Improving the Consistency Between Regional and Operational Models

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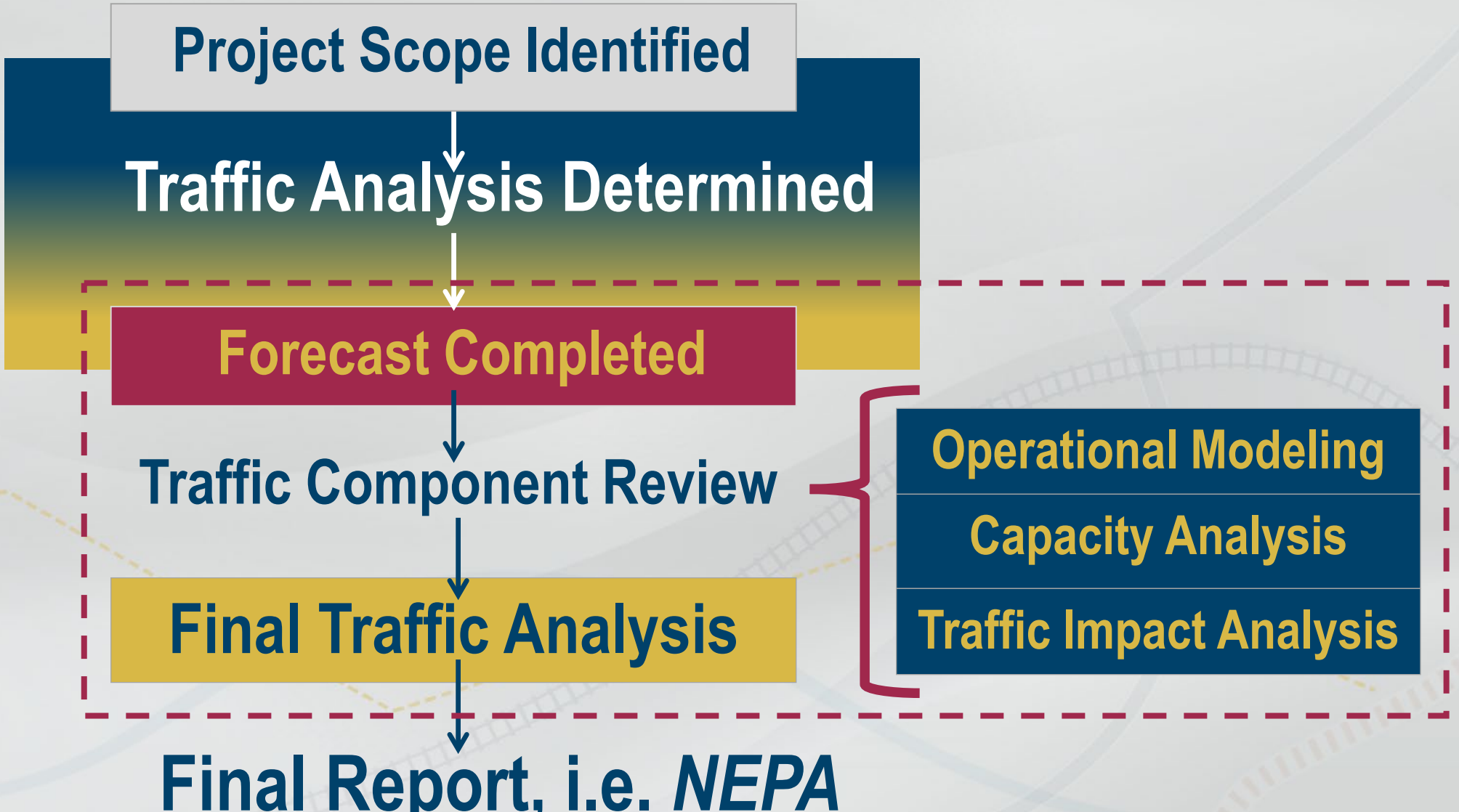
Presentation Summary

Assign Traffic to Recognize Time-Dependencies

- Traffic Analysis Steps and the Need for Specific Time/s
- Reasons for This Approach
- Project Analysis Example
- Technical Specs
- Outcomes

Collaborative Traffic Analysis Components used for WisDOT Projects

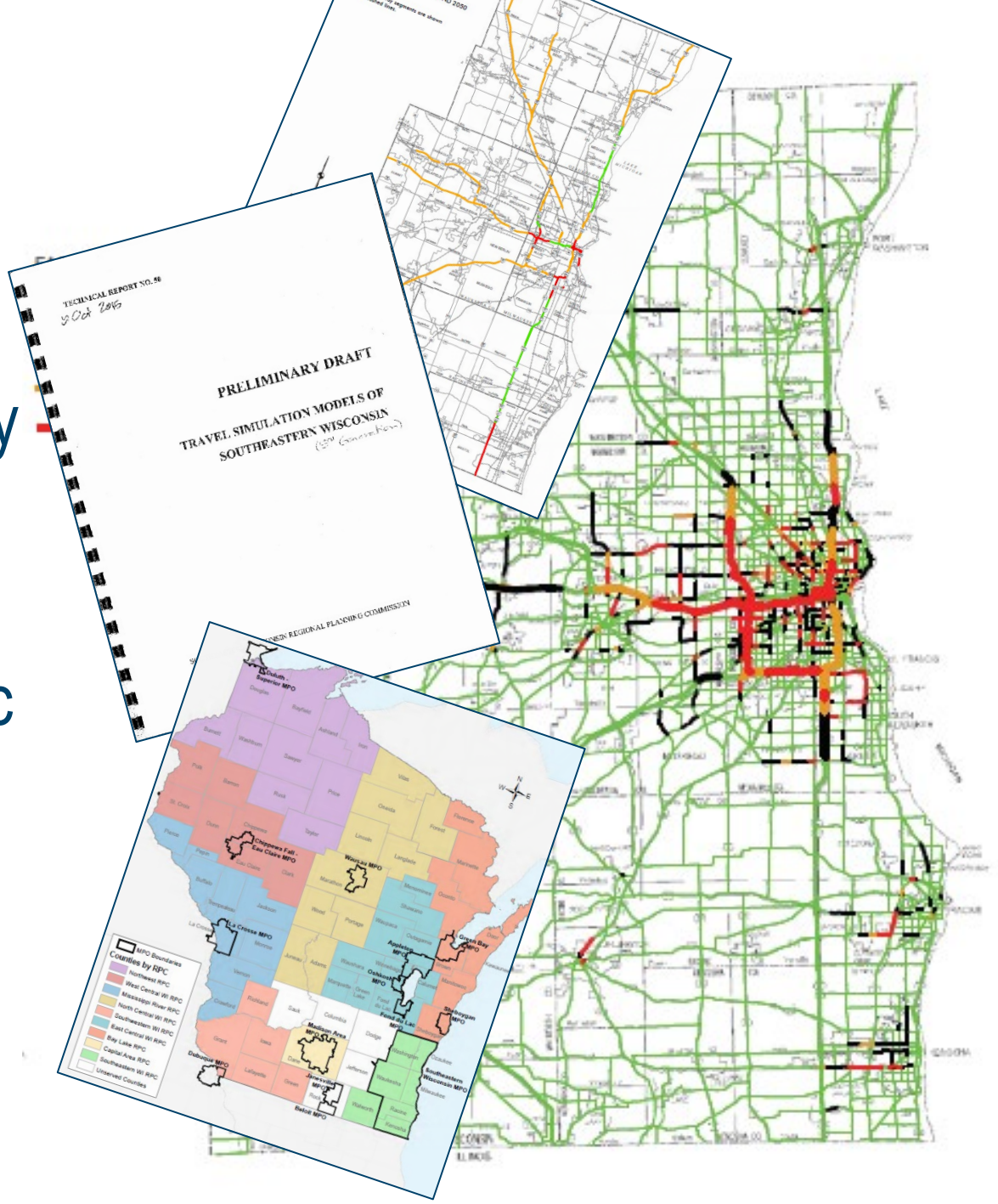


Reasons for Dynamic Traffic Assignment (Temporal) Project-Level Approach

- Discrete analysis period
- Multi-phased analysis
- Addresses complexity – existing travel demand models a good starting point for origin-destination matrix
- Corridor analysis needs had been well understood
- Capacity and interchange scenarios were used during preliminary engineering & environmental impact statement

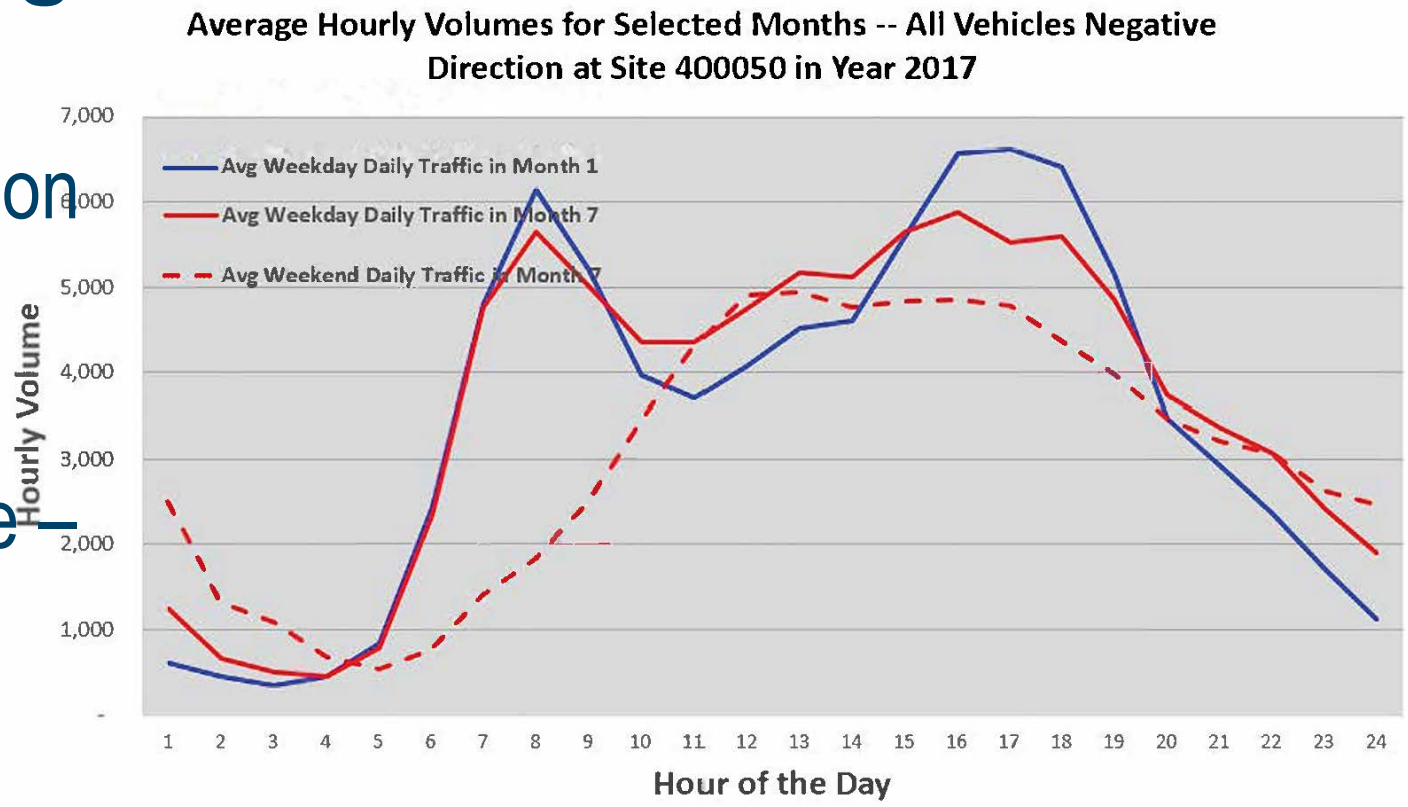
Reasons for Cooperative Approach

- MPO's 4th Generation Travel Demand Model reviewed for current consistency
- MPO's 5th Generation Travel Demand Model completed and well validated
- Weekday volumes and Dynamic Traffic Assignment capabilities
- Captured traffic changes over the day, speeds, etc…
- Subarea analysis



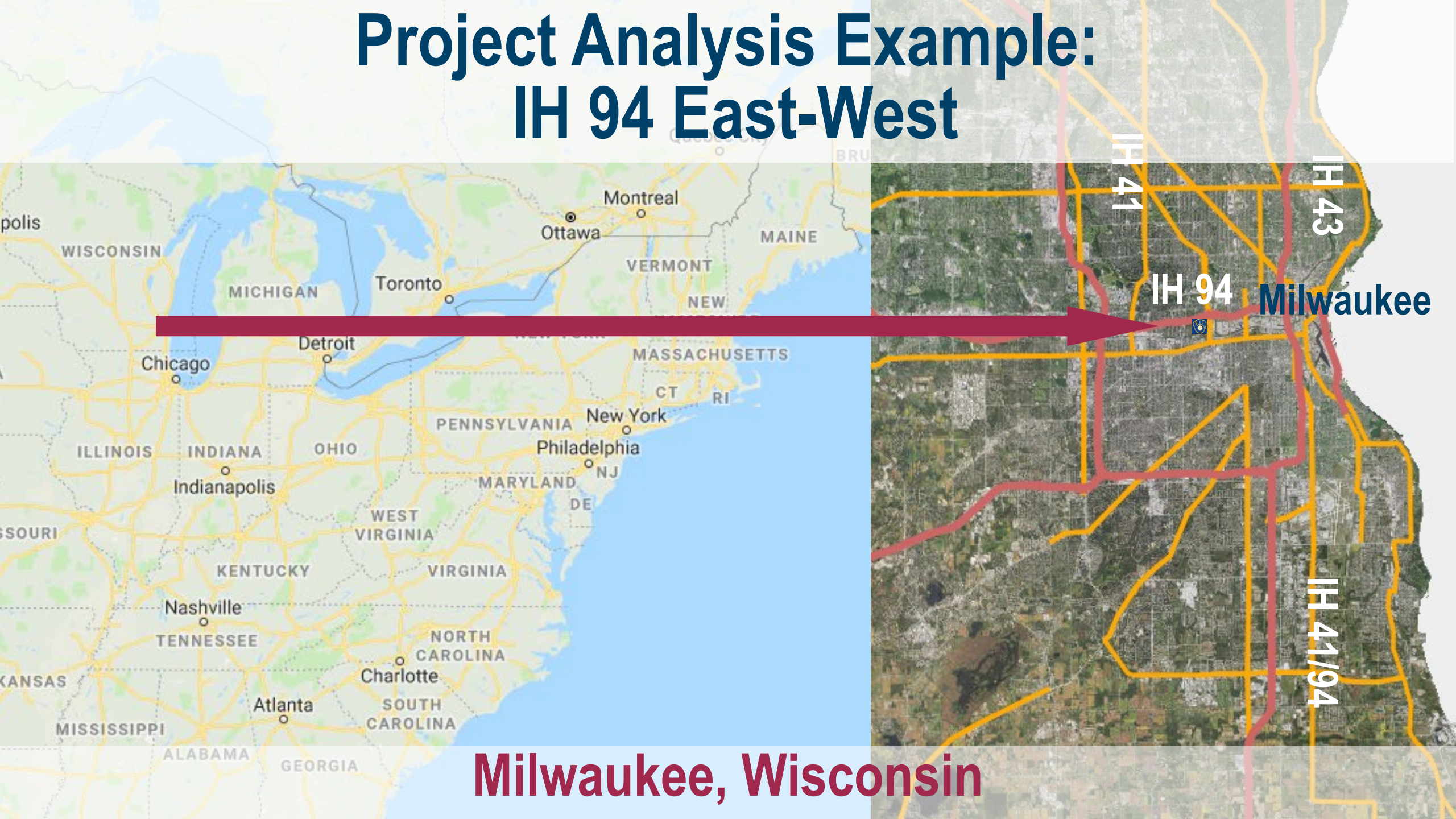
Project-Level Approach: Cooperation can Leverage the Tools at Hand

- Corridor has had regular congestion
- Travel time between O-D pairs dependent on departure times
- Traveler's choice is based on time – "dynamic moving sum"
- Grow each O-D pair
- Capture traffic increases in specific areas where a general, model-wide rate may under or over-estimate growth



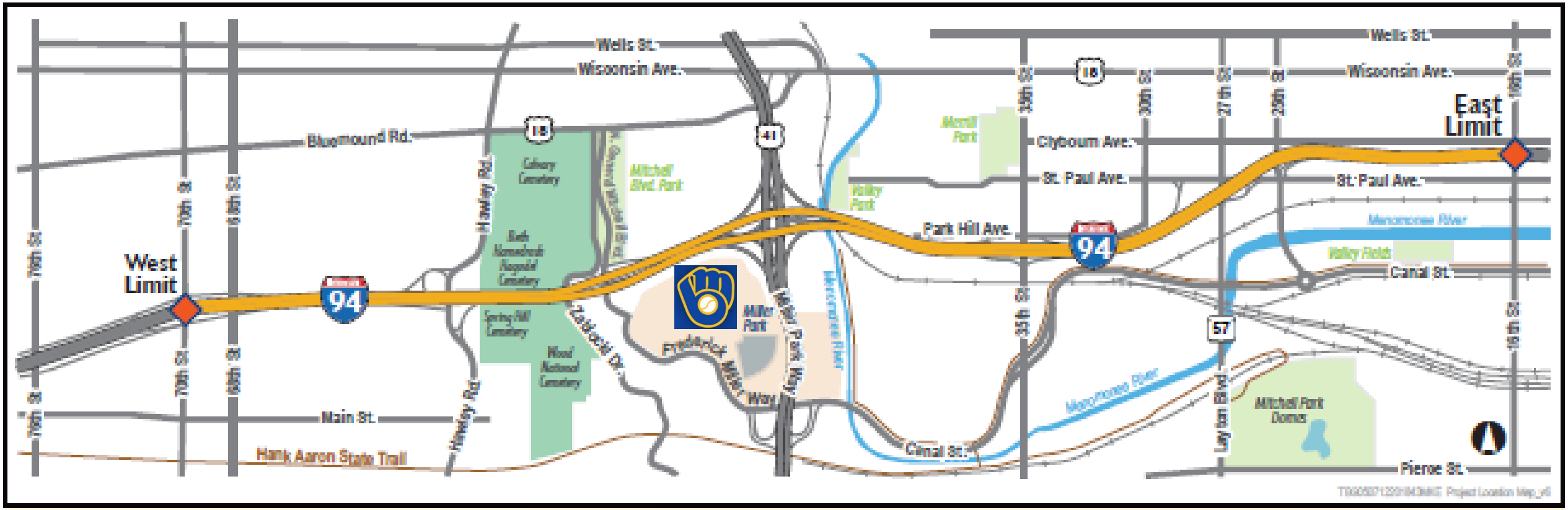
K200 (7.6% of Traffic) was within 0.2% of the AM Peak (7.4%) = Regular Congestion

Project Analysis Example:
IH 94 East-West

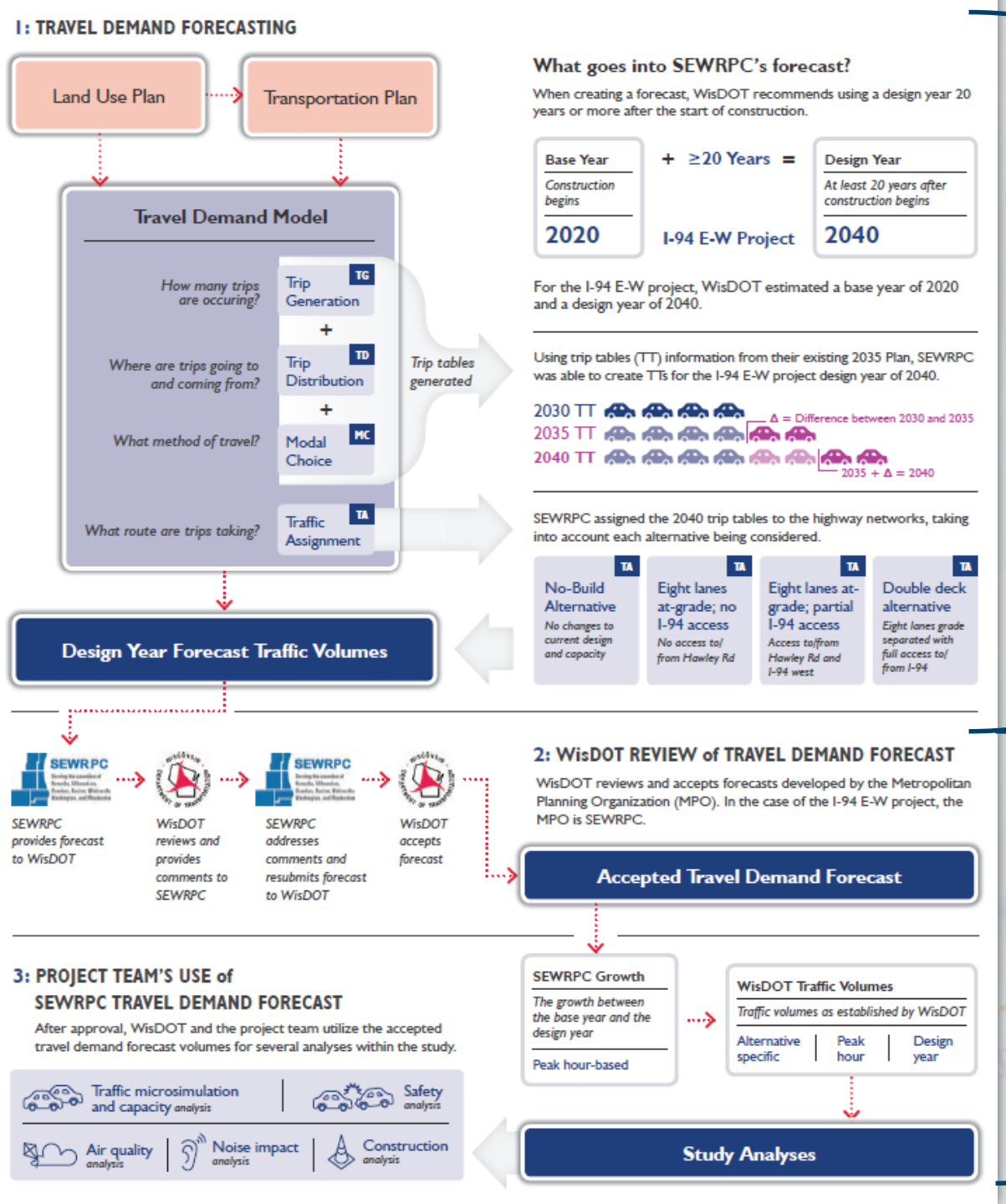


Milwaukee, Wisconsin

Project Analysis Example:
IH 94 East-West



70th Street to 16th Street

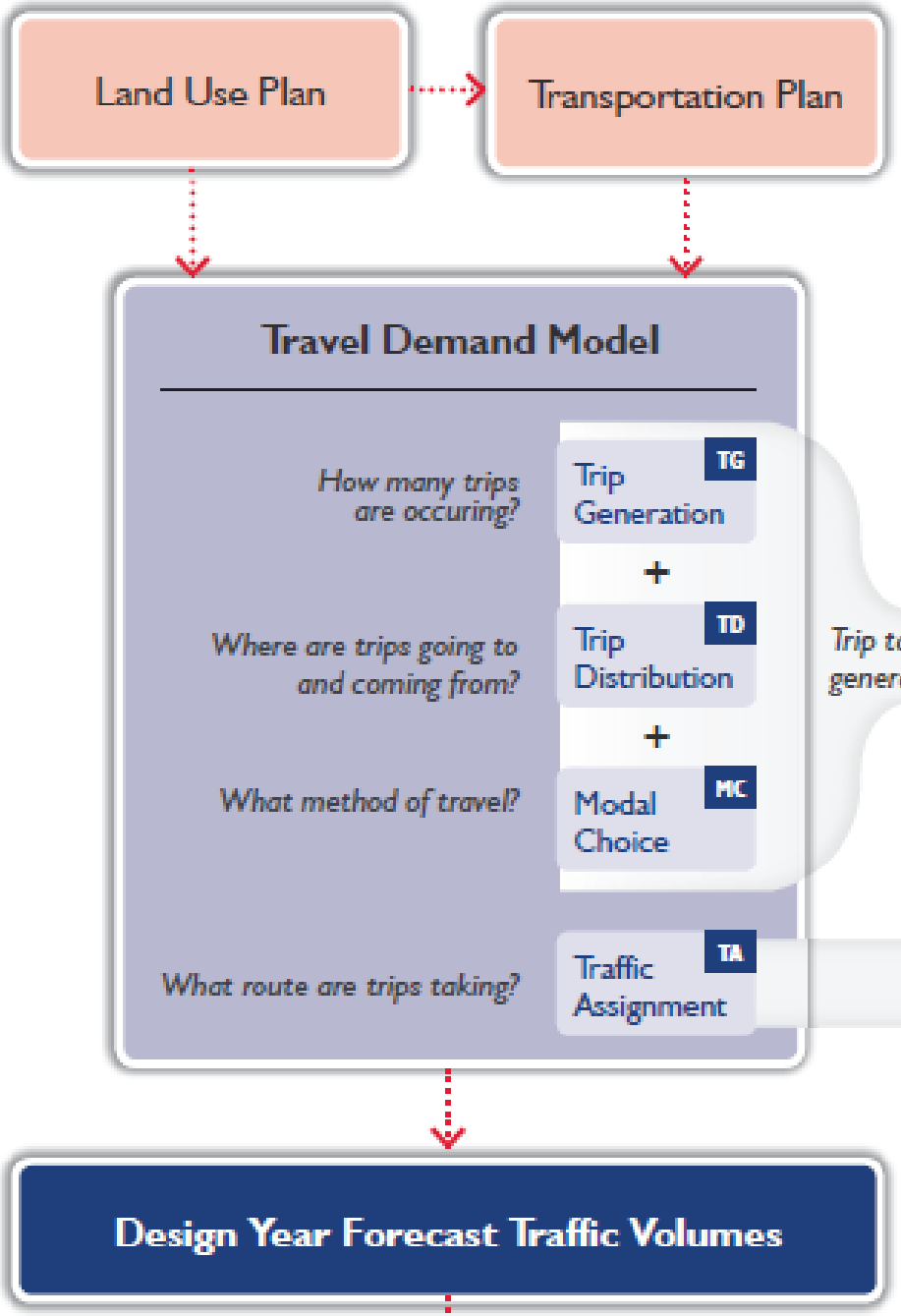


Technical Specs: IH 94 E-W Travel Forecasting

SEWRPC Activities

WisDOT Activities

I: TRAVEL DEMAND FORECASTING



What goes into SEWRPC's forecast?

When creating a forecast, WisDOT recommends using a design year 20 years or more after the start of construction.

Base Year	+ ≥20 Years =	Design Year
Construction begins		*At least 20 years after construction begins*
2020	I-94 E-W Project	**2040**

For the I-94 E-W project, WisDOT estimated a base year of 2020 and a design year of 2040.

Using trip tables (TT) information from their existing 2035 Plan, SEWRPC was able to create TTs for the I-94 E-W project design year of 2040.

SEWRPC assigned the 2040 trip tables to the highway networks, taking into account each alternative being considered.

TA No-Build Alternative
No changes to current design and capacity

TA Eight lanes at-grade; no I-94 access
No access to/ from Hawley Rd

TA Eight lanes at-grade; partial I-94 access
Access to/from Hawley Rd and I-94 west

TA Double deck alternative
Eight lanes grade separated with full access to/ from I-94

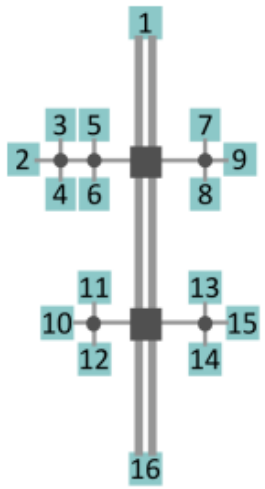
Technical Specs for Peak Period Development

Process for Extracting OD Trip Tables

1. WisDOT shares zone system for operational model with SEWRPC
2. SEWRPC generates subarea and network data for each project alternative (at the hourly level)
3. SEWRPC runs model and extracts peak period OD Trip Tables and adjusts if need to match hourly forecasts
4. WisDOT analyzes OD tables and adjusts based on incremental differences or growth rates

Technical Specs for Peak Hourly Data Development

Process for using Extracted OD Trip Tables



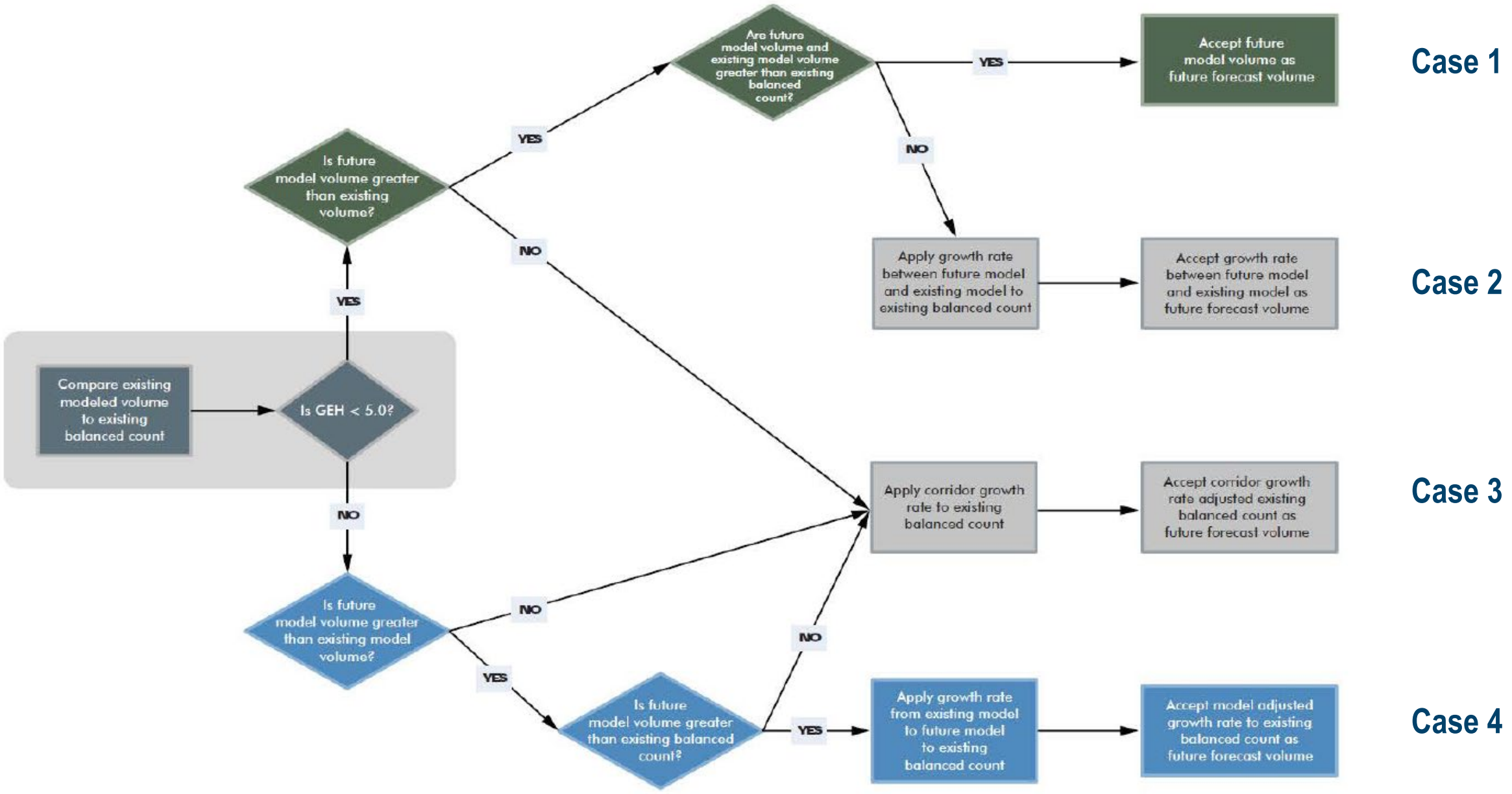
O-D Matrix

Destinations

Origins	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	0	1	18	12	39	27	25	13	40	33	40	2	33	27	49	32
2	10	0	23	8	43	23	19	2	39	16	42	1	0	45	35	5
3	2	1	0	21	17	37	5	32	37	18	35	35	30	5	34	6
4	26	14	1	0	17	13	25	3	42	36	31	28	50	42	46	35
5	45	38	22	16	0	0	49	49	22	8	2	9	12	5	7	17
6	8	32	18	26	15	0	17	20	37	26	41	11	3	26	41	45
7	22	34	4	49	41	31	0	20	28	48	36	37	10	8	3	38
8	47	32	8	37	16	28	27	0	9	33	28	5	2	12	28	7
9	40	49	33	15	29	47	37	28	0	12	32	2	46	12	37	26
10	41	31	49	48	22	0	47	9	11	0	34	21	41	30	33	12
11	15	45	42	25	14	49	2	1	12	18	0	10	31	19	35	11
12	39	47	4	12	26	12	29	33	47	6	34	0	40	46	40	15
13	10	13	19	22	46	21	13	15	39	42	13	42	0	7	3	34
14	37	27	49	8	44	40	42	12	15	8	39	2	27	0	24	49
15	40	7	24	36	33	33	34	46	31	46	22	43	13	28	0	18
16	5	8	33	5	38	39	13	47	36	8	20	21	29	23	47	0

1. WisDOT built and ran the base free flow network operations model
2. WisDOT extracts the assigned volumes
3. WisDOT compares existing volumes with this adjustment check procedure
4. WisDOT uses SEWRPC data to develop future year 2040 volumes

WisDOT Operations Model Checks Coming from OD Tables



SEWRPC *provides forecast to WisDOT*

WisDOT reviews and provides comments to SEWRPC

SEWRPC *addresses comments and resubmits forecast to WisDOT*

WisDOT accepts forecast

2: WisDOT REVIEW of TRAVEL DEMAND FORECAST

WisDOT reviews and accepts forecasts developed by the Metropolitan Planning Organization (MPO). In the case of the I-94 E-W project, the MPO is SEWRPC.

Accepted Travel Demand Forecast

SEWRPC Growth

The growth between the base year and the design year

Peak hour-based

WisDOT Traffic Volumes

Traffic volumes as established by WisDOT

Alternative specific | Peak hour | Design year

Study Analyses

3: PROJECT TEAM'S USE of SEWRPC TRAVEL DEMAND FORECAST

After approval, WisDOT and the project team utilize the accepted travel demand forecast volumes for several analyses within the study.

- Traffic microsimulation and capacity *analysis*
- Safety *analysis*
- Air quality *analysis*
- Noise impact *analysis*
- Construction *analysis*

Successful Outcomes of the Study Analysis

- Used local data during study
  - Interactions along the corridor's operational characteristics, across alternatives
  - Air quality, noise impact, and safety analysis
  - Components of construction phasing
- Consistent public outreach
- Approved environmental impact statement
- Standard process

Standards and Protocols

Documentation - From Planning through NEPA

- SEWRPC approved long-range transportation plan
- SEWRPC documentation of travel demand model functions
- WisDOT traffic forecasting guidelines - Transportation Planning Manual https://wisconsindot.gov/Documents/projects/data-plan/plan-res/tpm/9.pdf
- WisDOT traffic analysis and microsimulation modeling - Traffic Engineering, Operations and Safety Manual https://wisconsindot.gov/Pages/doing-bus/local-gov/traffic-ops/manuals-and-standards/teops/ch16.aspx
- IH 94 East-West https://wisconsindot.gov/Pages/projects/by-region/se/94stadiumint/default.aspx

Questions?