Is It Better to Just Shut the Darn Thing Down?

Construction Alternative Screening with a Regional Travel Demand Model

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Overview

- Project Background and Context
- Regional Model Application
- Example Application and Results
- Conclusions

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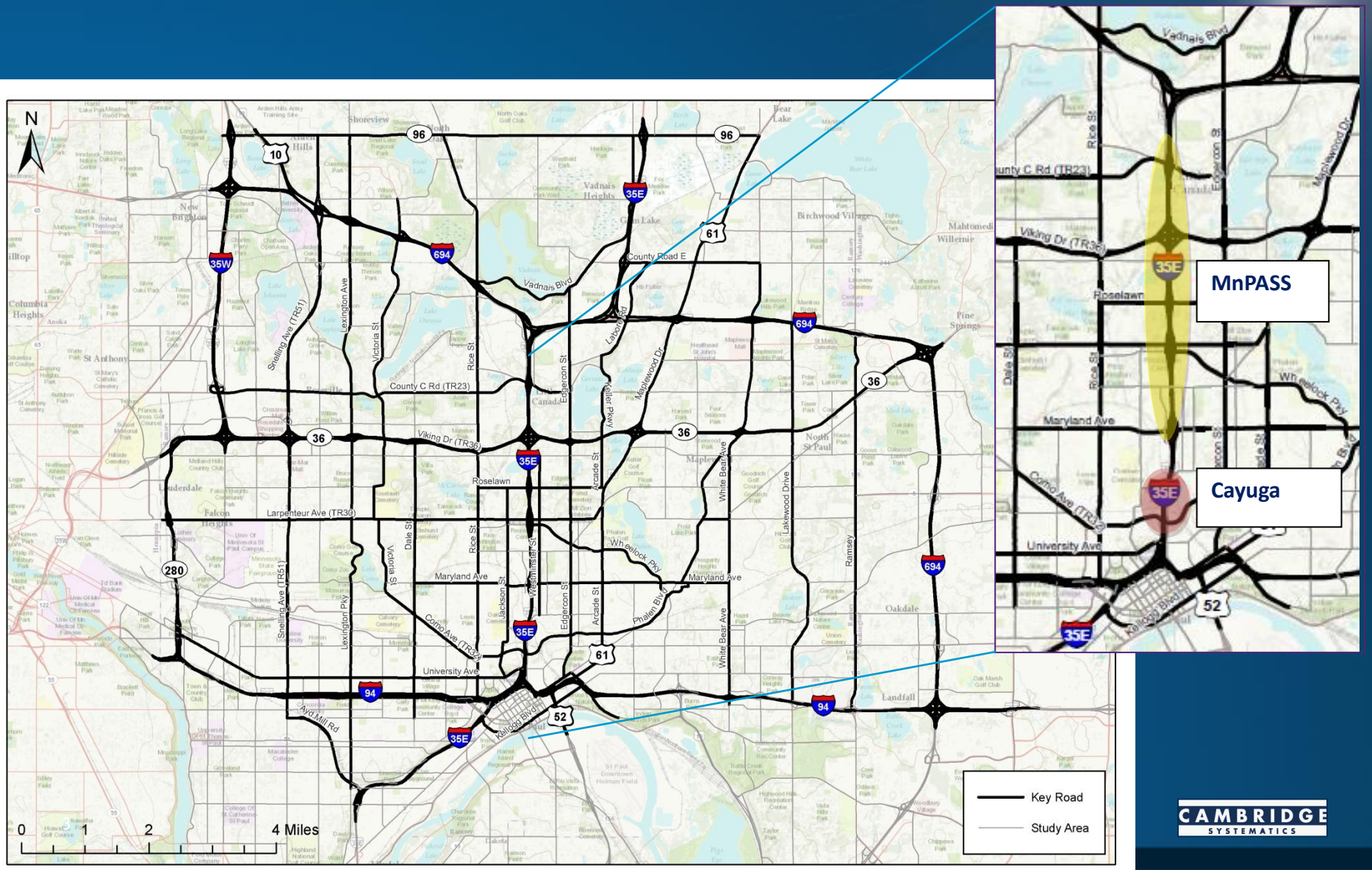
The Project



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The Construction Alternatives

Alternative	2014	2015	2016
Full Closure	Close I-35E		
Four Lane	Traffic routed to NB side	Traffic routed to SB side	
Six Lane	Traffic routed to NB side	Traffic routed to SB side	Cayuga Finishing

The Context

- Agency interested in ways to shorten construction schedule
- Initial decisions needed within 3 months
- Construction road closure would require strong and obvious justification to public
- Only calibrated model available: regional demand model with static assignment

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The Approach

- Ran each construction alternative through the regional model
- Examined volume diversions
- Calculated change in user costs during construction
  - » Delay (VHT)
  - » Operating costs (VMT)

Why Not DTA?

- Time
- Availability of a calibrated model

Static Assignment Capabilities

- Insights into diversion behavior
  - » Extent of traffic diversions
  - » Local vs. regional traffic diversion patterns
  - » Volume of diverting traffic from construction corridor
- Develop comparable metrics for each construction alternative
  - » Diversion volumes
  - » User costs and benefits

Static Assignment Limitations

- Model assumes fixed departure time
- Model calibrated to forecast long-term decisions in destination
  - » May not be appropriate for a construction season (e.g. work, school trips)
- Static assignment cannot be used for to evaluate specific path level of service

Construction Alternative Modeling Considerations

Generation	• No changes were made
Distribution	• Mandatory trips unchanged from base • Non-mandatory trips sensitive to construction
Time of Day	• No changes were made
Mode Split	• No changes – construction skims input
Assignment	• Stable network during construction • Created network for each construction stage

Construction Alternative Development

- Define discrete stages of construction
  - » Condense ramp/lane closures
  - » Fixed through entire construction season
- Reduce capacity within the construction area
  - » HCM 2010 Exhibit 10-14
- Use base network distribution for trip purposes that are not likely to change destination (e.g. Work & School)
- Use construction network distribution for non-mandatory trip purposes that may change destination (e.g. Shopping & Other)

Example Application: Minnesota Route I-35E MnPass Lanes and Bridge Reconstruction

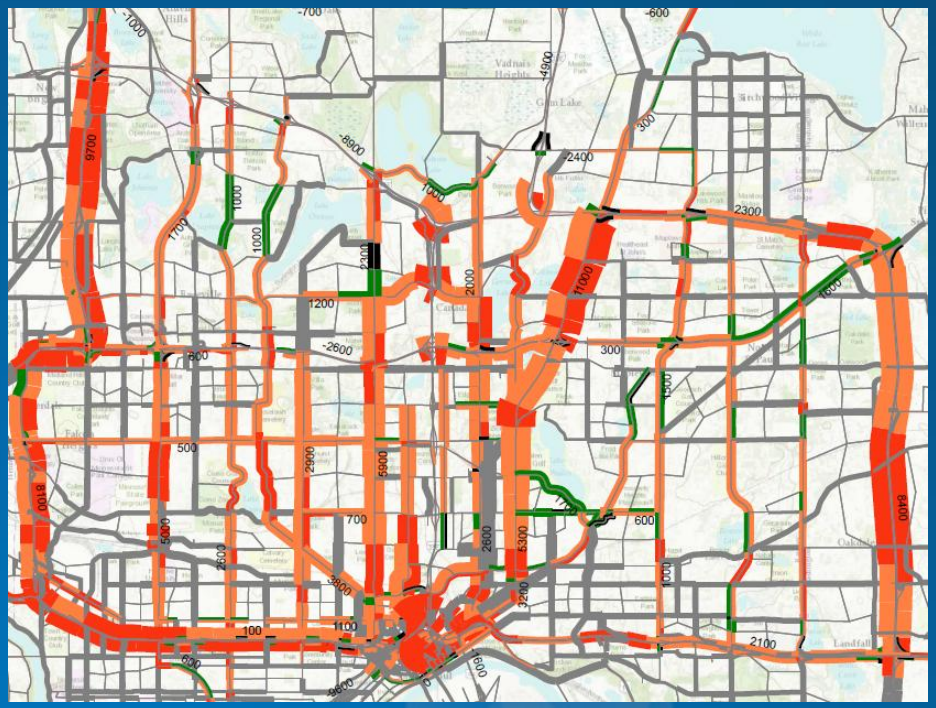
Twin Cities Regional Model

- Distribution
- Mode Choice
  - » No HOV lanes in study area
  - » No significant mode shift
- Assignment
  - » 24 time periods – fixed "TOD" factors

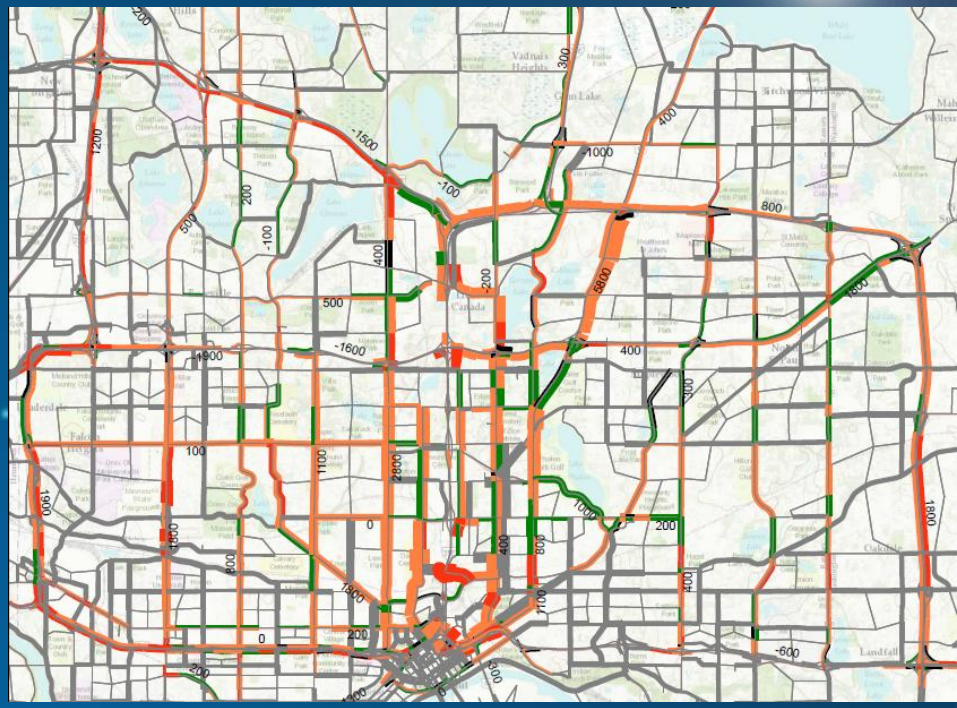
Purpose	Network
HBW	Base
HBWR	Base
HBSCH	Base
HBSH	Construction
HBO	Construction
NHBW	Construction
NHBO	Construction

Graphics: Diversion Maps

Full Closure



4-Lane Year 1



Directional V/C

- *Max VC > 0.75*
- *Max VC > 1*
- *Max VC >1.5*
- *Other Roads*

Volume Labels:
Total Volume Difference (Directional)

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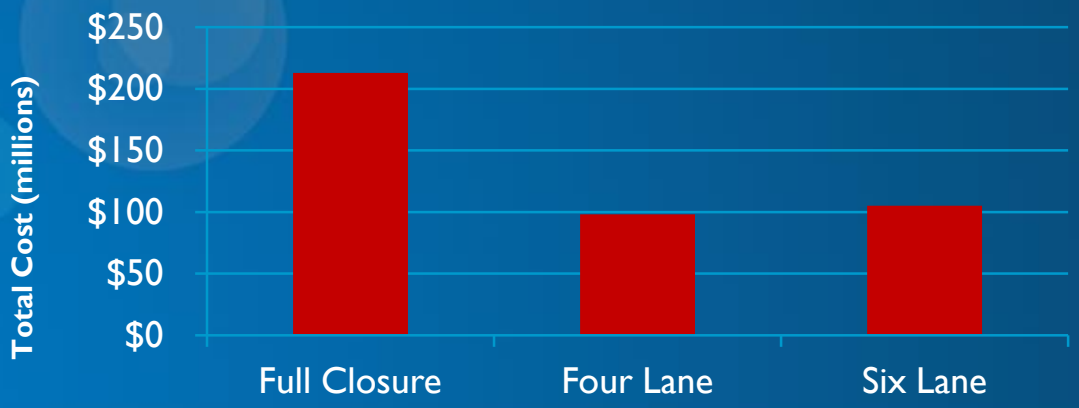
User Costs During Construction

- Calculated change in operating costs and travel time from pre-construction network
- Extending construction delays the benefit of the new/improved facility

Benefit Description	Value
Auto Occupant Value of Time	$13.93/hour
Truck Value of Time	$17.51/hour
Auto Vehicle Operating Cost	$0.32/mile
Truck Vehicle Operation Cost	$0.95/mile

User Cost Calculations

Alternative	Stage	Duration (months)	Daily	Monthly (millions)	Season (millions)	User Cost (millions)	MN Pass Benefit (millions)	Total 3 Year Cost (millions)
Full Closure	Full Closure	8	$1,360,203	$29.90	$239.40	$239.40	($26.53)	$212.87
Four Lane	Traffic on NB Side	8	$341,984	$7.50	$60.20	$111.30	($13.26)	$98.04
	Traffic on SB Side	8	$290,391	$6.40	$51.10			
Six Lane	Traffic on NB Side	8	$314,905	$6.90	$55.40	$105.20	$0.00	$105.20
	Traffic on SB Side	8	$252,889	$5.60	$44.50			
	Cayuga Finishing	8	$29,667	$0.70	$5.20			



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Conclusions and Future Work

- Static assignment was sufficient to demonstrate that full closure would be substantially more onerous on the public
- Did not compare user costs directly to construction costs due to model limitations
- **Future work**: Analyze the change in trip distributions to impacted area
  - » Understandable metric for the public
  - » Requires a singly constrained model