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IRF WORLD ROAD MEETING 2017
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Identification of Critical Locations for Incident Modelling: A Case Study of Kolkata City

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Overview of the presentation

- Background
- Methodology
- Study Area
- Analysis and Results
- Conclusion

Background

- Rapid **urbanization** and growth of **private vehicles**
- **Demand-supply imbalance** resulting in increasing traffic congestion
- **Major traffic incidents** - Situation becomes worse

Consequence

✓ Propagation of **shockwave** and resulting blockage, gridlock

- Need of proper **traffic management plan**
- Use of **micro-simulation platform** for incident modelling
- Major challenge – incident **response**
- Fixing incident **locations** – '**Critical Locations**'

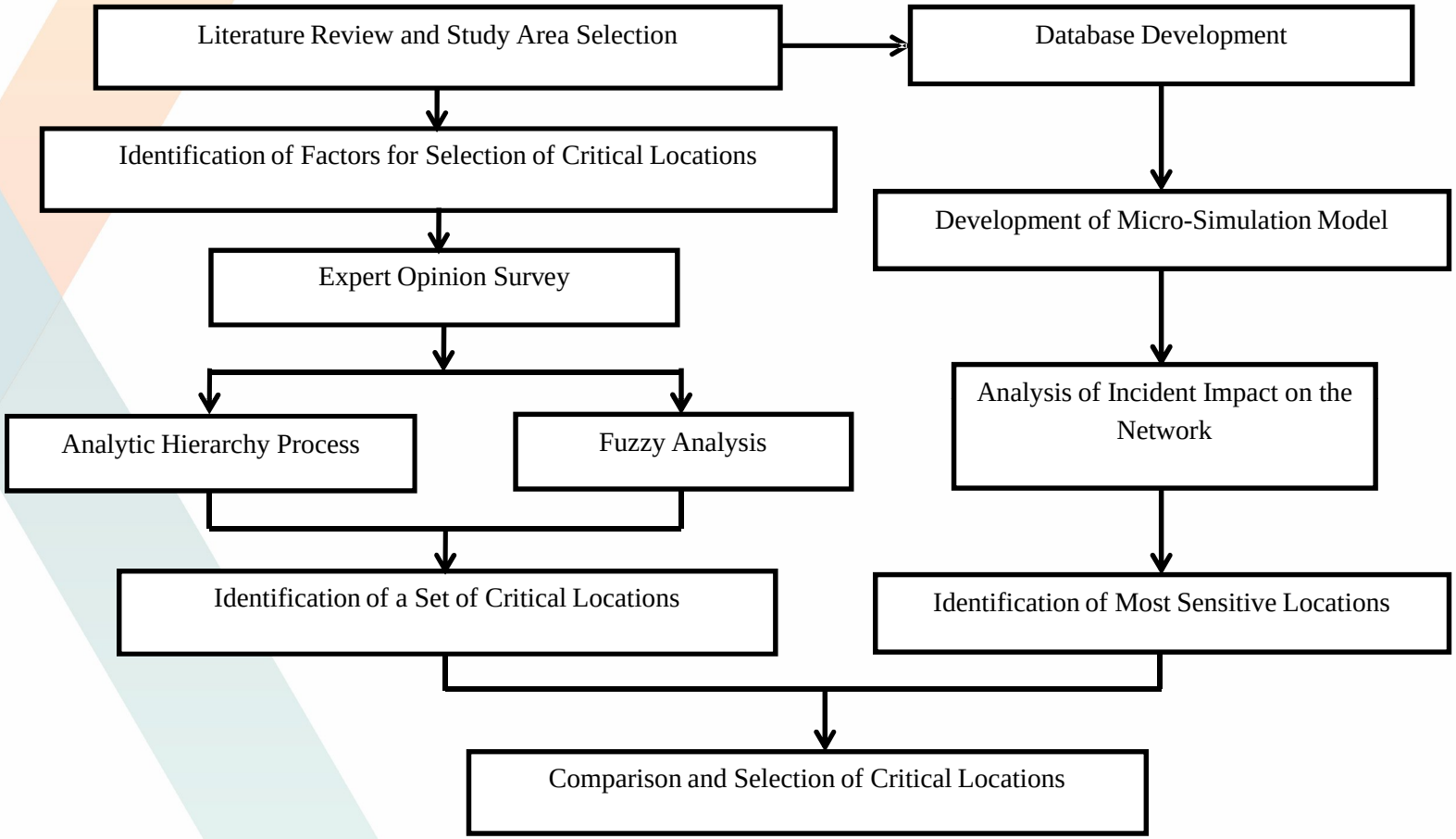
Background (Contd…)

- Critical locations are the locations on the network that are difficult to manage under traffic incident conditions
- The choice of critical locations does not simply focus on the locations with the most frequent incident occurrence
- It considers the complexity regarding traffic management during incidents

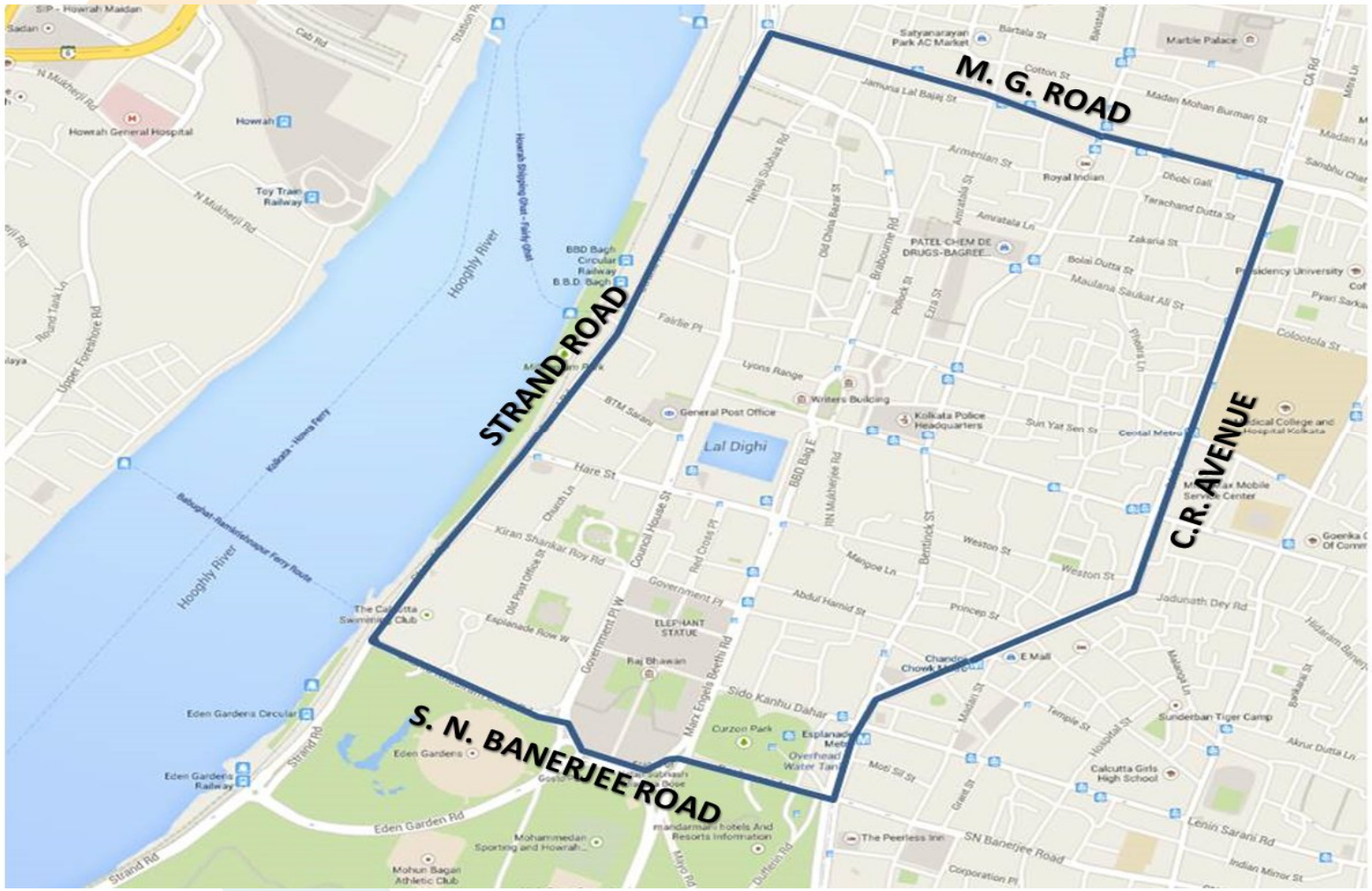
Objective of the Study

To develop a methodological framework for identifying critical incident locations required for incident simulation in an urban road network.

Methodology



Study Area



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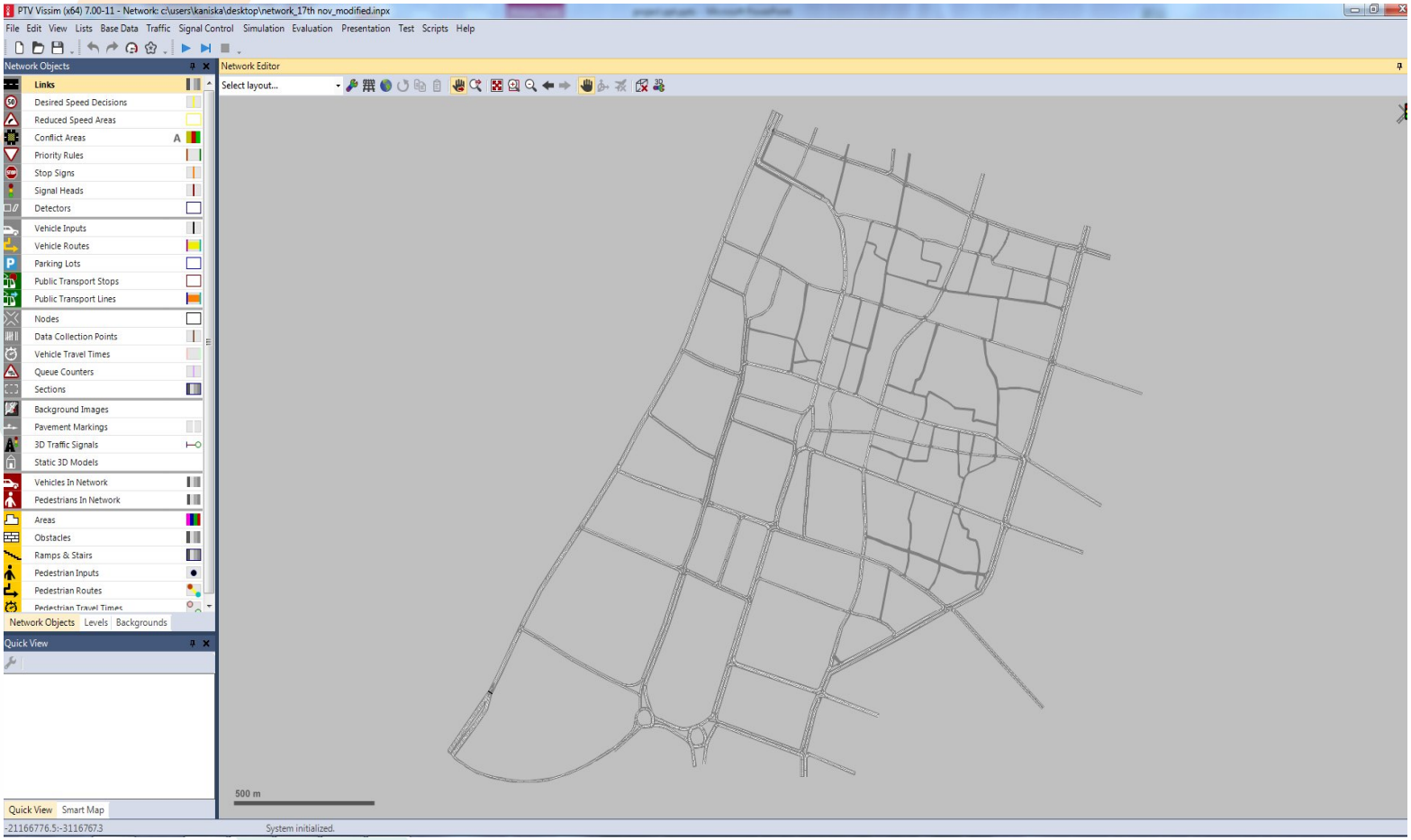
Identification of Critical Locations

- Simulation Analysis
- Expert Opinion Analysis
  - Analytic Hierarchy Process (AHP)
  - Fuzzy Analysis

Simulation Analysis

- Micro-simulation model of the study network is developed using VISSIM
- 131 intersections are considered as the incident locations in turns for the simulation study
- Impact of incident is quantified and analysed based on the simulation runs
- Travel time and queue length are used as the MOEs
- 20 travel time sections and 64 queue counters are placed at strategic locations within the network

Network Development in VISSIM



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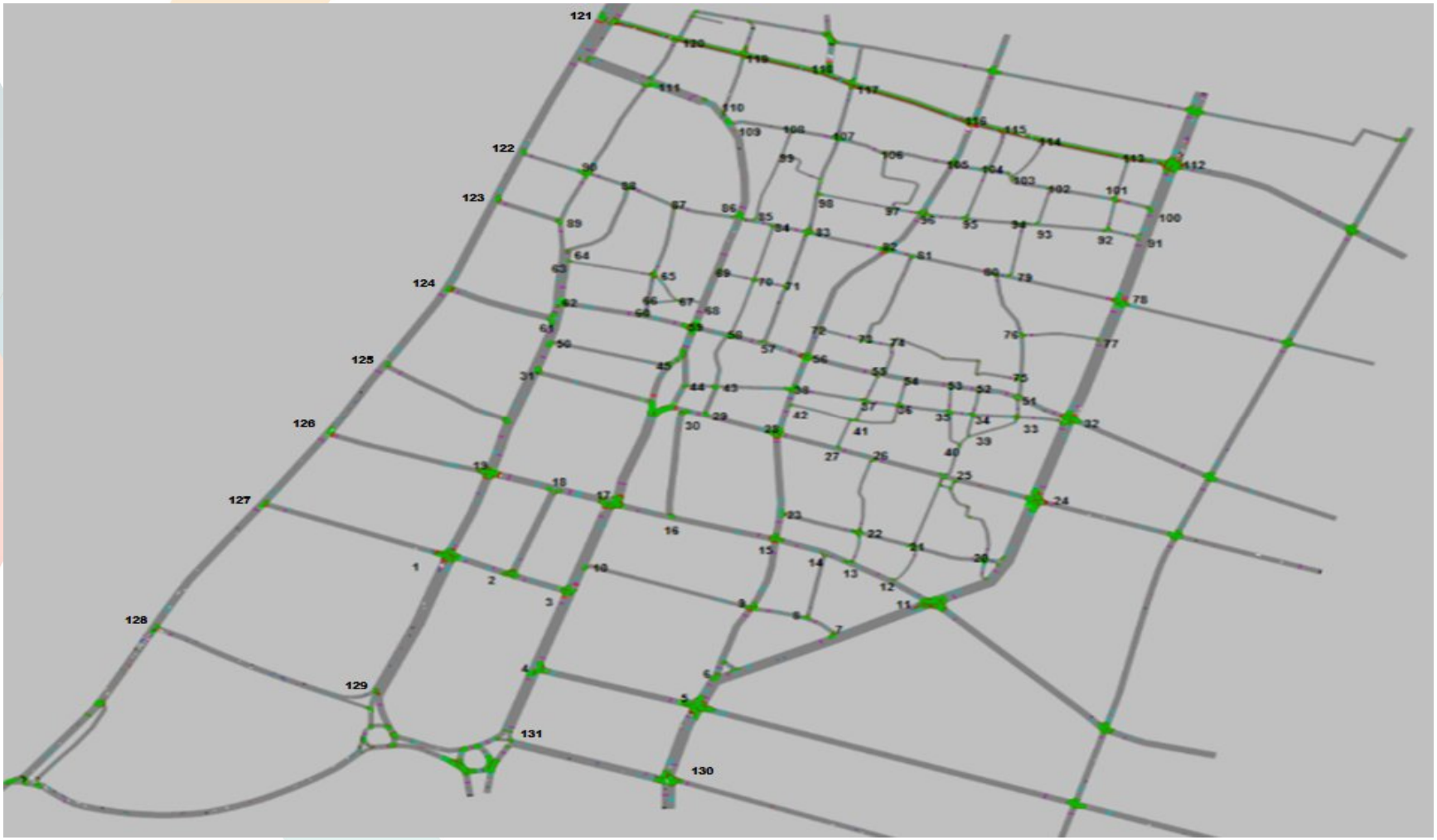
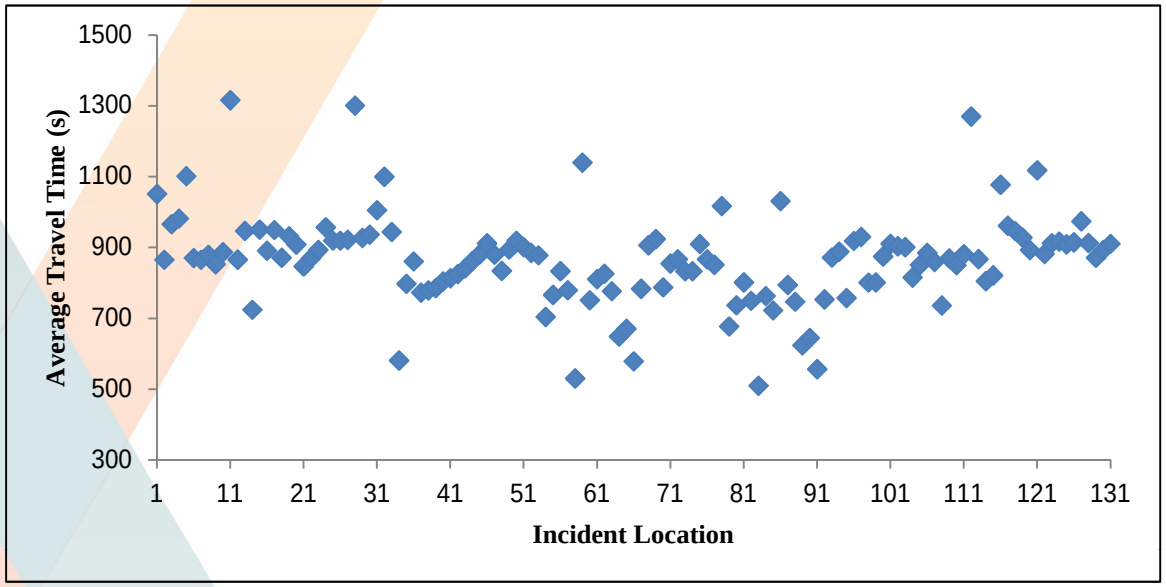
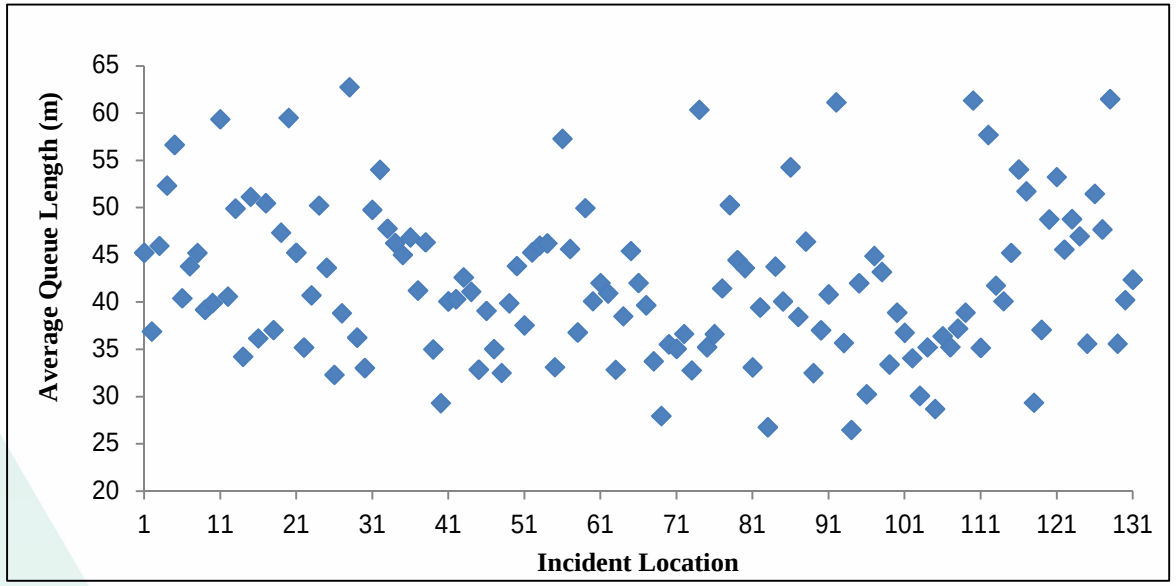
Simulation Analysis



Simulation Analysis





Expert Opinion Analysis

- Factors influencing the selection of critical locations are identified
- Pool of 45 signalized intersections and 52 mid-block locations
- AHP survey is done by using twenty experts' ratings
- Fuzzy analysis is done by collecting opinions of five experts

$$Y = a_1x_1 + a_2x_2 + \ldots + a_nx_n$$

Y=overall score, a_i = weightage of factors obtained by AHP, x_i = values obtained by defuzzification of the variables

Factors Influencing the Selection of Critical Locations

- Traffic Volume
- Scope of Diversion to Alternative Route
- Number of Lanes in Each Direction
- Traffic flow direction
- Proximity to Traffic Signal
- Proximity to Major Intersection

AHP Analysis

Factors	W_{10}	W_{15}	W_{20}	W_{avg}
Traffic Volume	0.205	0.219	0.216	0.213
Scope of Diversion to Alternative Route	0.233	0.222	0.224	0.226
No. of Lanes in each direction	0.144	0.162	0.174	0.160
Traffic flow direction	0.144	0.126	0.113	0.128
Proximity to Traffic Signal	0.111	0.118	0.118	0.116
Proximity to Major Intersection	0.163	0.154	0.155	0.157

	4	On Rabindra Sarani	60.67	Bentinck Street-Rabindra Sarani	71.44

- Wilcoxon signed-rank test


Sections
Background Im
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8. Stinson, M., and C. Bhat. A Comparison of the Route Preferences of Experienced and Inexperienced Bicycle Commuters. *Transportation Research Record: Journal of the Transportation Research Board*, No. 05-1431, 2004.