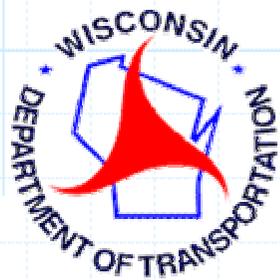


Using Microsimulation to Help Make Decisions



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Selecting The Right Tool..



**Small
Network**

**Planning &
Forecasting**

**Strategic/Policy
Models**

**Traffic Analysis &
Engineering**

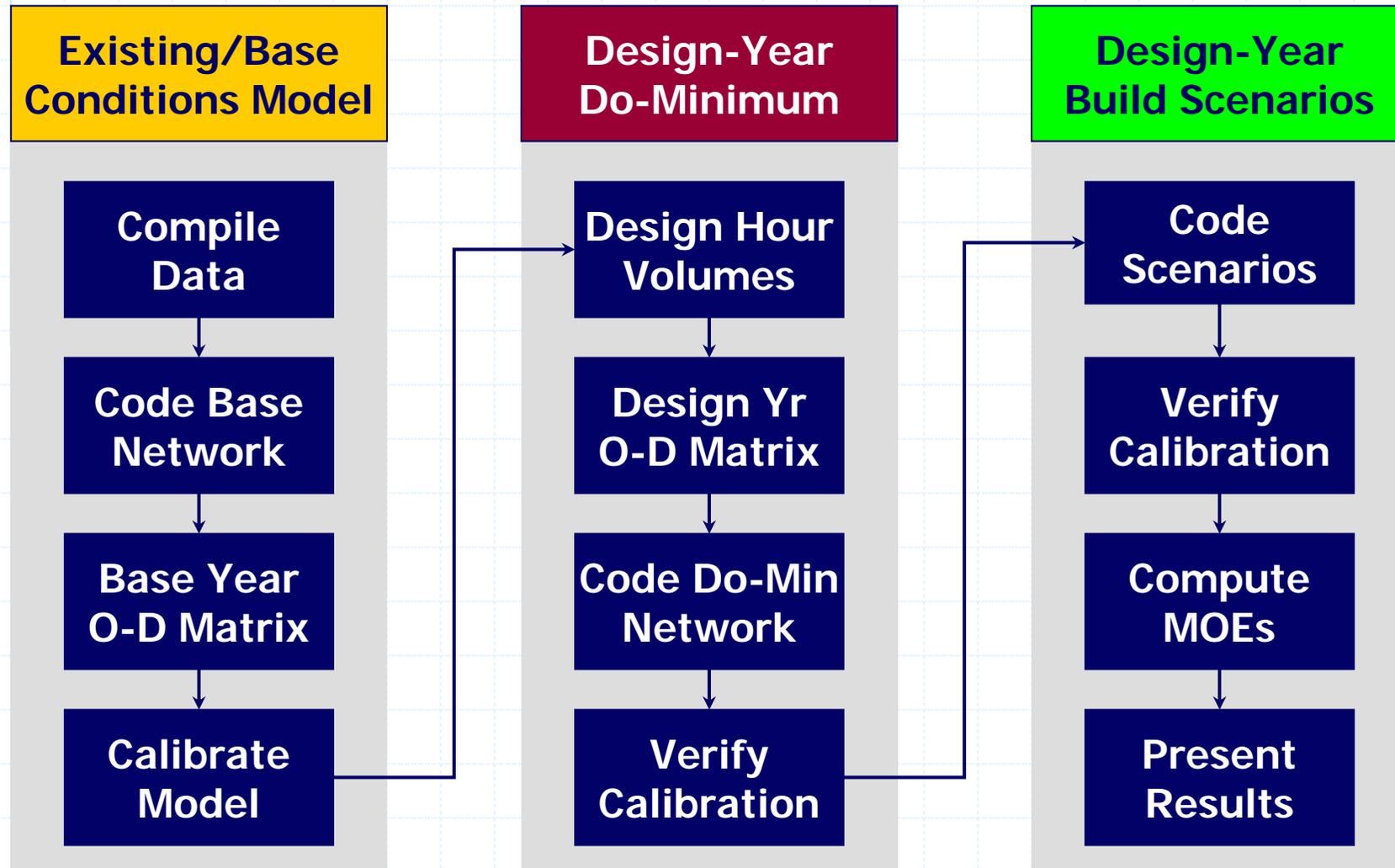
**Signal
Optimization
Models**

**Large
Network**

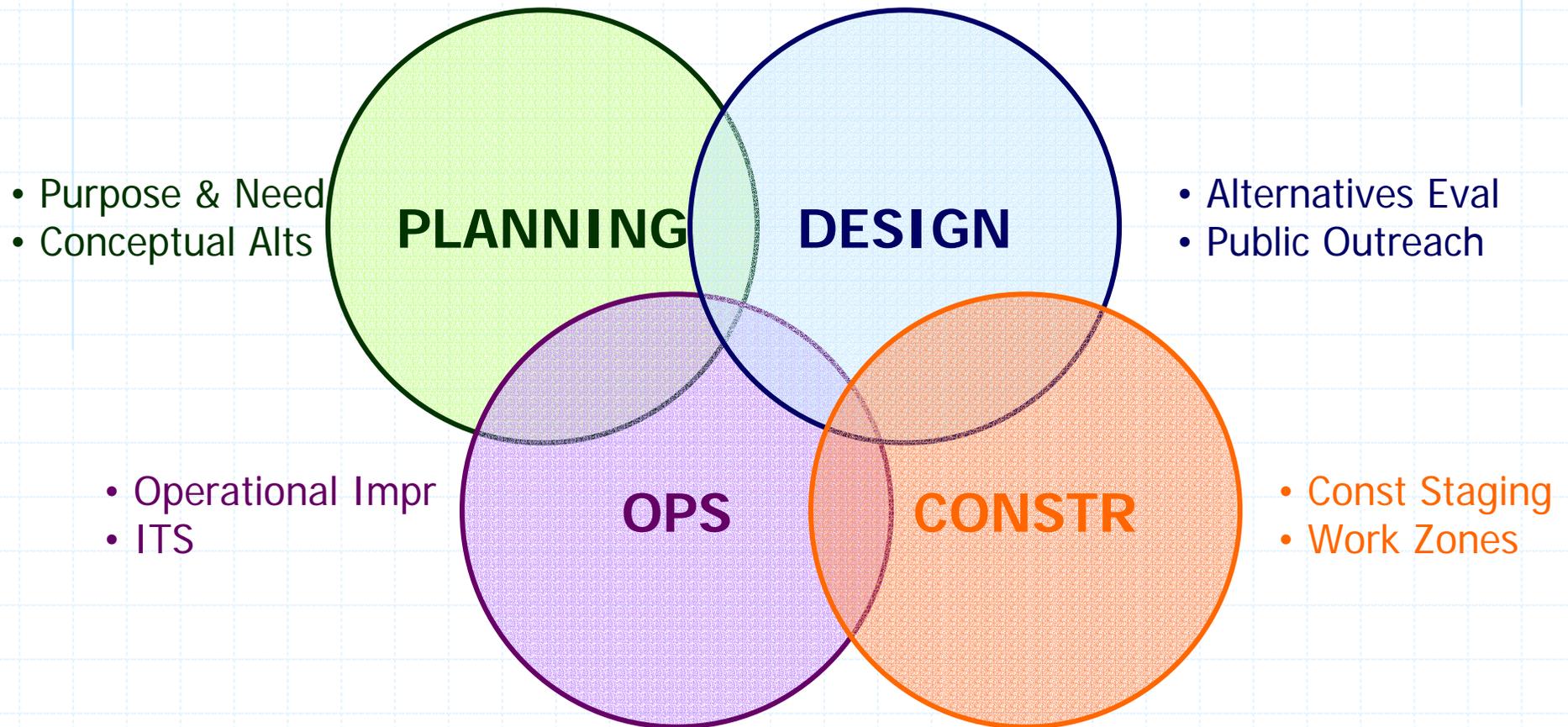
**Four-Step
Regional Models**

**Microsimulation
Models**

Microsimulation Process Overview



In Wisconsin DOT Who Uses Microsimulation?



Level of Detail Changes At Different Stages

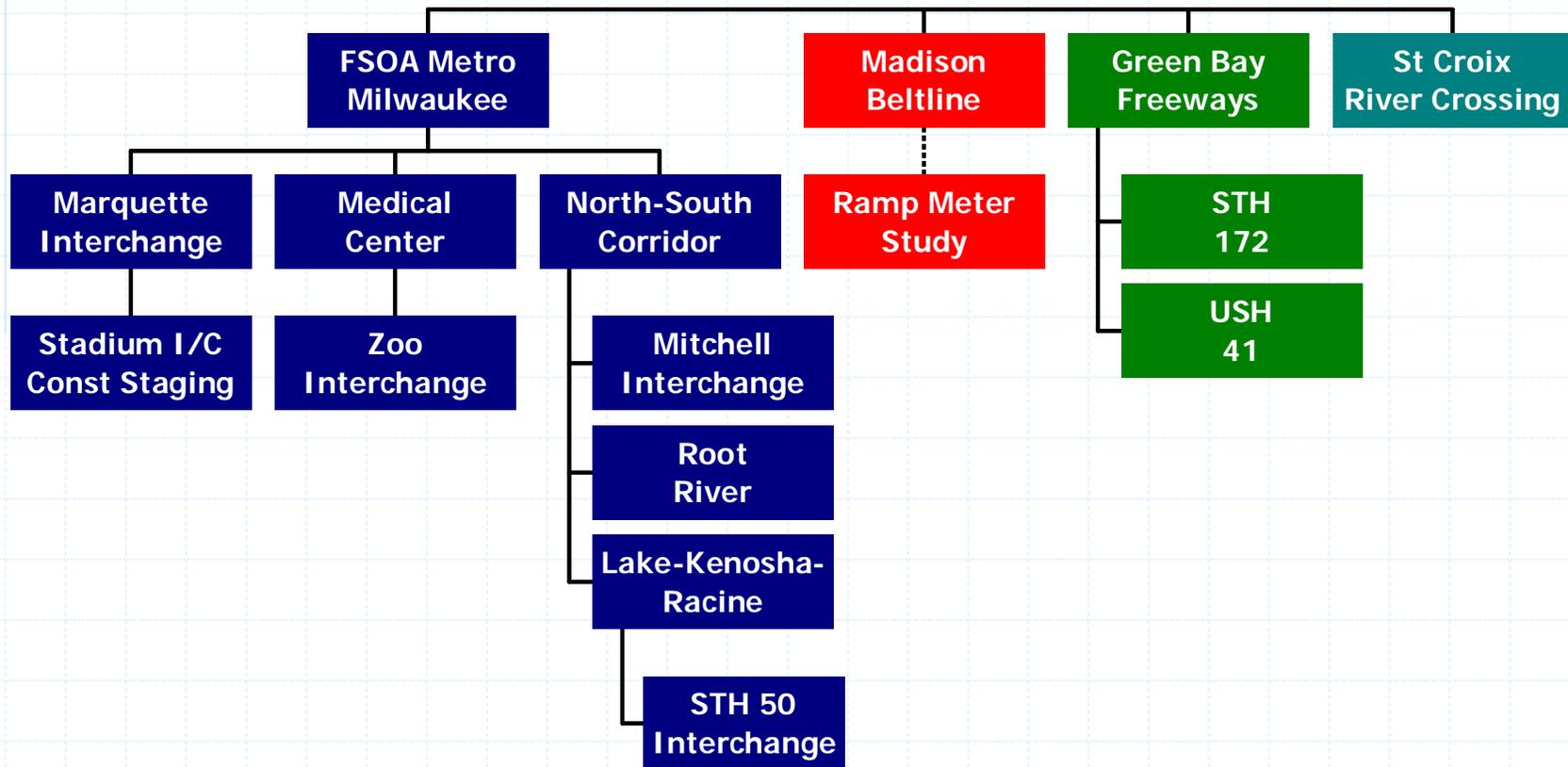


- Corridor Prioritization within System
- Project Prioritization within Corridors
- Alternatives Analysis within Projects
- Interim Operational Strategies
- Construction Staging Analysis

Decisionmaking Challenges

CORRIDOR STUDY	TMP
Evaluating design alternatives.	Evaluating construction staging alternatives.
Accurately estimating project costs.	Determining appropriate incentives/disincentives.
Demonstrating fiscal responsibility.	Identifying cost-effective traffic mitigation strategies.
Communicating with the public and local government.	Communicating internally and with contractors.

Re-Purposing Models



Model Re-Purposing Example

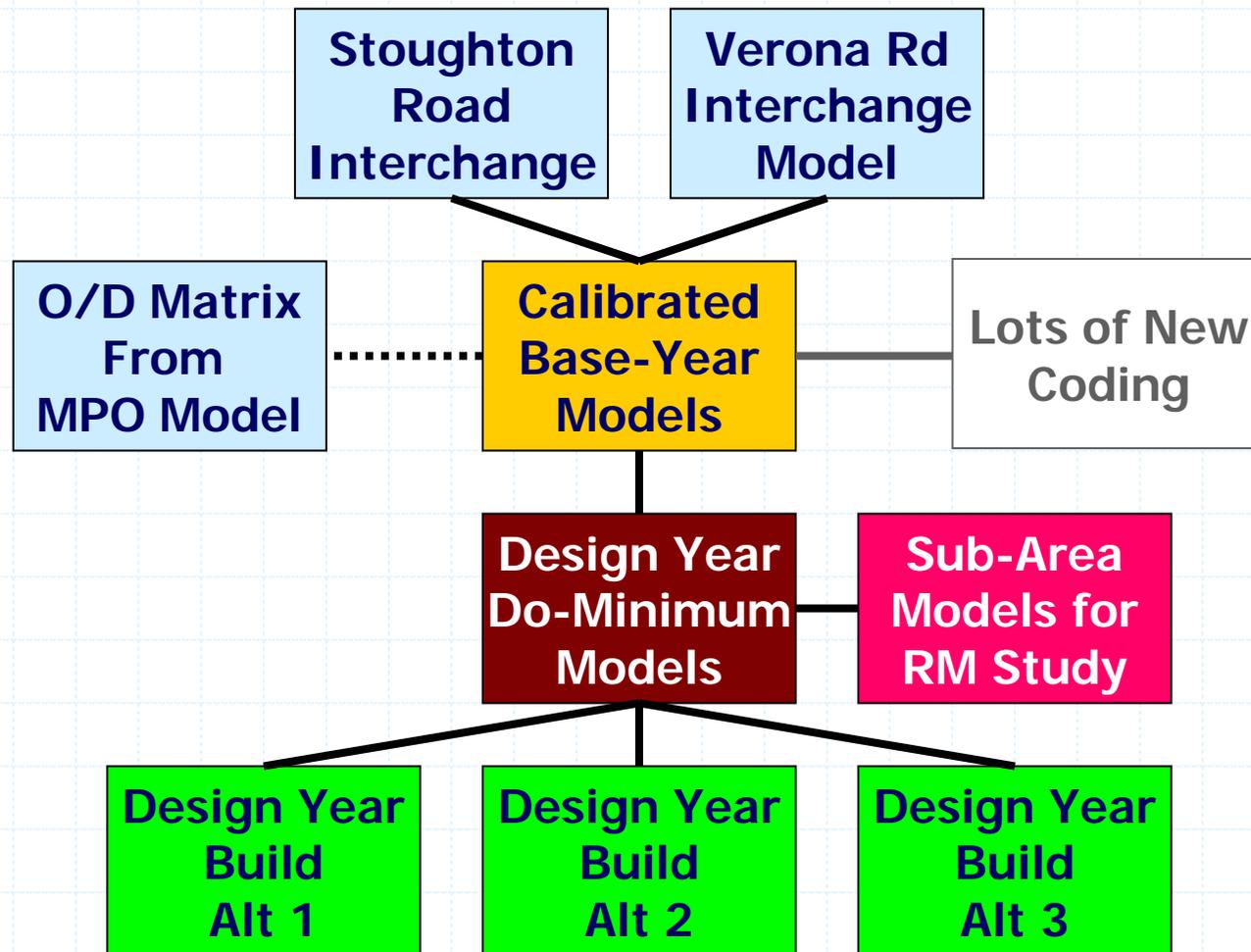
Madison South Beltline – USH 14 to CTH N



- 20 Mile Corridor
- 1 System Interchange
- 17 Service Interchanges
- At-Grade Jcts W of I-90
- 6 to 8 Lanes 120,000 AADT
- Congestion Disproportionate to City Size
- No Alternate Routes

A Family Tree

Madison South Beltline



Decisionmaking Criteria

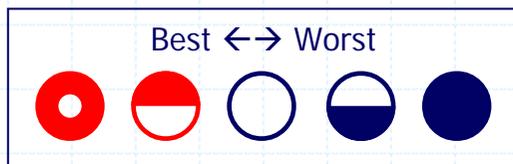
- **Economy & Mobility**
 - Travel Time
 - Agency Costs (Budget)
- **Safety**
- **Environment**
- **Interconnection**
 - Non-Highway Modes
 - Interactions with Land Use
- **Partnerships**

<http://www.webtag.org.uk>



Strengths and Weaknesses of Microsimulation

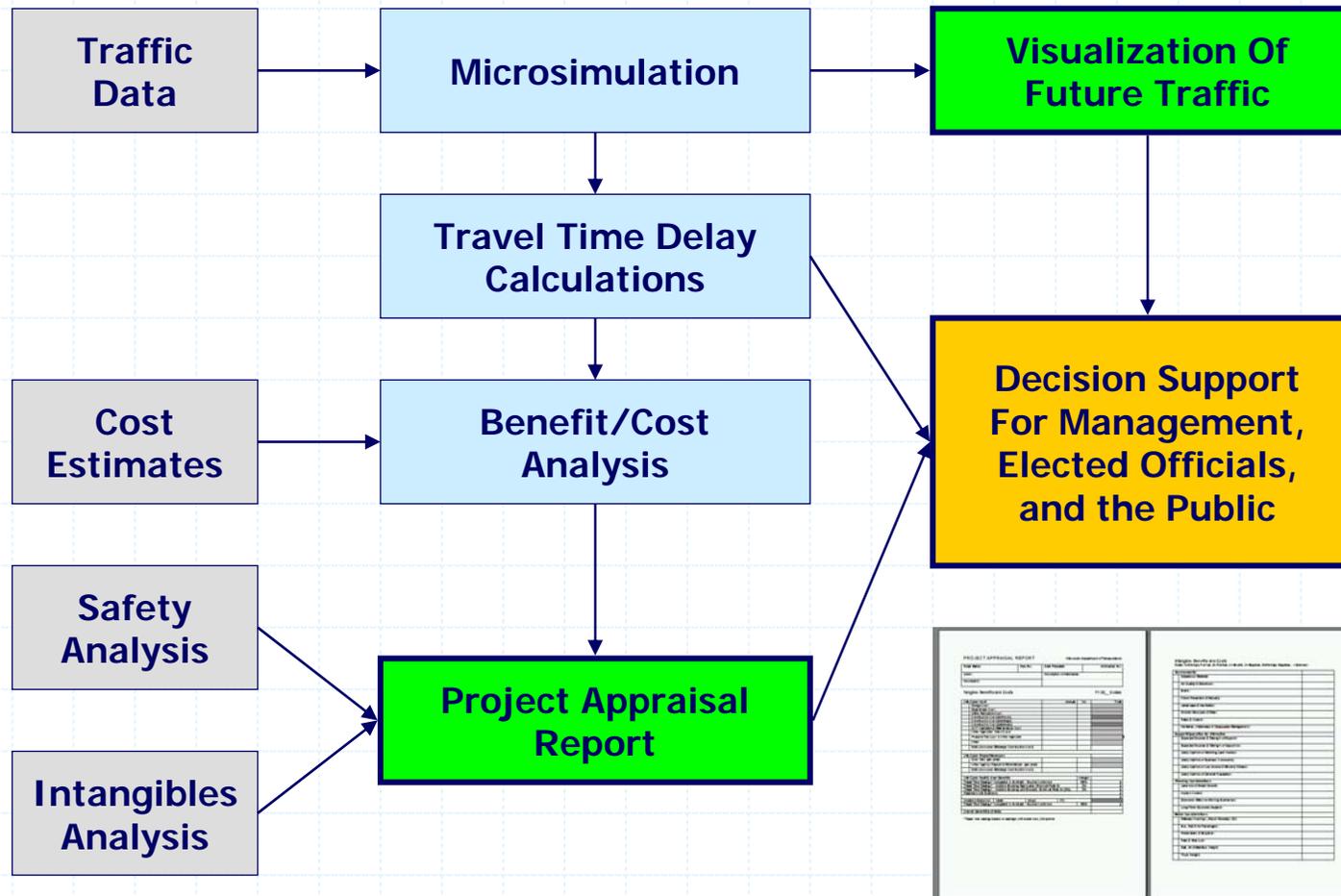
- Economy & Mobility
- ◐ Safety
- Environment
- Interconnection
- ◑ Partnerships



VCAT Safety Analysis Tool

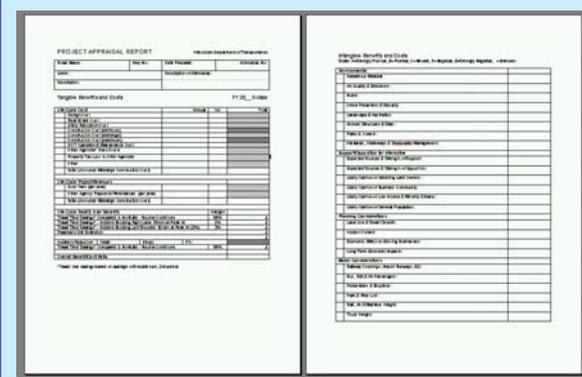


Developing A Balanced Process for Informed Decisions



Project Appraisal Report

- **Economy:** Travel Time Savings & Vehicle Operating Cost Savings
- **Safety:** Crash Reduction
- **Environment:** Qualitative Assessment of Changes
- **Interconnection:** Qualitative Assessment of Benefits for Multimodal Transportation & Non-Drivers
- **Partnerships:** Likely Sources of Public Support and/or Opposition



The image shows a screenshot of a Project Appraisal Report form. The form is divided into several sections:

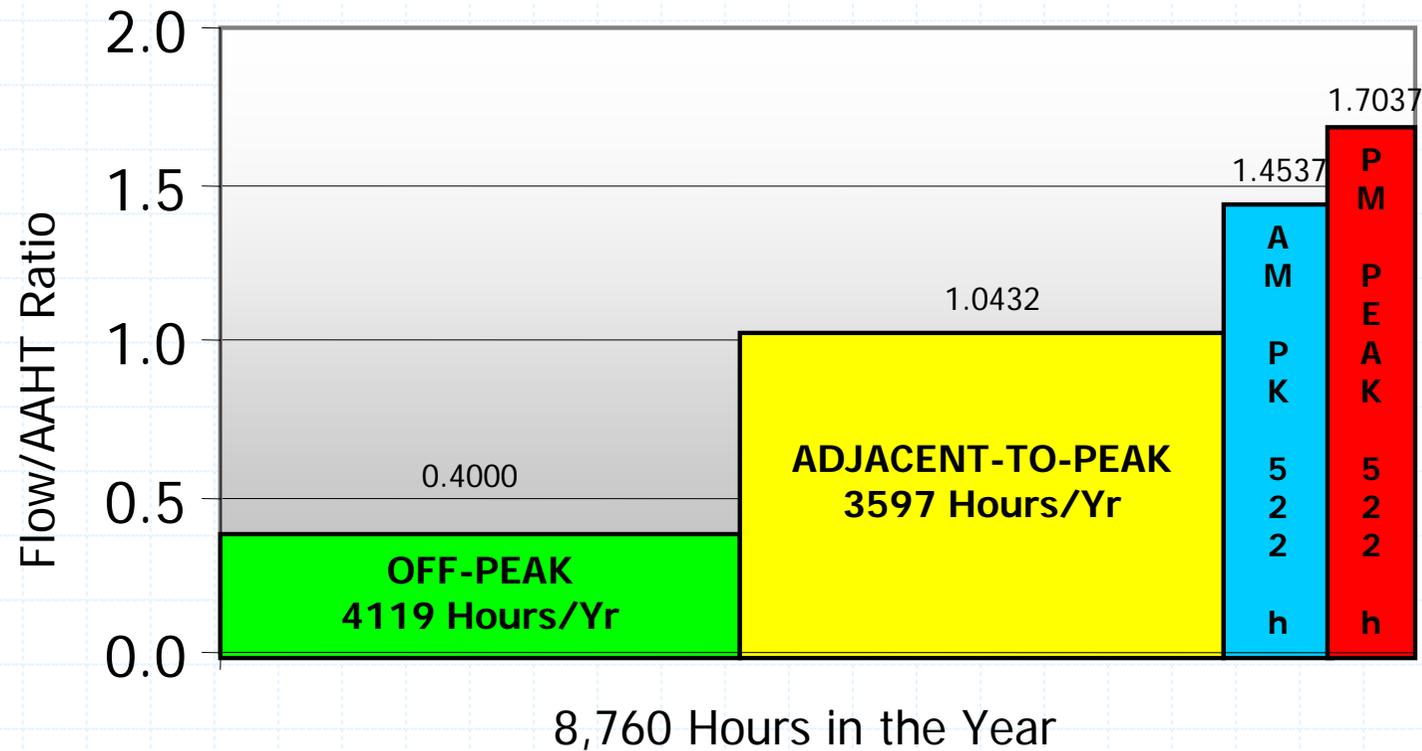
- PROJECT APPRAISAL REPORT** (Title)
- PROJECT DETAILS** (Project Name, Location, etc.)
- Region, Benefits and Costs** (Region, Benefits, Costs)
- Benefits and Costs** (Table with columns for Benefits, Costs, and Net Benefits)
- Summary** (Total Benefits, Total Costs, Net Benefits)

Category	Item	Value
Benefits	Travel Time Savings	
Benefits	Vehicle Operating Cost Savings	
Benefits	Crash Reduction	
Benefits	Qualitative Assessment of Changes	
Benefits	Qualitative Assessment of Benefits for Multimodal Transportation & Non-Drivers	
Benefits	Likely Sources of Public Support and/or Opposition	
Costs	Construction Costs	
Costs	Operational Costs	
Costs	Maintenance Costs	
Costs	Other Costs	
Net Benefits	Total Net Benefits	

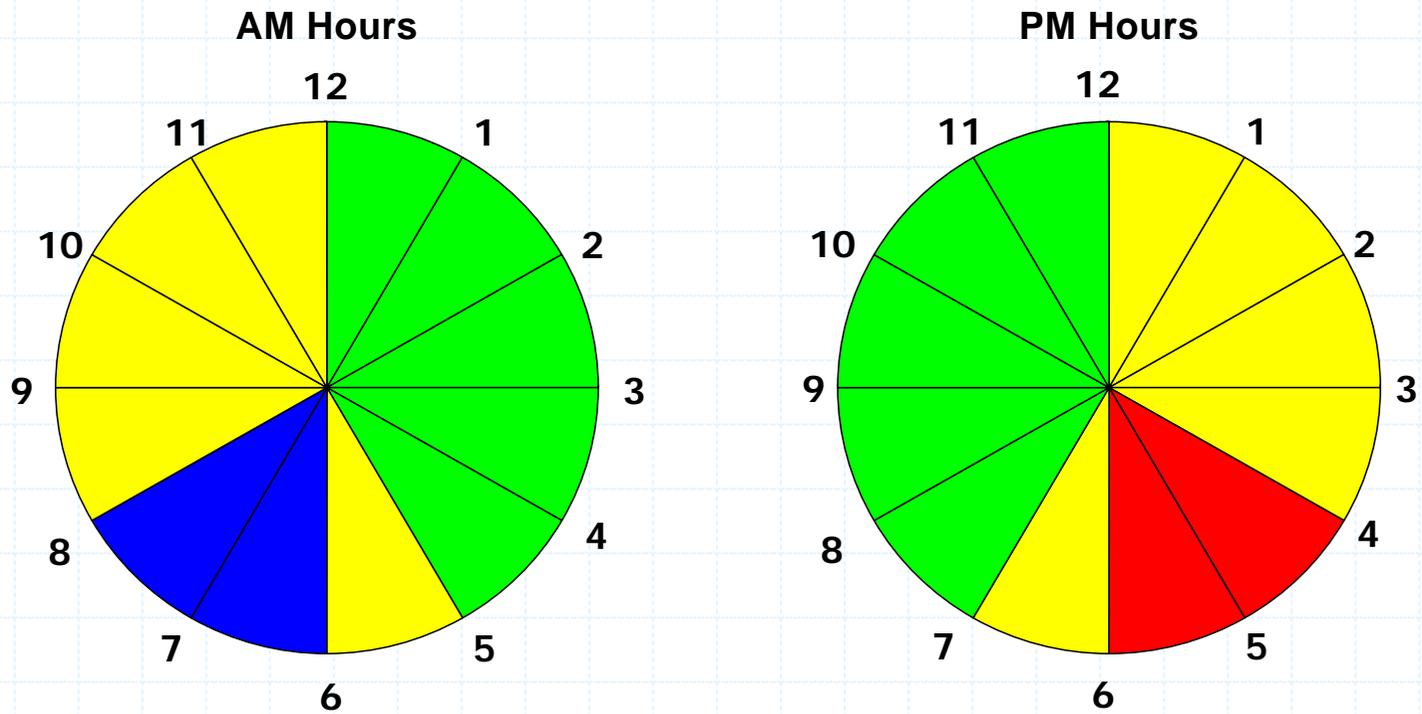
A Tool for Informed Decisionmaking

Time-of-Day Analysis

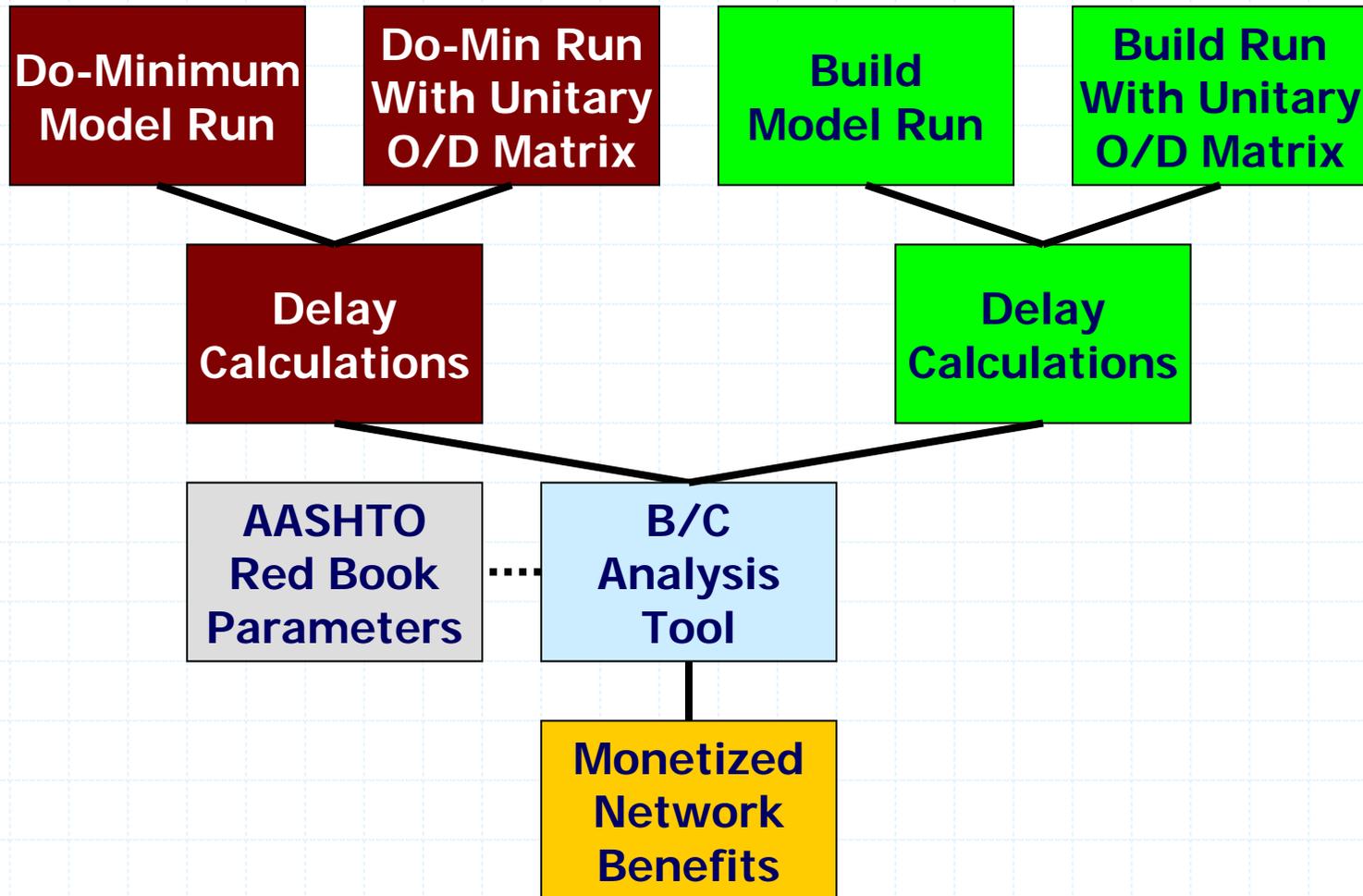
Flow Groups Representing Annual Flow



Analysis Periods

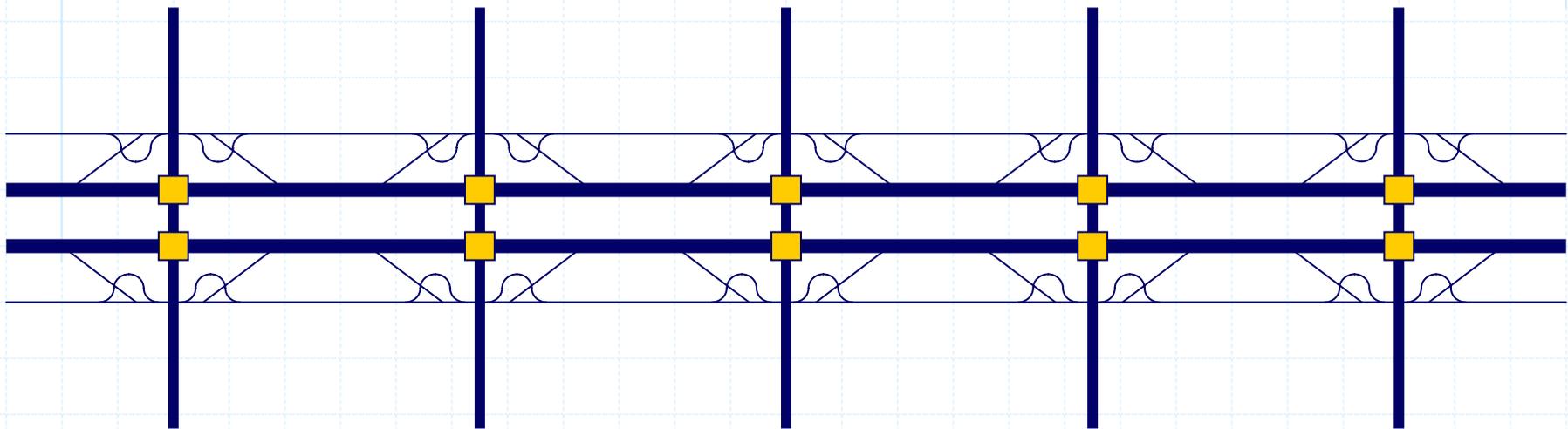


Linking Microsimulation with B/C Analysis



Ex: I-94 North-South Corridor Kenosha & Racine Counties

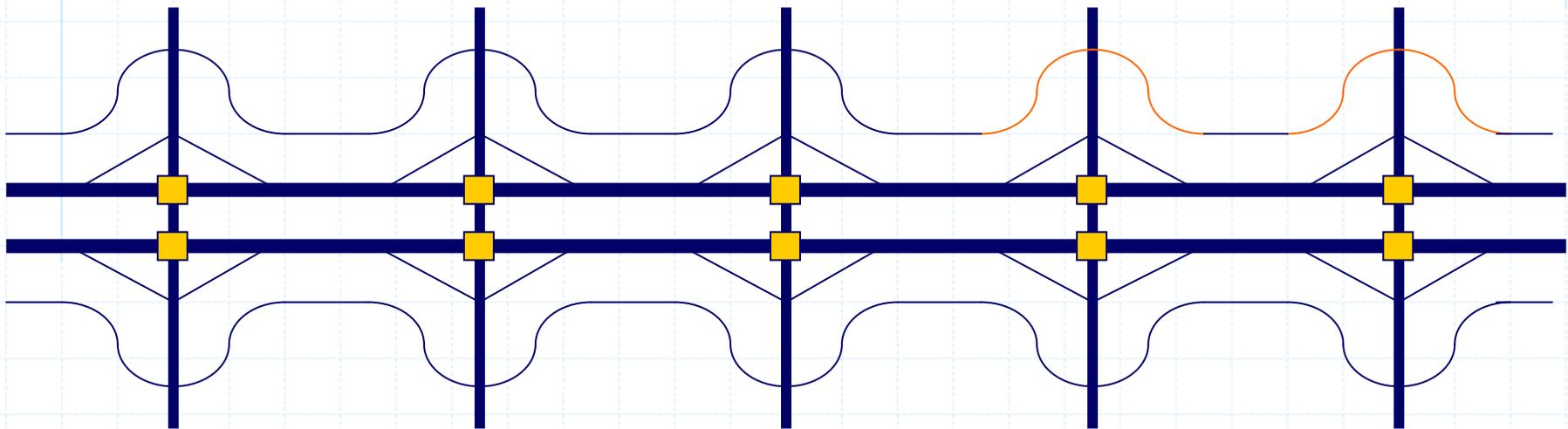
← N



- 32 Mile Corridor
- 14 Service Interchanges, most of obsolete basketweave design.
- 6 Lanes / 85,000 AADT
- Continuous Frontage Roads on both sides
- Local Hwy also parallels

Expert A Stage 1

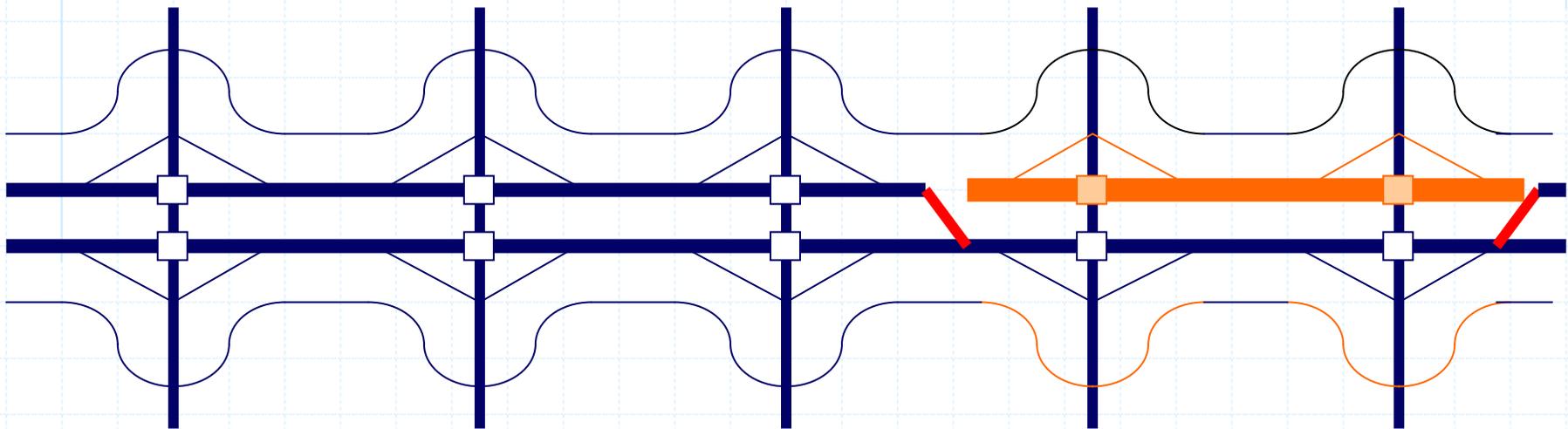
← N



- Build frontage road bulb-outs for ~5 miles on NB side.

Expert A Stage 2

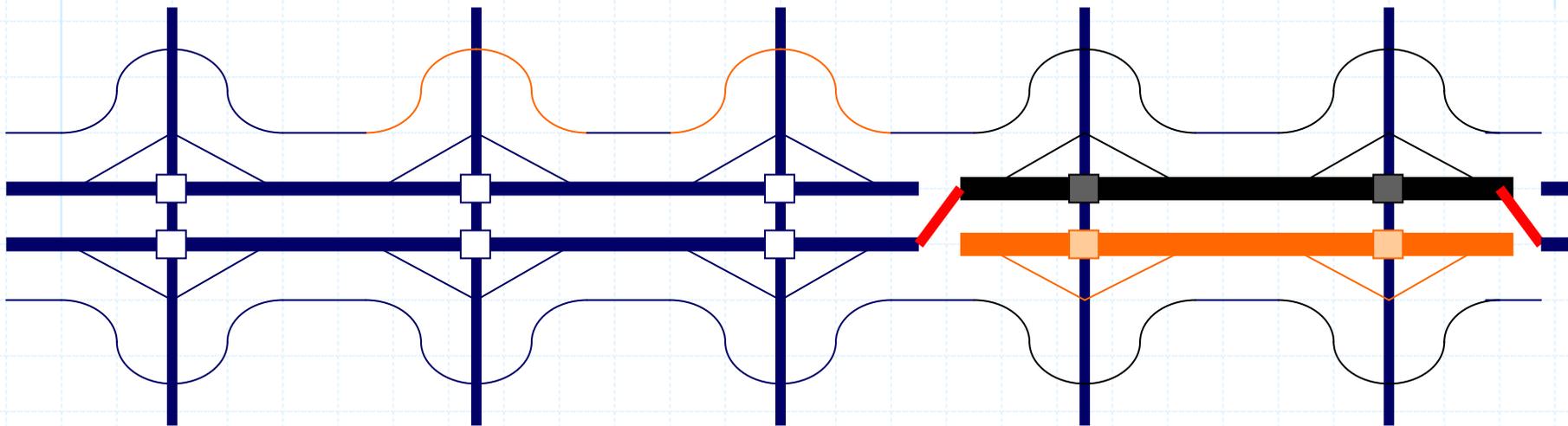
← N



- Shift NB traffic over to SB side (2 lanes/direction)
- Build ~5 miles of NB lanes and ramps .
- Build bulb-outs on SB side.

Expert A Stage 3

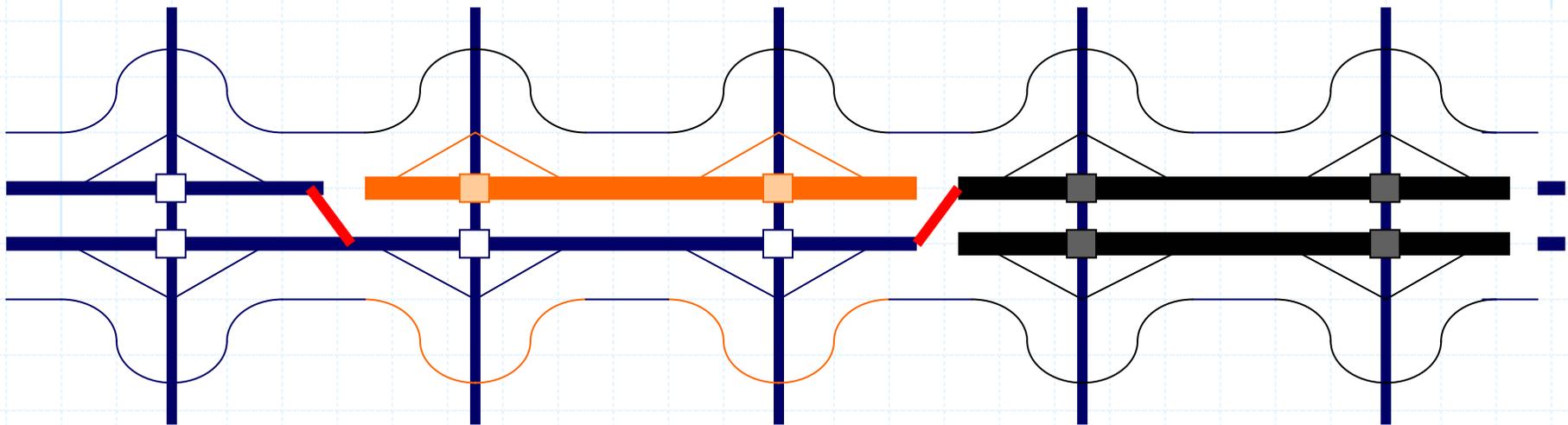
← N



- Shift SB traffic over to NB side (3 lanes/direction)
- Build ~5 miles of SB lanes and ramps.
- Build next ~5 miles of bulb-outs on NB side.

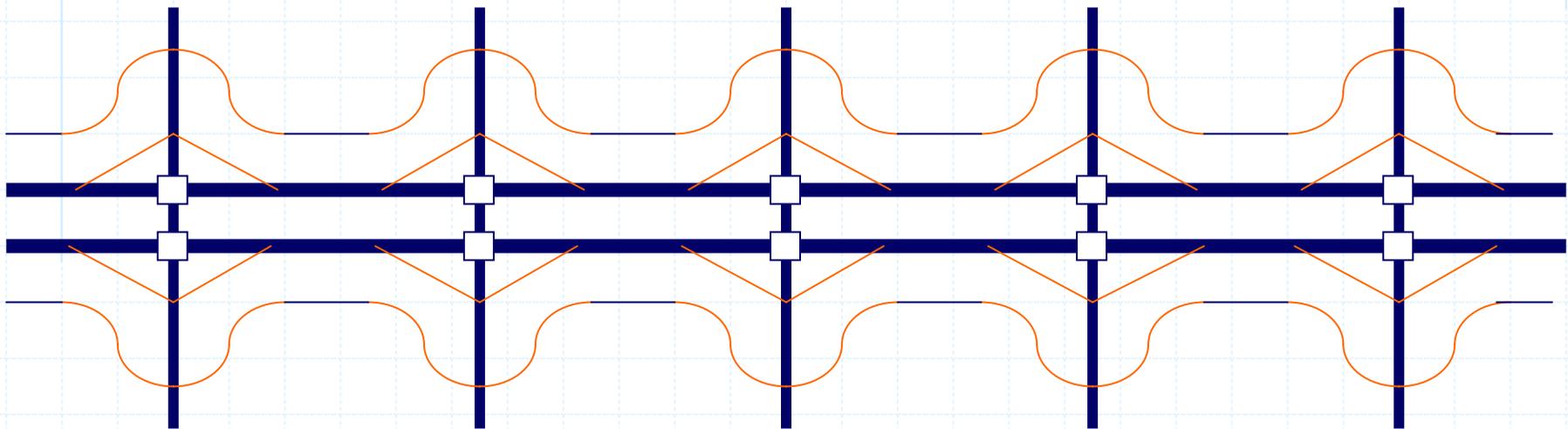
Expert A Stage 4

← N



- Shift NB traffic back to SB side (2 lanes/direction)
- Build ~5 miles of NB.
- Build ~5 miles of bulb-outs on SB side.

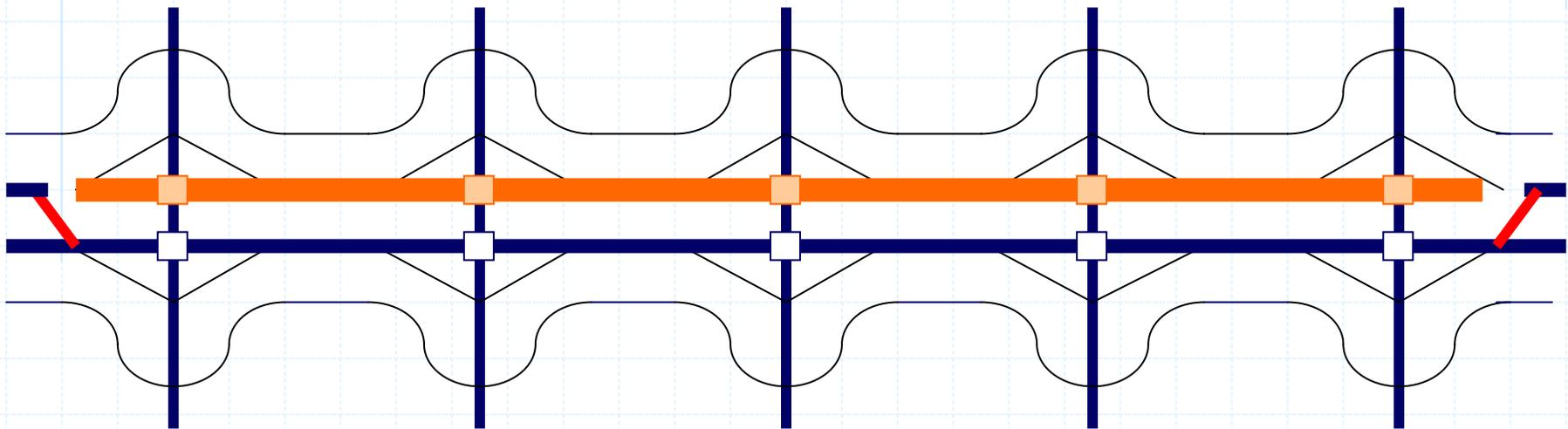
Expert B Stage 1



- Build all frontage road bulb-outs.
- Build all new ramps and ramp terminals.

Expert B Stage 2

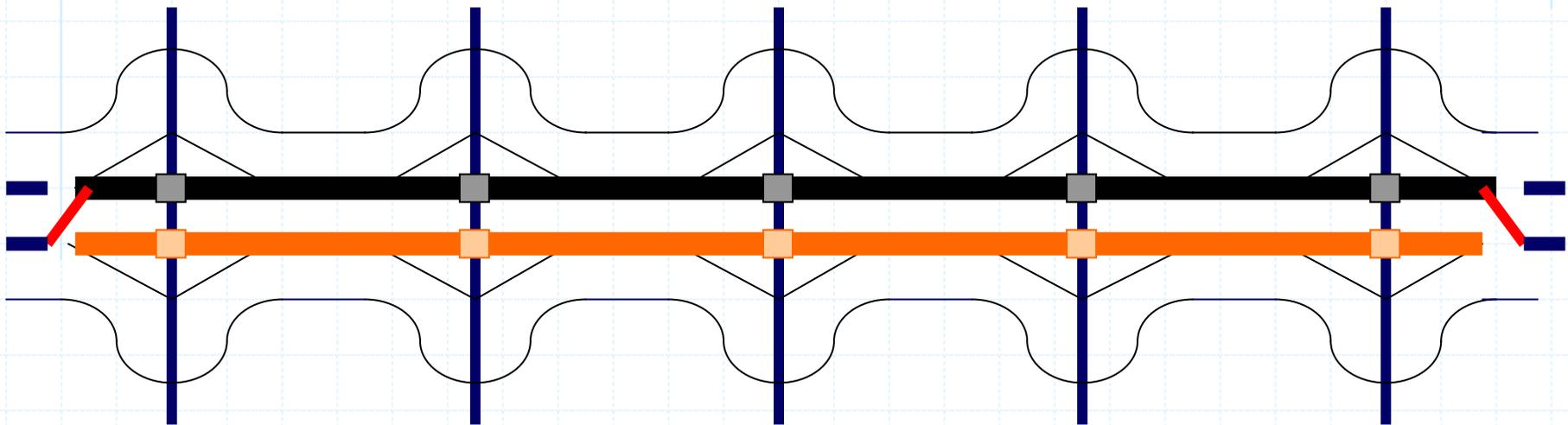
← N



- Shift NB traffic over to SB side (2 lanes/direction).
- Build 15 miles of NB lanes as a single operation.

Expert B Stage 3

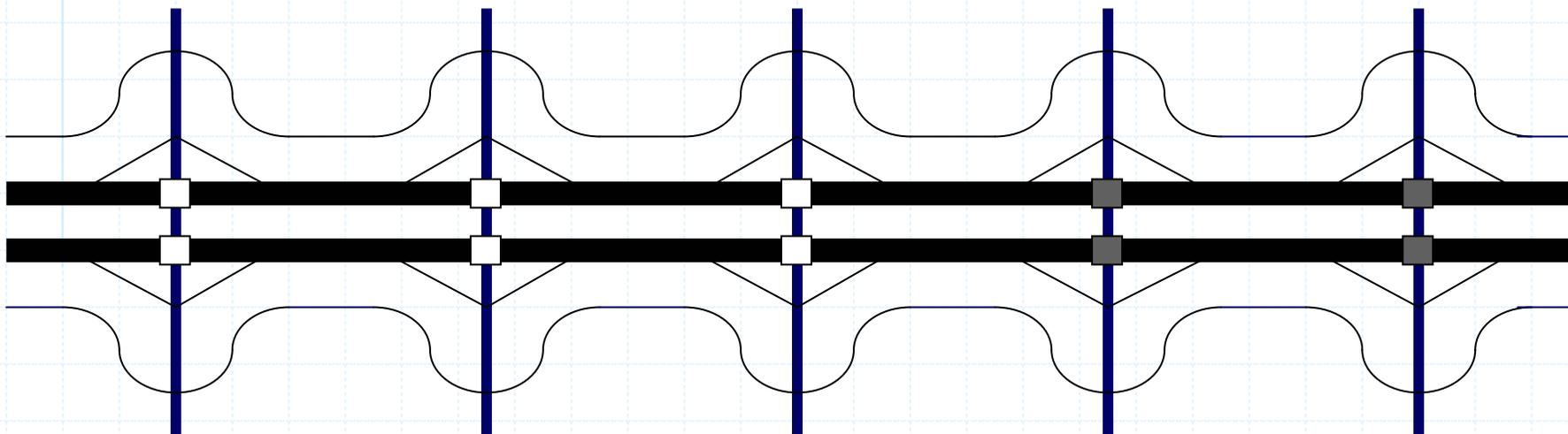
← N



- Shift SB traffic to new NB lanes (3 lanes/direction).
- Build 15 miles of SB lanes as a single operation.

So Who's Right?

← N



Possible Analytical Approach



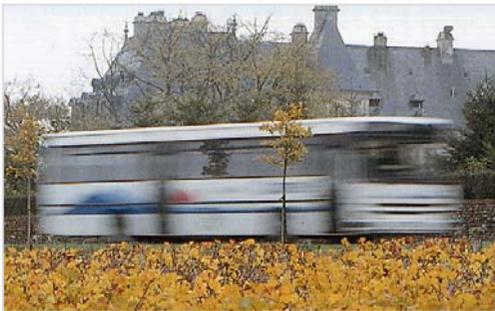
- Build and calibrate model for 30 mile freeway corridor.
- Adjust traffic volumes and traffic control to reflect build-year conditions (2010)
- Model major stages of each expert's concept (about 10 models)
- Calculate user delay associated with each stage.
- Multiply by duration of each stage to compute total user delay.
- Iterate...

In the TMP Context...



- Modeled Delay tends to become surrogate for various road user disbenefits.
- Multimodal and demand suppression elements of TMPs present special analytical challenges.
- Potential for scenario proliferation.
- Potential conflicts between microsimulation and other tools (e.g. QuickZone).
- Should models to establish contractor incentive/disincentive payments?

Key Implementation Challenges



- Internal definitions of Delay and other MOEs vary in different models.
- Quality of modeling workmanship directly influences MOE accuracy.
- Most DOTs lack sufficient staff with modeling expertise.
- Some popular analytical tools cannot predict diversion.
- Unclear whether models with dynamic assignment accurately predict diversion.
- Limited data on temporary demand suppression during construction.



I-94 13TH ST

03/16/2007 07:38



I-94 35TH ST

03/16/2007 07:38



I-94 28TH ST

03/16/2007 08:28