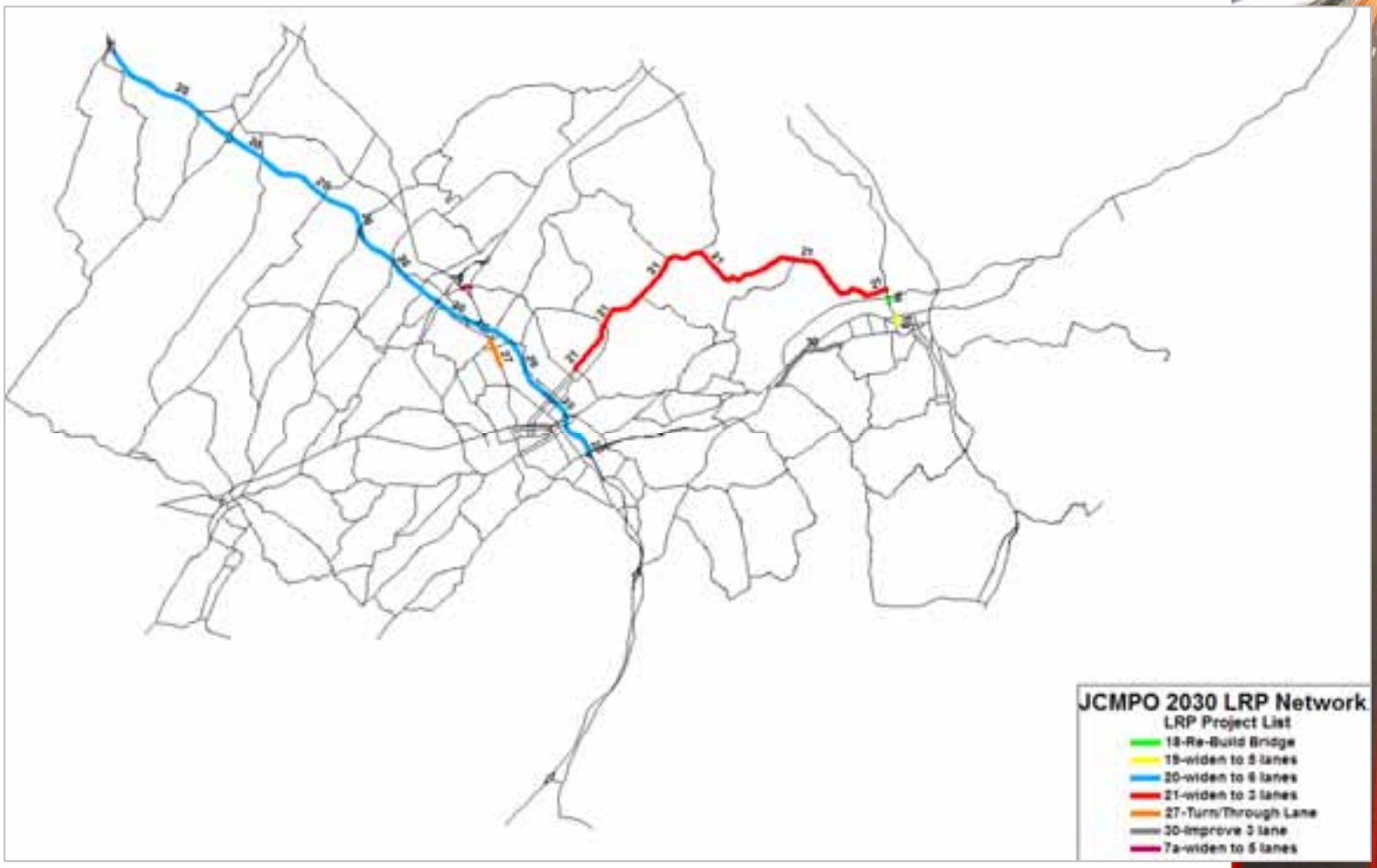
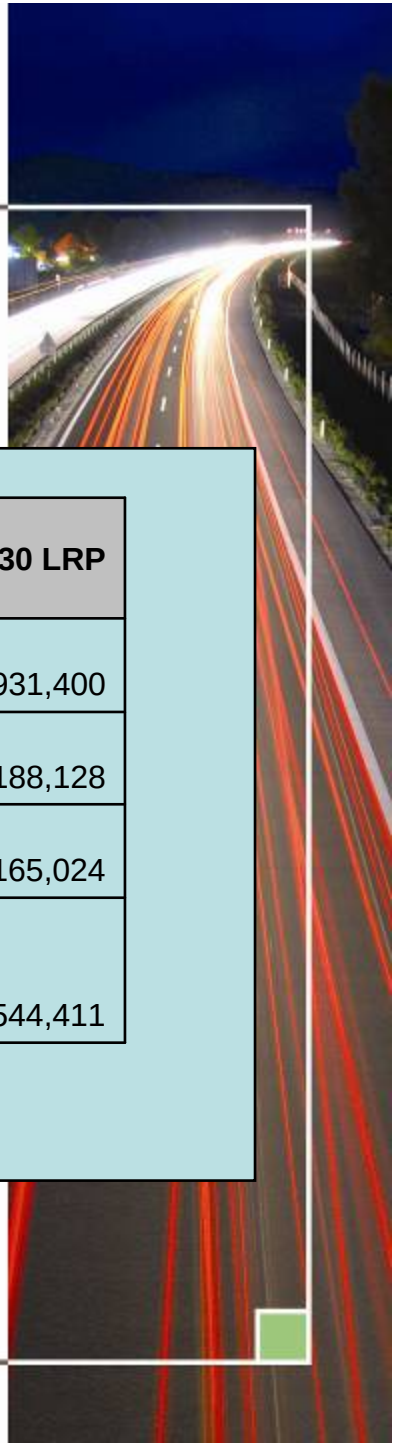
FORECAST YEAR MODEL (2030)
"LONG RANGE PLAN"



FORECAST YEAR MODEL (2030)
"LONG RANGE PLAN"

	2005 Calibrated Model	2030 NO BUILD	2030 E+C	2030 LRP
Total Demand (vpd)	603,091	931,400	931,400	931,400
Vehicle Hours Traveled (VHT)	112,220	193,486	190,208	188,128
Vehicle Miles Traveled (VMT)	3,856,293	6,169,519	6,161,503	6,165,024
Network Miles Traveled (No Centroid Connectors) (VMT)	3,441,494	5,546,590	5,539,361	5,544,411



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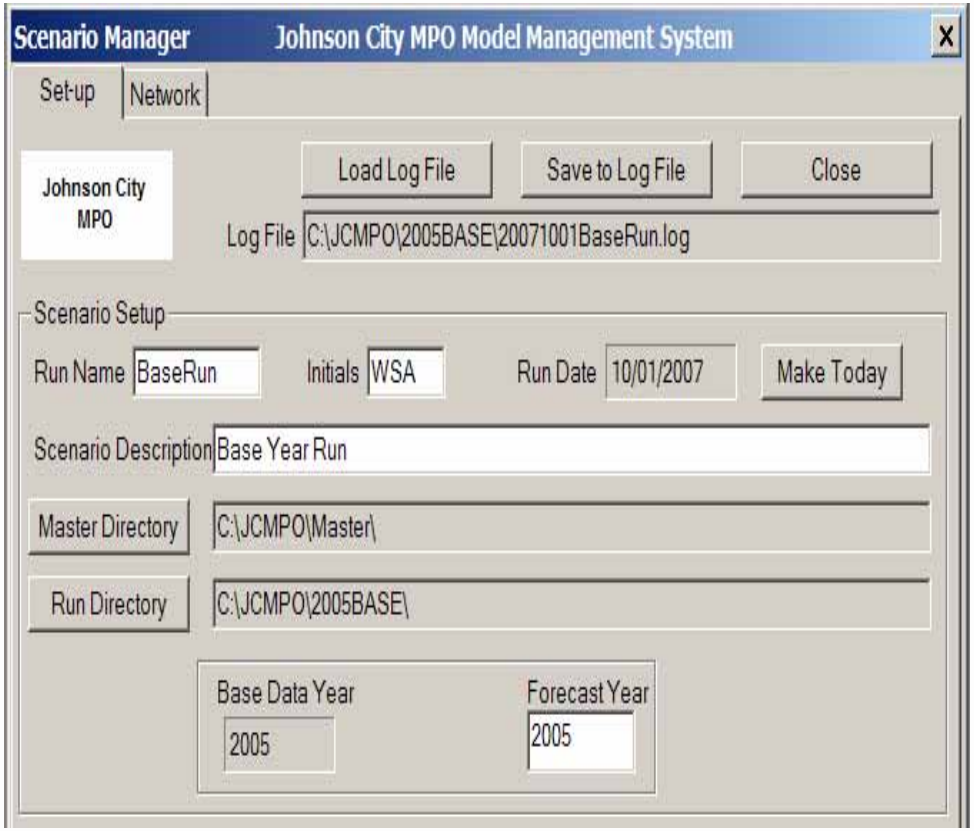
USER INTERFACE



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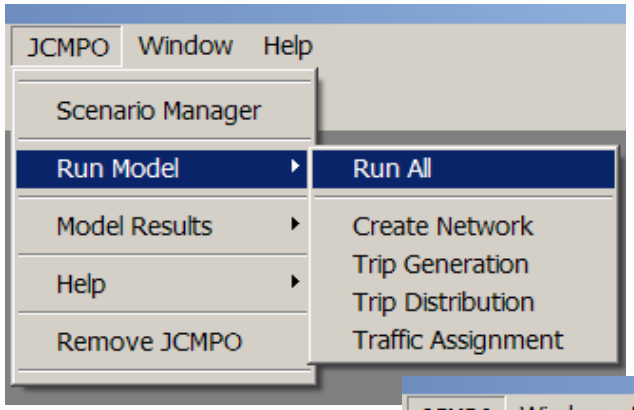
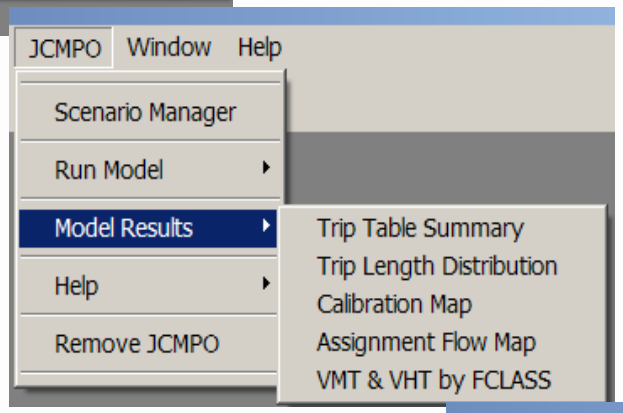
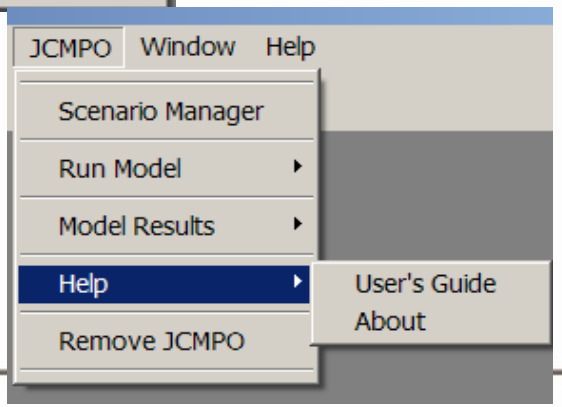
USER INTERFACE







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"MOVING AHEAD"

- Data Availability
  - Network Attributes
  - Socioeconomic Data
- Local Quality Control
  - Agency Involvement
  - Interagency Coordination

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QUESTIONS?

THANK YOU!

Glenn Berry – JCMPO Manager
Jeff Rawles – JCMPO Staff
Bob Rock – TNDOT