Guidance Tool for Implementation of Traffic Incident Management Performance Measures (NCHRP 07-20)

December 16, 2014

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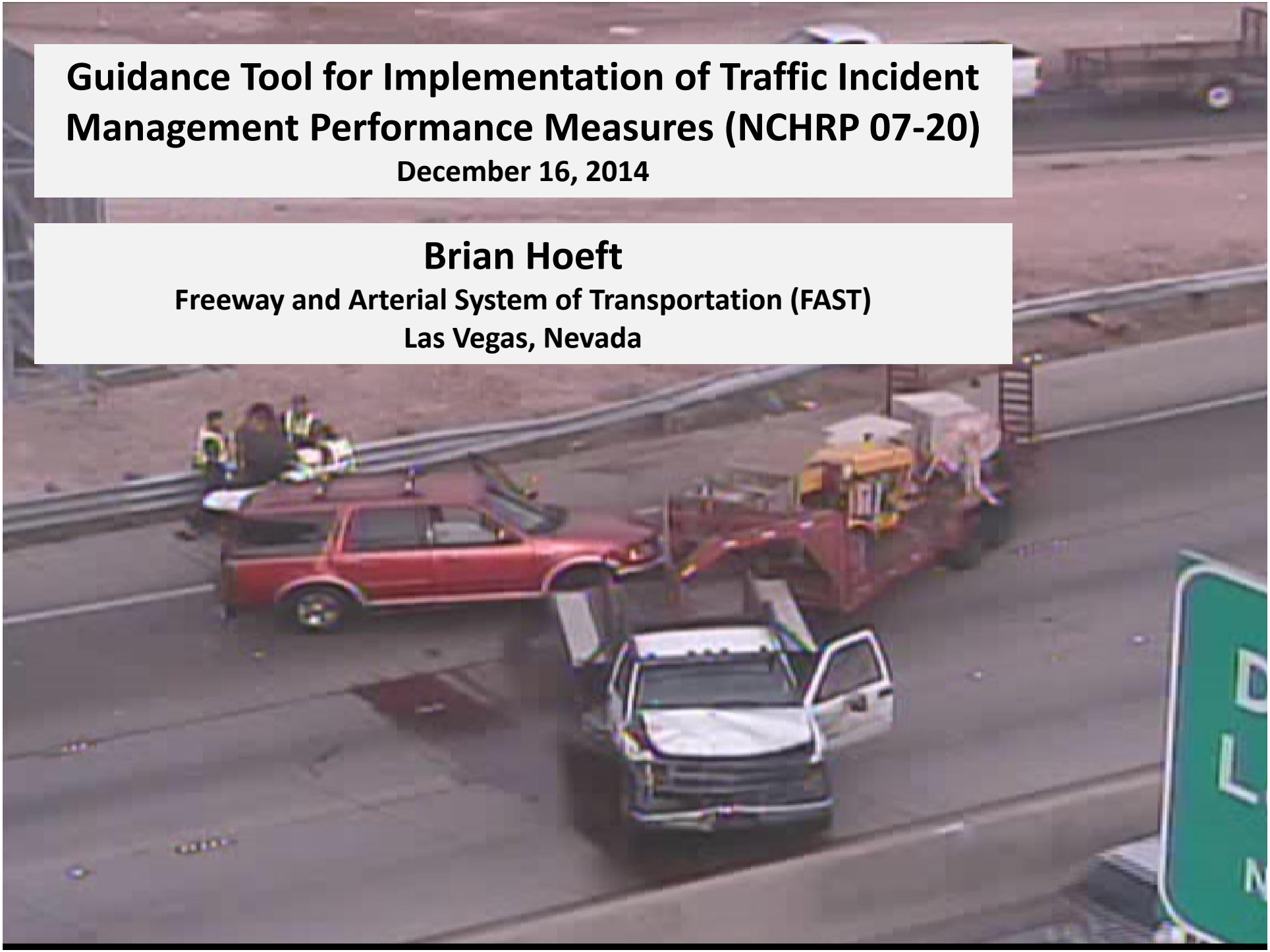
Freeway and Arterial System of Transportation (FAST)

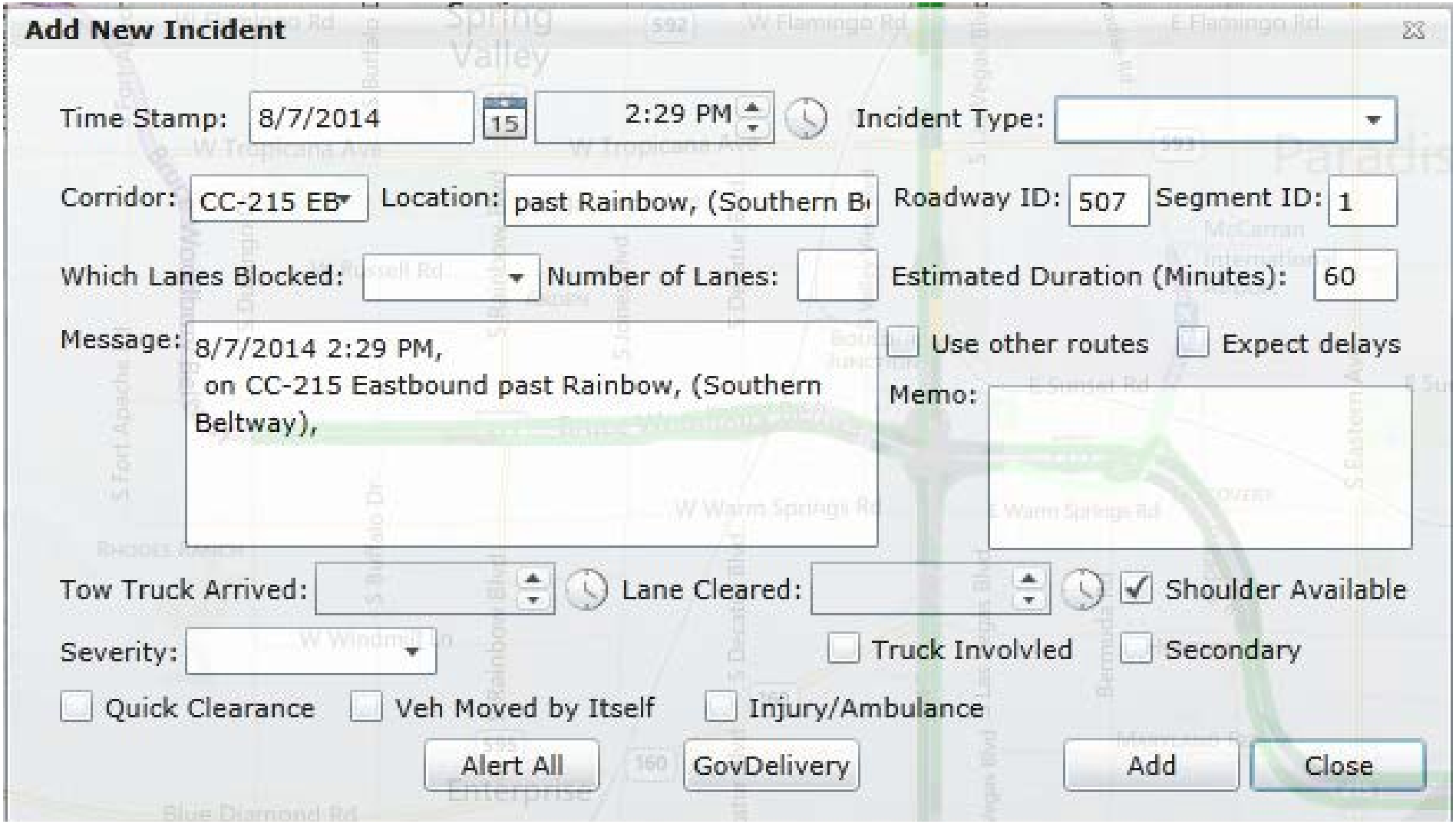
Las Vegas, Nevada



Highlights of FAST Dashboard and Incident Management Performance

- FAST examples from report
- Quantifying performance and reliability
- Next steps in Southern Nevada: Predictive opportunities using data mining of traffic sensor archives
- Secondary Crash example

Real-Time input



Data mining

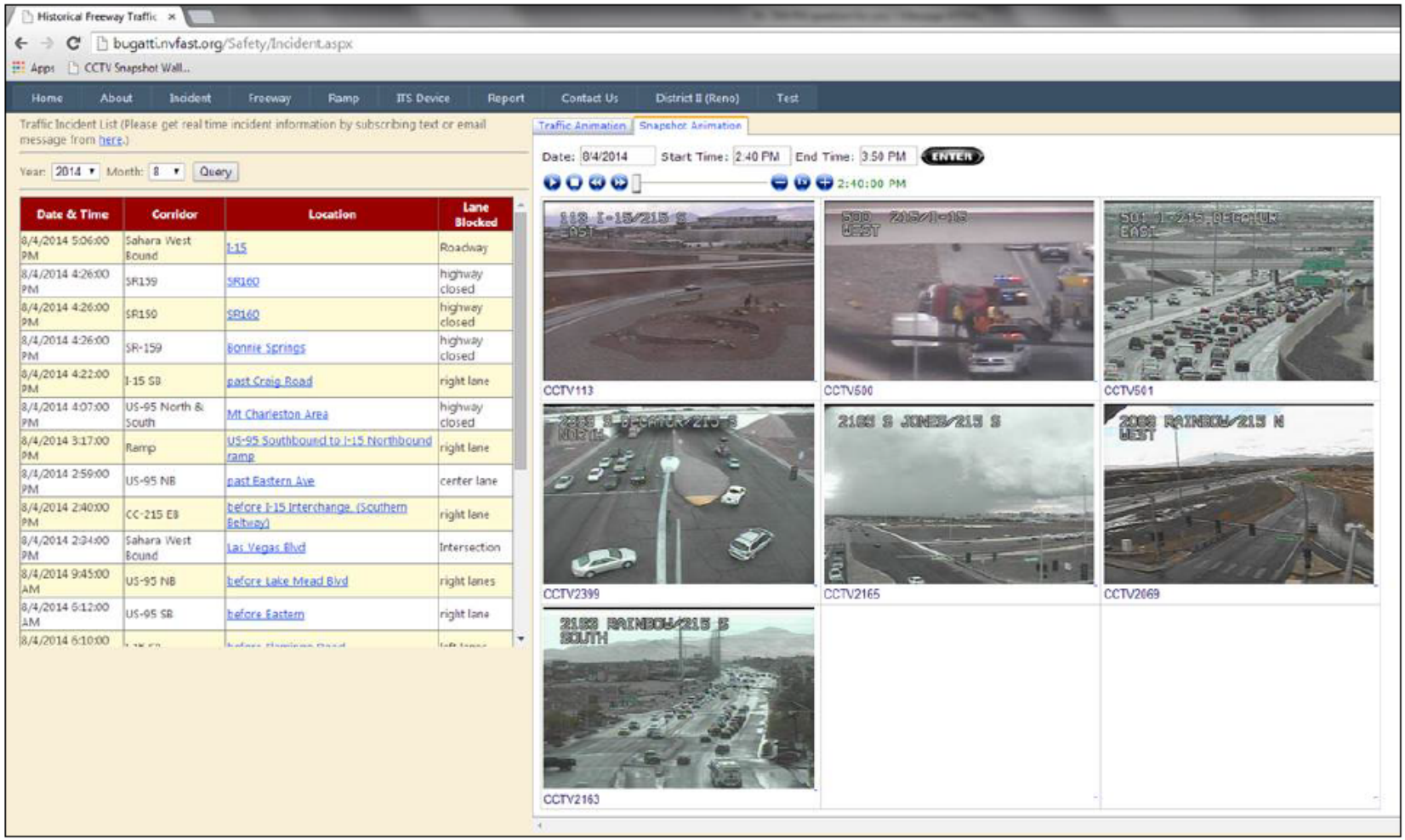
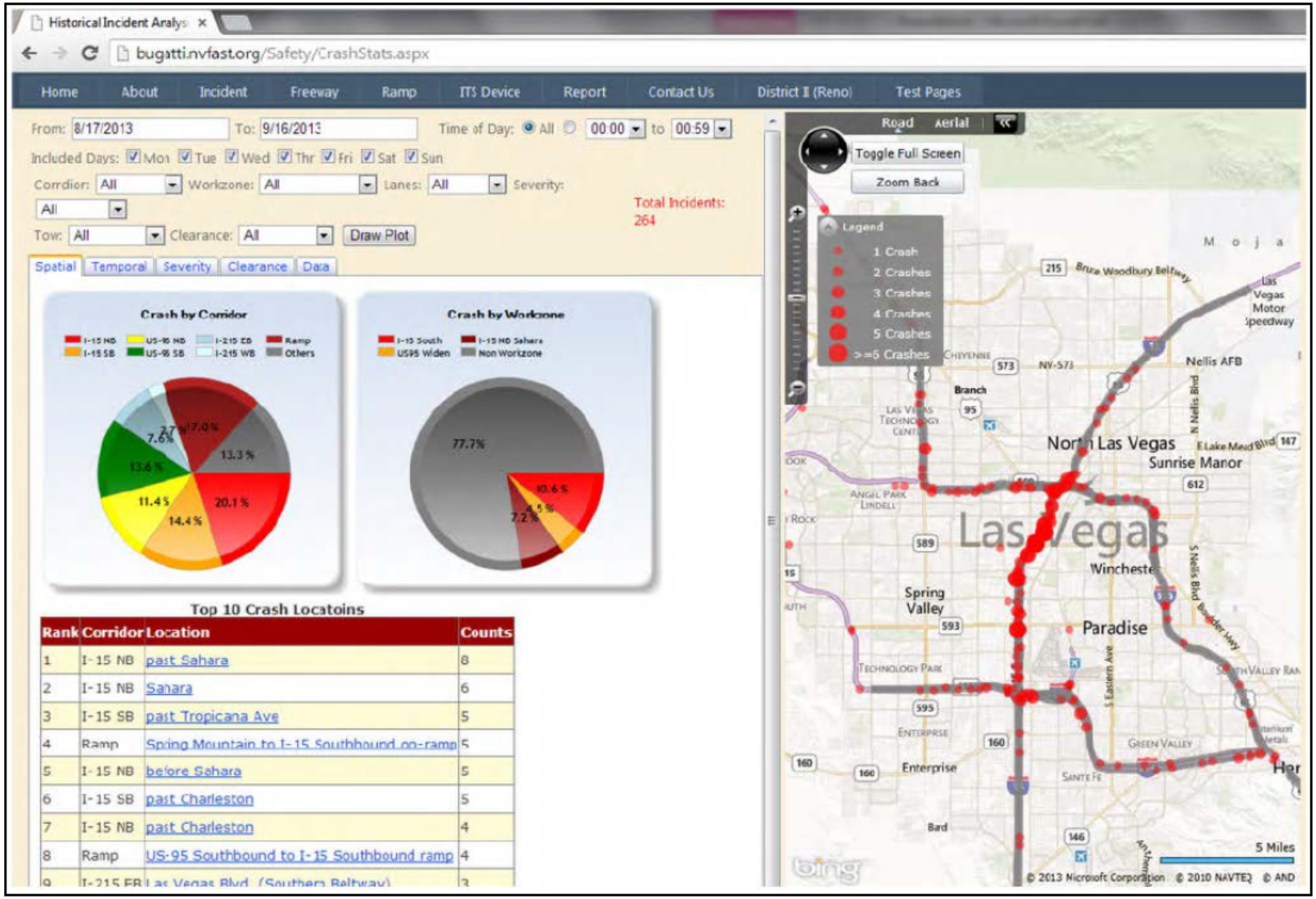


Figure 11. Snapshot Archiving Used for Data Mining
Graphics provided courtesy of FAST. Used with permission.

Reporting

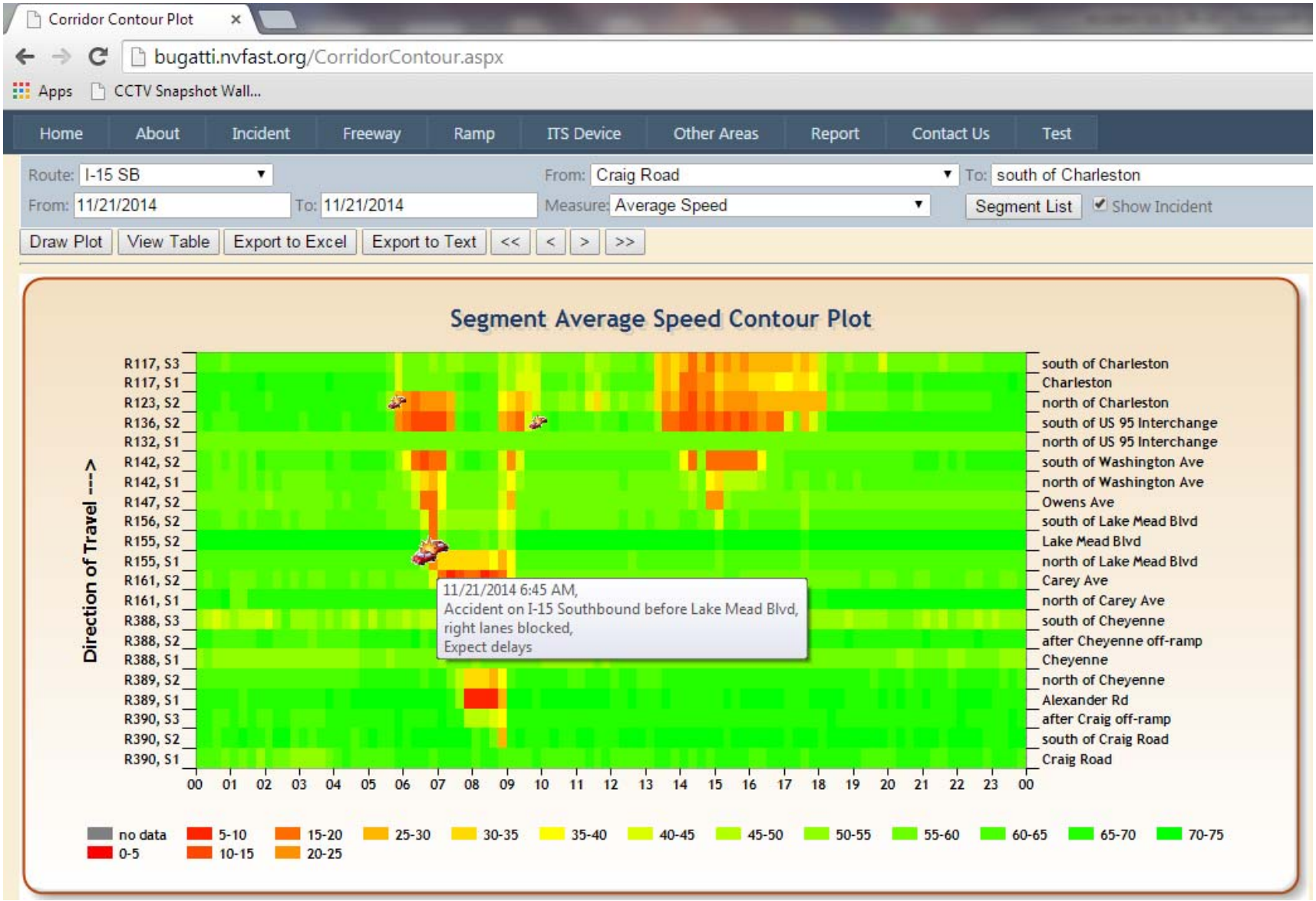


Source: FAST

Data sets

- Speed contour plots (congestion events)
- Volumes and speeds
- Travel time
- Congestion scores: broken down into congestion frequency and reliability

Speed Contour plot



Corridor Contour Plot

bugatti.nvfast.org/CorridorContour.aspx

Apps | CCTV Snapshot Wall...

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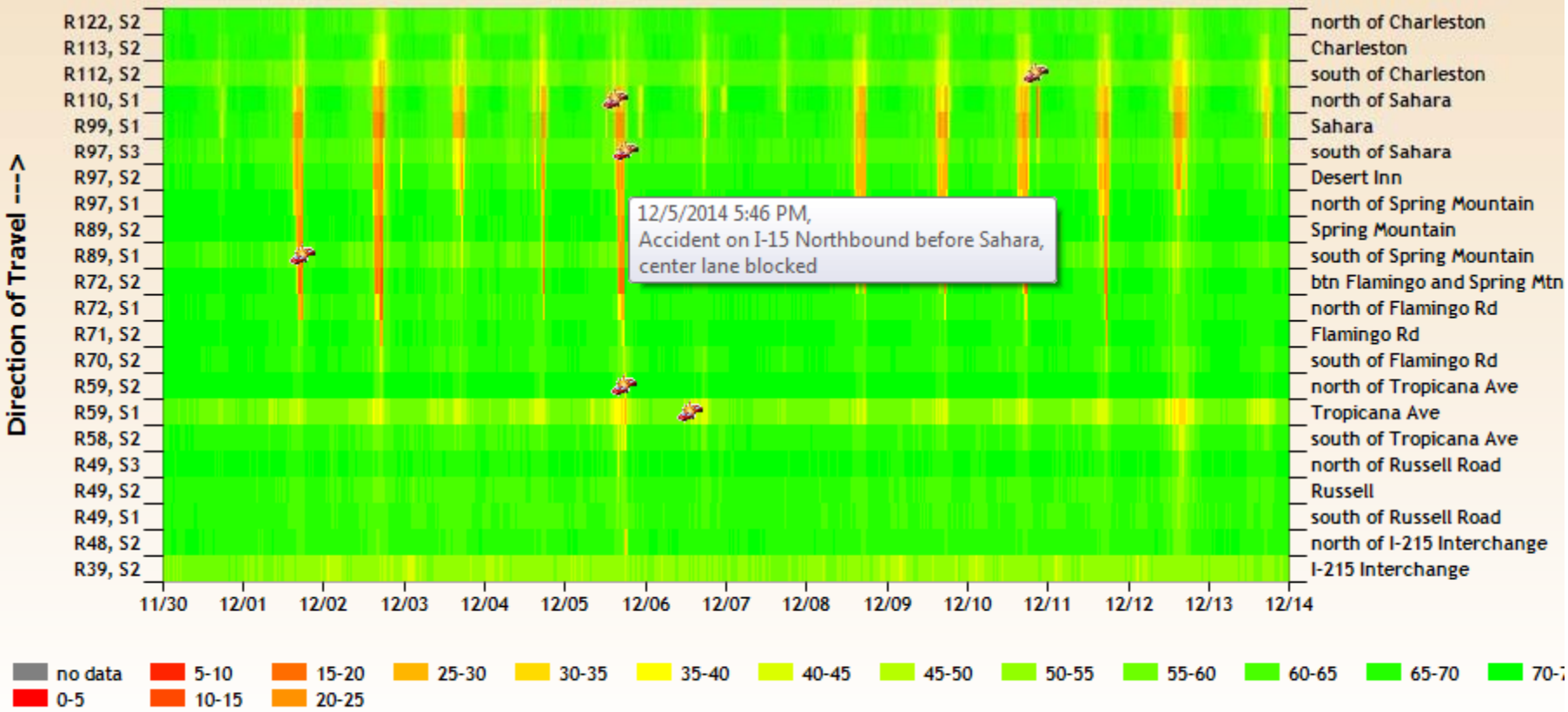
Route: I-15 NB | From: I-215 Interchange | To: north of Charleston

From: 11/30/2014 | To: 12/13/2014 | Measure: Average Speed | Segment List | Show Incident

Draw Plot | View Table | Export to Excel | Export to Text | << | < | > | >>

Segment Average Speed Contour Plot



	Average weekly volumes by season									
I-15 nb 2	Tropicana to Flamingo			Desert Inn to Sahara			Sahara to Charleston			
	14	13	12	14	13	12	14	13	12	
hol		891.5	894.6		835.6	847.4		867.8	871.8	
fall	959.1	917.2	911	910.2	859.6	860.4	917	883.8	871.4	
summer	972.5	941.4	905.9	918.3	883.1	859.1	938	910.1	914	
early sum	967.1	930.3	911.8	914.7	898.1	829.3	946.8	908.8	919.7	
spring	984.5	950.3	907.6	929.7	909.6		960.4	951.7	922.9	
beg yr	929.1	878.4	850	876.4	850.5		912.2	885	862.4	
avg	**962**	**918**	**897**	**910**	**873**	**849**	**935**	**901**	**894**	
	Average weekly speeds by season									
hol		65.9	66.2		61.1	62.0		58.7	60.1	
fall	66.1	66.5	66.3	60.2	59.9	60.7	58.7	57.4	58.8	
summer	66.2	66.0	66.4	60.7	59.5	61.3	58.9	57.6	50.1	
early sum	66.2	66.2	66.4	61.9	60.4	62.5	59.1	57.3	45.9	
spring	66.7	66.1	66.0	61.1	60.5		58.9	58.5	59.5	
beg yr	66.9	66.4	66.6	61.7	61.1		58.9	59.6	60.5	
avg	**66.4**	**66.2**	**66.3**	**61.1**	**60.4**	**61.6**	**58.9**	**58.2**	**55.8**	

Peak Period congestion: max delay, delay duration, start time of delay

			15 NB to US 95 PM (through Sah / Char bottleneck)						515 NB to I-15 AM						515 NB to I-15 PM				
11.02	14	Fall 2014	14	15	16	11	12	Fall 2014	6	6	24	17	6		14	16	20	25	0
10.26	14		7	16	10	10	10		0	0	14	0	0		11	25	11	7	0
10.19	14		15	10	10	13	9		0	0	5	0	0		14	10	6	10	12
10.12	14		18	12	9	10	12		5	6	0	5	10		0	10	10	10	11
10.05	14		10	7	12	12	15		6	0	5	6	6		7	5	10	8	8
9.28	14		10	9	11	16	17		12	9	6	0	0		8	8	19	8	7
9.21	14		11	9	9	8	8		5	7	7	6	0		0	10	8	15	7
9.14	14		10	8	8	11	13		6	6	6	5	5		5	8	7	7	7
9.07	14		13	0	9	13	8		6	8	7	7	6		14	6	6	6	17
8.31	14		8	8	9	7	9		0	6	9	7	6		0	9	12	11	18
8.24	14		6	9	9	11	15		0	8	7	9	5		0	8	5	8	13
8.17	14	Summer 2014	6	7	7	7	15	Summer 2014	8	0	0	7	0		0	7	0	0	0
8.10	14		6	0	8	12	15		8	0	0	0	0		0	5	0	6	7
8.03	14		19	10	7	10	8		7	0	0	0	0		8	9	0	5	6
7.27	14		13	0	8	13	16		0	0	6	0	0		6	5	5	5	5
7.20	14		5	9	9	10	7		0	0	0	0	0		0	0	20	7	10
7.13	14		20	10	27	0	7		0	0	0	0	0		0	4	0	0	0
7.06	14		6	11	9	9	11		10	0	0	0	0		0	9	0	0	5
6.29	14		22	5	0	6	0		0	0	4	11	0		0	4	5	5	0
6.22	14		5	8	25	8	13		0	5	0	0	0		0	5	4	0	0
6.15	14		14	11	8	8	12		0	0	5	0	0		0	0	0	6	0
6.08	14		14	22	13	10	10		0	0	0	5	0		0	0	0	0	0
6.01	14	Ear Sum 2014	7	5	0	8	7	Ear Sum 2014	0	11	6	6	6		19	0	6	0	7
5.25	14		0	11	5	9	7		0	20	0	0	0		0	0	8	11	15
5.18	14		12	25	5	4	6		0	0	0	0	0		0	8	6	11	8
5.11	14		0	9	9	7	8		9	0	0	14	0		0	6	6	8	7
5.04	14		12	6	0	9	16		8	0	0	0	0		0	8	16	10	7
4.27	14		5	5	15	12	17		0	5	4	0	0		0	7	9	8	12

I-15 NB: California Stateline to Craig

	14	13	12	11	10	9
		PM				
Flam-Charleston						
holiday		**407**	273	382	443	428
fall	**259**	**423**	340	472	410	458
summer	**256**	**363**	397	371	422	
early summer	**313**	**304**	344	353	319	
spring break	**241**	**357**	373	430	400	
begin year	**251**	**309**	403	392	396	

PROJECT 14 – 29: TRAFFIC PREDICTION AND RESPONSES THROUGH DATA MINING AND DATA STREAM PROCESSING

PROJECT UPDATE

Approach

- Data from FAST Dashboard Archive
- Data Collection architecture from FAST engineer
- Data Analysis
  - Completeness
  - Quality
  - Usability
- Prediction Model
  - Predictors
    - Past Traffic Data, Weather Data, Events Data
  - Initial approach is to use Vehicle Flow as the measure of performance of the various links available for analysis

Task 3 – Assess Approaches to Data Pattern/Mining

- Considerations to Pattern Recognition/Prediction
  - Is the goal to determine a state in which a particular section of highway will be at in the next prediction window or to know a specific value for flow or speed?
  - For example, we can predict a state of the system such as a level of service or free-flow, breakdown, or unstable regime (classification)
  - Or, we can predict a specific speed or flow rate in the next prediction window (regression)
  - Need to determine which is more useful to TMC operations

Secondary Crash example

CCTV Snapshot Wall Anin ×

bugatti.nvfast.org/CCTVSnapshotWallAnimation.aspx

Apps CCTV Snapshot Wall...

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Corridors: I-15 North (Spaghetti Bowl to Speedway) Date: 11/21/2014 Start Time: 5:00 aM End Time: 3:00 PM ENTER

7:00:00 AM

CCTV300 7:00 AM

CCTV301 7:00 AM

CCTV302 7

CCTV303 7:00 AM

CCTV304 7:00 AM

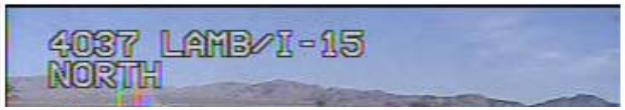
CCTV305 7

CCTV303 8:25 AM

CCTV304 8:25 AM

CCTV305 8:25 AM

CCTV306 8:25 AM

CCTV307 8:25 AM

CCTV308 8:25 AM