

# Expressway Incident Analysis Platform: Application of archived real-time incident data



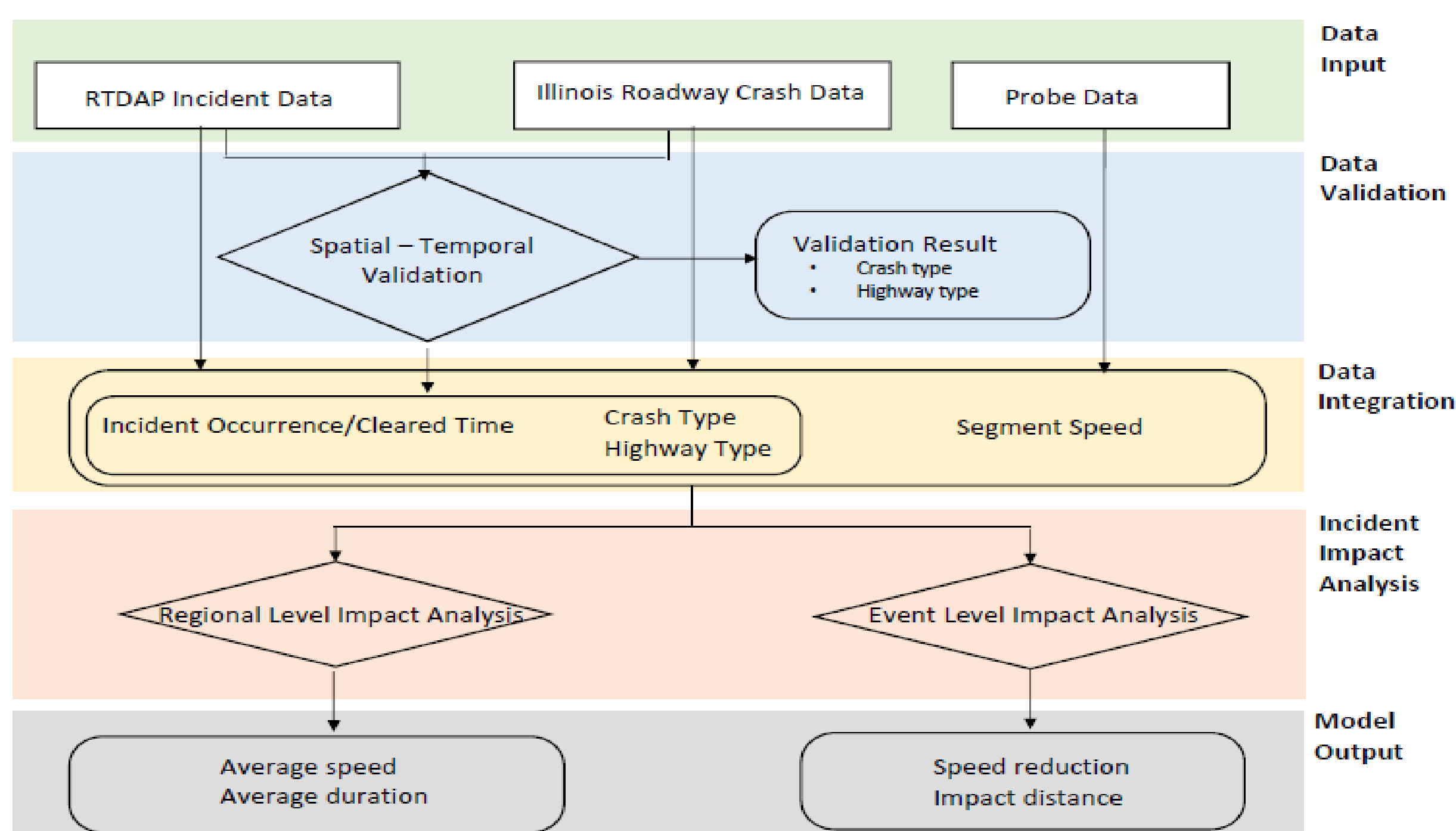
## Introduction

Expressway crashes are a major problem resulting in loss of lives and property in metropolitan regions across the world. Furthermore, crashes have additional consequences on the transportation system in terms of congestion. Real-time traffic data gives us a new opportunity to further explore the relationship between traffic crashes and traffic congestion. This study develops a platform to analyze real-time expressway crash data and explore crash impacts on the expressway system. The platform can validate archived real-time crash data and provide two levels of evaluation that captures both the regional incident impacts and the specific event-level impacts. This study also illustrates a case implementation in Chicago Metropolitan Area.

## Data Sources

- 2015 Incident data from CMAP's RTDAP (Regional Transportation Data Archive Program), an archive of IDOT's Gateway System.
- 2015 Illinois Roadway Crash Report Data, which is a wide variety of data reports about motor vehicle crashes.
- Expressway Speed Data, NPMRDS (National Performance Measurement Research Data Set)

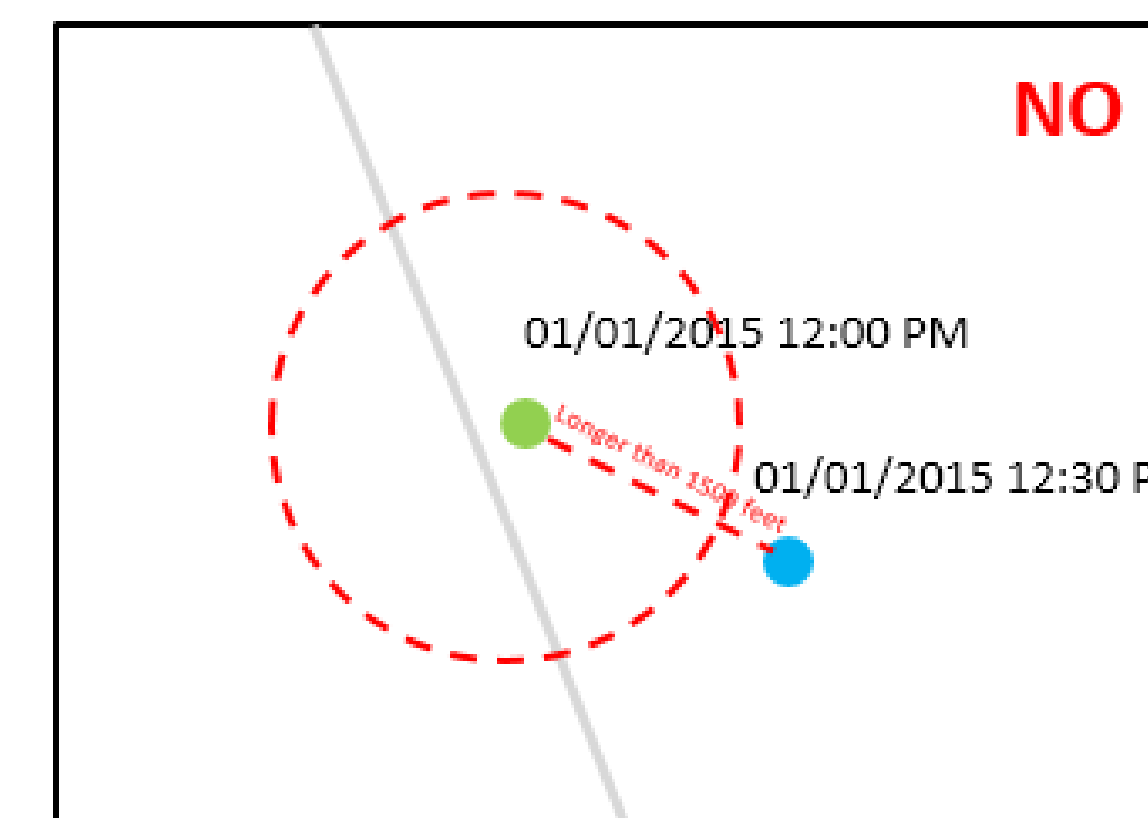
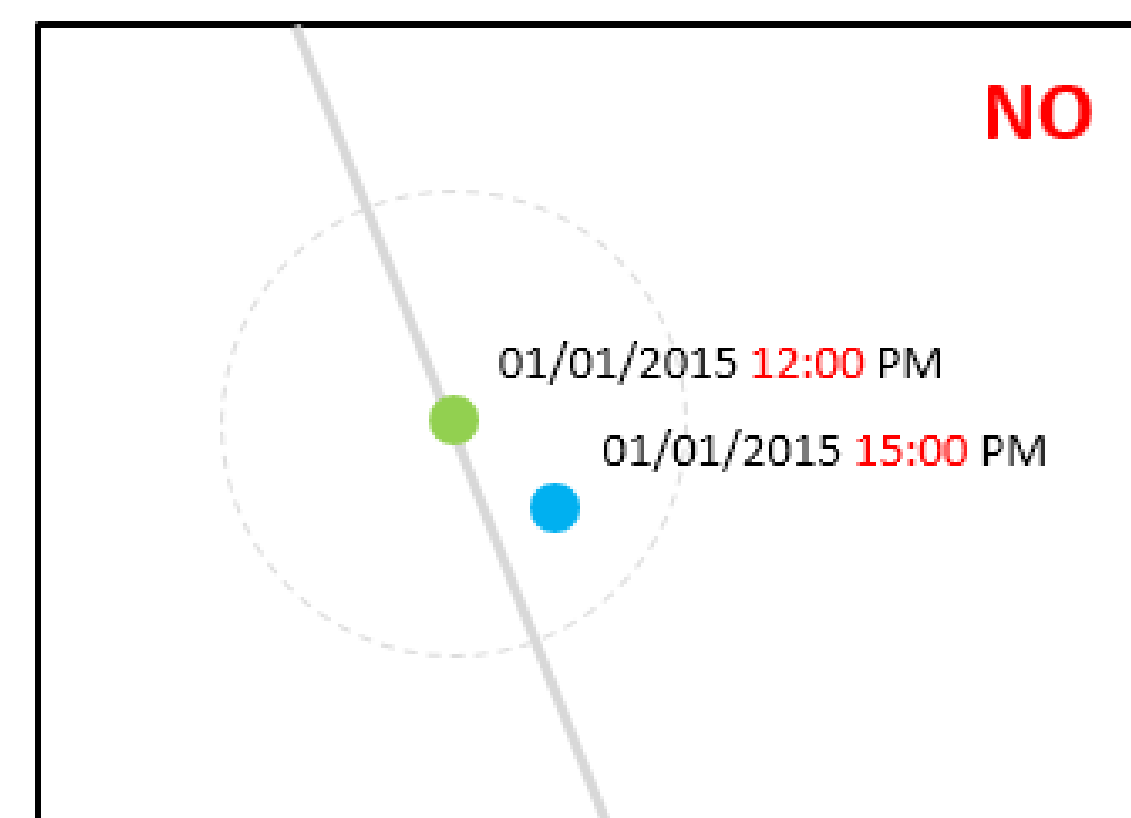
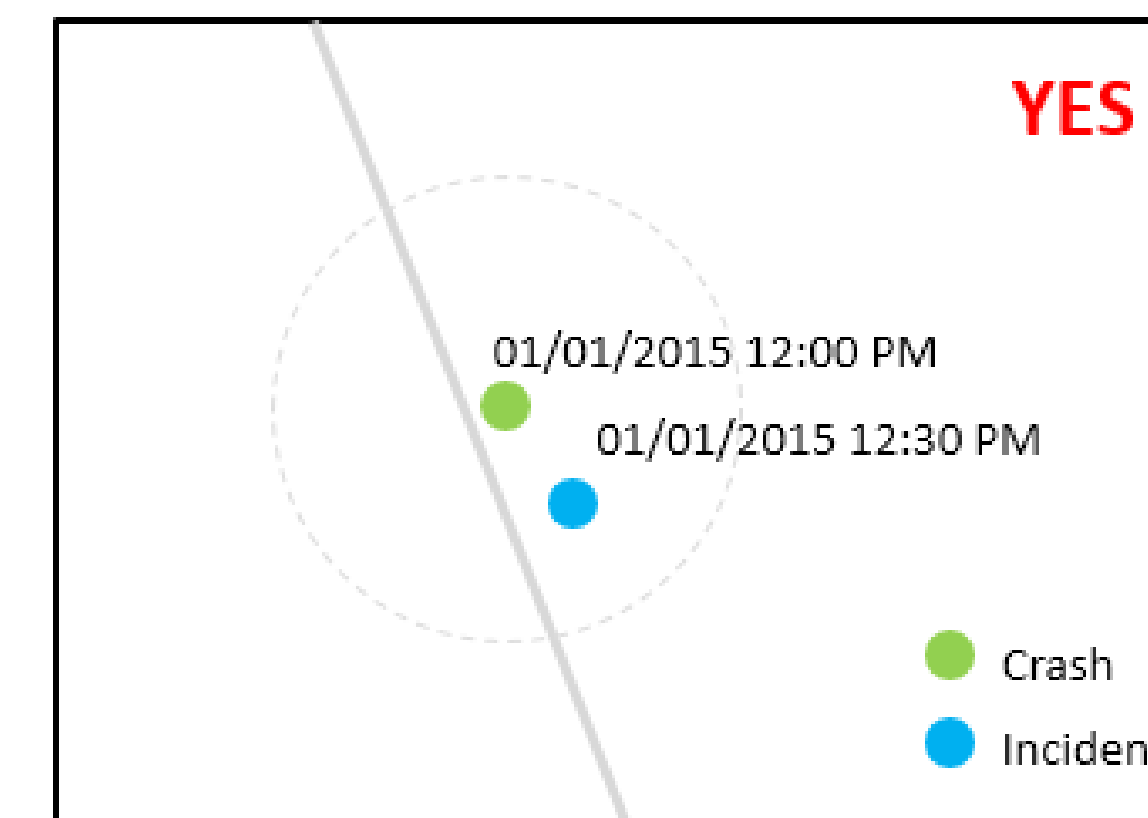
## Study Flow



## Methodology

### Validation

- Spatial Validation
  - Within 1500 feet
- Temporal Validation
  - Within 2 hours



### Impact Analysis

#### Regional Level Impact Analysis:

The regional level impact analysis will summarize the general impacts of incident.

$$\text{Average Duration} = \frac{\sum_i^n (\text{Cleared Time}_i - \text{Occurrence Time}_i)}{n}$$

$$\text{Average Speed} = \frac{\sum_i^n (\text{Incident Speed}_i)}{n}$$

#### Event Level Impact Analysis:

The event level impact will focus on the details of each incident event to demonstrate the impact between locations

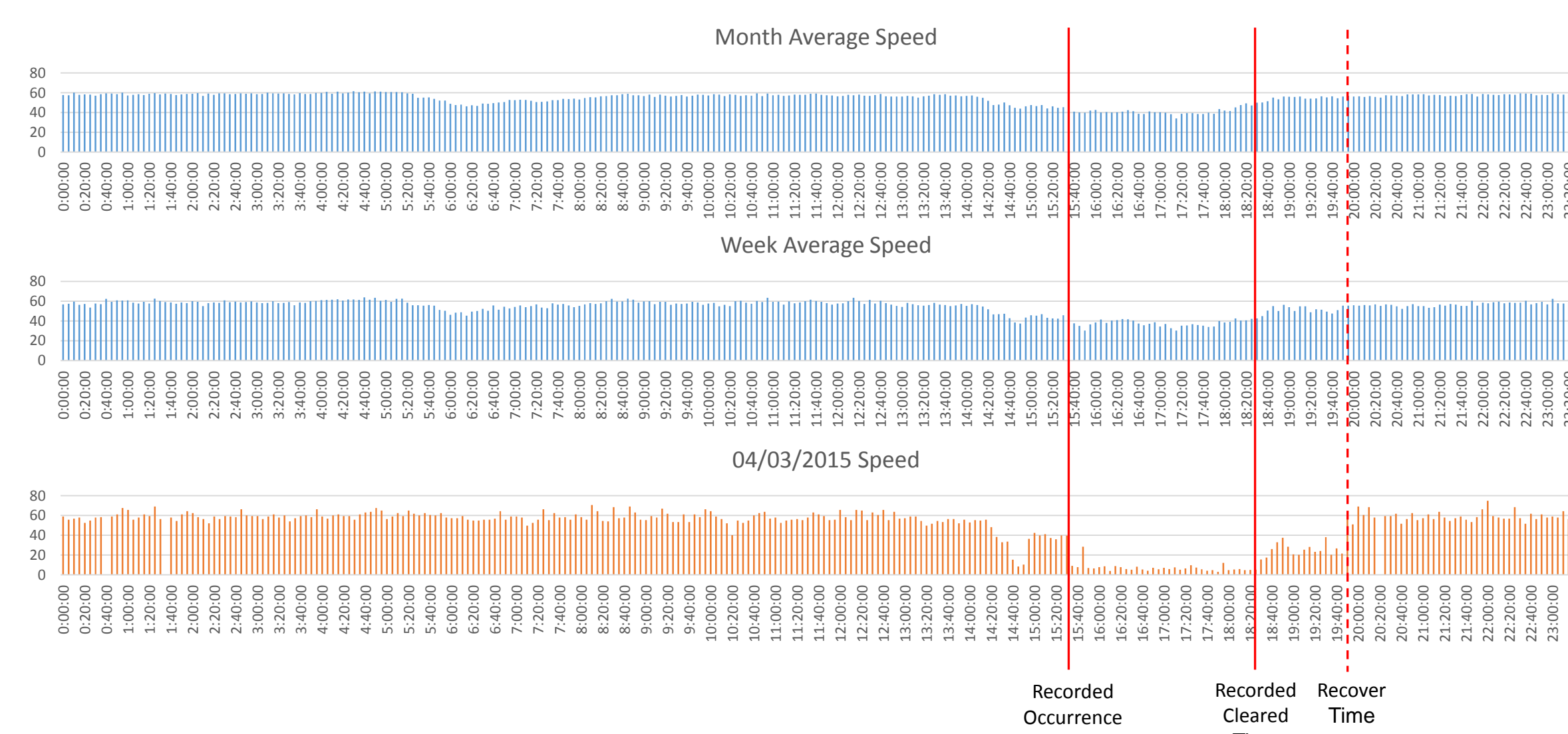
- Speed reduction by comparing the week/month average speed at the same location and time period of the day to note the speed reduction.
- Quantified incident impact distance by looking at up/down stream traffic speed.

## Result

### Regional Level Impact :

	Numbers of Crash	Numbers of Validated Incident	Percentage of Validated Incident	Average Duration	Average Speed
Fatal Freeway	51	19	37%	3:33	29.10
Fatal Tollway	13	6	46%	3:32	37.94
Type A Freeway	363	58	16%	1:16	33.20
Type A Tollway	90	38	42%	1:02	43.69
Fatal & Type A	517	121	23%	N/A	35.70
<b>Total</b>	<b>30436</b>	<b>1973</b>	<b>6%</b>	<b>N/A</b>	<b>N/A</b>

### Event Level Impact -- A Freeway Fatal Crash in I-55:



## Takeaways

- Crash severity affects the capture capability of real-time crash data significantly.
- The real-time data technology captures the fatal and serious injury crashes better than light injury crashes.
- The impacts analysis shows fatal crashes and serious injury crashes decrease the average travel speed in Chicago Metropolitan Area by 46.7% and 36.7%, respectively.
- The average duration of speed reduction associated with fatal crashes and serious injury crashes in Chicago Metropolitan Area is 3.5 hours and 1 hour, respectively.
- The mileage affected varies greatly, but a crash can cause speed reductions in segments up to 9 miles in length.