Shining a Light Inside the Black Box

Part 4 of 4

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Speakers

- Fred Ducca, FHWA
- Bill Woodford, AECOM Consult
- Bill Davidson, PB Americas
- Douglas Laird, FHWA

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Series Schedule

- Four sessions of two hours each
  - "Motivations & Data": February 12th, 2008 at 2:30 PM EST
  - "Model Testing": March 11th, 2008 at 2:30 PM EST
  - "Transportation Supply & Travel Distribution": April 8th, 2008 at 2:30 PM EDT
  - "Translating Results Into Insights for Decision Makers": May 13th, 2008 at 2:30 PM EDT
- Please submit questions to chat pod to Dave Schmitt
- Questions will be answered at the end of each session

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Speaker

- Bill Woodford, AECOM Consult

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Translating Results into Insights for Decision Makers

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"I wish I had answer for that, because I'm tired of answering that question"

- Yogi Berra

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Translating Model Insights

- Why? Increasing stakeholder scrutiny resulting from the expectation of high return on taxpayers' investment
- How? Modelers must be able to articulate the merits of their proposed improvements and the reasons why they represent the best possible solution to transportation problems

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The Process of Generating Insights

- Understand the model's capabilities
- Explain important changes expected for the future
- Describe how a proposed transportation solution/policy improves the future situation

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Understanding Model Capabilities

- It is critical to establish what the model really knows and what it doesn't in each step
  - How well it understands land use and the travel it generates
  - How well it knows about the relationship between the home and trip attractions
  - How well the transportation supply and how people traverse through the network are represented
  - How the general valuations of travel costs are reflected throughout the model
- It is also important to know the degree that new programs / policies have a peer in the existing world
  - Models cannot reliably understand what doesn't appear today

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Understanding the Model Capabilities

Example: Land Use and the Travel It Generates

What the Model Knows	Insights
Production zone vs. attraction zone	Does the zone generate trips or attract them?
Type of development	The amount of travel generated by different land uses
Development intensity	Is travel more concentrated in certain areas?

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Understanding the Model Capabilities

Example: Land Use and the Travel It Generates

What the Model Might Not Know	Examples
The difference between a unique major generator and its standard counterpart	University vs. high school Military base vs. office government jobs
How the types of jobs available in the zone might impact travel	Office complex vs. gas station and fast food restaurants
The difference between the motorized trip destination and the ultimate destination	Parking garages in a different zone than the work location More established "fringe" parking patterns

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Understanding the Model Capabilities

Example: Relationship between Home and Attractions

What the Model Knows	Insights
Average trip length and trip length frequencies by purpose	How (generally) long do people travel for work trips and Shopping trips.
District-to-district flows (maybe)	How many trips cross the river each day.

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Understanding the Model Capabilities

Example: Relationship between Home and Attractions

What the Model Might Not Understand	Examples
The spatial relationship between home and work locations for different income or occupation types	Medium-income housing and manufacturing areas vs. High-income housing and corporate headquarters
The degree to which different land uses generate different trip lengths.	A specialty retail mall attracts trips from further away than a grocery store.

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Understanding the Model Capabilities

Example: How well the transportation supply and how people traverse the network are represented

What the Model Knows	Insights
Connectivity	How can the network can be traversed between two points?
Speeds by facility type	What are the average speeds for arterials? Freeways?
Transit routes, speeds and access/egress/transfer characteristics	How convenient are transit trips?

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Understanding the Model Capabilities

Example: How well the transportation supply and how people traverse the network are represented

What the Model Might Not Understand	Examples
The impacts of traffic operations	Excessive queuing
Use of facility vs. type of trip	Shorter trips tend to use arterials, while longer trips tend to use freeways
Congested speeds by time of day	24-Hour assignment

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Understanding the Model Capabilities

Example: General Valuations of Travel Costs

What the Model Knows	Insights
Highway traffic volumes	How congested are different facilities?
Transit ridership by station and route	Where will new transit services be successful?

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Understanding the Model Capabilities

Example: General Valuations of Travel Costs

What the Model Might Not Understand	Examples
How people value or utilize a new mode	New park-rides in an area that previously did not have them New rail system in an area that previously had only bus service
The impact of transportation changes	Magnitude of bias constants may dominate changes due to transportation system
Correct distribution of trips by mode and access mode	Do the estimated auto-access trips reflect the correct origins and destinations from latest survey?

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Explaining How the Present will Change into the Future

- The following changes need to be explored:
  - The growth or decline in certain socio-economic characteristics
  - Any major changes to the transportation supply
  - Any new travel patterns likely to emerge
- These changes can be assessed by:
  - Comparing input and output data from different scenarios, or
  - Running the model with either socio-economic or transportation supply changes only

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Examining Changes in the Future
Common Examples

Changes in…	Examples
Socio-economic characteristics	Strong population growth in outlying counties Emergence of new suburban employment centers and major shopping attractions near strong population growth areas
Transportation supply	New freeway or major transit service New bridge or tunnel Travel time changes along major corridors
Travel patterns	Outlying population working in new suburban employment centers rather than downtown New housing developments along recently opened rail service

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Improving the Future

- Describing how an project or policy improves the transportation system requires:
  - Quantitative evidence of the transportation problems and how the project/policy will address the problem
  - A description of the travel markets that will benefit from the project/policy and describe how and why they will benefit
  - Evidence that the project is a better investment than all other strategies for meeting the transportation problems
  - Real evidence of non-transportation benefits and impacts (if such benefits exist)

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Improving the Future:
Describing the Purpose of the Project

- From a transportation perspective, whom is it intended to serve? And from where to where?
  - "The South Corridor Tollway will connect the bedroom community of Maintown with the tech employment center in Springfield"
- From an economic development perspective, where are the development locations and how what will be the role of the project in the development

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Improving the Future:
Making the Case for Your Project

- First, describe the impacts and effectiveness of the best, lowest-cost alternative
- Then describe the same for the best build project or policy action
- Evidence of the impacts and effectiveness includes:
  - Impact on service quality, ridership and volumes
  - Mobility benefits (time savings), other benefits
  - Disbenefits
  - Cost-effectiveness
  - Success in addressing the transportation problems

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Stating Sources of Risk & Uncertainty

- Common sources of cost-related risk and uncertainty include project scope, unit prices, track record, comparability to similar projects
- Sources of benefit-related risk and uncertainty include travel time savings, projected volume or ridership, track record and comparable to similar projects

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Thoughts on Good Practice

- This takes time and effort!
- Clarity is essential, so it should be devoid of technical jargon
- Remember that the insights are not the results from the model themselves, the insights are gained <u>from</u> an examination of the results

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Speaker

- Bill Davidson, PB Americas

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"Ninety percent of this game is mental, and the other half is physical"

- Yogi Berra

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Highlighted

Example #1:
Perris Valley Commuter Rail Extension

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Perris Valley Line

Identification

- 23-mile extension of the Metrolink commuter rail system from Riverside to communities in Perris Valley southeast of Riverside

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Setting

- City of Riverside
  - 50 miles east of downtown LA
  - 30 miles northeast of central Orange County
- Perris Valley and I-215 to southeast
- Moreno Valley and SR-60 to the east
- Metrolink lines
  - Riverside Line to LA via Pomona
  - 91 Line to LA via Fullerton
  - Inland Empire line to Orange County

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Purpose of the Project

- The Perris Valley extension will improve transit access to the Metrolink system and the locations it serves for residents of Perris and Moreno Valleys.

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Current Conditions

- Demographics
  - 425,000 people and 123,000 jobs
  - One of the most rapidly growing counties nationally
  - Housing prices 25-35% less than in LA and OC
- Long commutes and drive times
  - Riverside to LA CBD: 54 miles, 100 minutes
  - Riverside to Orange: 35 miles in 76 minutes)

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Current Conditions

- Key travel markets from Perris Valley
  - 18,000 workers to LA County
  - 30,000 workers to Orange County
- Metrolink service from Riverside
  - 37 trains per day on two lines to LA and one line to OC
  - Focused on peak periods and commuters
- Metrolink ridership: Riverside and adjacent stations
  - 4,000 weekday trips total; 3,000 at Riverside station
  - 84% commuters; 65 % Perris Valley residents
  - 90 percent use auto access; 10 percent connector bus
  - Drive from South Perris to Riverside: 21 miles, 32 mins.

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Conditions in 2030

- Rapid growth in Perris Valley
  - +76% population to 600,000 people
  - +115% employment to 210,000 jobs
- Resulting growth in commuter markets
  - 24,000 workers to LA County (+33%)
  - 46,000 workers to Orange Co. (+53%)
- Consequent lengthening of peak periods for auto travel

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Conditions in 2030

- Large Metrolink changes
  - 126 trains per day (versus 37 per day currently)
  - 16,300 trips per day using Riverside Co. stations
  - 11,700 of these from Perris Valley
  - Same commuter-oriented characteristics
- More difficult drive-access
  - South Perris to Riverside, 21 miles
    - 32 minutes (39 mph) today
    - 67 minutes (19 mph) in 2030

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Case for the Project

- Low-cost alternative
  - New express bus service to Riverside station
  - Additional park/ride facilities
  - Mixed-traffic operations
  - An increase of 216 riders/day over No-Build
  - Key limitation: long travel times because of congested highways

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Case for the Project

- Proposed project
  - 23-mile commuter rail line
  - Six stations (5 park/ride with 1,800 spaces)
  - Extension of the 91 line to downtown LA
- Travel times: Perris Valley to Riverside
  - 67 minutes by driving
  - 87 minutes by bus
  - 40 minutes by commuter rail

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Case for the Project

- Metrolink ridership
  - 8,800 more weekday riders than in TSM
- User benefits: 3,100 hours/day saved
  - 79% by commuters; 83% by PV residents
  - Key markets – Perris Valley to:
    - Orange County: 1,000 hrs; ≈18 min/trip
    - Los Angeles: 700 hrs; ≈29 min/trip
    - Riverside: 400 hrs; ≈22 min/trip

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Case for the Project

- Cost effectiveness
  - Capital: $180 million in 2007 dollars
  - Added O&M cost: $1.5 million/year
  - Time savings: 850,000 hours/year
  - $22.40 per hour of time savings
  - Competitive for federal funding

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Risks (Some Thoughts)

- Ridership and transportation benefits
  - Sources of risk?
    - Very high growth projections
    - Very large congestion increases
    - Very large Metrolink service increases (NB)
  - Aspects that help contain risk
    - Existing Metrolink ridership from Perris Valley
    - Large Metrolink system, ridership, DATA
- Costs: from formal risk analysis

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Summary

- Rapid growth
- Long-distance commutes
- Difficult access to Metrolink system
- Large time savings (total and per rider)
- Low capital cost
- Costs in scale with the benefits

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Speakers

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- Doug Laird, FHWA

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Example #2:

White House Area Transportation Study

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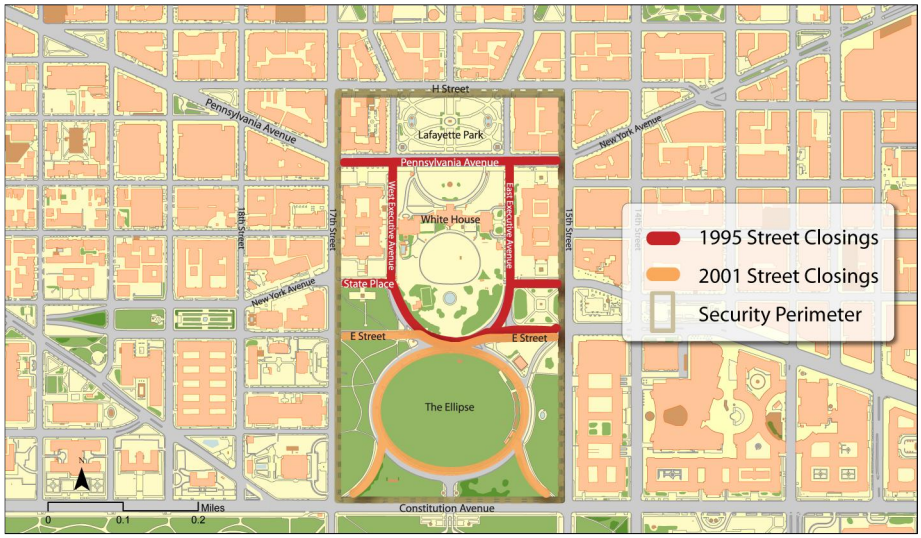
White House Area Closures



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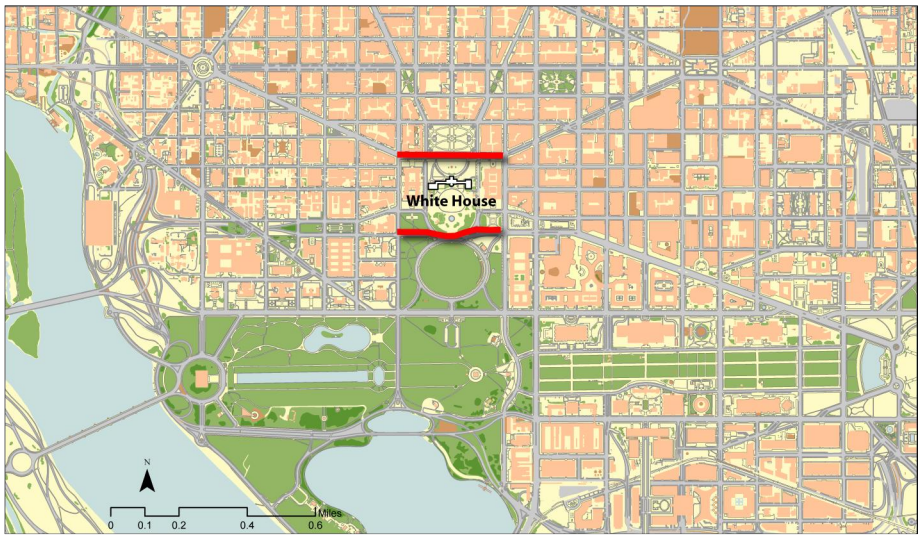
Study Area



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Broader Impact Area

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Speaker

- Doug Laird, FHWA

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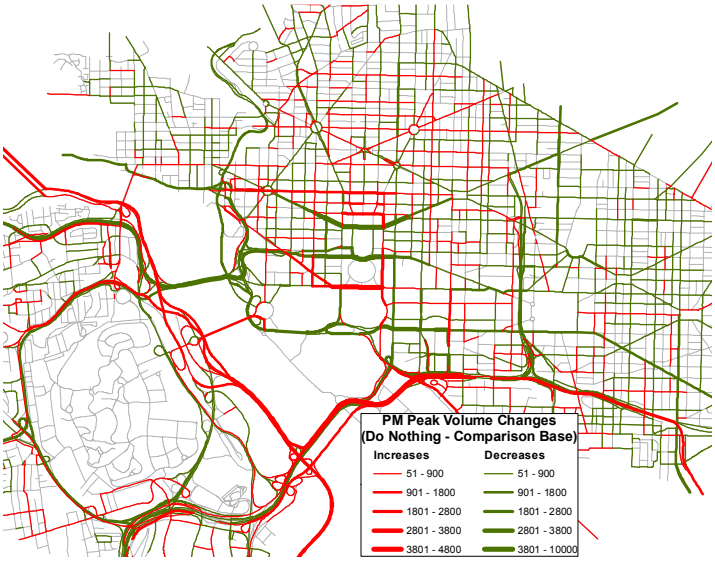
Closings Displaced Traffic



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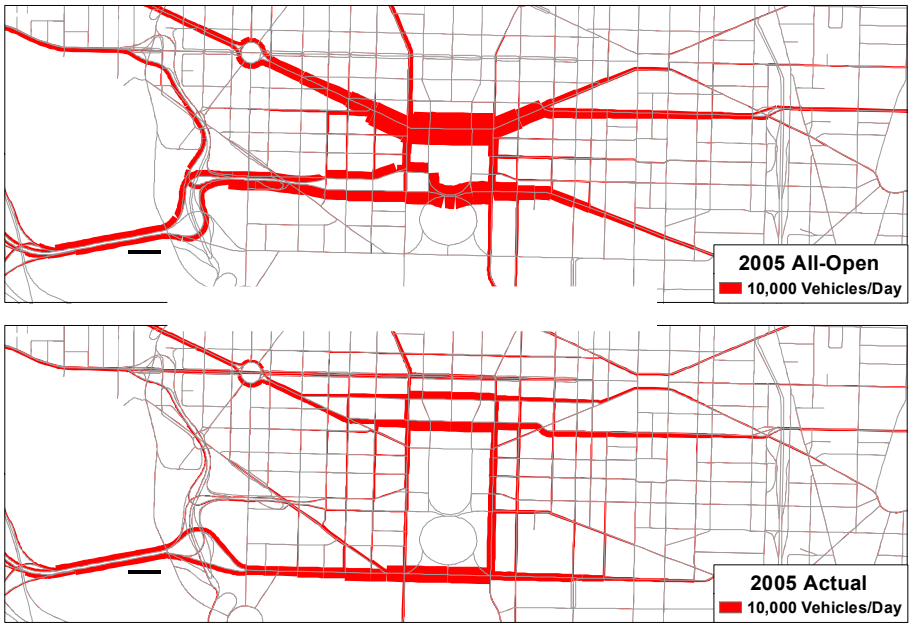

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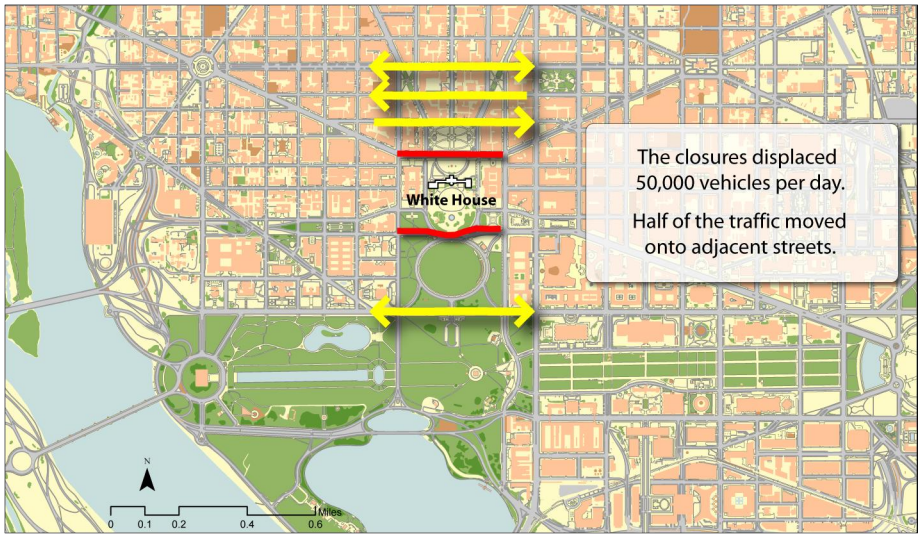
Closings Displaced Traffic



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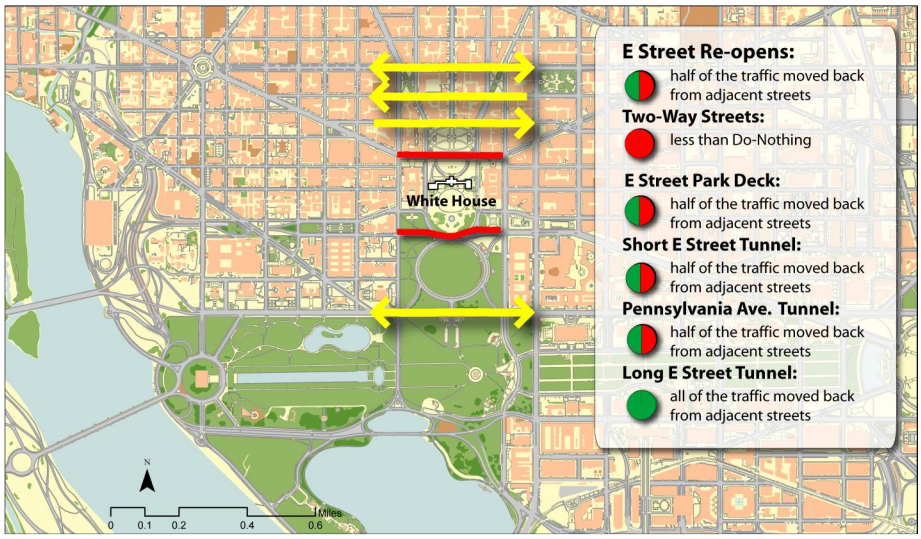
Relieve Adjacent Streets



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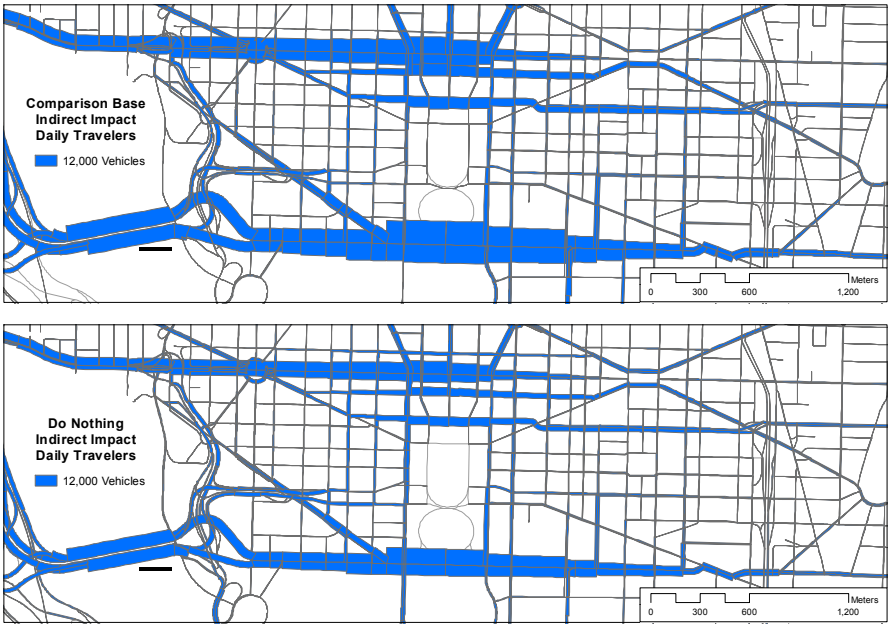

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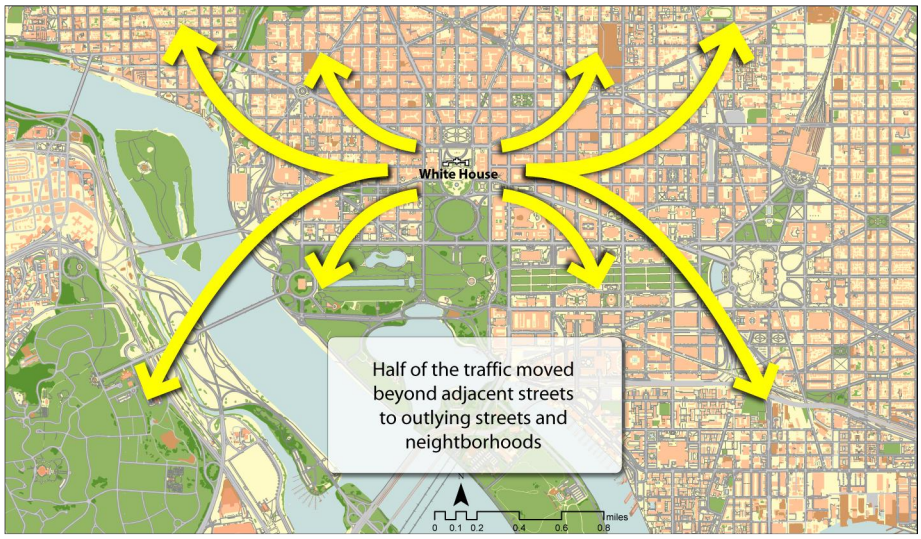

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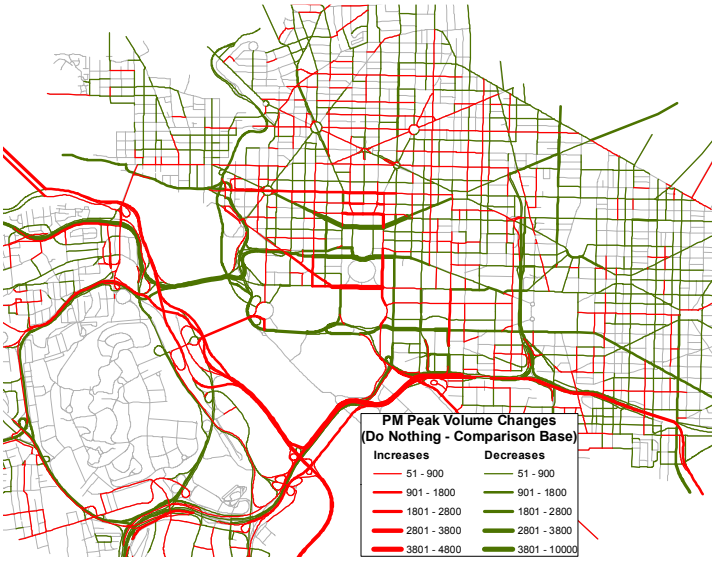

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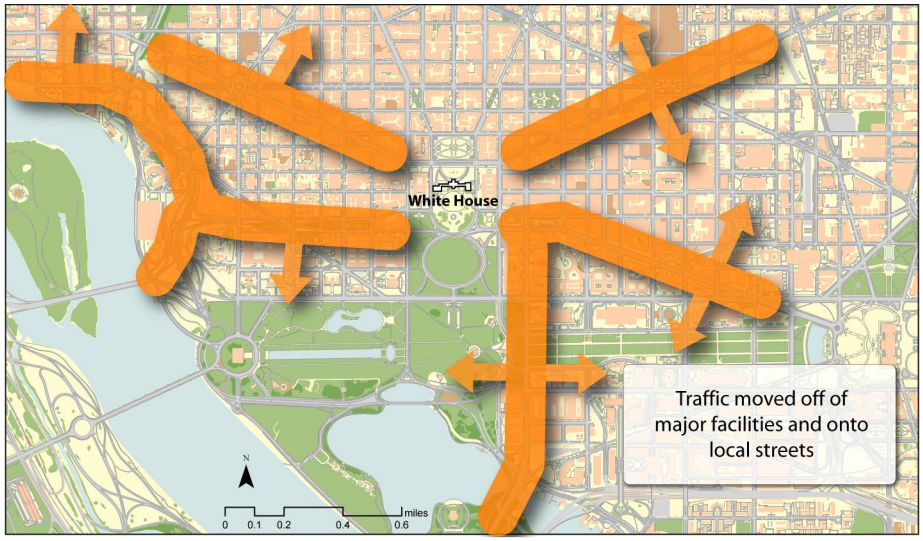
Closings Displaced Traffic



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Traffic Back to Major Streets

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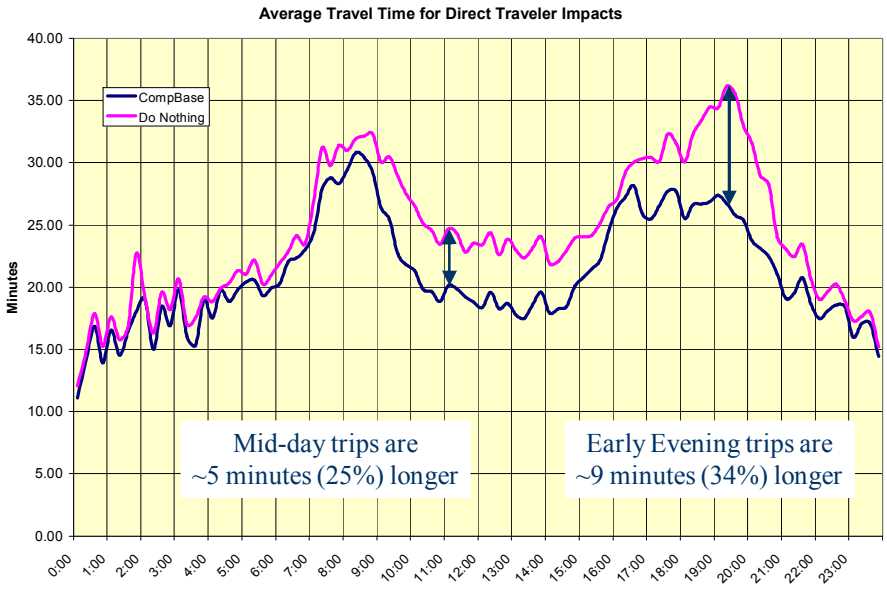

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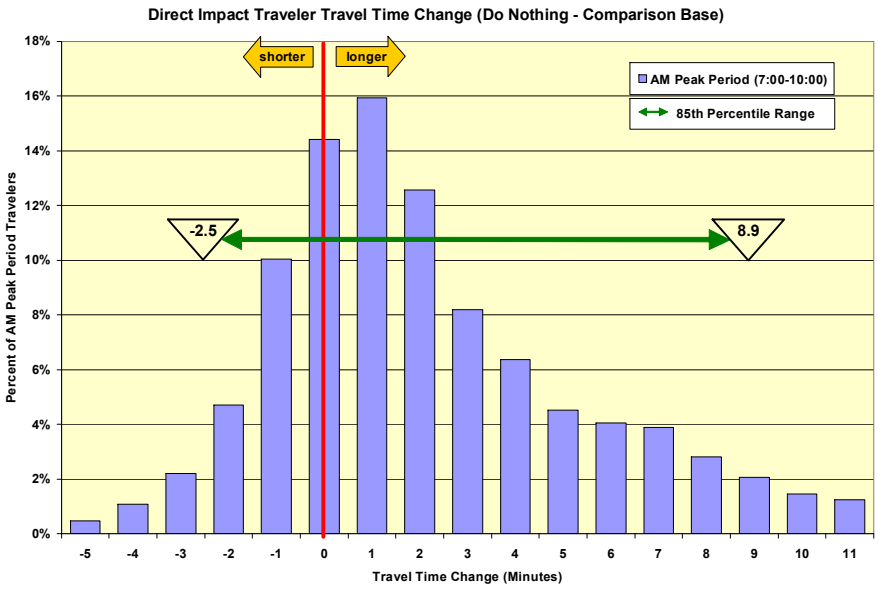

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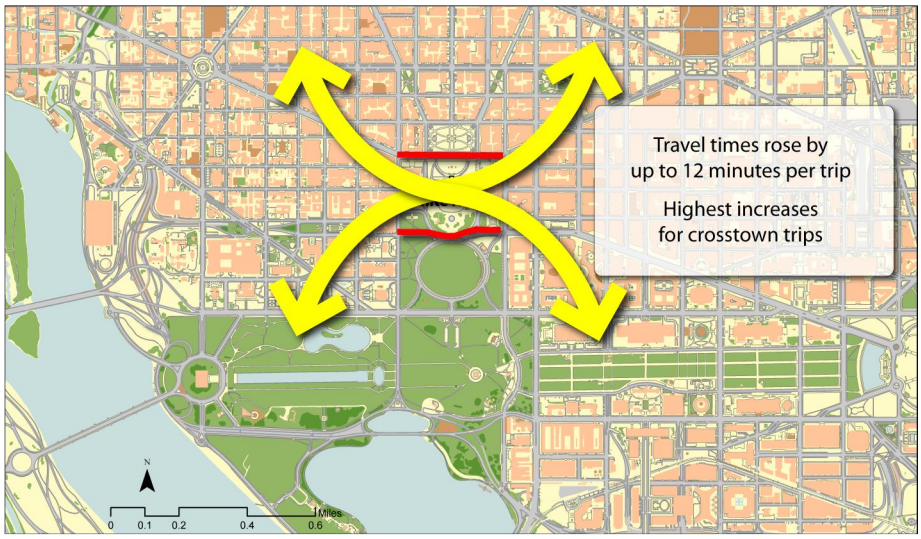
Travel Time Differences



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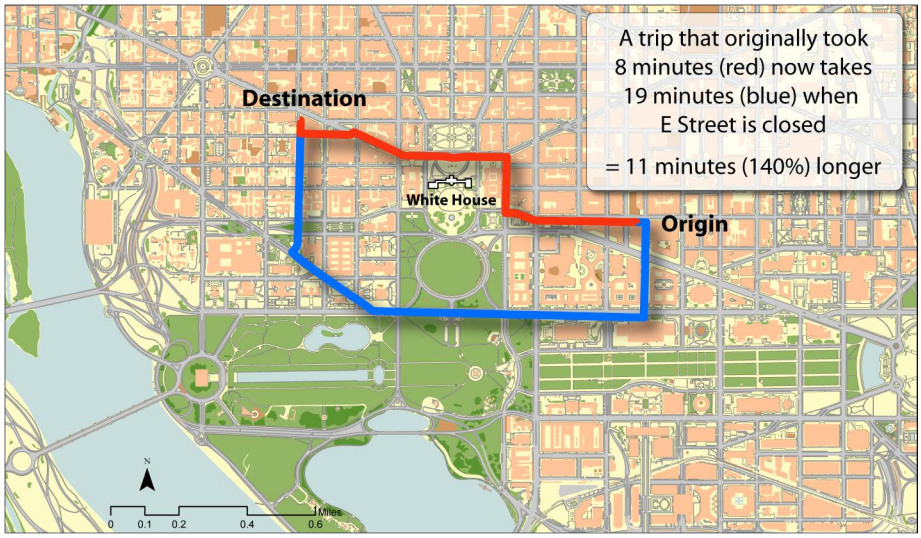
Closings Increased Travel Times…



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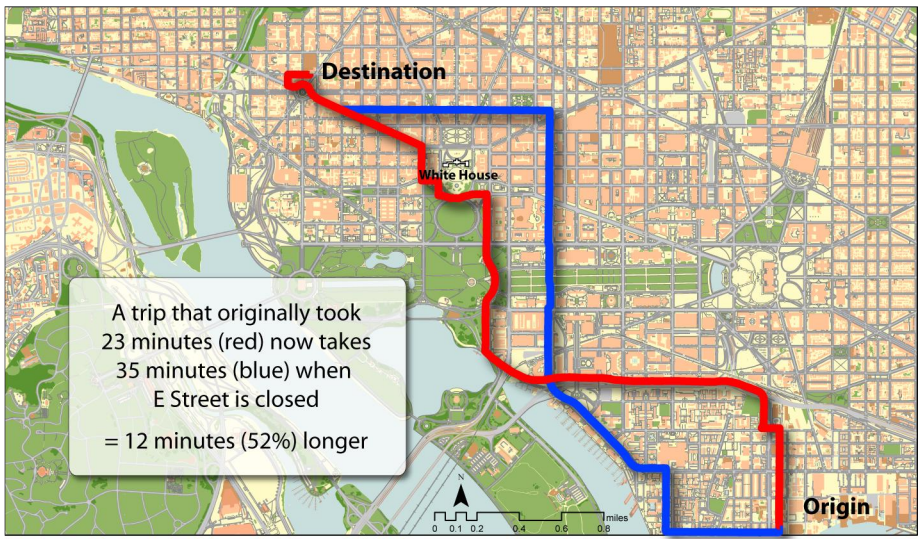
… with Major Crosstown Impacts



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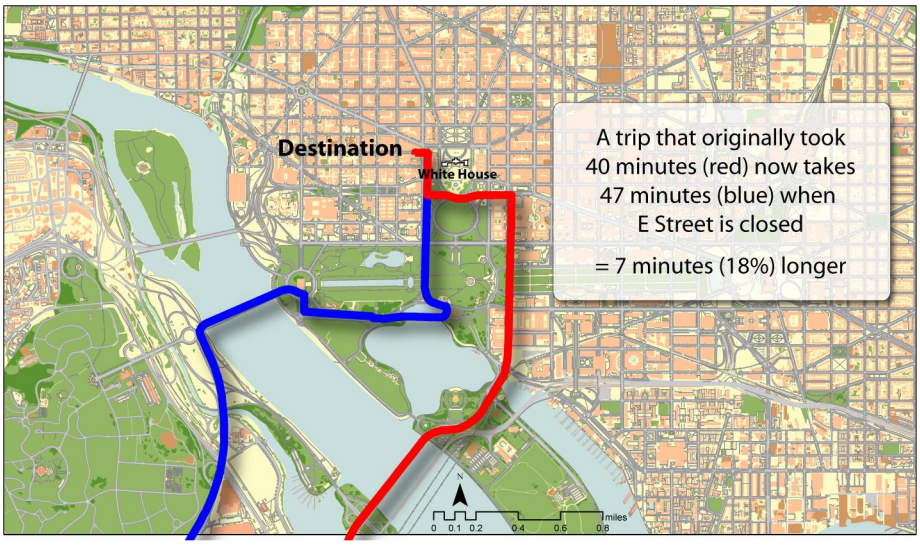
… and Changed Travel Paths



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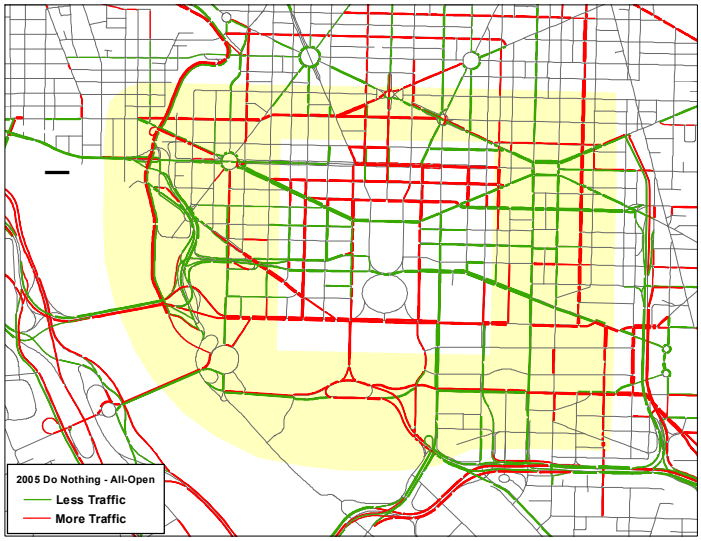
Daily Traffic Displacements



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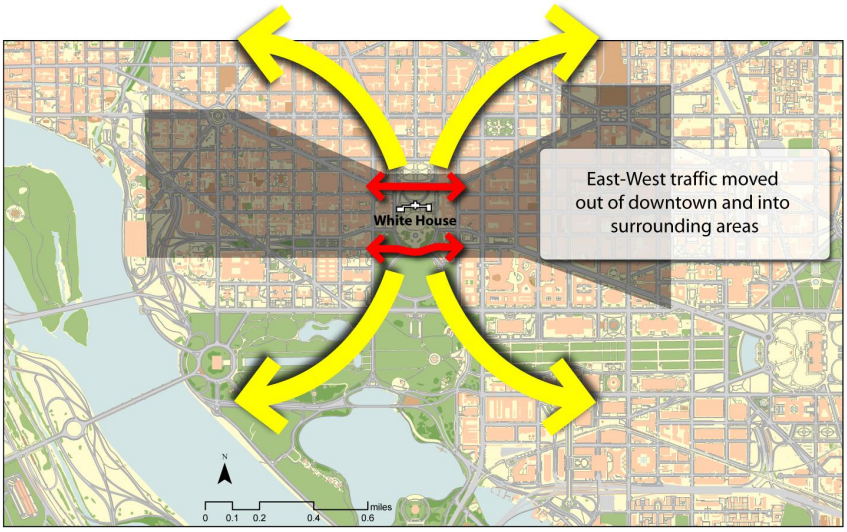
Closings Displaced Traffic



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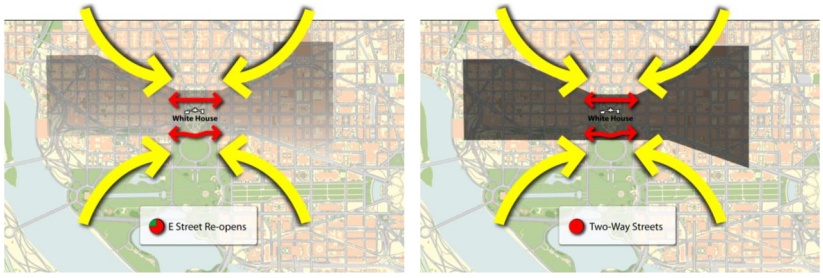
Reconnect East-West Downtown



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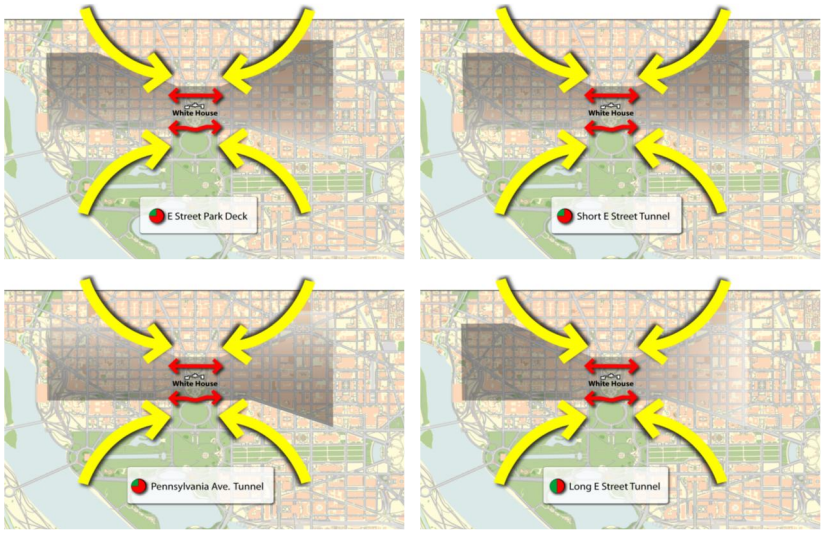

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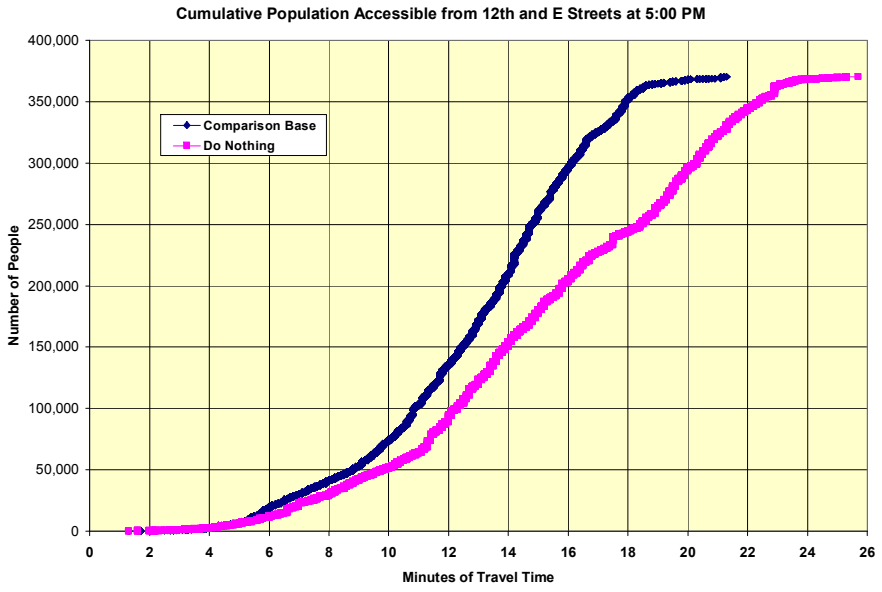

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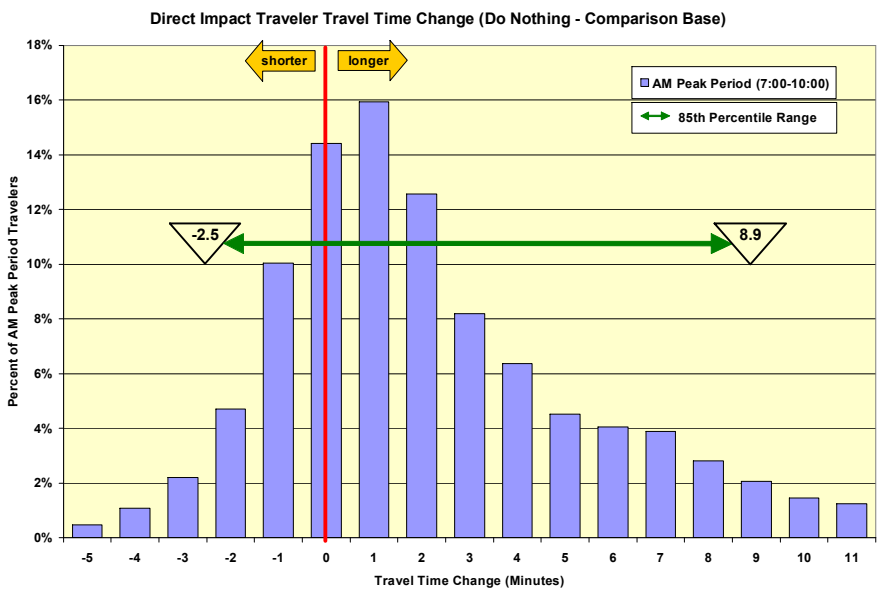
Direct Impact Traveler Travel Time Change (Do Nothing - Comparison Base)
shorter
longer
AM Peak Period (7:00-10:00)
85th Percentile Range
-2.5
8.9
Percent of AM Peak Period Travelers
18%
16%
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Travel Time Change (Minutes)

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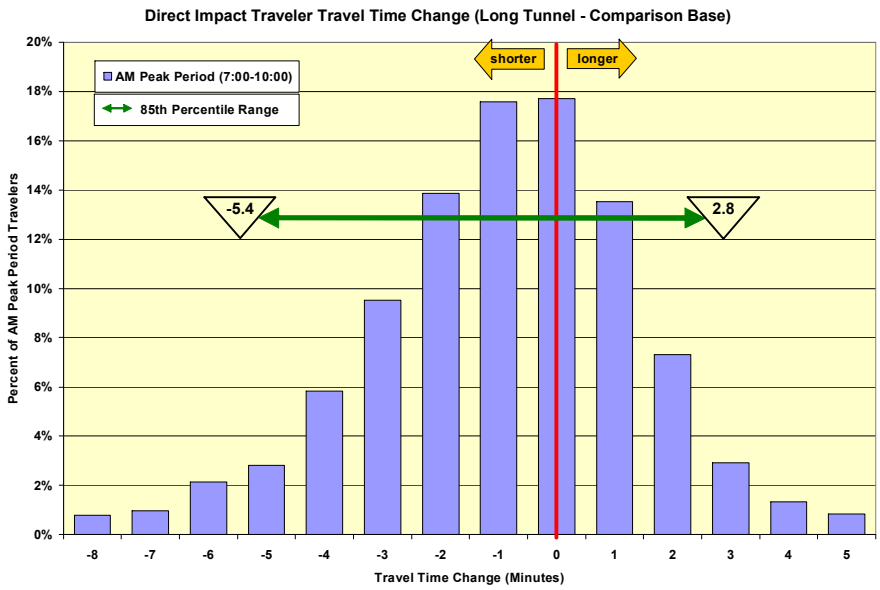
Direct Impact Traveler Travel Time Change (Long Tunnel - Comparison Base)
shorter
longer
AM Peak Period (7:00-10:00)
85th Percentile Range
-5.4
2.8
Percent of AM Peak Period Travelers
20%
18%
16%
14%
12%
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Travel Time Change (Minutes)

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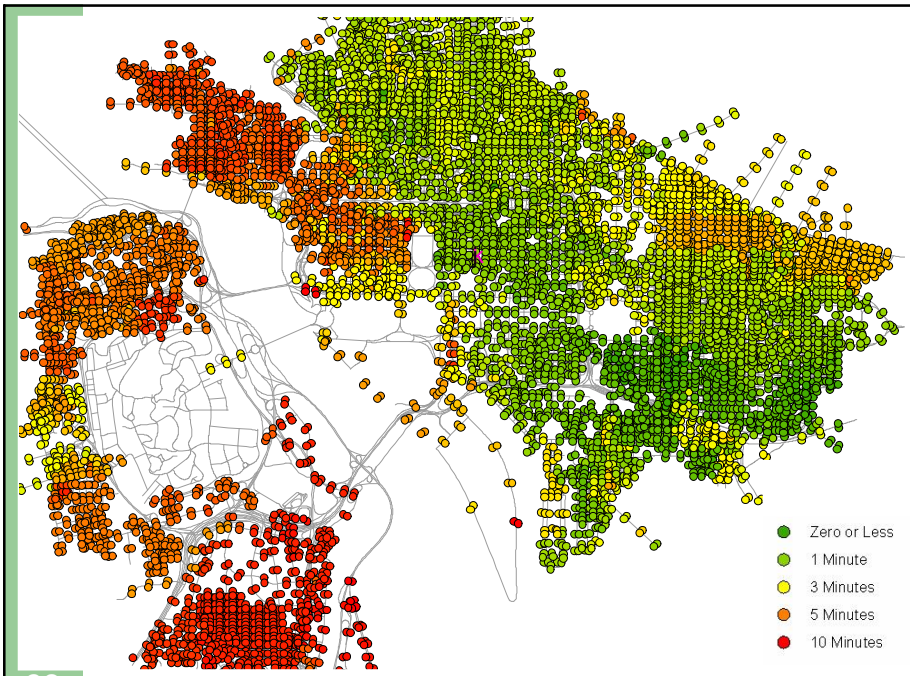

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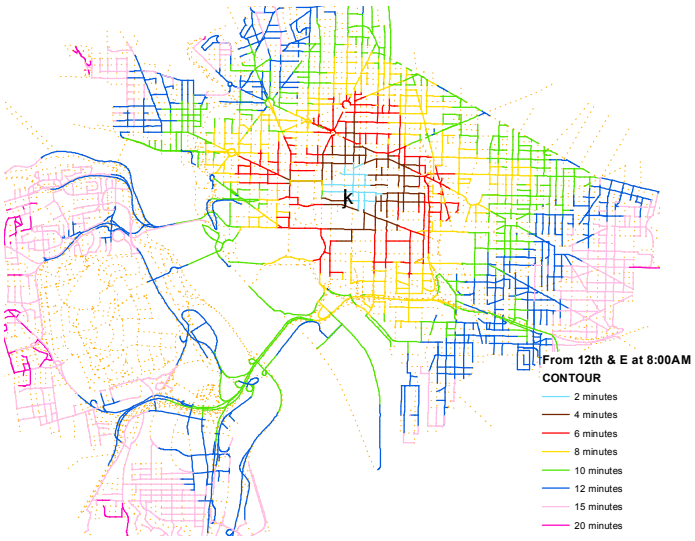
Travel Time Contours For the Comparison Base



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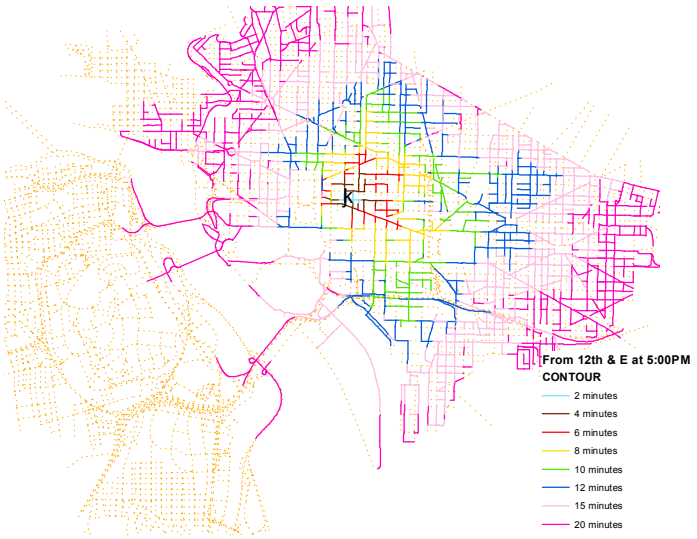
Travel Time Contours For Two-way Streets



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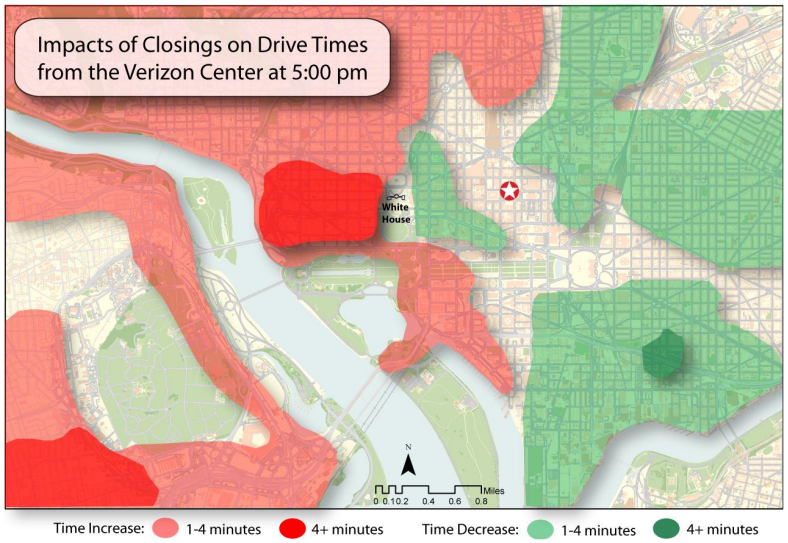
Travel Time Differences



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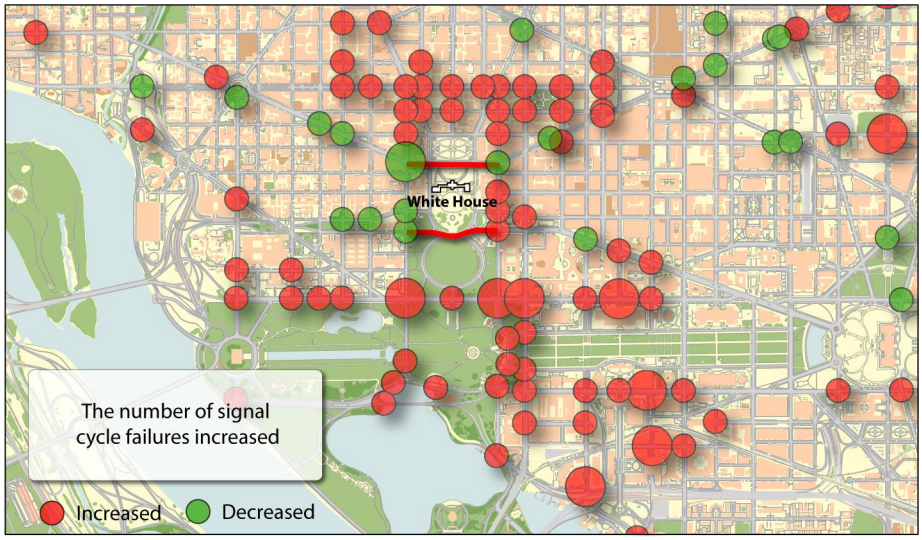
Closings Increased Congestion



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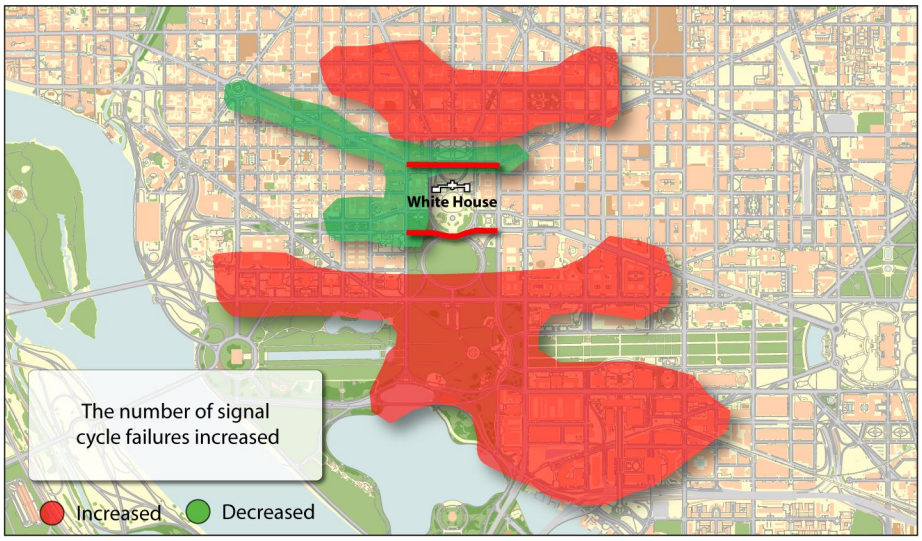

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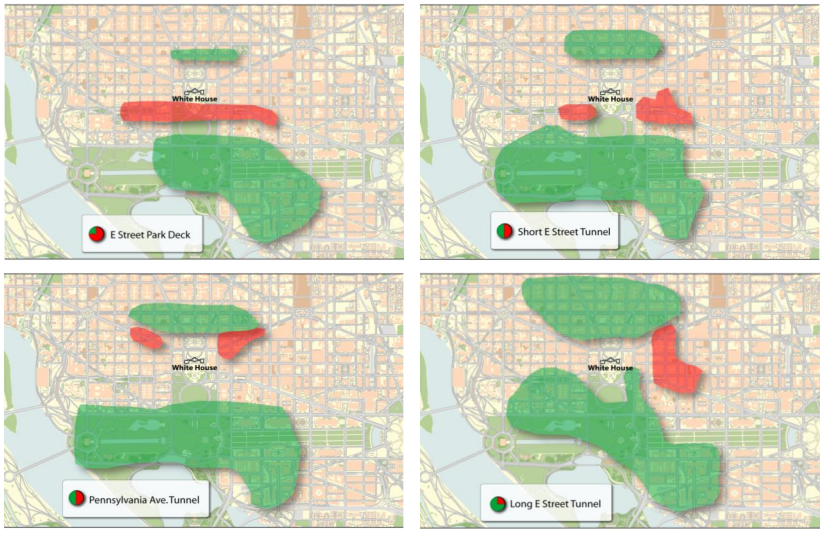
Reduce Congestion (Cycle Failures)



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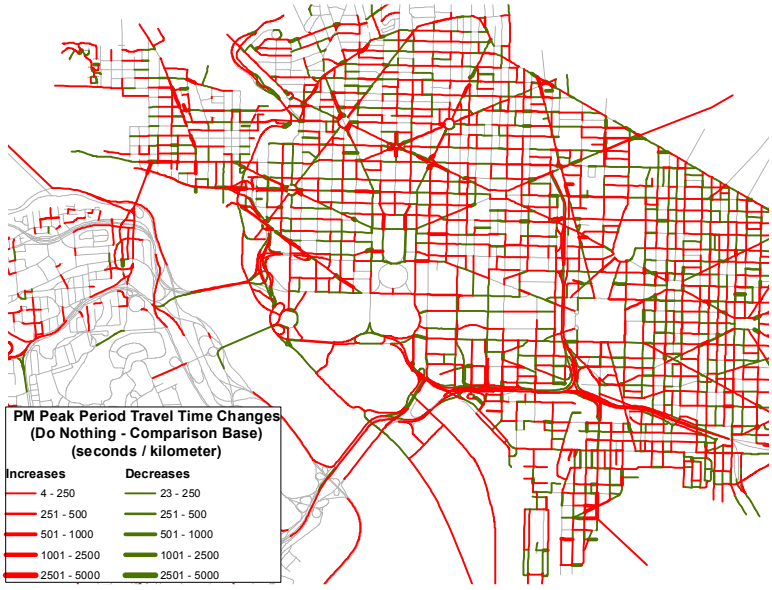
Congestion Growth (Travel Time)



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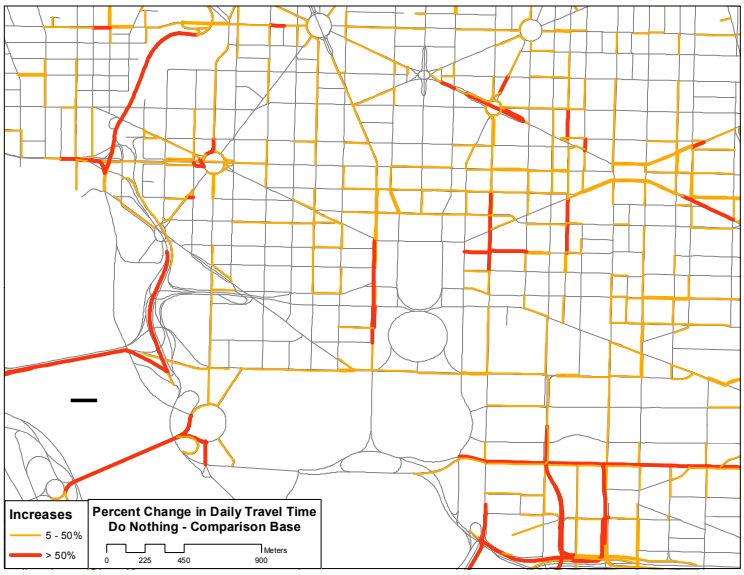
Congestion Growth (Travel Time)



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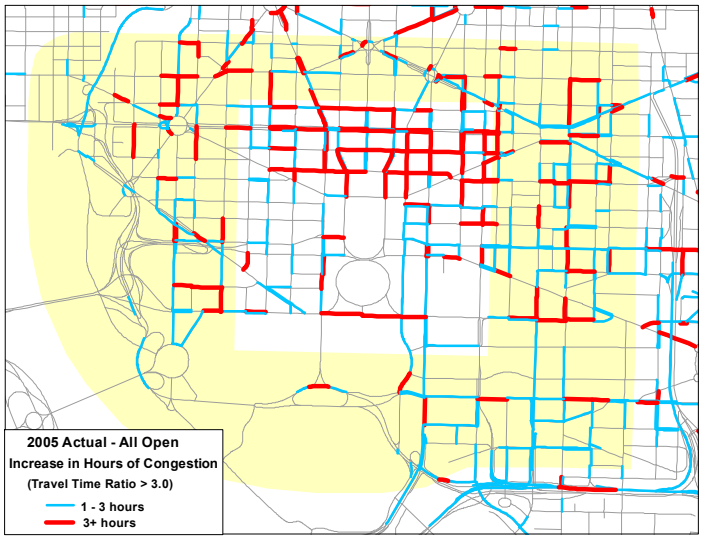
Congestion Duration Increase



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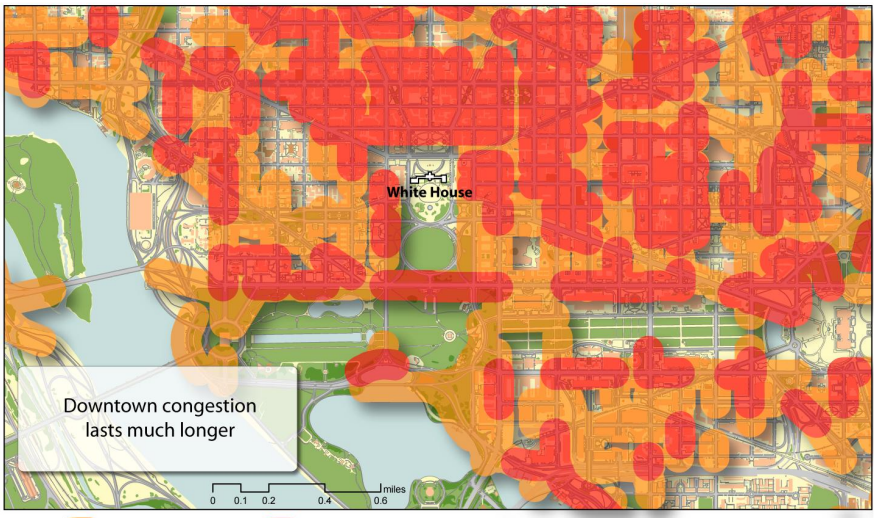
Closings Increased Congestion



1 to 3 hours longer 3+ hours longer -- than 2005 with E Street and Pennsylvania Ave. Open

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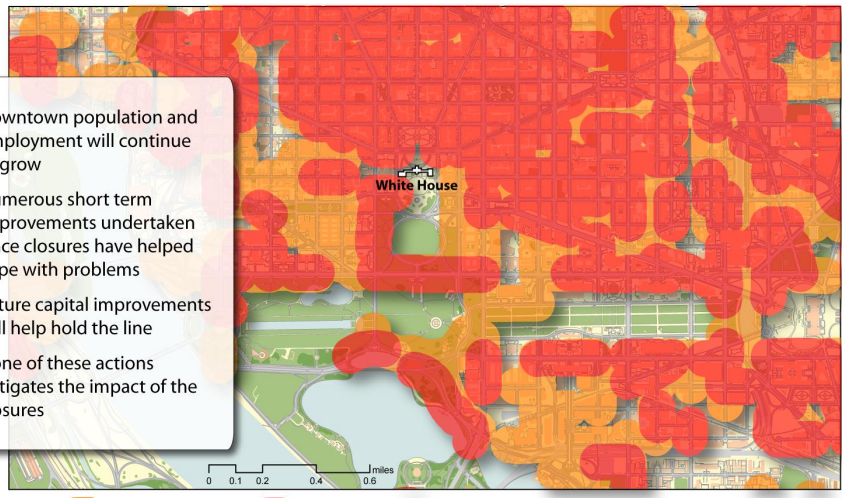
Looking into the Future (2020)



- Downtown population and employment will continue to grow
- Numerous short term improvements undertaken since closures have helped cope with problems
- Future capital improvements will help hold the line
- None of these actions mitigates the impact of the closures

1 to 3 hours longer 3+ hours longer -- than 2005 with E Street and Pennsylvania Ave. Open

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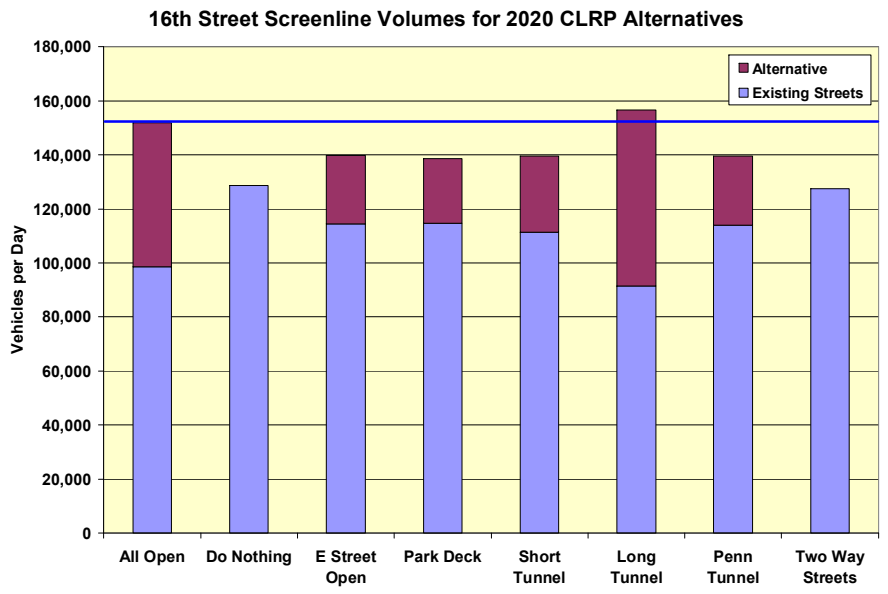
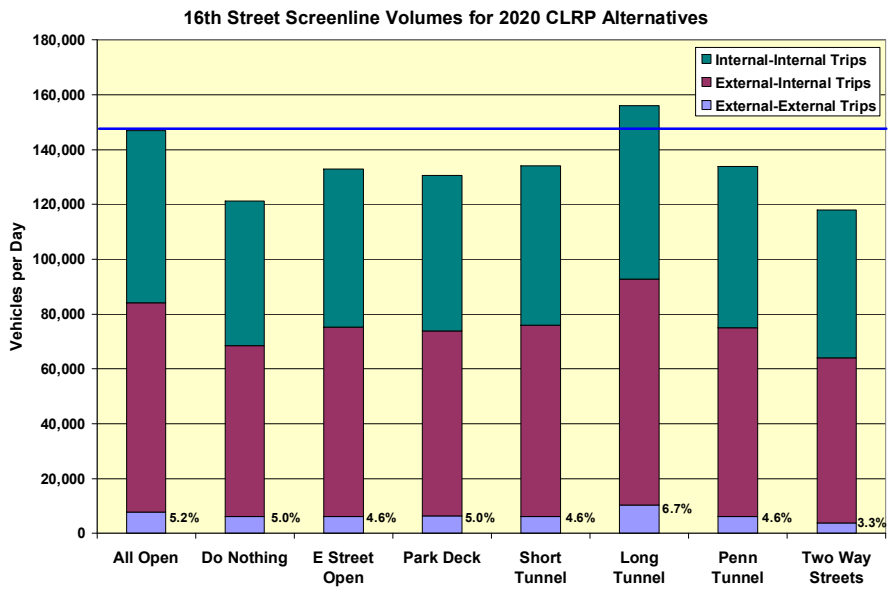

16th Street Screenline Volumes for 2020 CLRP Alternatives
Vehicles per Day
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Alternative
Existing Streets
All Open
Do Nothing
E Street Open
Park Deck
Short Tunnel
Long Tunnel
Penn Tunnel
Two Way Streets

81


16th Street Screenline Volumes for 2020 CLRP Alternatives
Vehicles per Day
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Internal-Internal Trips
External-Internal Trips
External-External Trips
5.2%
5.0%
4.6%
5.0%
4.6%
6.7%
4.6%
3.3%
All Open
Do Nothing
E Street Open
Park Deck
Short Tunnel
Long Tunnel
Penn Tunnel
Two Way Streets

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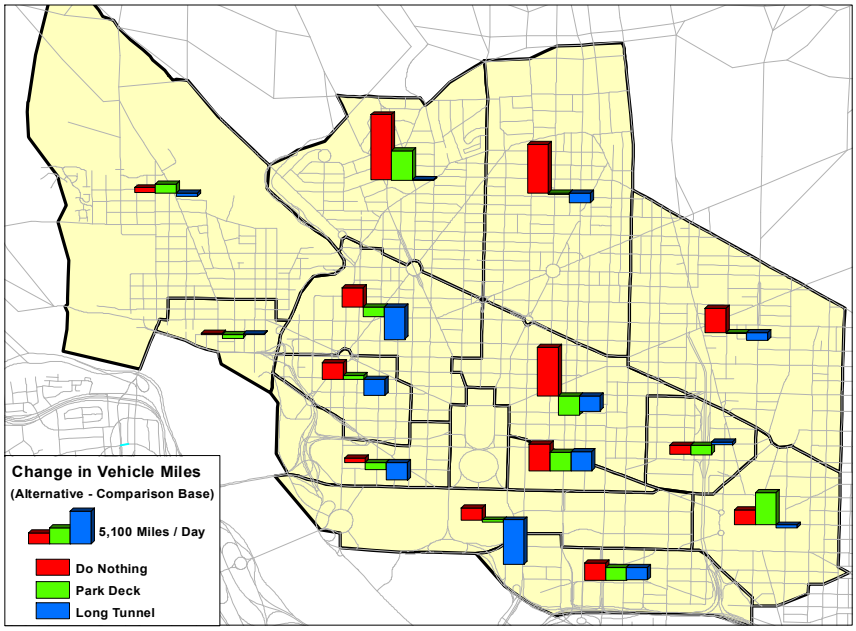
Change in Vehicle Miles
(Alternative - Comparison Base)
5,100 Miles / Day
Do Nothing
Park Deck
Long Tunnel

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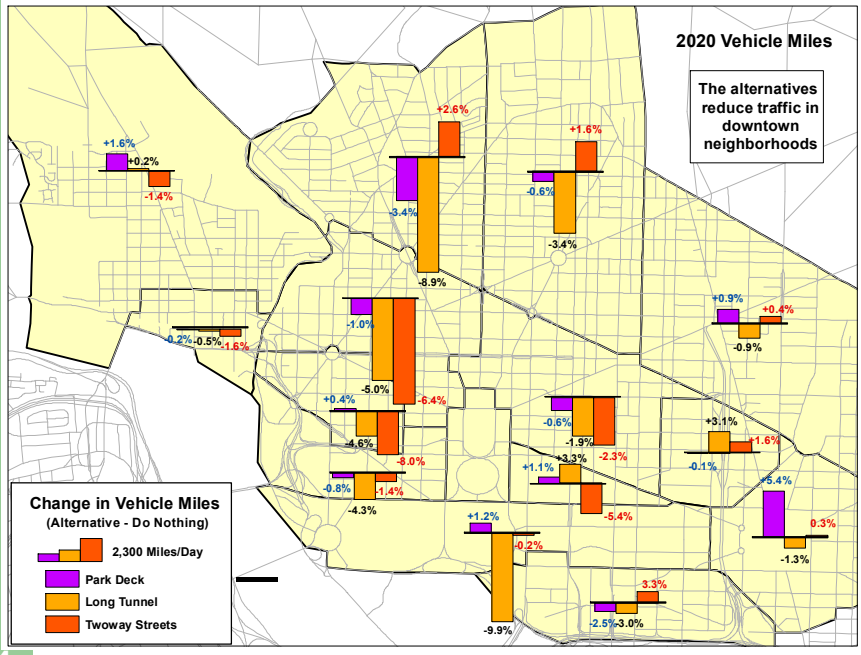
2020 Vehicle Miles
The alternatives reduce traffic in downtown neighborhoods
Change in Vehicle Miles
(Alternative - Do Nothing)
2,300 Miles/Day
Park Deck
Long Tunnel
Twoway Streets
+1.6%
+0.2%
-1.4%
+2.6%
-3.4%
-8.9%
+1.6%
-0.6%
-3.4%
-0.2%
-0.5%
-1.6%
-1.0%
-5.0%
-6.4%
+0.9%
+0.4%
-0.9%
+0.4%
-4.6%
-8.0%
-0.6%
-1.9%
-2.3%
+3.1%
+1.6%
-0.1%
-0.8%
-1.4%
-4.3%
+1.1%
+3.3%
-5.4%
+5.4%
0.3%
-1.3%
+1.2%
-0.2%
-9.9%
3.3%
-2.5%
-3.0%

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Reduce Neighborhood Traffic

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Other Implications

- System less resilient
  - Susceptible to normal traffic variations and incidents
  - Special events
- System less intuitive for occasional users and visitors

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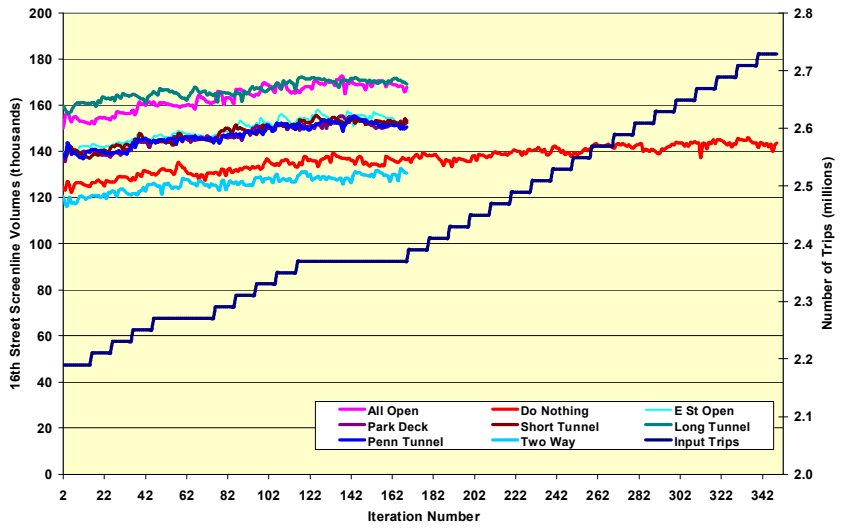
16th Street Screenline Volumes



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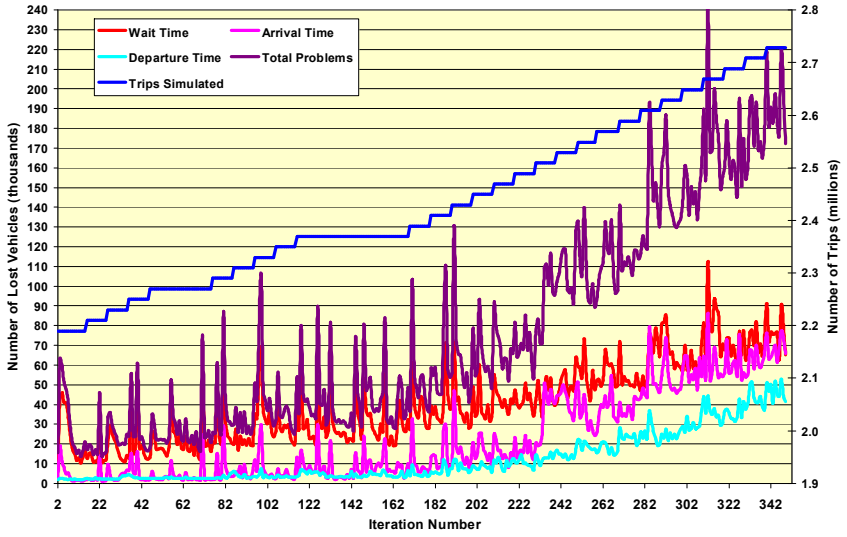
Resiliency Tests – Do Nothing



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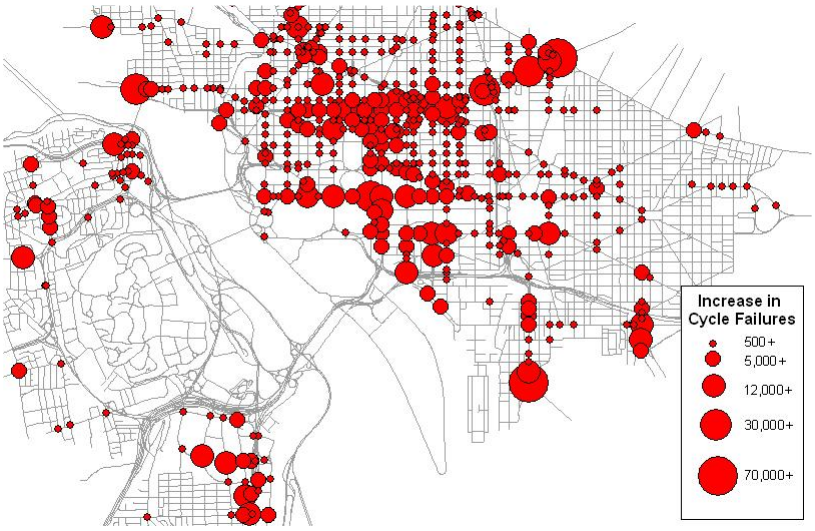
Cycle Failure Impacts



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Conclusions

- Closures have had a measurable impact
- Businesses, residents, and travelers have adapted, but they paid a price

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Speaker

- Bill Woodford, AECOM Consult

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What Should You Be Doing?

- Planning to spend time and money during your next model update to fully understand your model calibration and changes in the future before pronouncing the model validated
- Not underestimating the time needed to make extra runs or produce extra reports needed to provide data for these insights

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Questions

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Special Thanks

- To those that contributed examples, insights and experiences:
  - Riverside County (California) Transportation Commission
  - The White House Area Transportation Study project team
  - Federal Highway Administration
  - Federal Transit Administration

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References

- *Making the Case: An Example – Perris Valley Commuter Rail Extension*. Riverside County Transportation Commission (California). September 2007.
- *Presentations to the Working Group*. White House Area Transportation Study Project Team. July-October 2007.
- *Telling a Good Story.* Federal Transit Administration. September 2007.

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