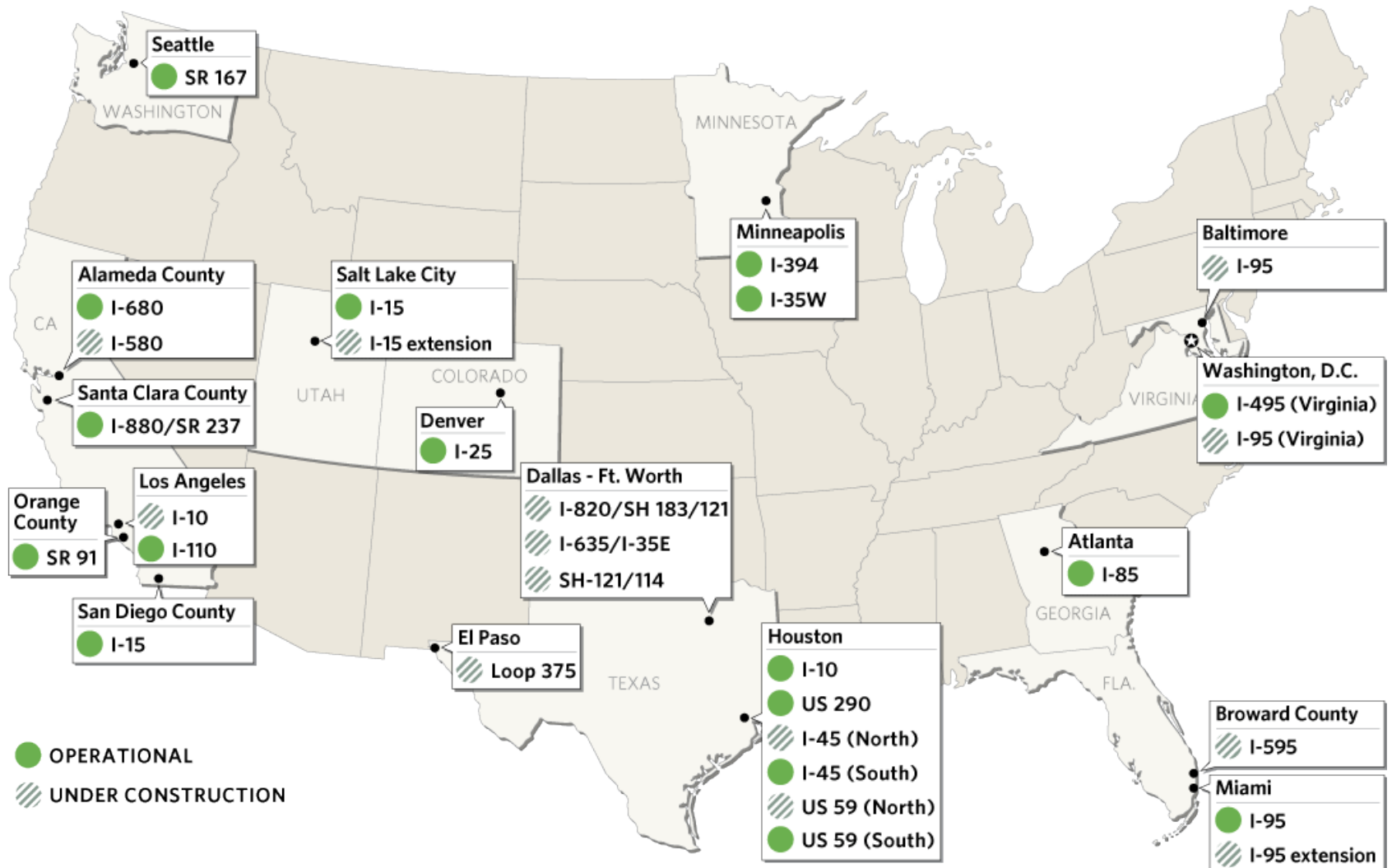# CMAP GO TO 2040

Application of an Activity-Based Model for Highway Pricing Studies in Chicago

Policy Environment

- Chicago's notorious congestion problem
- GO TO 2040
  - Regional comprehensive plan, 2010
- Pricing queries lead to ABM development

Express or HOT lanes in the US (2012)

Model Development

Integrated Model System

- CT-RAMP demand model
  - **C**oordinated **T**ravel **R**egional **A**ctivity-based **M**odeling **P**latform

- Highway Assignments and Skimming
 - Handles route choice for trucks, externals, & airport traffic

CT-RAMP Person Types

PERSON-TYPE	AGE	WORK STATUS	SCHOOL STATUS
Full-time worker	18+	Full-time	None
Part-time worker	18+	Part-time	None
Non-working adult	18 – 64	Unemployed	None
Non-working senior	65+	Unemployed	None
College student	18+	Any	College +
Driving age student	16 – 17	Any	Pre-college
Non-driving student	6 – 16	None	Pre-college
Pre-school	0 – 5	None	None

CT-RAMP Activity Types

PURPOSE	DESCRIPTION	CLASSIFICATION	ELIGIBILITY
Work	Working at regular workplace or work-related activities outside the home.	Mandatory	Workers and students
University	College +	Mandatory	Age 18+
High School	Grades 9-12	Mandatory	Age 14-17
Grade School	Grades K-8	Mandatory	Age 5-13
Escorting	Pick-up/drop-off passengers (auto trips only).	Maintenance	Age 16+
Shopping	Shopping away from home.	Maintenance	Age 5+
Other Maintenance	Personal business/services, and medical appointments.	Maintenance	Age 5+
Social/Recreational	Recreation, visiting friends/family.	Discretionary	Age 5+
Eat Out	Eating outside of home.	Discretionary	Age 5+
Other Discretionary	Volunteer work, religious activities.	Discretionary	Age 5+

Model Flow
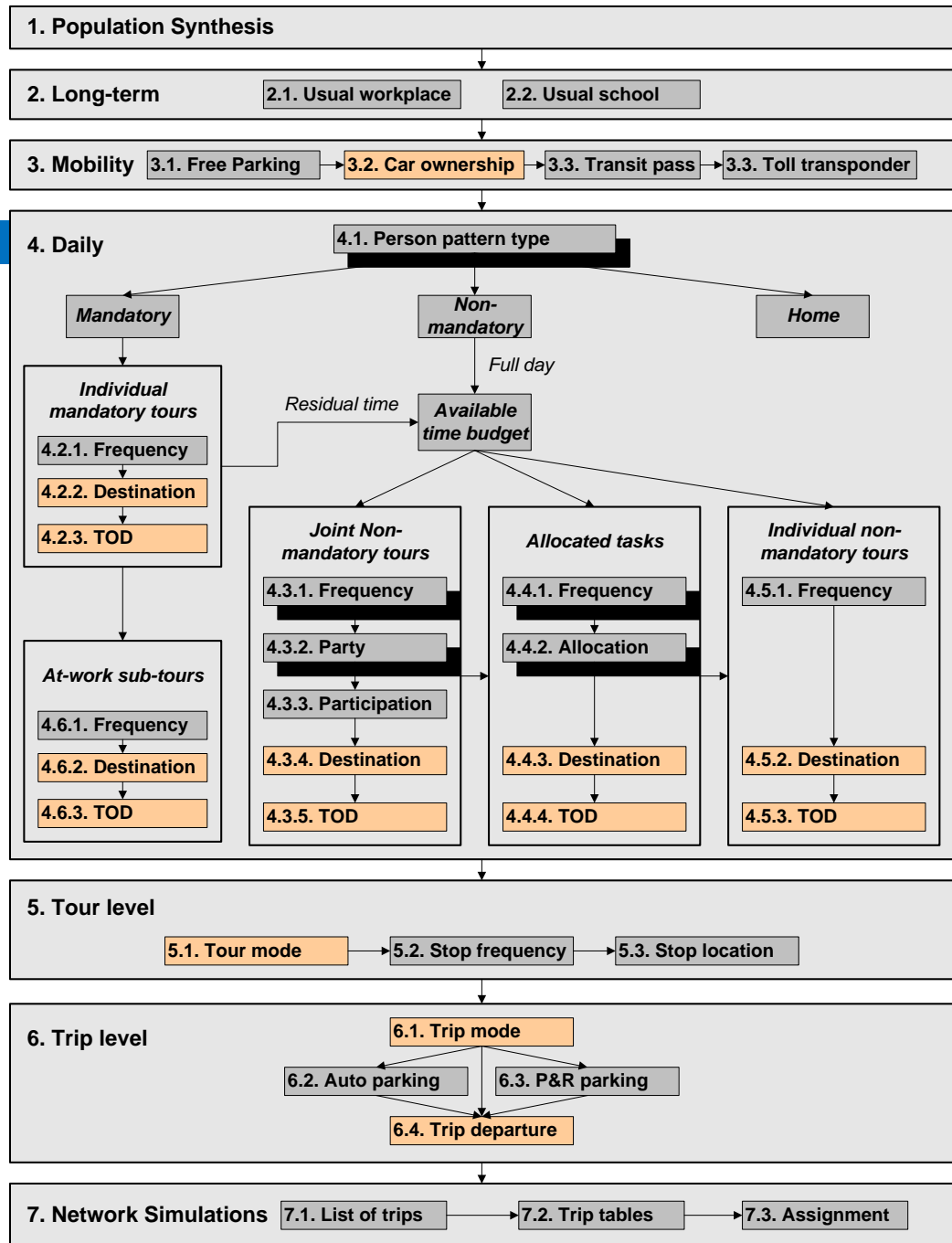
Model Re-estimated for CMAP Pricing ABM

- Auto ownership model
- Destination choice models
- Time-of-day choice models
- Mode choice models

1. Population Synthesis

2. Long-term — 2.1. Usual workplace — 2.2. Usual school

3. Mobility — 3.1. Free Parking → 3.2. Car ownership → 3.3. Transit pass → 3.3. Toll transponder

4. Daily

- 4.1. Person pattern type
  - *Mandatory*
  - *Non-mandatory*
  - *Home*

Full day / *Residual time* → *Available time budget*

Individual mandatory tours
- 4.2.1. Frequency
- 4.2.2. Destination
- 4.2.3. TOD

At-work sub-tours
- 4.6.1. Frequency
- 4.6.2. Destination
- 4.6.3. TOD

Joint Non-mandatory tours
- 4.3.1. Frequency
- 4.3.2. Party
- 4.3.3. Participation
- 4.3.4. Destination
- 4.3.5. TOD

Allocated tasks
- 4.4.1. Frequency
- 4.4.2. Allocation
- 4.4.3. Destination
- 4.4.4. TOD

Individual non-mandatory tours
- 4.5.1. Frequency
- 4.5.2. Destination
- 4.5.3. TOD

5. Tour level — 5.1. Tour mode → 5.2. Stop frequency → 5.3. Stop location

6. Trip level
- 6.1. Trip mode
  - 6.2. Auto parking
  - 6.3. P&R parking
- 6.4. Trip departure

7. Network Simulations — 7.1. List of trips → 7.2. Trip tables → 7.3. Assignment

Multi-Class Assignment

Vehicle Type & Value-Of-Time	Non-toll SOV	Non-toll HOV2	Non-toll HOV3+	Toll SOV	Toll HOV2	Toll HOV3+
Auto + external + airport low & high VOT	1	3	5	2	4	6
Commercial + light truck		7			8	
Medium truck		9			10	
Heavy truck		11			12	

Distributed Model System
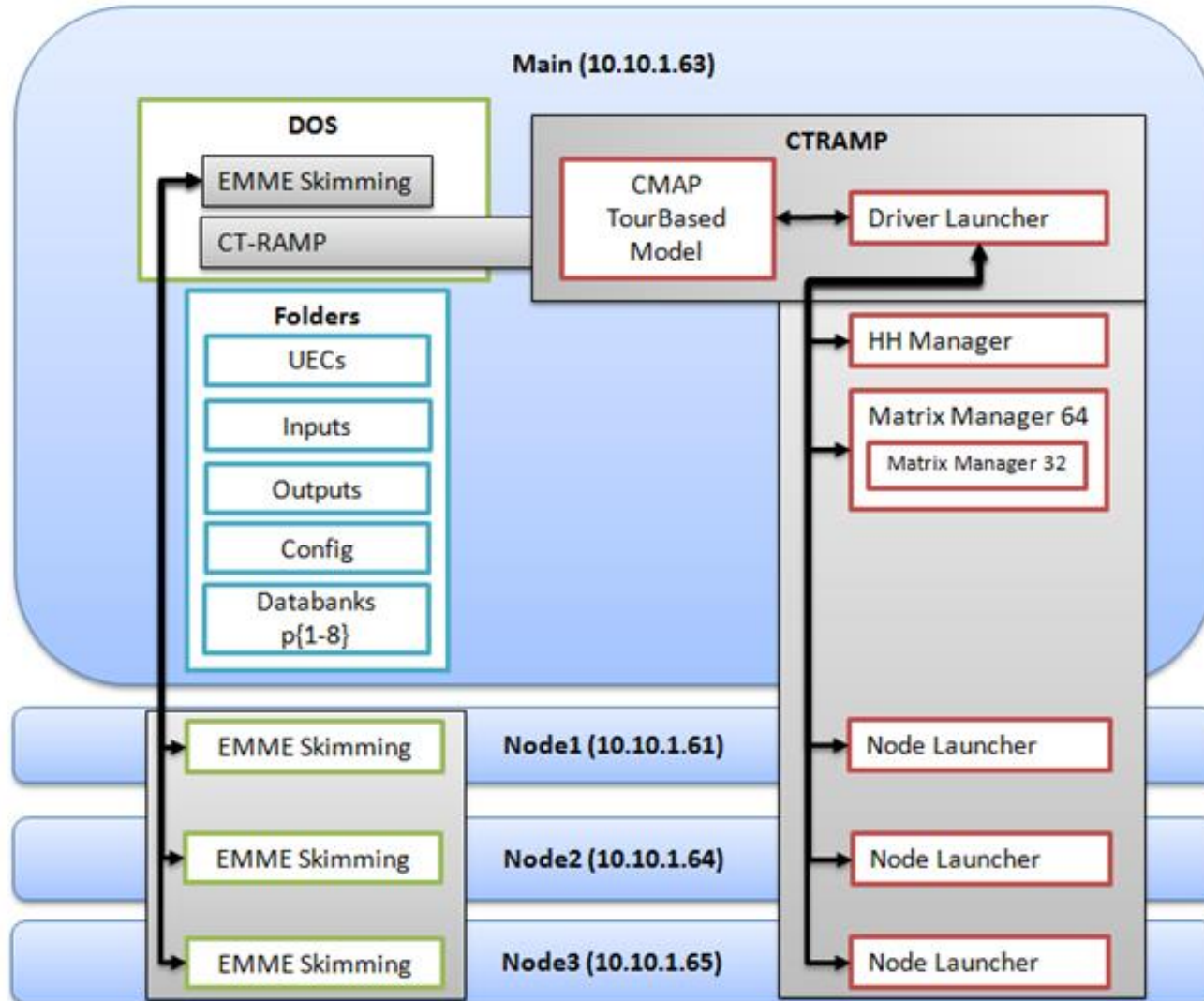
Model Application

Projects

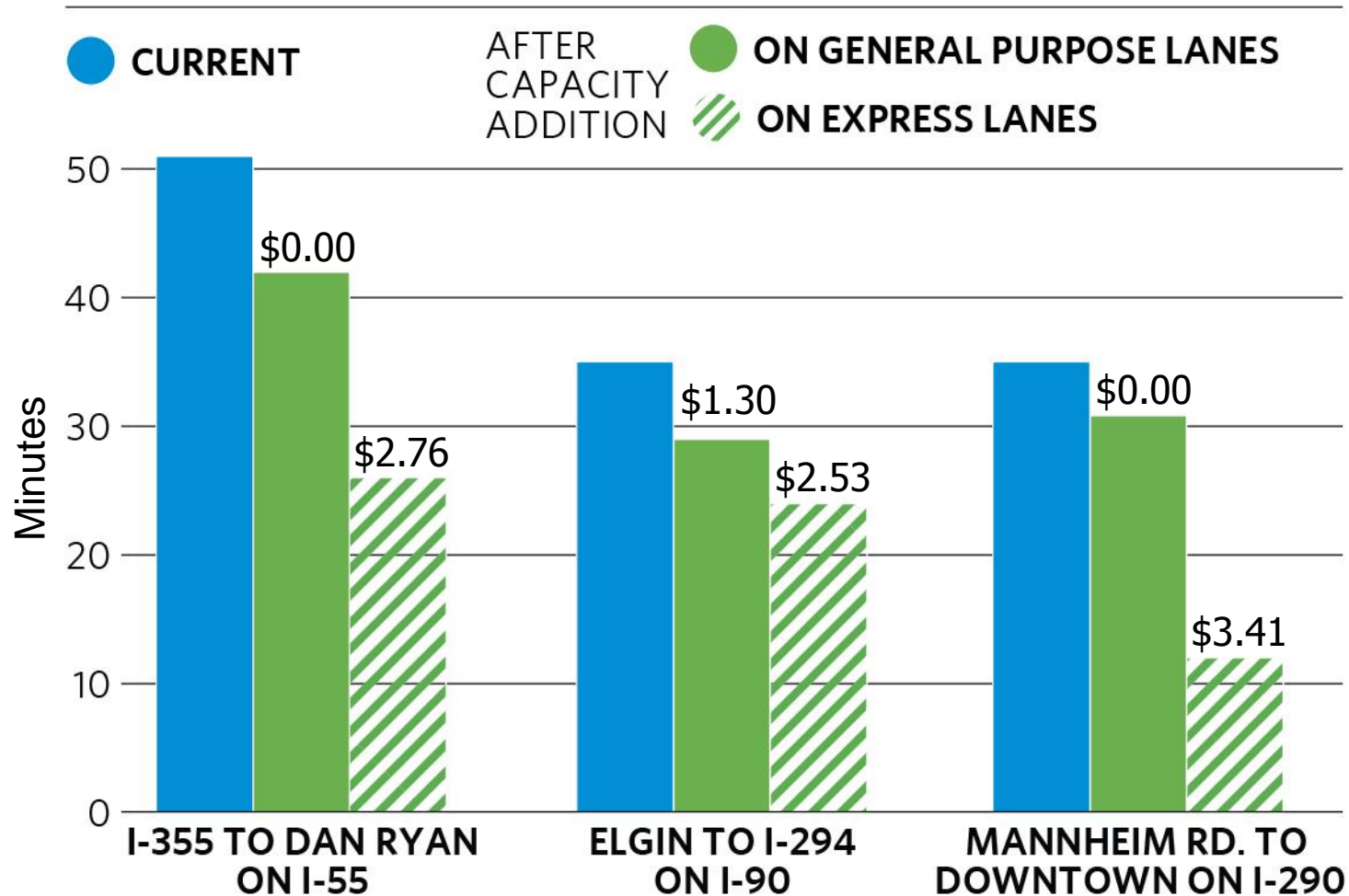- □ New highways
  - ■ IL 53/120
  - ■ Elgin O'Hare West Bypass
- □ Add lanes
  - ■ I-90
  - ■ I-290
  - ■ I-55

IL 53/120

I-90

EOWB

I-290

I-55
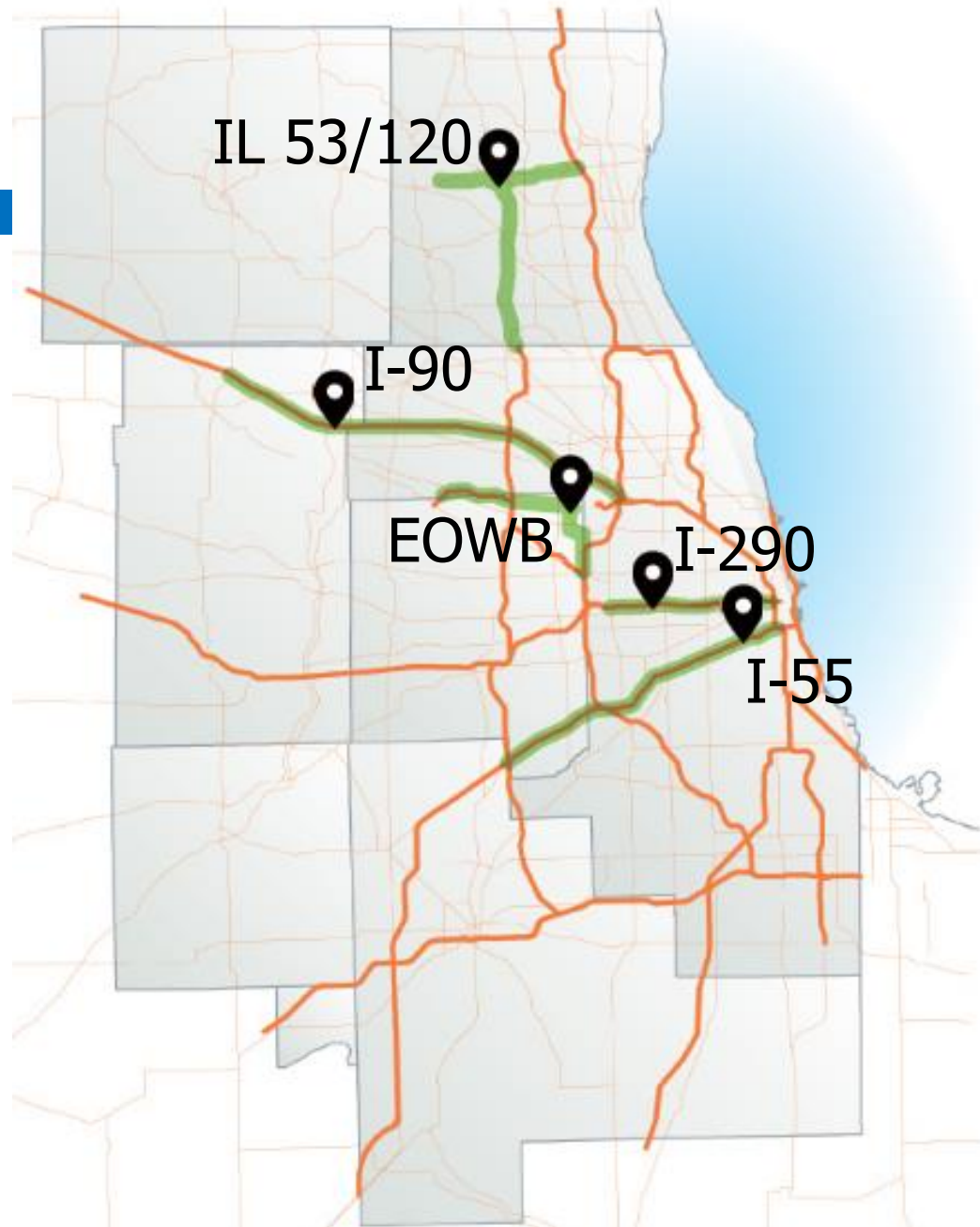
Setting Toll Rates
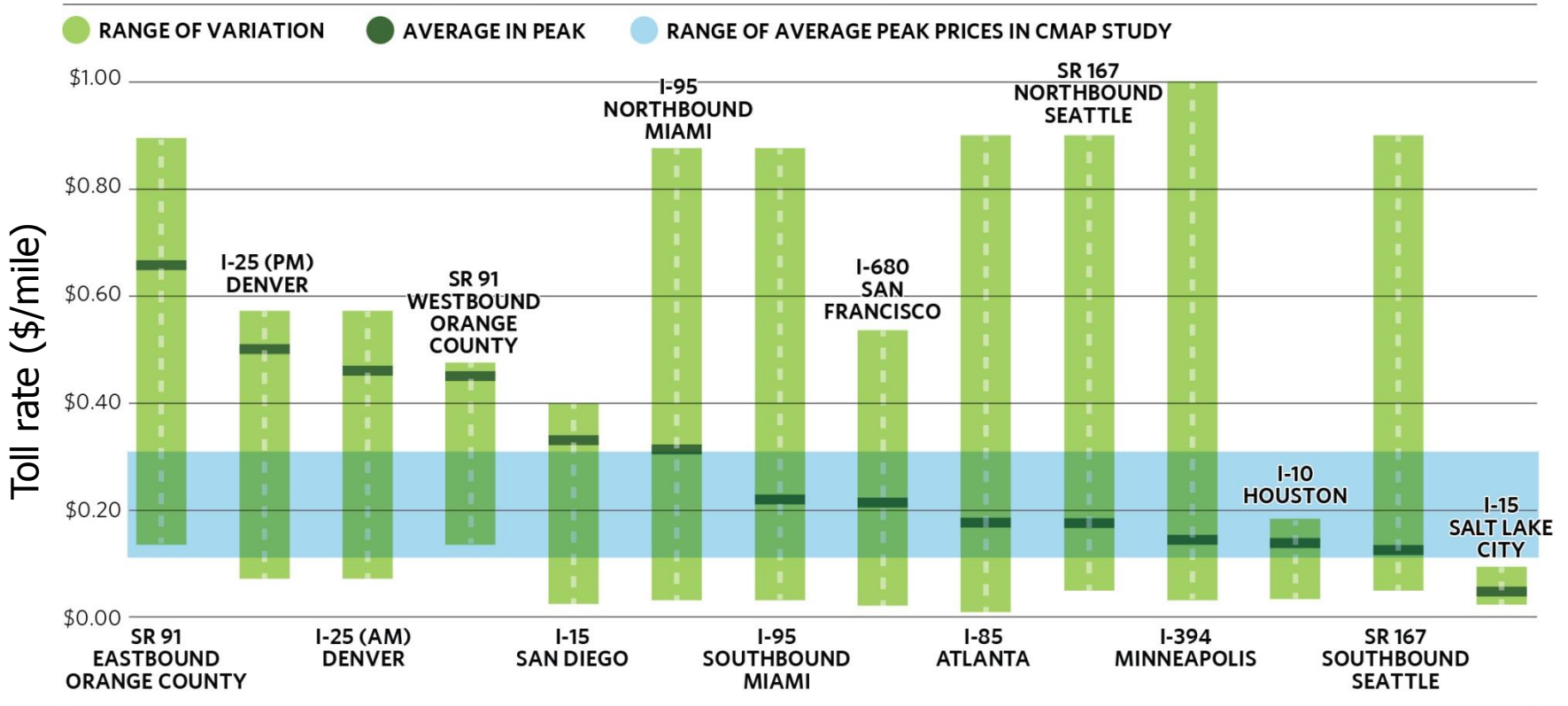
□ Current

    ◻ Set to recover construction & operating costs

□ Congestion pricing

    ◻ Set to achieve performance objectives

        ■ Maintain free flow speed

        ■ Maximize revenue

        ■ Maximize throughput

Travel Times (AM Peak)

Source: CMAP analysis.

Toll Rate Comparisons

Source: Project websites and CMAP analysis.

Other Findings

- Mode Share
  - Small HOV increase and SOV decrease
- Traffic Spillover
  - Arterials and General Purpose Lanes
    - Decreased congestion

Questions?

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