

Work Unit 1.2: Scenario-Driven and Real-Time Information based Storm and Evacuation Plan

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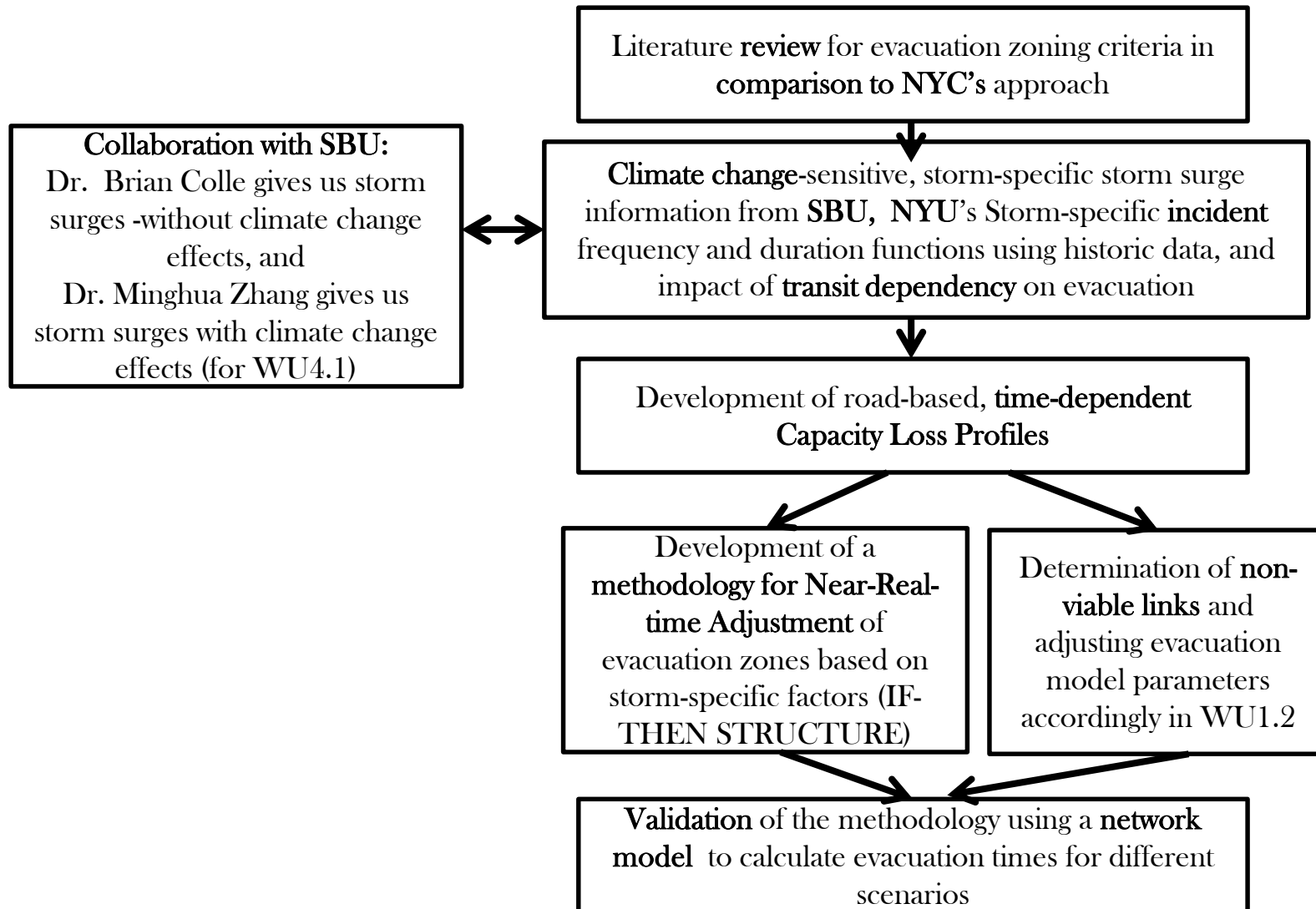


Work Unit 1.2: Steps of Evacuation Modeling Methodology

- SLOSH maps and existing NYC evacuation zones (June 2013) are used
- **A quasi-dynamic network assignment model (based on TRANSCAD's TA)** is used to estimate evacuation times for Sandy case study
- **Non-viable links** are identified and model parameters adjusted accordingly
- **Hourly distribution of demand** is done systematically using theoretical S-Curves and observed demand curves during Sandy from TRANSOM data
- **Different Demand Scenarios** are developed and evacuation model runs are conducted for different demand assumptions
- **Comparison** of evacuation time results with actual Sandy data is done for
 - major bottlenecks (V/C ratios)
 - evacuation times from vulnerable zones to safe zones

Visualization of our preliminary results is completed

Extension of Proposed Methodology (in relation to WU4.1)

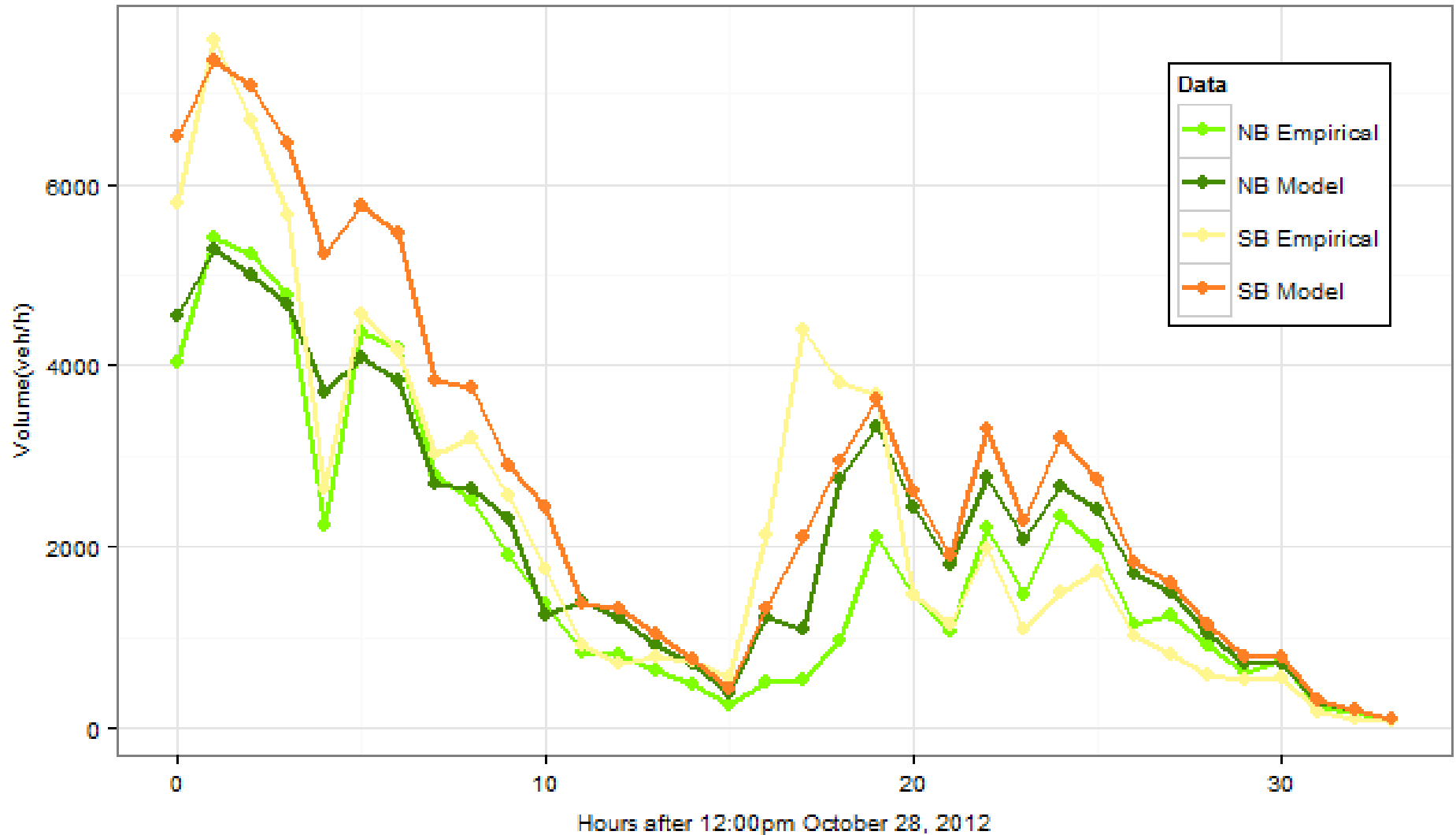


Evacuation Studies for NY in Literature

Study	Author, Year	Focus
Metro NY Hurricane Transportation Study	USACE (1995)	Hazard and vulnerability assessment
NY Hurricane Evacuation Study	USACE (2005)	Behavioral analysis findings
Final Report on NYC Emergency Response and Evacuation Plans in the Event of a Weather-Related Emergency	Brodsky (2006)	Review of NYC Emergency Planning
Recommendations to Improve the Strength and Resilience of the Empire State's Infrastructure	NYS2100 Commission (2012)	Recommendations towards a more vibrant, resilient, and crisis-ready New York State.
Managing a Regional Transit System in a Severe Weather Event Case Study of the NY Region and Hurricane Irene	Schofer et al. (2012)	Post-Irene study
Hurricane Sandy Exploratory Survey	Baker and Downs (2013)	telephone survey in Evacuation Zone A in Queens and Staten Island to gain insights to the evacuation decision mechanisms and behaviors during Sandy
Low-Probability Flood Risk Modeling for New York City	Aerts et al. (2013)	Assessment of the full distribution of hurricane flood risk in NYC by calculating potential flood damage with a flood damage model that used many possible storms and surge heights as input
NYC Hazard Mitigation Plan 2014	NYC Mayor's Office (2014)	Planning towards reducing risks from natural and non-natural hazards under climate change
Organizing Chaos: Hospital Evacuation During Hurricane Sandy	Adalja (2014)	Effect of hospital evacuations on hospitals in NYC during Sandy.

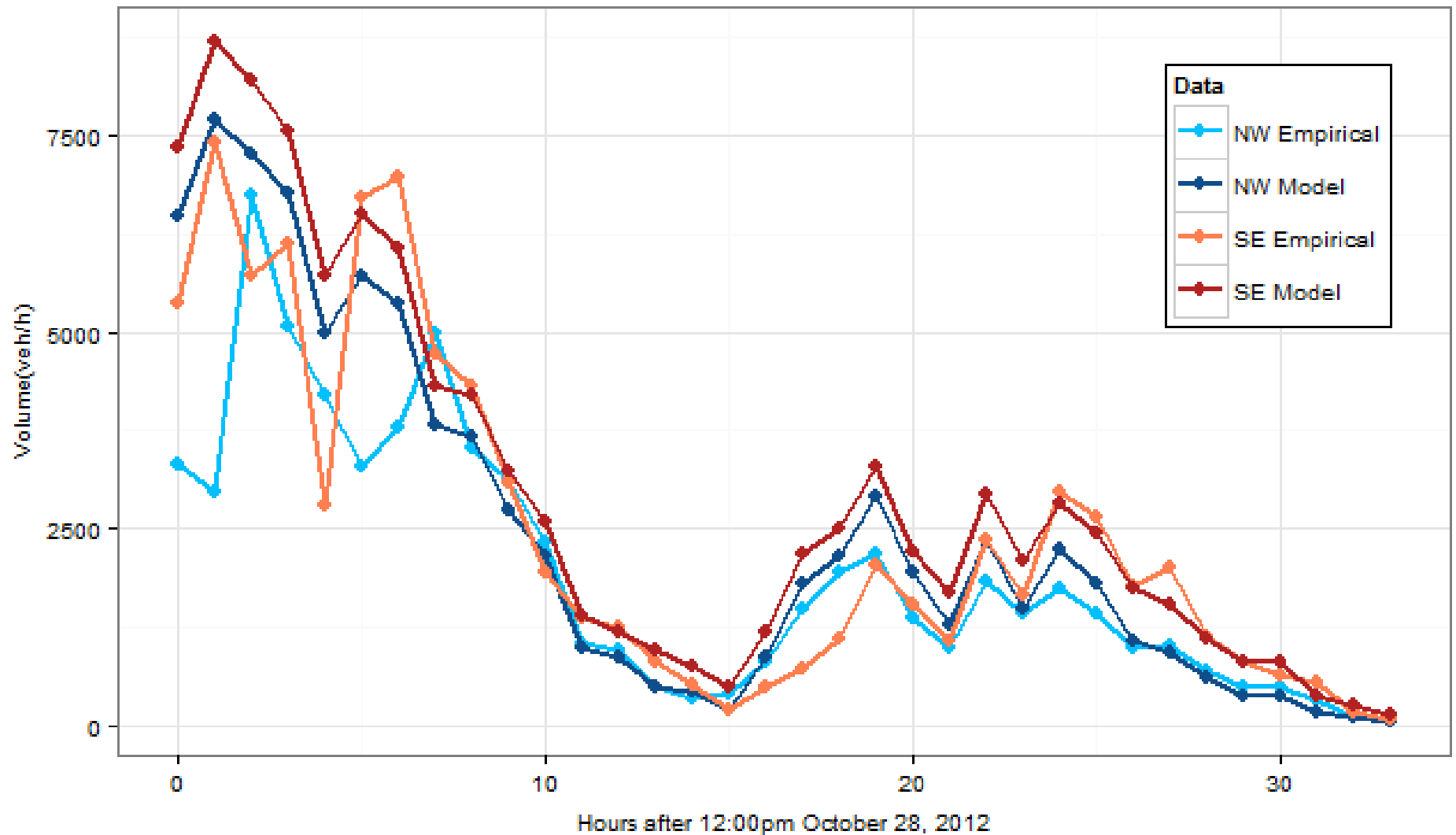
Comparison of Empirical and Simulation Data

(a) I-278 Gowanus Expressway



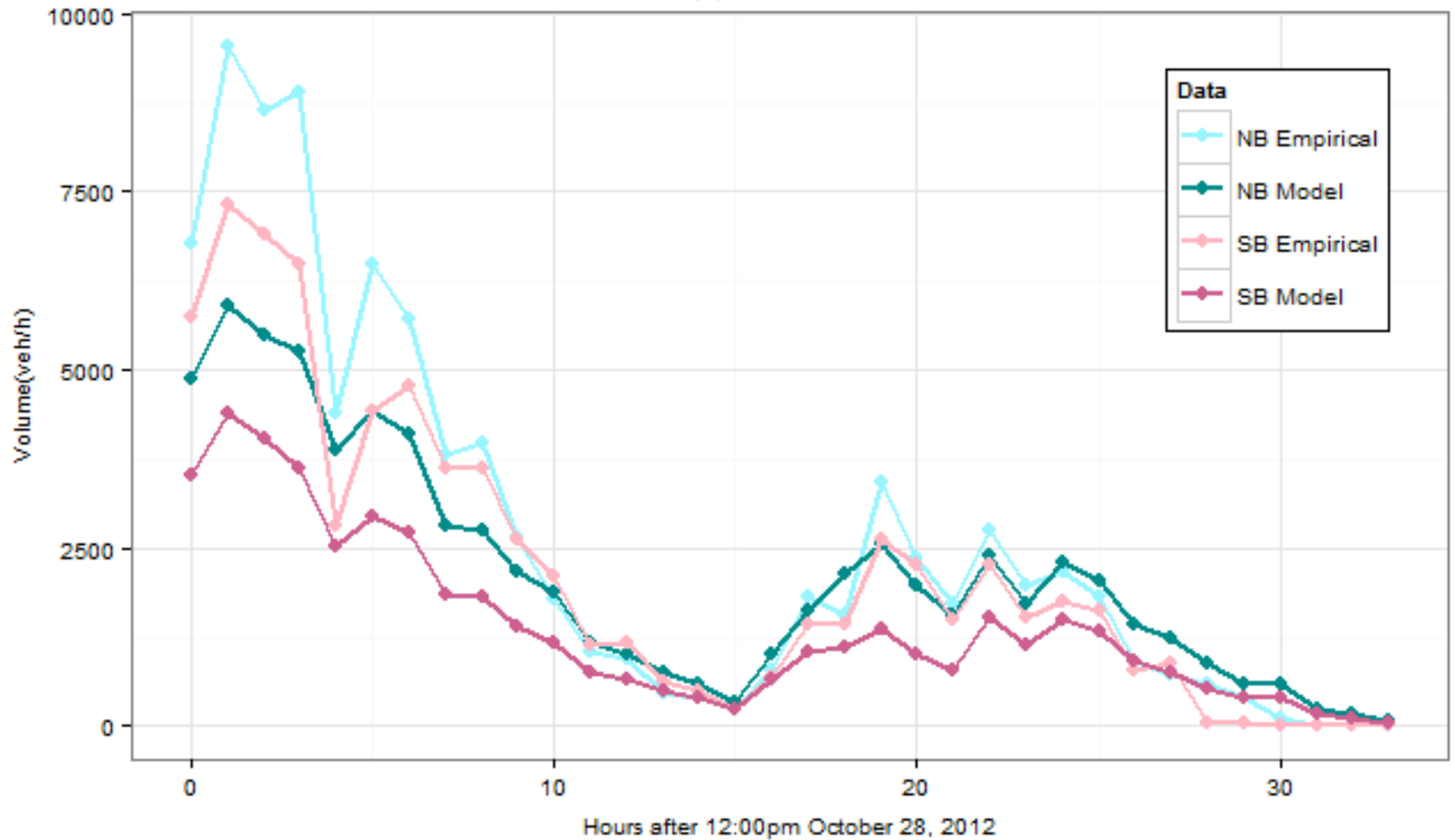
Comparison of Empirical and Simulation Data (Cont'd)

(b) Grand Central Parkway

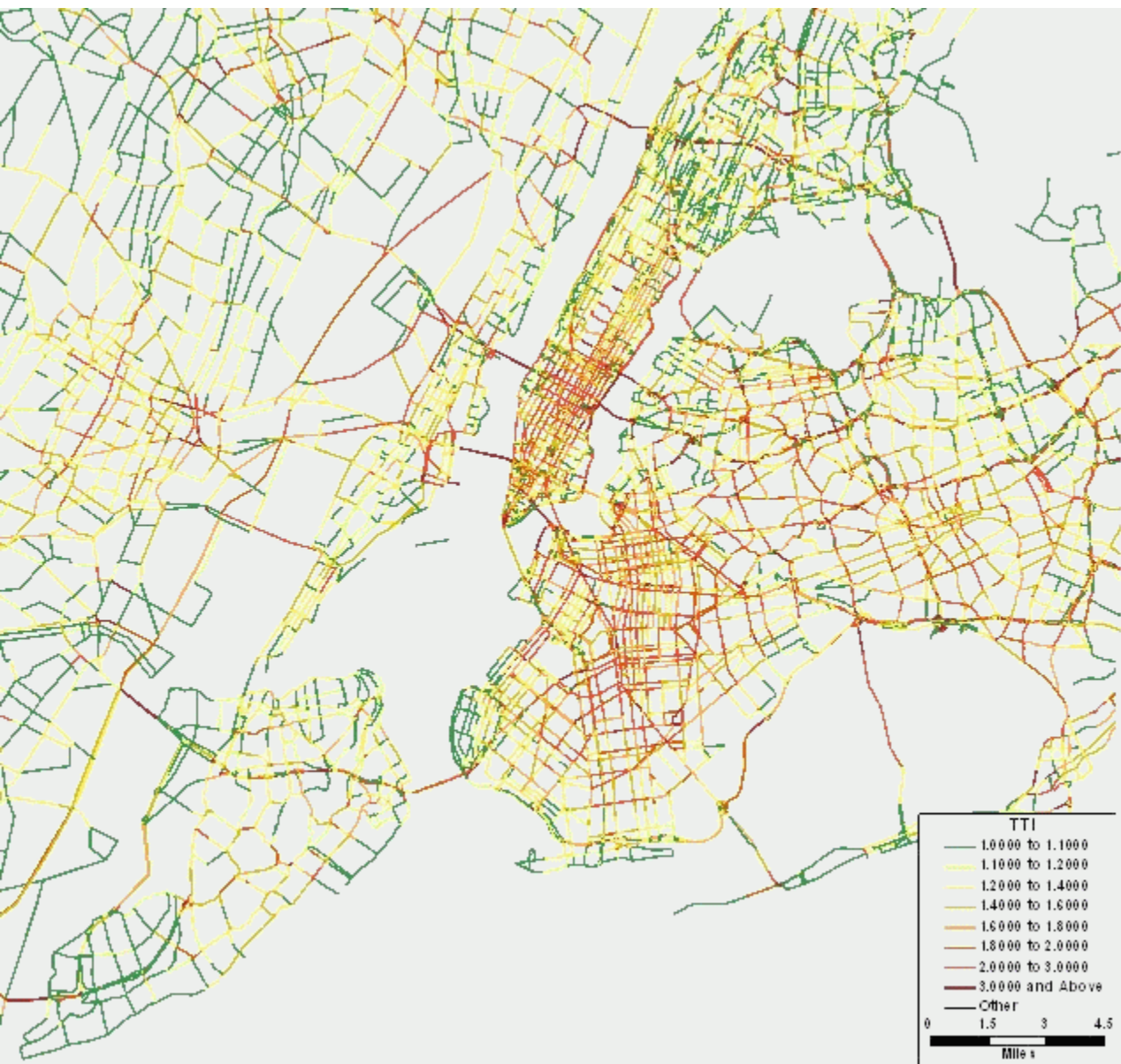


Comparison of Empirical and Simulation Data (Cont'd)

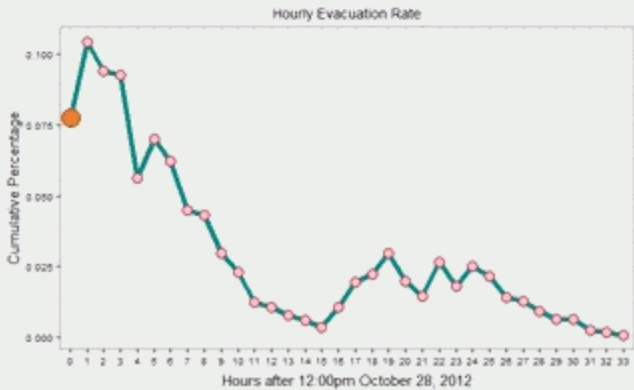
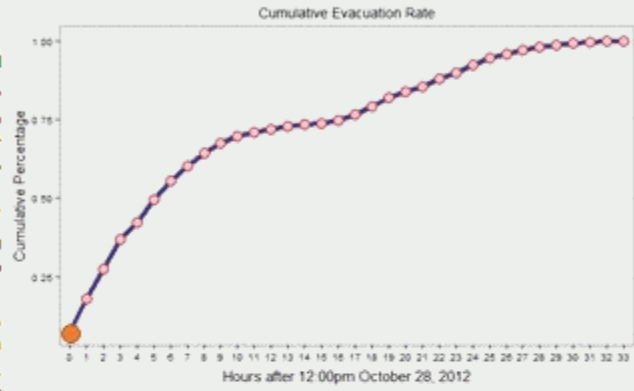
(c) FDR Drive



Sample Animation of Our Results

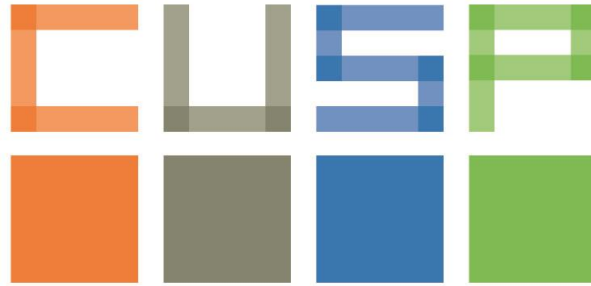


Sandy Simulation Scenario
Travel Time Index(TTI)
Day 1
12:00 pm – 1:00pm



Future Work

- Improve network model's estimations for Sandy using more realistic demand profiles
- Complete implementation of the “proposed extension of the basic methodology”
- Incorporate SBU's flooding data into our model to be able to better represent effects of climate change on highway capacities in the presence of major storms/hurricanes
- Compare evacuation times for the Sandy case using existing SLOSH maps and SBU flooding data
- Improve visualization aspects of the evacuation results
- Propose easy to understand performance measures for the evacuation that can be used for risk assessment and decision making



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Thank You!

