September 2012 **FHWA-NJ-2008-001**

New Jersey Department of Transportation
Bureau of Research

Technical Brief

Development of New Jersey Rates for the NJCMS Incident Delay Model

This study developed a working database for calculating incident rates and related delay measures, which contains incident related data in Year 2005 from various sources, such as the New Jersey Department of Transportation (NJDOT) Crash Records, Traffic Operation Center (TOC) incident data, TOC Emergency Service Patrol (ESP) data, and New Jersey Turnpike and Garden State Parkway incident data. In order to improve the output accuracy of non-recurring delay estimated by the New Jersey Congestion Management System (NJCMS), there is a need to develop the NJ specific incident rates, response times, and clearance times for both peak and off-peak periods. This study determined whether new data in the form of actual field observations of incidents (from the beginning to the end of an incident) will be reasonable and useful to supplement and tie together the existing data. An assessment of cost and benefit analysis was conducted, while a list of recommendations were provided at the end of this report.

Background

The New Jersey Congestion Management System, called the NJCMS, is a system of software and data tables that enables planners / engineers / analysts at the New Jersey Department of Transportation (NJDOT) and the Metropolitan Planning Organizations (MPOs) to analyze and monitor the performance of the roadway network through reporting performance measures including levels of service, volume to capacity ratios, delays and travel speeds statewide, or at the county, corridor or link level of analysis. Since some of the incident related inputs such as incident rates as well as clearance and response times were based on national data, New Jersey specific data is needed to calculate reasonably accurate rates and related measures for the NJCMS. In this study, the research team aimed to develop a prototype working database for gathering incident related information, which is heavily applied in this study for the NJCMS to provide reasonably accurate estimates for delay related measures.

Research Objectives and Approach

The NJDOT seeks to develop new incident rates and related measures (e.g., clearance and response times, etc.) for estimating non-recurring delay with the NJCMS. The main objectives of this study are:

- Determine if and how the existing incident reports and databases can be used to generate New Jersey specific estimates of incident rates, response time, and clearance time

- Determine if new data in the form of actual field observations of incidents (from the beginning to the end of an incident) will be reasonable and useful to supplement and tie together the existing data
- Develop an up-to-date working incident database to store the required information and generate reasonably accurate estimates for the NJCMS
- Conduct a cost and benefit analysis of this study
- Recommend methods to improve the data quality and the resulting accuracy from the NJCMS

Findings

(1) The study developed incident rates on freeways and arterials for the NJCMS are shown below:

Incident Rates on Freeways										
Time Periods	**ADT/C Range**	**Fatal**	**Injury**	**Property Damage**	**Elecl /Mechl**	**Stall**	**Flat Tire**	**Aband**	**Debris**	**Other**
AM PEAK	**0-7**	*0.007*	*0.251*	*0.912*	*2.426*	*1.024*	*1.962*	*1.688*	*0.538*	*1.102*
	7-10	*0.002*	*0.309*	*1.222*	*1.471*	*0.510*	*1.381*	*0.668*	*0.172*	*0.606*
	10-999	*0.001*	*0.332*	*1.398*	*2.123*	*0.810*	*1.668*	*0.998*	*0.303*	*0.703*
PM PEAK	**0-7**	*0.005*	*0.298*	*0.958*	*3.522*	*2.104*	*2.547*	*1.492*	*0.705*	*1.719*
	7-10	*0.003*	*0.319*	*1.233*	*2.352*	*1.204*	*1.760*	*0.706*	*0.259*	*1.214*
	10-999	*0.001*	*0.377*	*1.518*	*2.848*	*1.612*	*1.939*	*0.900*	*0.311*	*1.050*
MID-DAY	**0-7**	*0.005*	*0.304*	*1.016*	*3.869*	*2.285*	*3.140*	*2.551*	*1.147*	*2.337*
	7-10	*0.004*	*0.351*	*1.204*	*2.213*	*1.135*	*2.100*	*1.054*	*0.454*	*1.270*
	10-999	*0.007*	*0.378*	*1.241*	*2.768*	*1.716*	*2.332*	*1.330*	*0.522*	*1.451*
NIGHT	**0-7**	*0.014*	*0.346*	*1.148*	*2.164*	*1.334*	*1.654*	*2.162*	*0.482*	*1.000*
	7-10	*0.007*	*0.403*	*1.380*	*1.041*	*0.583*	*0.770*	*0.828*	*0.204*	*0.566*
	10-999	*0.006*	*0.462*	*1.392*	*1.662*	*0.982*	*1.074*	*1.529*	*0.242*	*0.729*
Incident Rates on Arterials										
AM PEAK	**0-7**	*0.009*	*0.728*	*1.792*	*2.426*	*1.024*	*1.962*	*1.688*	*0.538*	*1.102*
	7-10	*0.006*	*0.666*	*1.788*	*1.471*	*0.510*	*1.381*	*0.668*	*0.172*	*0.606*
	10-999	*0.000*	*0.732*	*1.819*	*2.123*	*0.810*	*1.668*	*0.998*	*0.303*	*0.703*
PM PEAK	**0-7**	*0.014*	*1.282*	*2.874*	*3.522*	*2.104*	*2.547*	*1.492*	*0.705*	*1.719*
	7-10	*0.008*	*1.212*	*2.834*	*2.352*	*1.204*	*1.760*	*0.706*	*0.259*	*1.214*
	10-999	*0.004*	*1.245*	*3.137*	*2.848*	*1.612*	*1.939*	*0.900*	*0.311*	*1.050*
MID-DAY	**0-7**	*0.012*	*1.194*	*2.736*	*3.869*	*2.285*	*3.140*	*2.551*	*1.147*	*2.337*
	7-10	*0.003*	*1.170*	*2.769*	*2.213*	*1.135*	*2.100*	*1.054*	*0.454*	*1.270*
	10-999	*0.005*	*1.158*	*2.838*	*2.768*	*1.716*	*2.332*	*1.330*	*0.522*	*1.451*
NIGHT	**0-7**	*0.030*	*1.237*	*2.748*	*2.164*	*1.334*	*1.654*	*2.162*	*0.482*	*1.000*
	7-10	*0.028*	*1.256*	*2.593*	*1.041*	*0.583*	*0.770*	*0.828*	*0.204*	*0.566*
	10-999	*0.017*	*1.166*	*2.697*	*1.662*	*0.982*	*1.074*	*1.529*	*0.242*	*0.729*

(2) The complete disablement incident data covering all the NJCMS links are needed for generating reasonably accurate rates of disablement incidents, which can be partially achieved by increasing the number of routes with ESP services and hours of operation. In addition, obtaining data from other available data sources will help to increase disablement incident data coverage.

(3) The slightly overestimated number of crashes was likely caused by the conversion of traffic volume from daily to annual in the NJCMS; therefore, it deserves a further investigation to examine this difference.

(4) It was found that the number of disablement incidents reported by the ESP database is much less than the number what was generated by the NJCMS. To develop reasonable estimates, the derived upward adjustment factors shall be applied to estimate the number of disablement incidents and the associated delay using the NJCMS.

(5) The Number of Incidents with Rates in the Top 10 Counties.

Rank	Crash Rates	No. of Crashes	Disable Incident Rates	No. of Disable Incidents
1	Essex	Middlesex	Mercer	Camden
2	Hudson	Bergen	Camden	Gloucester
3	Union	Union	Burlington	Morris
4	Passaic	Essex	Monmouth	Burlington
5	Sussex	Monmouth	Gloucester	Mercer
6	Camden	Morris	Cumberland	Somerset
7	Mercer	Camden	Salem	Essex
8	Cumberland	Ocean	Ocean	Middlesex
9	Somerset	Mercer	Somerset	Union
10	Bergen	Hudson	Middlesex	Hunterdon

(6) The Number of Incidents with Rates in the Top 10 Routes

Rank	Crash Rates	No. of Crashes	Disable Incident Rates	No. of Disable Incidents
1	NJ 439	GSP	I-676	I-295
2	NJ 82	I-95	NJ 29	I-78
3	NJ 63	US 1	I-76	I-287
4	NJ 184	US 9	NJ 42	I-80
5	NJ 182	I-80	I-195	NJ 55
6	NJ 140	I-78	I-295	I-195
7	NJ 67	I-287	NJ 55	NJ 42
8	NJ 93	US 46	I-95M	I-280
9	NJ 124	US 22	I-78	I-676
10	NJ 26	US 206	I-280	I-76

(7) The Number of Incidents with Rates in the Top 10 NJCMS Links

Rank	Crash Rates	No. of Crashes	Disable Incident Rates	No. of Disable Incidents
1	NJ 28 2.22~2.34	NJ 3 4.85~4.93	NJ 55 60~60.44	I-76 0.37~0.55
2	NJ 439 0.62~0.7	US 1	I-295 58~58.5	I-76 0~0.37
3	US 206	GSP	I-295 57~57.5	I-76 0.95~1.05
4	US 1	I-280	I-76 0.37~0.55	NJ 42
5	655 4.62~4.67	NJ 28 2.22~2.34	I-76 0~0.37	NJ 42
6	NJ 31	I-95 67.46~67.7	I-295 60~60.5	I-76 0.75~0.95
7	NJ 156	US 1	I-676 0.2~0.58	I-76 0.55~0.75
8	659 0.51~0.70	I-95 54.1~54.7	I-295 59~59.5	NJ 42
9	659 0.34~0.43	I-95 56.15~56.4	I-195 0~0.33	I-676 0.2~0.58
10	NJ 156	NJ 17 12.3~12.48	I-195 5.87~6.54	NJ 42

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A final report is available online at: http://www.state.nj.us/transportation/refdata/research/. If you would like a copy of the full report, send an e-mail to: Research.Bureau@dot.state.nj.us and request:

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NJDOT Research Report No: FHWA-NJ-2008-001