Transportation Models and Transportation Muddles:

What New Urbanists Need to Know

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CNU London Summit

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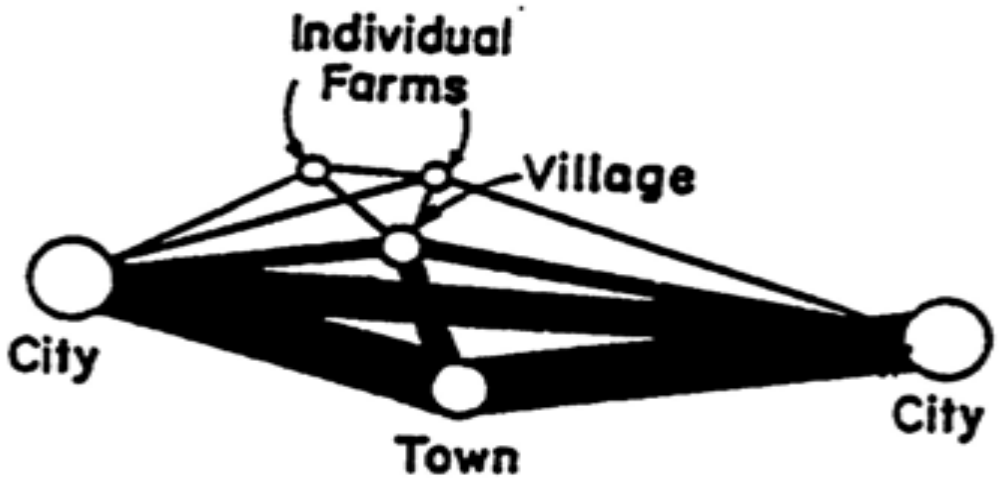
Overview

- Introduction to transportation models
- How they are used
- How they can be abused (or ignored)
- Case studies
  - Seattle
  - Sheridan
  - Legacy Highway
- Myth-Busting

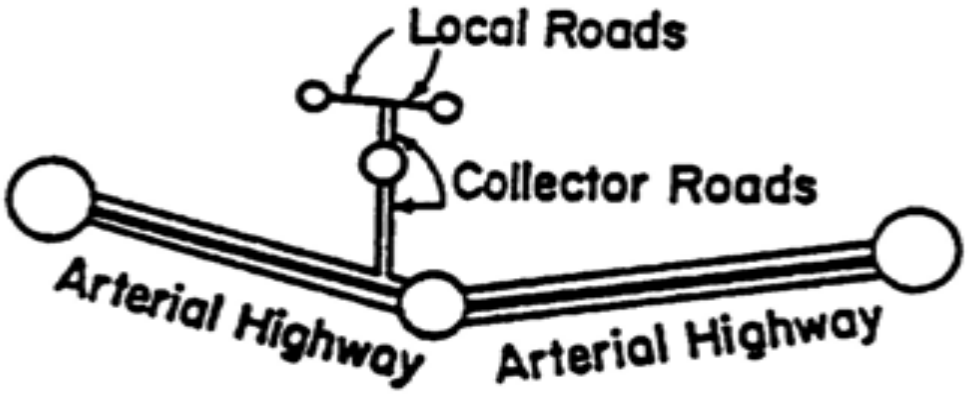
Levels of Modeling

- Regional: Metropolitan Area or Statewide models, predict larger patterns of growth and traffic distribution, air quality/carbon emissions
- Corridor: Used to evaluate a particular major facility: freeway, arterial or transit line
- Site or Project: Used to evaluate the traffic from a proposed development; or to evaluate small scale (i.e. intersection) “improvements”.

Classification
Bringing Cars To and Through

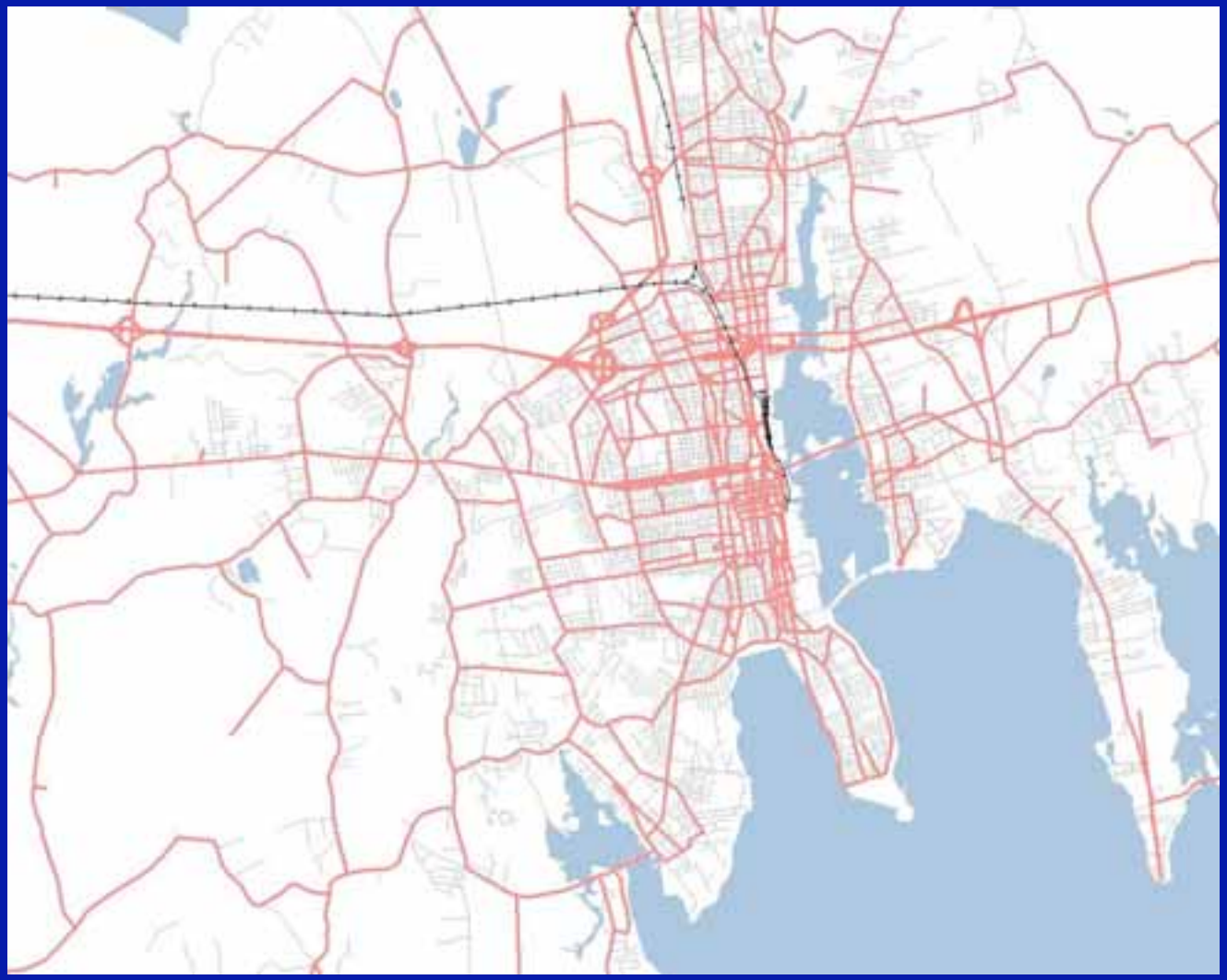


(A) Desire Lines of Travel



(B) Road Network Provided

Simplified Road Networks



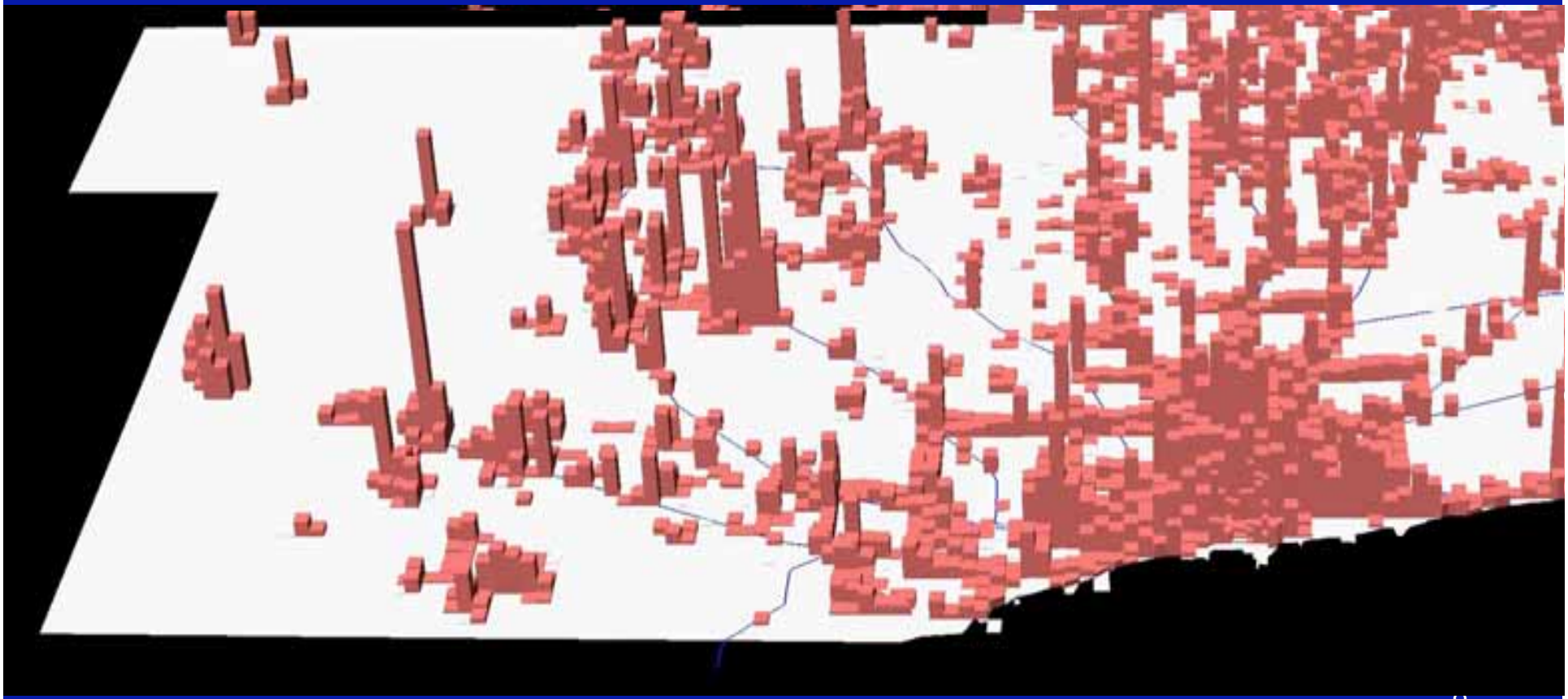
How are these models Used?

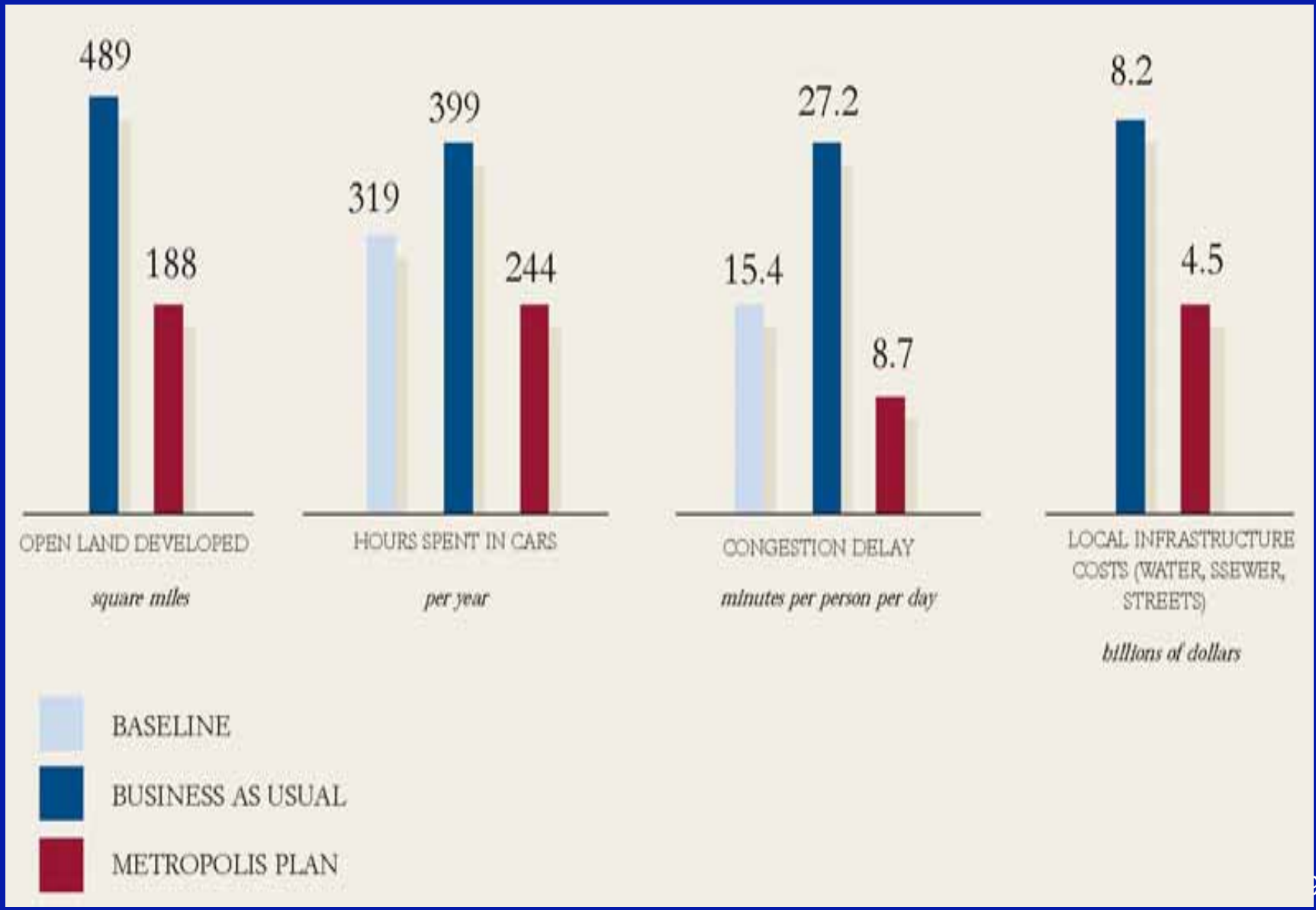
- Regional Air Quality Modeling/Conformity
  - Highly regulatory
  - Focused on getting the right answer – emissions below their “budget”
- Regional Planning
  - Scenario Analysis
  - Transportation Planning
- Project Planning
  - Major Developments – Impact Assessment
  - Major Transportation Projects
  - Traffic Forecasts

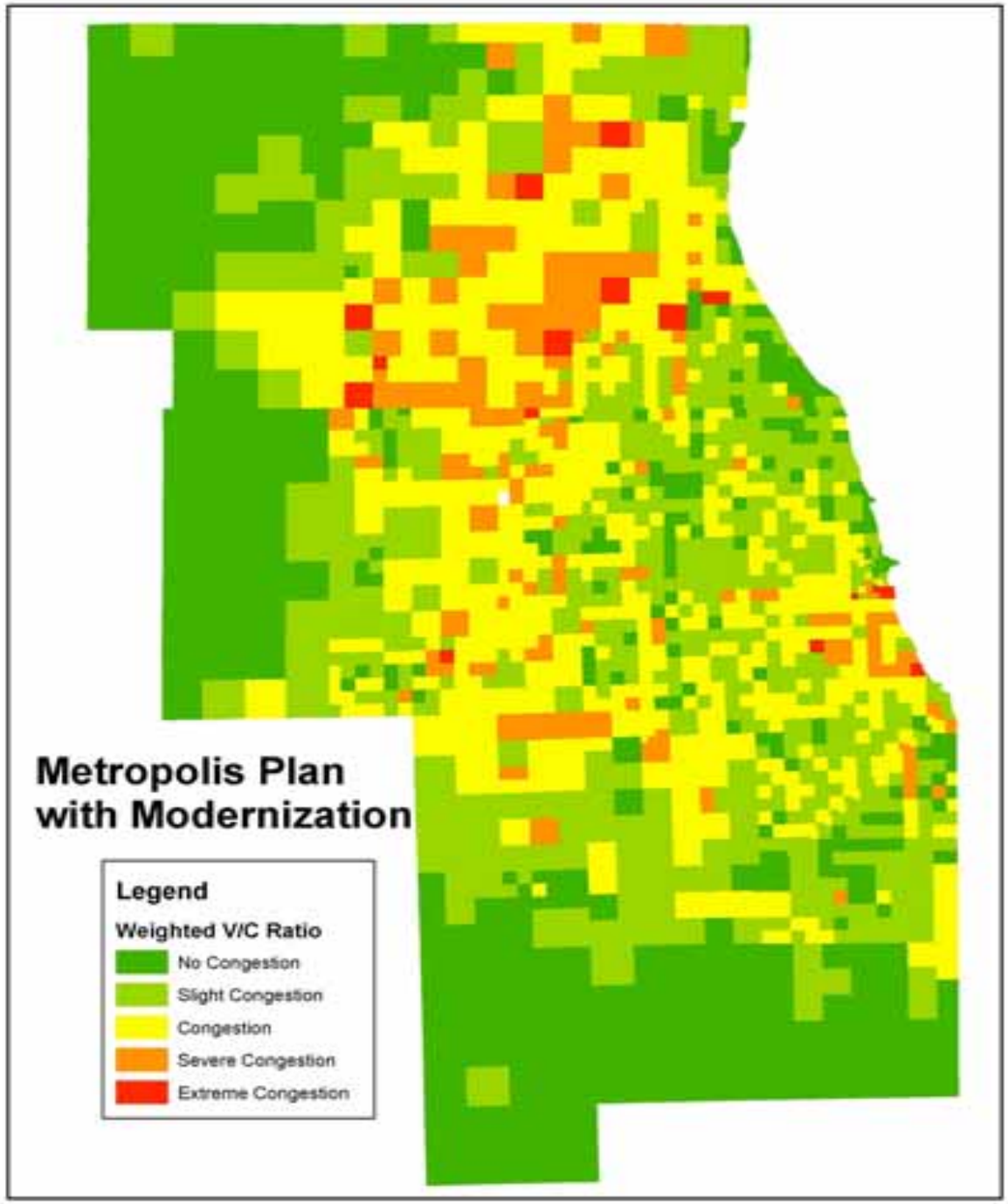
What are their outputs?

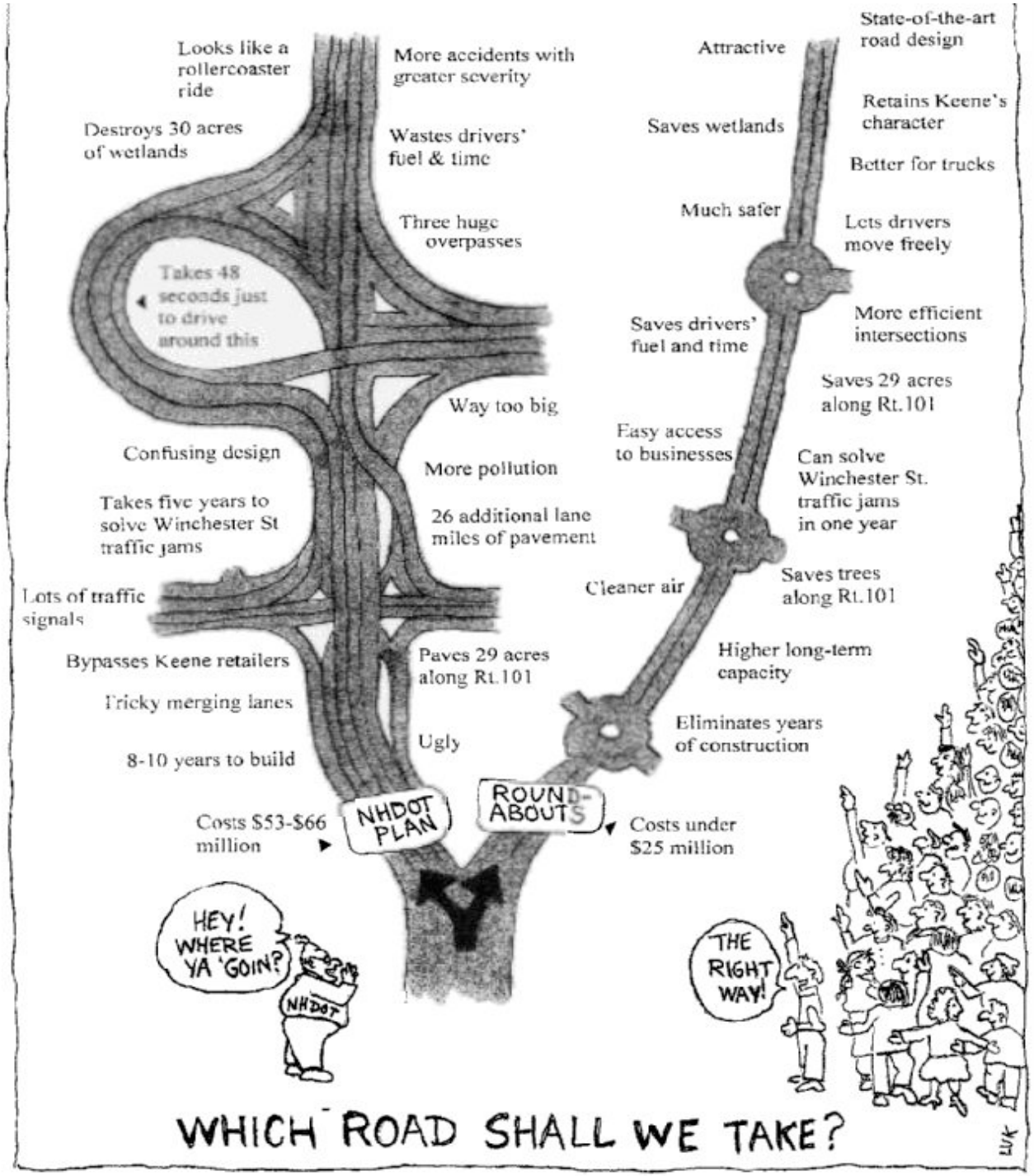
- Vehicle-Miles Traveled
- Air Pollution Emissions
- Vehicle-Hours Traveled
- Delay
- V/C Ratio
- Mode Splits
- Travel Patterns

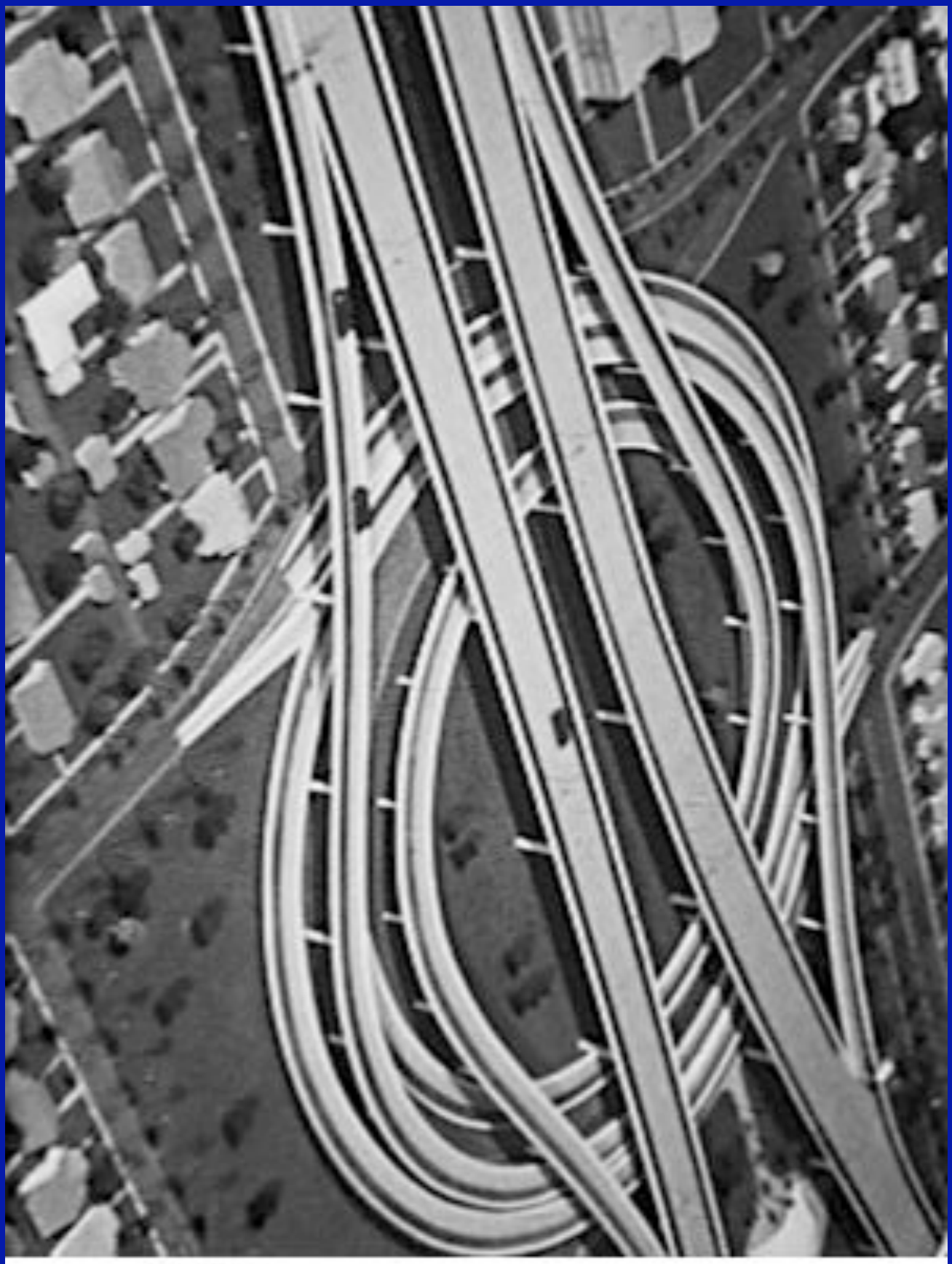
Chicago Region Household Growth




489
188
OPEN LAND DEVELOPED
square miles
319
399
244
HOURS SPENT IN CARS
per year
15.4
27.2
8.7
CONGESTION DELAY
minutes per person per day
8.2
4.5
LOCAL INFRASTRUCTURE COSTS (WATER, SSEWER, STREETS)
billions of dollars
BASELINE
BUSINESS AS USUAL
METROPOLIS PLAN


Metropolis Plan
with Modernization
Legend
Weighted V/C Ratio
No Congestion
Slight Congestion
Congestion
Severe Congestion
Extreme Congestion


Looks like a rollercoaster ride
More accidents with greater severity
Destroys 30 acres of wetlands
Wastes drivers' fuel & time
Three huge overpasses
Takes 48 seconds just to drive around this
Way too big
Confusing design
More pollution
Takes five years to solve Winchester St traffic jams
26 additional lane miles of pavement
Lots of traffic signals
Bypasses Keene retailers
Paves 29 acres along Rt.101
Tricky merging lanes
Ugly
8-10 years to build
Costs $53-$66 million
NHDOT PLAN
ROUND-ABOUTS
Costs under $25 million
HEY! WHERE YA 'GOIN?
NHDOT
THE RIGHT WAY!
Attractive
State-of-the-art road design
Saves wetlands
Retains Keene's character
Better for trucks
Much safer
Lets drivers move freely
Saves drivers' fuel and time
More efficient intersections
Saves 29 acres along Rt.101
Easy access to businesses
Can solve Winchester St. traffic jams in one year
Cleaner air
Saves trees along Rt.101
Higher long-term capacity
Eliminates years of construction
WHICH ROAD SHALL WE TAKE?
LUK



ADOT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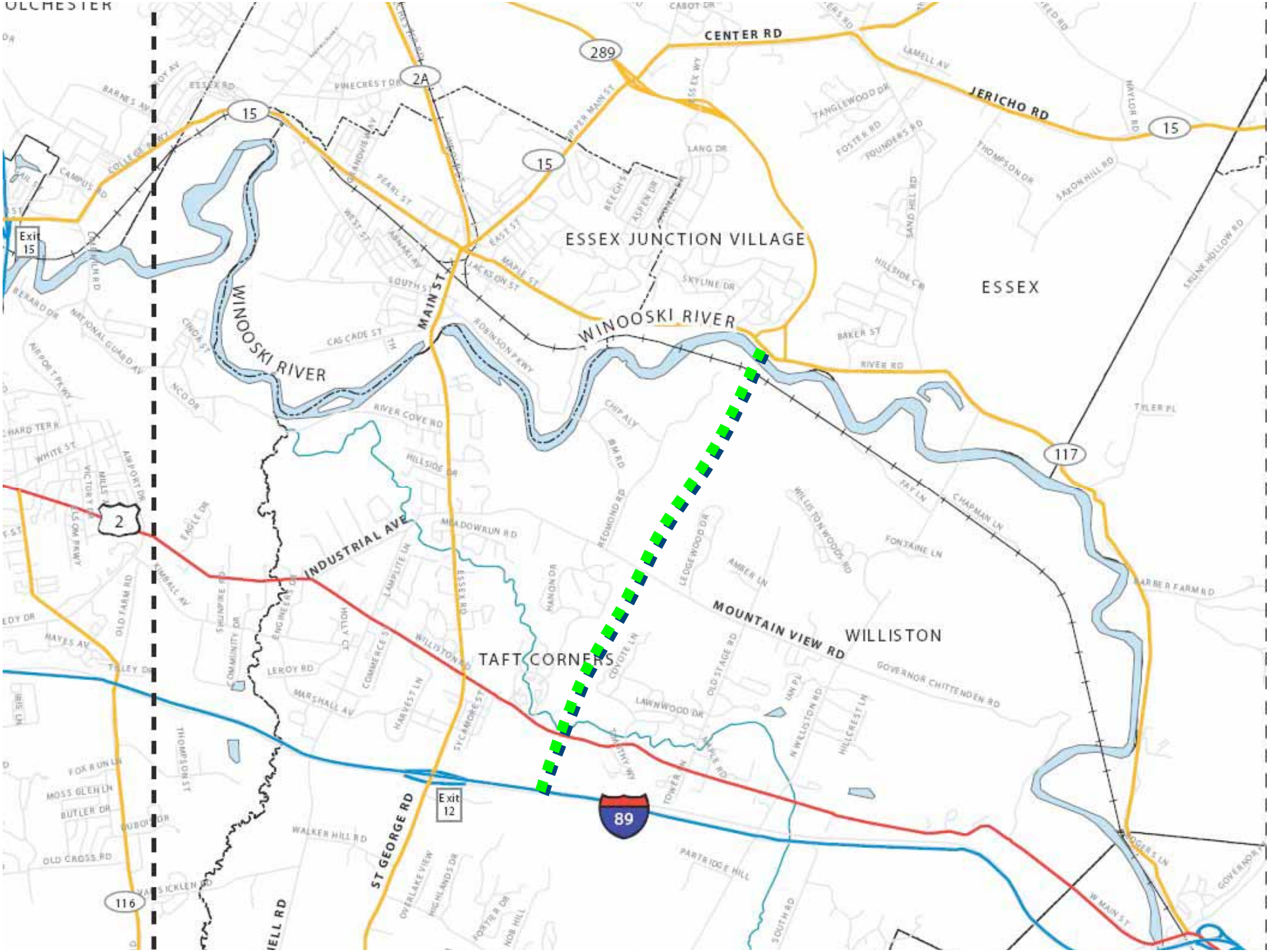
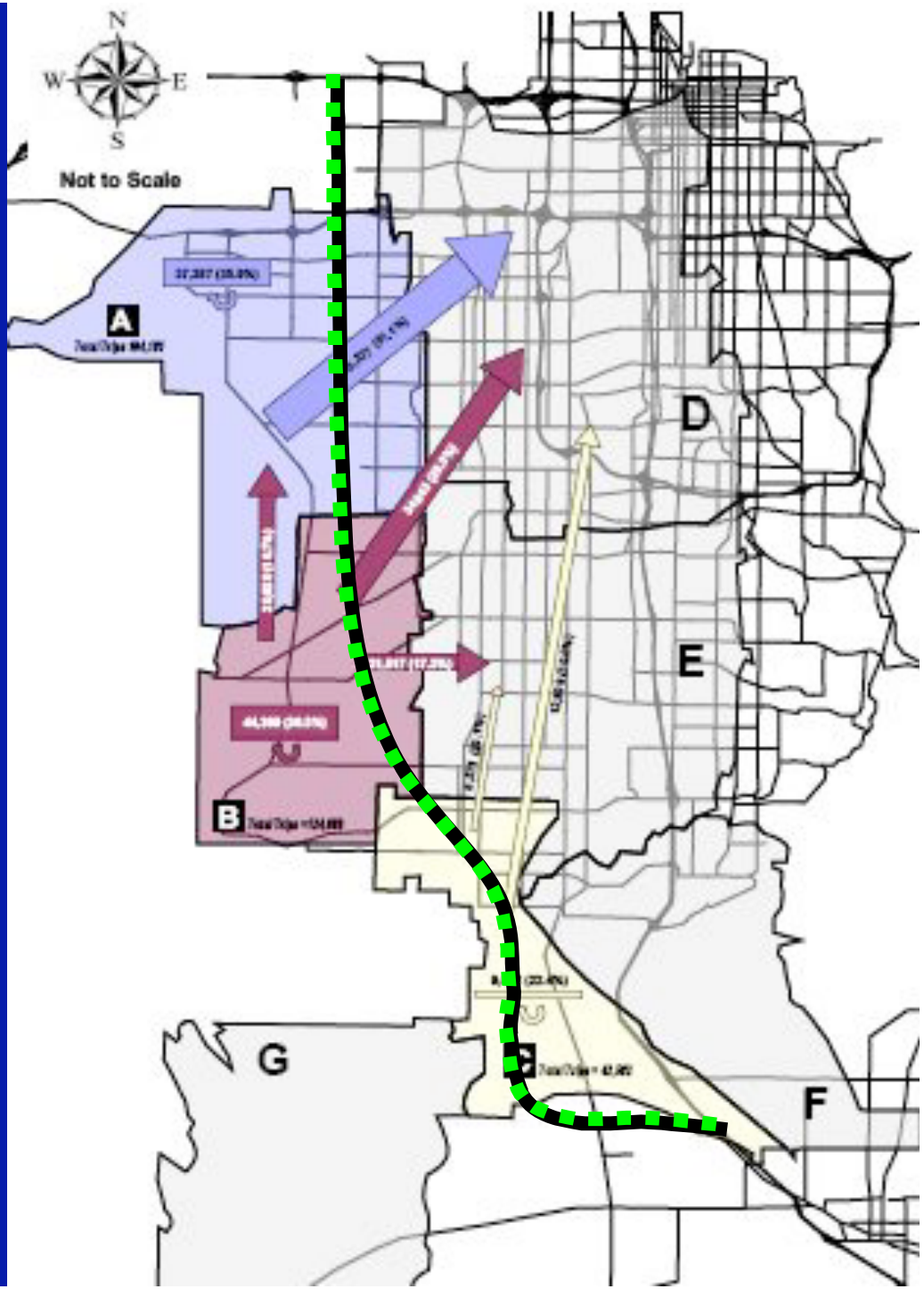
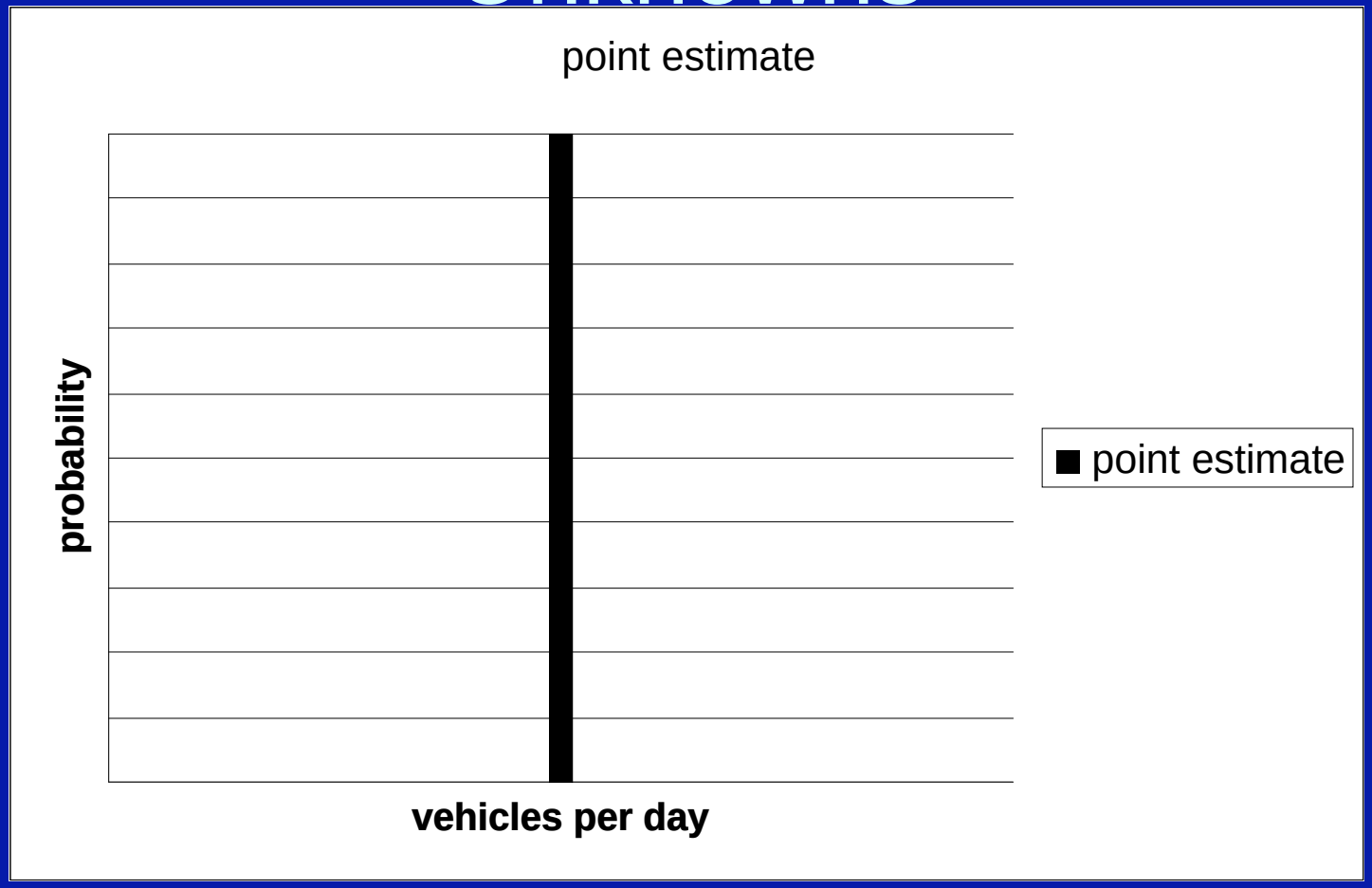

CENTER RD
289
2A
15
JERICHO RD
ESSEX JUNCTION VILLAGE
ESSEX
WINOOSKI RIVER
MAIN ST
Exit 15
INDUSTRIAL AVE
MOUNTAIN VIEW RD
WILLISTON
TAFT CORNERS
ST GEORGE RD
Exit 12
89
117
2
116
WILLISTON RD
RIVER RD
CHAMPLAIN PKWY

Major Travel Needs are not Served by Mountain View Corridor



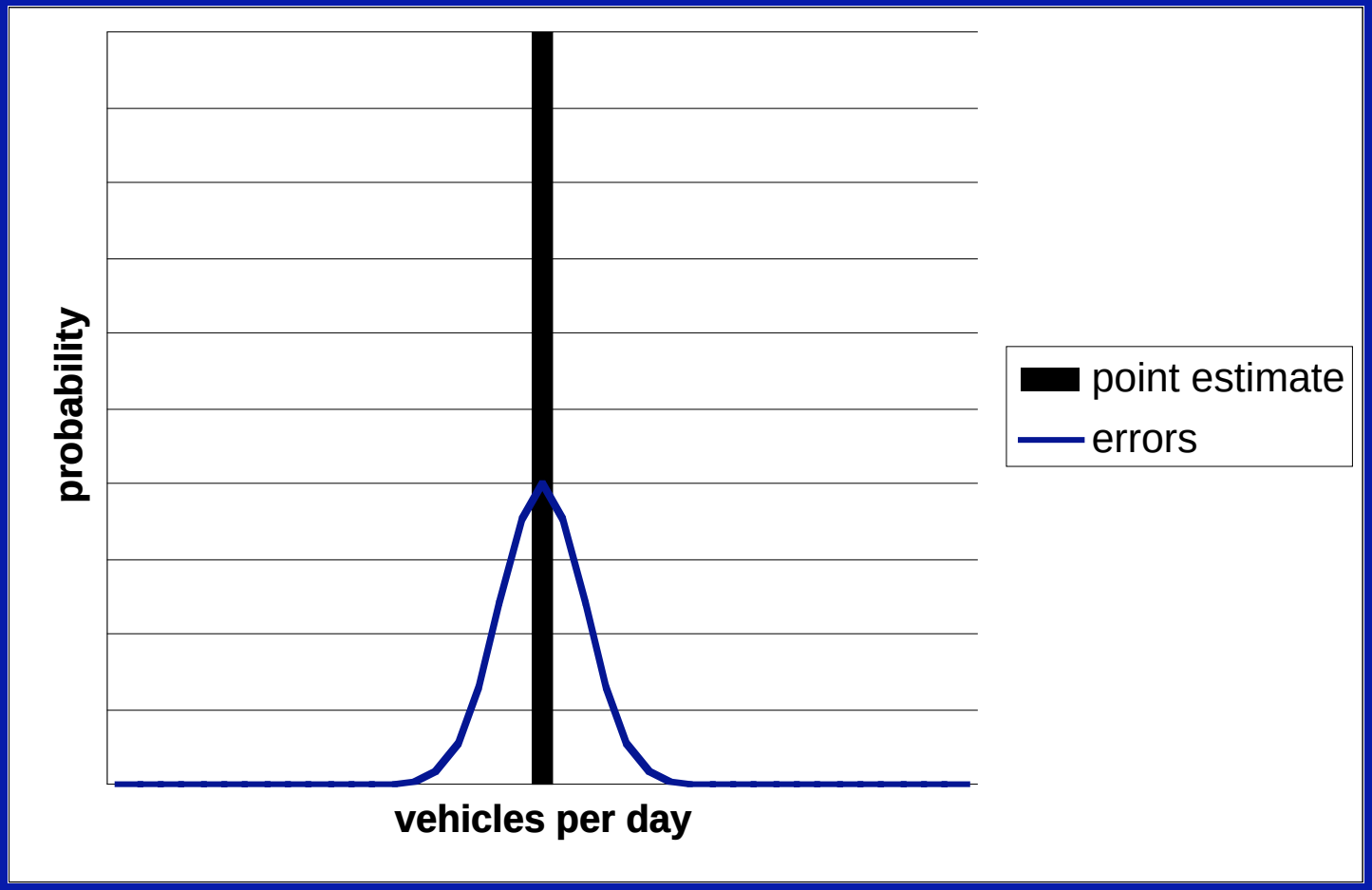
Point Estimates Ignore Model Errors, Model Omissions, and Unknowns



Model Errors

- Errors in Inputs
  - Land Use Forecasts
  - Road Network Assumptions
  - Transit Model Assumptions
- Errors in Model Process
- Mis-Representation of Results

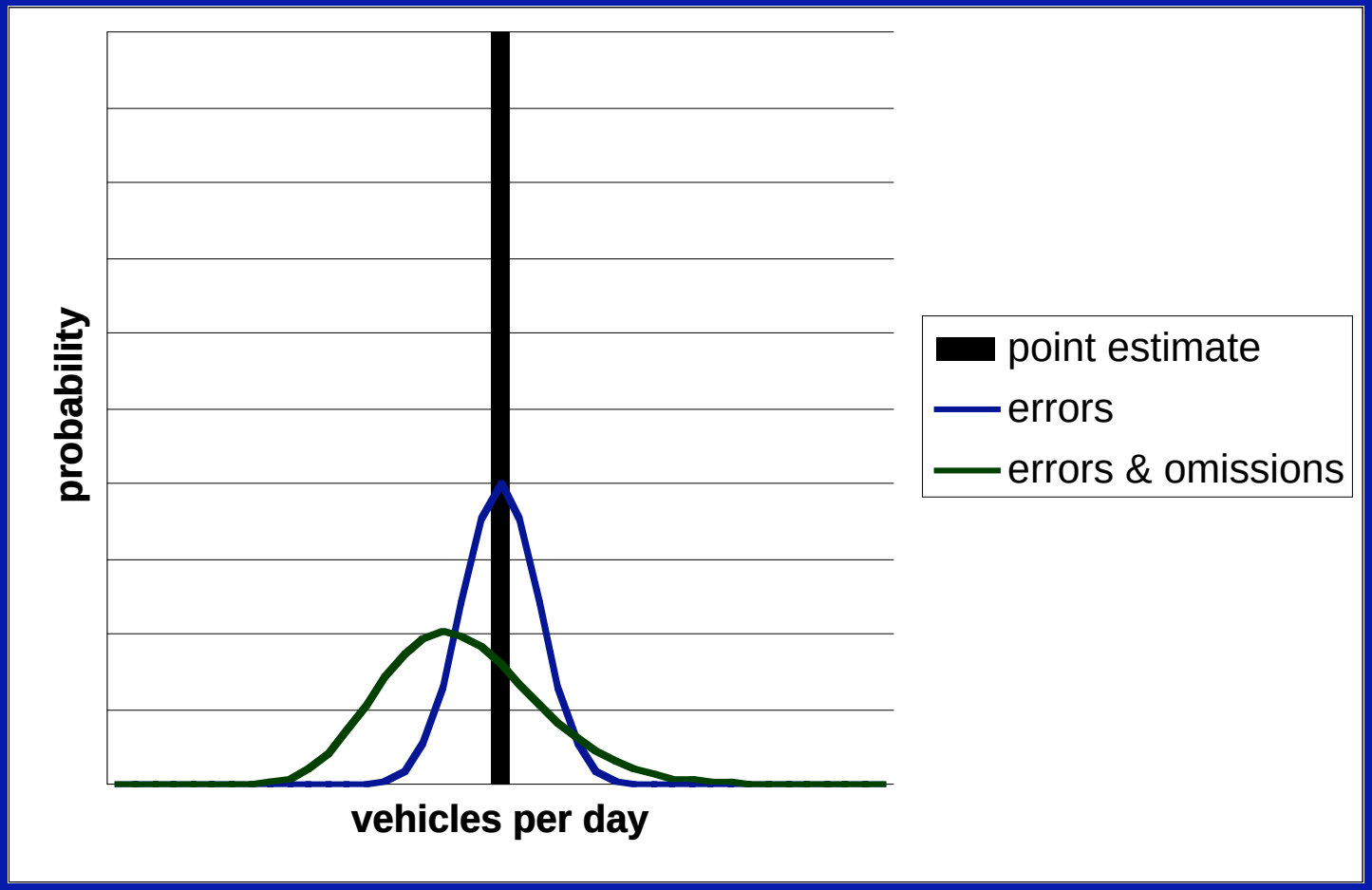
Uncertainty from Model Errors



Model Omissions

- Route changes
  - Including more efficient/more direct routing
- Destination changes
- Travel mode changes
- Time of day shifts
- Not make trip
- Land use form changes
- Changes in attitudes and social norms

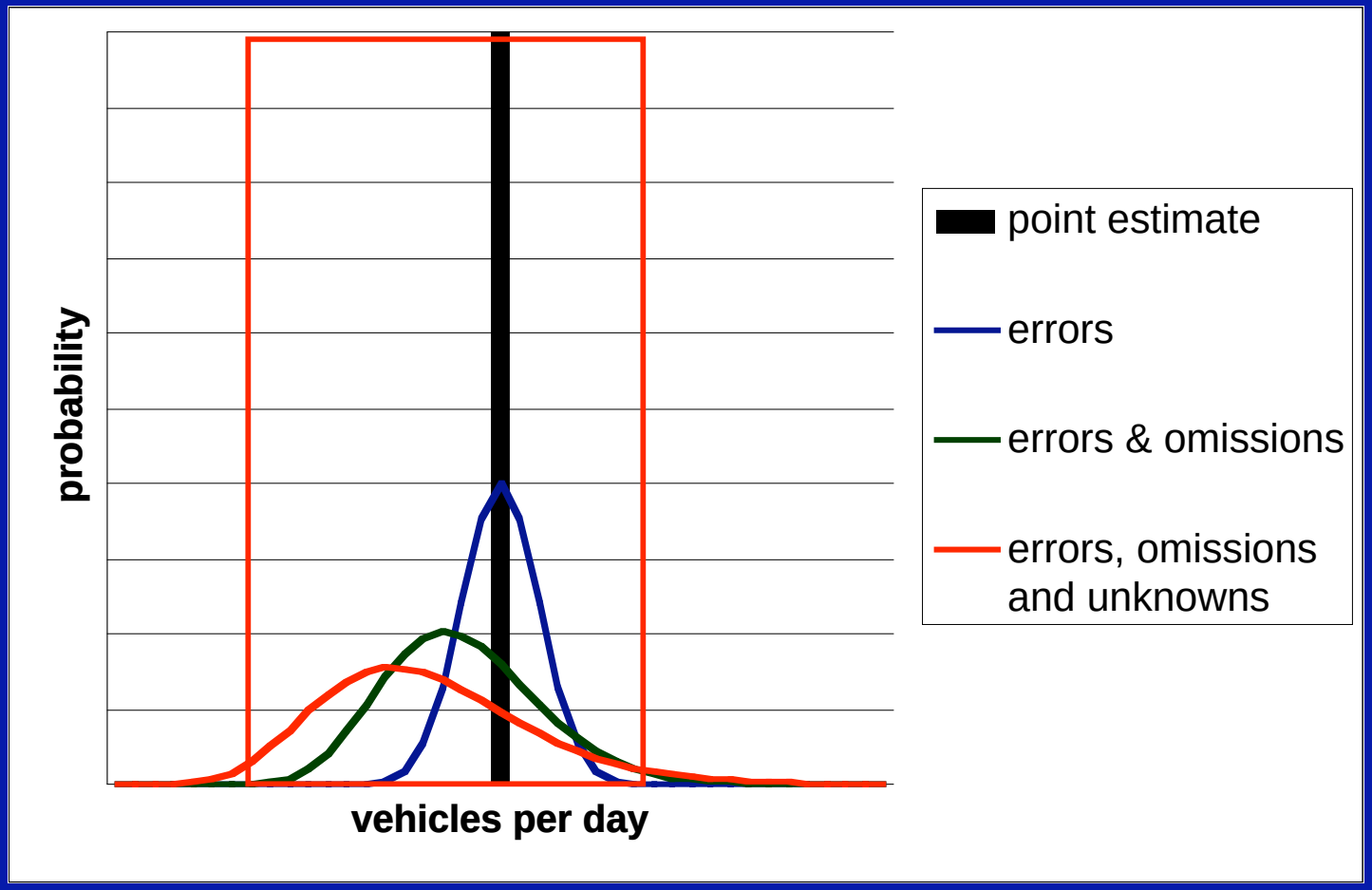
Uncertainty from Model Errors and Model Omissions



Unknowns

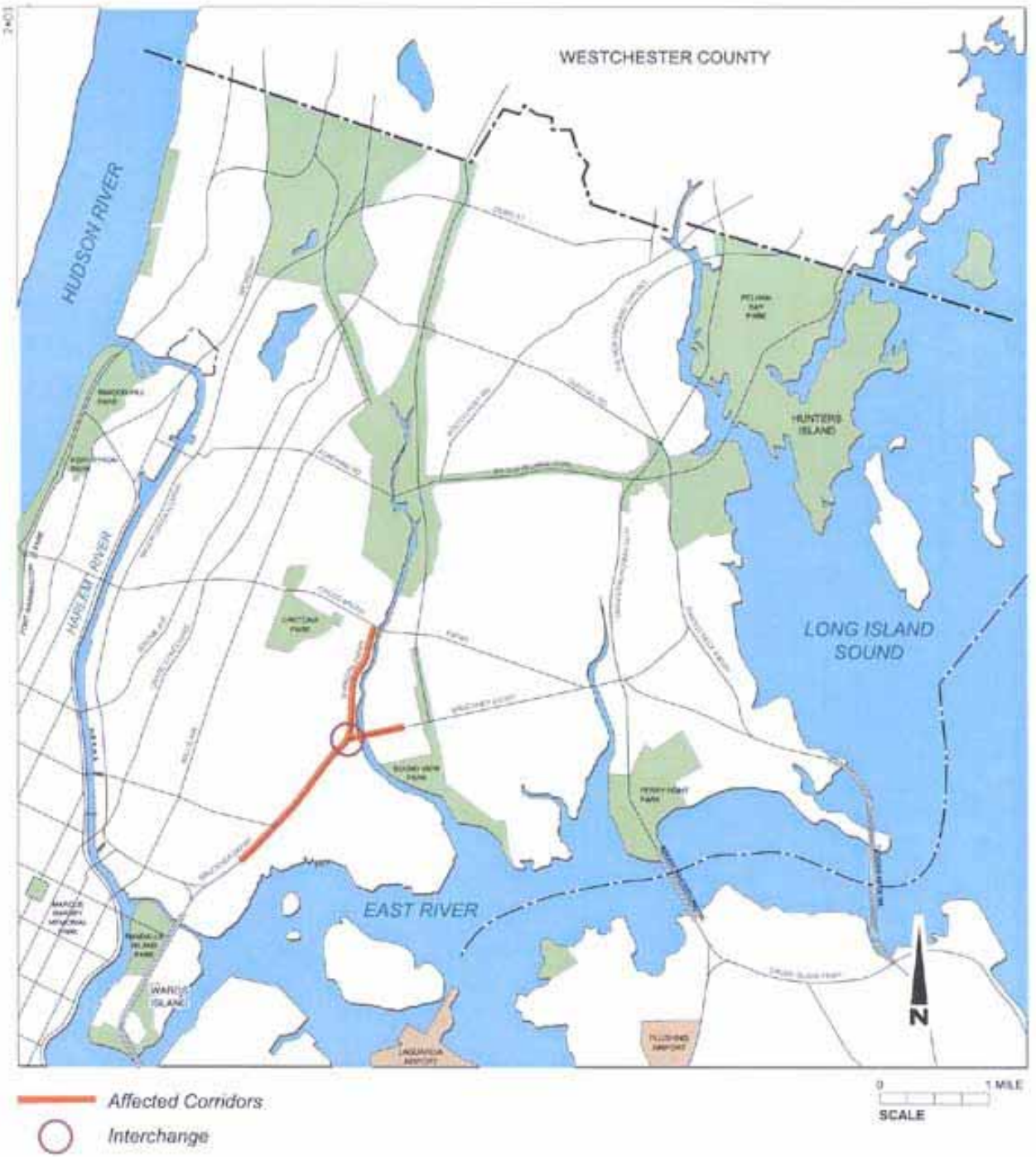
- General level of economic activity
- Energy pricing
- Greenhouse gas regulation
- Technological change
- Social change, e.g. much more widespread telecommuting

Uncertainty from Model Errors, Model Omissions, and Unknowns



Case Studies

- Sheridan Expressway, South Bronx, NY
- Alaskan Way Viaduct, Seattle, WA
- Legacy Highway, Salt Lake City, Utah


WESTCHESTER COUNTY
HUDSON RIVER
HARLEM RIVER
LONG ISLAND SOUND
EAST RIVER
HUNTERS ISLAND
WARD ISLAND
LAGUARDIA AIRPORT
FLUSHING AIRPORT
N
Affected Corridors
Interchange
0
1 MILE
SCALE


By annual average daily traffic,
150,000 to 175,000 (3)
125,000 to 150,000 (5)
100,000 to 125,000 (10)
75,000 to 100,000 (4)
50,000 to 75,000 (3)
25,000 to 50,000 (1)
0 to 25,000 (5)
WASHINGTON BR
CROSS BRONX EP
123,604
148,481
172,967
144,696
122,618
113,119
50,53
MAJOR DEEGAN EP
118,666
118,524
98,020
110,034
105,847
124,901
HARLEM RIVER
SHERIDAN EP
50,643
38,827
BRONX RVR PY
58,647
BRUCKNER EP
80,471
99,774
6,947
8,349
5,965
BRUCKNER BL
147,171
8,260
9,015
LEGGETT AV
HUNTS POINT AV
EDGEWATER RD
WHITE PLAINS RD
BRONX RIVER
WEBSTER AV
CROTONA AV
GRAND CONCOURSE
BOSTON RD
E 169 ST
E 163 ST
E 149 ST
WESTCHESTER AV
E 138 ST
WILLIS AV
BROOK AV
ST ANNS AV
CYPRESS AV
LOCUST AV
Map prepared for the Southern Bronx River Watershed Alliance
© Pratt Institute Center for Community & Environmental Development

BRUCKNER - SHERIDAN INTERCHANGE AND ACCESS TO HUNTS POINT EIS

QUANTITATIVE RATINGS O

	GOALS:	TRANSPORTATION EFFICIENCY	TRANSPORTATION SECURITY	ENVIRONMENTAL IMPACTS					ENVIRONMENTAL ENHANCEMENTS			
	OBJECTIVES:	1.1 Travel Delays	8.1 Alternate Routes	2.1 Trucks on Streets		5.1 Truck Emissions on Streets**	5.2 Highway Construction & Operation		1.5 Bike/ped Routes	6.3 Open Space	6.3 Open Space	
	PERFORMANCE MEASURES:	Auto, Van & Truck Hours[2]	Access Routes[3]	Truck Miles HP Residential	Truck Miles Arterial +Local[4]	NO_x, PM[5]	Vehicle Emissions[6]	Sound Levels[7]	Bike Paths route miles	Acres Total[7]	Acres Waterfront[8]	
	Minimize / Maximize:	*Min*	*Max*	*Min*	*Min*	*Min*	*Min*	*Min*	*Max*	*Max*	*Max*	
	Rank-based (average) Weight:	4.29	0.97	0.78	3.12	3.90	2.5	1.25	2.08	--	2.45	
0	***NO BUILD 2030***	*113,776*	*4*	*269*	*23,976*	*1.26*	15,306	NA	*20.5*	*386*	*187*	
	Change: No Build/Existing:	*25%*	*0%*	*-36%*	*24%*	*-89%*	*-54%*		*1364%*	*80%*	*1236%*	
	BUILD ALTERNATIVES 2030											
1	DEMAP SHERIDAN EXPRESSWAY LEGGETT AVE INTERCHANGE											
1A	Leggett Ave ramps to/from east and west	113,135	3	257	22,841	1.248	15,309	NA	24.0	401	202	
	Change: 1A/No Build	*-0.6%*	*-25%*	*-4.5%*	*-4.7%*	*-1.3%*	*0.0%*		*17.1%*	*3.9%*	*8.0%*	
	Score: weighted change	**2.42**	**-24.25**	**3.48**	**14.75**	**4.93**	**-0.05**	0.00	**35.51**		**19.65**	
1B	Leggett Ave ramps to/from west. Edgewater Rd intersection with Bruckner Blvd.	111,376	3	218	22,943	1.229	15,273	NA	24.0	401	202	
	Change: 1B/No Build	*-2.1%*	*-25%*	*-19.0%*	*-4.3%*	*-2.8%*	*-0.2%*		*17.1%*	*3.9%*	*8.0%*	
	Score: weighted change	**9.05**	**-24.25**	**14.77**	**13.43**	**10.79**	**0.54**	0.00	**35.51**		**19.65**	
2	SHERIDAN INTERCHANGE EDGEWATER - HUNTS POINT											
	Leggett Ave Interchange											
2C	Leggett Ave ramps to/from west. Direct Bruckner-Sheridan ramps. Edgewater Rd extension to/from Sheridan Expressway.	110,277	4	232	20,944	1.222	15,274	NA	21.0	386.0	187.0	
	Change: 2C/No Build	*-3.1%*	*0.0%*	*-13.8%*	*-12.6%*	*-3.3%*	*-0.2%*		*2.4%*	*0.0%*	*0.0%*	
	Score: weighted change	**13.19**	**0.00**	**10.71**	**39.40**	**12.94**	**0.52**	0.00	**5.07**		**0.00**	

Truck Routes

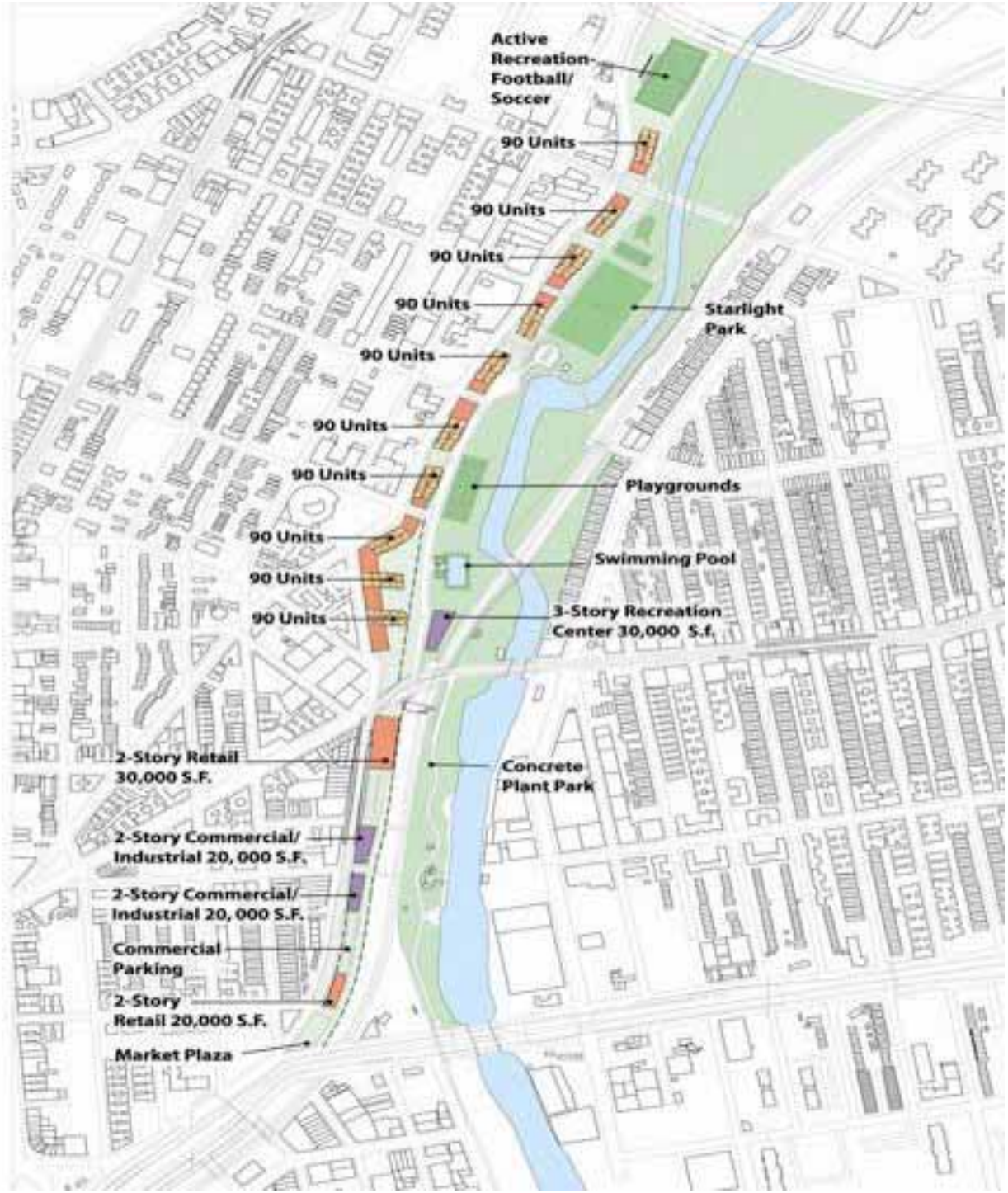
Bruckner - Sheridan Interchange

Figure 3

GS OF ALTERNATIVES

ITS	QUALITY OF LIFE		ECONOMIC DEVELOPMENT				REDUCE ACCIDENTS				FINANCIAL VIABILITY	
en e	2.2 Access to Open Space	2.3 Community Disruption	3.1 Direct Truck Access	3.2 Rail Freight Service	3.3 Truck Travel		4.1 Arterial Streets	4.2 Expressways	*TOTAL*		7.1 Cost Magnitude	
s ont[8]	Acres / 1000 Residents[8]	Takings, Disruptions	Travel Time to/from Alexander Hamilton Bridge	Delivery Time[9]	Truck VMT[2]	Truck VHT[2]	Accidents / year[10]	Accidents / year[10]	Accidents / year[10]	**Total Weighted Scores**	Capital *$millions*	Right of Way *$millions*
	Max	*Min*	*Min*	*Min*	*Min*	*Min*	*Min*	*Min*	*Min*		*Min*	*Min*
	3.39	3.16	5.53	2.26	1.34	1.34	4.08	2.58	6.66		0.29	
	2.19	*0*	*34.5*		*173,460*	*8,731*	*6,914*	*2,379*	*9,293*		0	0
%	*28%*	--	*21%*		*15%*	*30%*	*19%*	*9%*	*16%*		--	
	2.28	7	*36.8*		*174,289*	*8,685*	6,947	2,315	9,262		407.0	6.1
	3.9%		*6.7%*		*0.5%*	*-0.5%*	*0.5%*	*-2.7%*	*-0.3%*			
5	**13.17**		**-37.27**		**-0.64**	**0.71**			**2.22**	35		
	2.28	6	*35.7*		*173,256*	*8,527*	6,890	2,312	9,202		327.4	5.4
	3.9%		*3.5%*		*-0.1%*	*-2.3%*	*-0.3%*	*-2.8%*	*-1.0%*			
5	**13.17**		**-19.15**		**0.16**	**3.13**			**6.52**	83		
0	2.19	8	*31.4*		*171,917*	*8,400*	6,742	2,391	9,133		362.2	6.1
	0.0%		*-9.0%*		*-0.9%*	*-3.8%*	*-2.5%*	*0.5%*	*-1.7%*			
0	**0.00**		**49.77**		**1.19**	**5.08**			**11.47**	149		

- 900 to 1200 units of housing
- 200,000 square feet of school and community space
- 90,000 square feet of local retail

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Alaskan Way Viaduct, Seattle

What to Do About the AWV?

- Tied in with Seawall
- Structural Issues from Earthquake Damage & Aging
- $60 million EIS (yes, $60 million for planning only!)
- State DOT favors replacement with larger structure
- City Mayor/Council favored replacement with expensive tunnel
- Local advocates for surface street + transit alternative

Washington DOT Website

- **Can increased transit take the place of the Alaskan Way Viaduct?**
  WSDOT has planned for aggressive improvements in transit, but even with increased transit ridership, travel demand on the viaduct is expected to grow. Traffic on the viaduct replacement is expected to grow from 110,000 daily vehicles today to 135,000 vehicles per day by 2030 due to growth in population and commercial activity. This forecast takes into account heavy transportation investments, and also reflects a doubling of commute trips to downtown on transit, with an estimated 53 percent of workers in downtown commuting by transit in the year 2030.

Washington DOT Website

- **Can increased transit take the place of the Alaskan Way Viaduct?**

WSDO
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account heavy transportation investments, and also reflects a doubling of commute trips to downtown on transit, with an estimated 53 percent of workers in downtown commuting by transit in the year 2030.

increased
viaduct is
ct
110,000
s per day
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"SR 99 ramps and local arterials in the downtown showed little or no growth in vehicle traffic in 2030 as compared to the present…" (*Appendix C,* Exhibit 5-16, p. 158)

Washington DOT Website

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  Model error with 80% downtown transit share in base model, so large increase in model share not possible

Washington DOT Website

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“Several myths must be disposed of in order to create enough intellectual space for coherent thinking about the AWV”

- Myth #1 – Most AWV trips are long distance trips through the city
- Myth #2 – AWV is critical for freight movements
- Myth #3 – Downtown street grid cannot move additional traffic
- Myth #4 – There is a traffic “demand” independent of supply

The EIS Process: The Cynics View

- Develop raw data and modeling results
- Select data and modeling results that support desired conclusions
- Distort selected data and modeling results
- Communicate distorted, selected data to decision makers and general public
- Pretend that the process is analytical, precise, accurate and definitive

ROAD TO RUIN

Legacy Highway

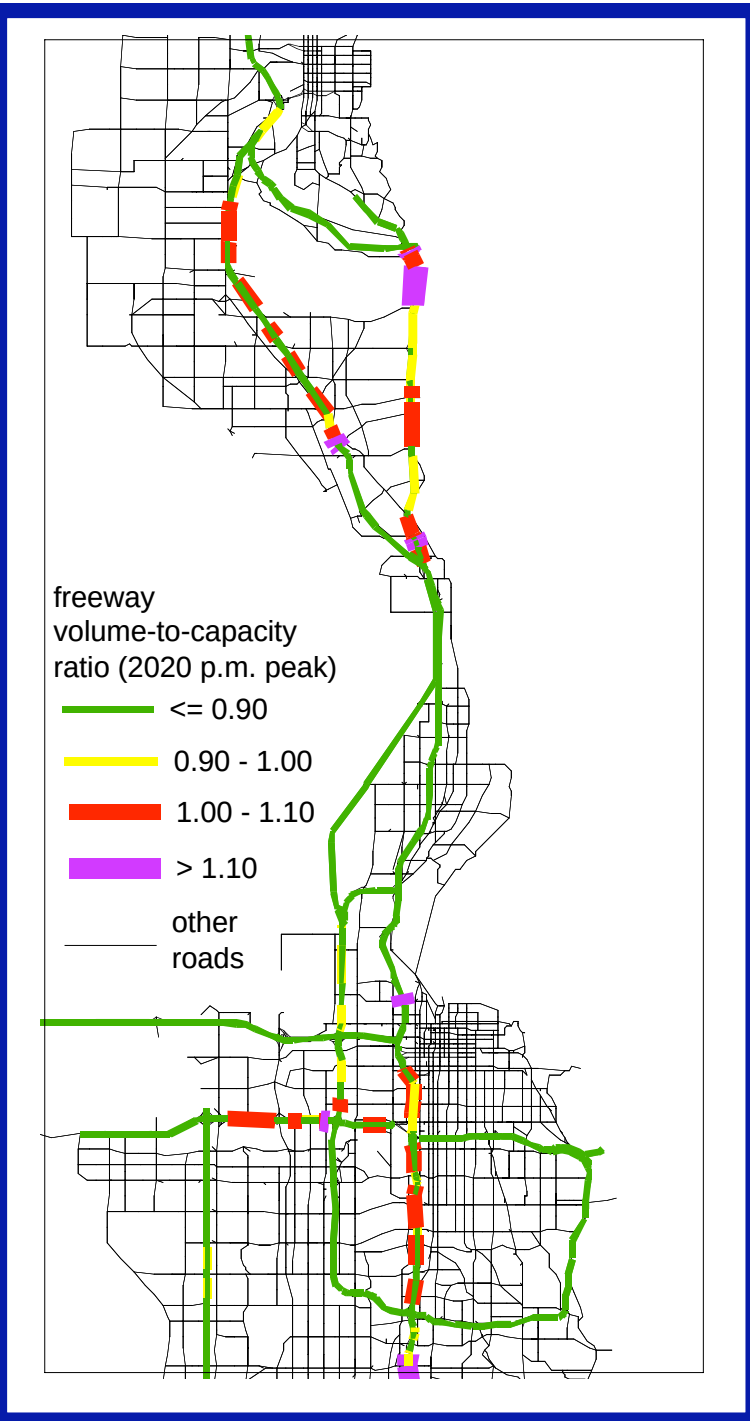
Utah

Cost to Federal Taxpayers: $1.4 billion

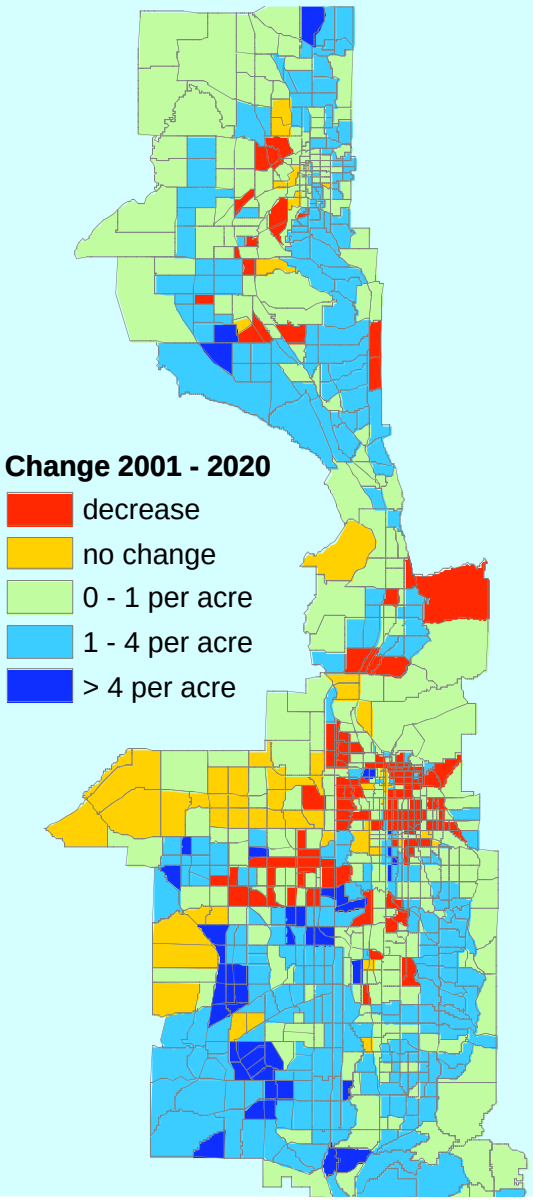
Top Ten

Problems with Modeling

- The “test” was too narrow-only one freeway segment justifies new highway.
- Land Use changes not included (induced growth brought on by freeway will bring back congestion)

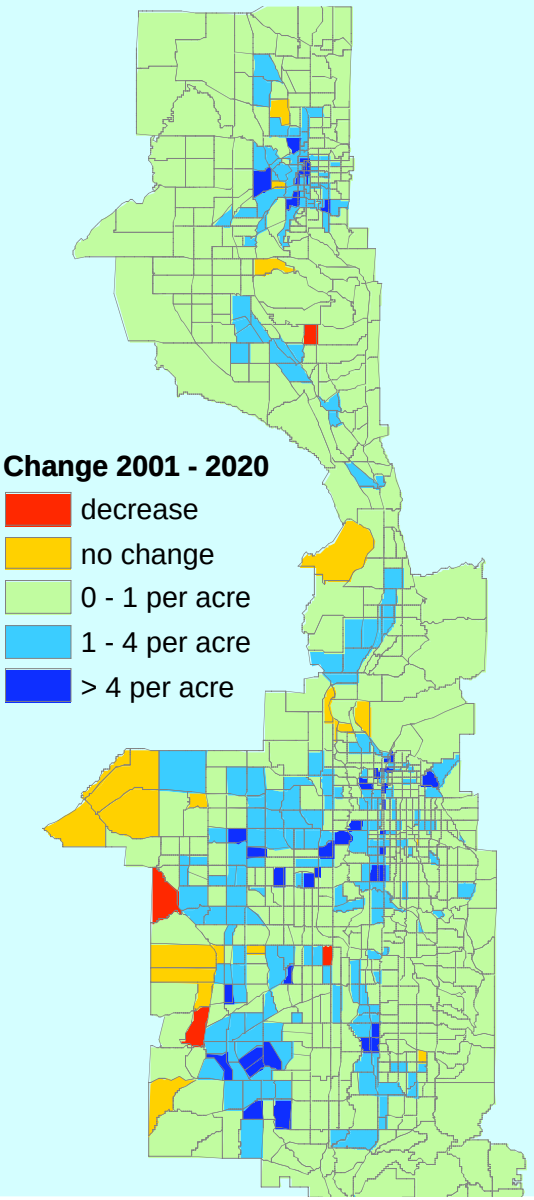


Unreasonable Land Use Assumptions



Population Change

Employment Change



Legacy ~~Highway~~ Parkway

- Transit and Commuter Rail advanced
- More land preservation along Great Salt Lake
- True Parkway Design with lower speeds, no trucks

Common Myths about Modeling

- We can provide precise predictions about future traffic, congestion, even speeds on highways during peak hour.
- There is a fixed demand for car travel on this corridor
- There is an inevitable future of growing traffic.
- Growth is already here – it won't be affected by a new highway – we need the highway already.

Pull Back the Curtain!