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Tech Brief

Alternative Performance Measures For Evaluating Congestion

FHWA-NJ-2004-006

April 2004

SUMMARY:

This report summarizes the results of the work performed under the project *Alternative Performance Measures for Evaluating Congestion*. The study first outlines existing approaches to looking at congestion. It then builds on the previous work in the area of evaluating congestion by incorporating the public's perception of what they consider to be congested through the use of a web-based survey. The idea of utilizing public input is not frequently seen in studies that look at congestion and its impacts and what makes this study additionally more unique is the focus on drivers in the State of New Jersey.

The results presented are specific to the area and allow for conclusions in terms of the entire state, various classifications throughout the state (age, income, etc.) as well as more disaggregated county level findings. The major findings of this effort are that New Jersey motorists are more tolerant of congestion than what is expected according to nationally used traffic engineering principles. The study also found that although New Jersey motorists are tolerant of congestion, they experience a very significant amount of stress while driving.

INTRODUCTION/BACKGROUND:

Transportation investments frequently must compete with other forms of government spending for scarce resources. Therefore, being able to accurately identify the cost of existing and future congestion is critical and allows decision-makers to develop a more accurate estimate of the potential benefits from the mitigation of congestion. Available and easy to use computer modeling systems allow the integration of congestion cost-benefit analysis within budget planning at the state, county and municipal levels.

Although there are many different ways to measure traffic conditions, in general, they fall into two broad categories – time-based and density-based. Time-based measures include variations on travel time, travel speed or travel rate (the inverse of speed).

Density-based measures include volume, density (vehicles per mile), or volume to capacity (v/c) ratio. Traffic engineers tend to favor density-based measures for several reasons: the data is far less costly and time-consuming to obtain, calculations are simplified through standardized computer software packages, and comparisons are more easily made among different roadways. The traveling public, as well as public officials, favor time-based measures because they can be directly measured, i.e. how long did it take me to travel from point a to point b, what was my average speed, or how long was my wait in a toll plaza queue.

This study builds on previous work in the area of evaluating congestion by incorporating the public's perception of what they consider to be congested. The idea of utilizing public input is not frequently seen in studies that look at congestion and its impacts and what makes this study additionally more unique is the focus on drivers in the State of New Jersey. The results presented are specific to the area and allow for conclusions in terms of the entire state, various classifications throughout the state (age, income, etc.) as well as more disaggregated county level findings.

RESEARCH APPROACH:

While the literature reviewed presented a variety of approaches to evaluating congestion, there is very little evidence of public input into deciding when roadway conditions are congested, and, when they are, what are the impacts of congestion. NJIT developed a web-based traffic congestion survey as part of this research project. The main objectives of this survey were to:

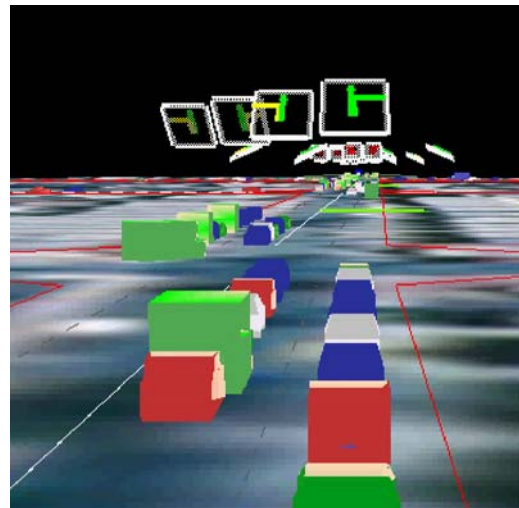
- Gauge New Jersey drivers' perception of congestion
- Quantify the stress that drivers experience in New Jersey
- Identify the most congested locations (intersections or roadway sections) in New Jersey

Due in large part to the NJDOT press release advertising the web-based congestion survey, there were 1,393 survey responses between the end of March and beginning of August 2003. The responses were analyzed by NJIT and summarized in the study's final report.

FINDINGS:

Perception of Congestion

The congestion survey contains a series of short video clips depicting various intersection and freeway traffic conditions. Each respondent is asked to view each of the



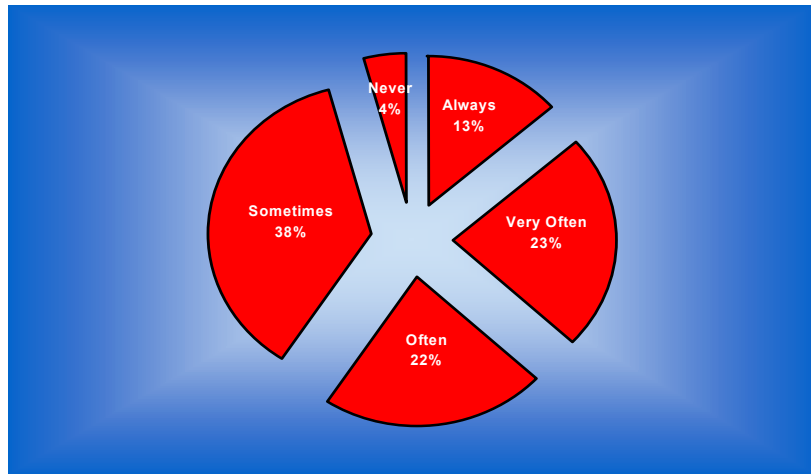
In order to measure the NJ drivers' perception of congestion, the research team designed a series of short video clips depicting various traffic conditions that the motorists may encounter.

clips and rate the level of perceived congestion depending on the type of trip that he/she would be making (work, shopping, vacation). The conditions presented in the video clips are based on traffic engineering principles used nationwide. This approach allows for a comparison of the New Jersey drivers' perceived congestion and the nationwide levels used by traffic engineers.

For each of the six scenarios presented in the survey, the survey respondents perceive the congestion level to be lower than defined by traffic engineering.

Stress Experienced While Driving

While the New Jersey drivers tolerate congestion, they seem to experience high levels of stress. Several of the survey questions deal with this issue asking the motorists to share how often they experience stress while driving. The respondents are asked about this frequency and how it varies based on the trip purpose (work, shopping, shore). They are also asked about whether they have observed an increase in frequency of stress while driving.



NJ motorists were asked how often they experience stress while driving to work. The above figure shows the breakdown of responses. A staggering 96% of the survey respondents experience some stress with 58% driving stressed often, very often or always.

Congested Locations

Another part of the survey deals with identifying the most congested locations across New Jersey. Motorists taking the survey are asked to identify locations throughout the State where they routinely experience congested conditions. Once the results of this were collected, the research team began to tabulate and map the results in order to pick out those locations that received the highest number of complaints.

Rank	Location	County
1	Garden State Parkway at the Union Toll Plaza	Union
2	I 295 and NJ 42 Interchange	Camden
3	Lincoln Tunnel	Hudson
4	Garden State Parkway and I 280 Interchange	Essex
5	NJ 24 and I 78 Interchange	Union

The survey respondents were asked to identify up to five locations where they encounter congestion on a regular basis. The top five locations are summarized in the table above.

CONCLUSIONS:

This report presented a very detailed overview of existing congestion measures. In addition to the overview of the existing congestion measures, this report presented a unique approach to looking at and evaluating congestion for the State of New Jersey. Incorporating the public's views into the process of establishing what is congested, evaluating congestion impacts and identifying congested location throughout New Jersey are the main components of this part of the study. Surveying the public is one of the best ways to understand congestion and its impacts because there is no better source than the people who use the State's roads on a daily basis. The successful survey distribution resulted in an extremely rich database of 1393 responses that can be used as a reference after the completion of this study. Some of the major findings of the survey analysis are:

1. New Jersey drivers are more tolerant of congested roadway conditions than the national average based on 2000 HCM traffic engineering principles used throughout the country.
2. The tolerance towards road congestion decreases as the drivers get older.
3. Although the respondents showed high tolerance for congestion, they also experience a great deal of driving stress with 58% of the respondents experiencing stress often, very often or always and only 4% never experiencing stress on their way to work.
4. Critical congested locations that can be used for potential NJDOT "Quick Fix" initiatives were identified throughout the State based on the respondents experiences.

RECOMMENDATIONS:

This study began an important process of looking at the potential impacts congestion and driving may have on individuals. Driving related stress and road rage are critical issues that are very common in New Jersey. This is clearly an area that deserves further study to see the extent of the problem as well as potential ways of alleviating it. Evaluating congestion in terms of delays and costs should only be a part of the process of identifying the problem. Identifying the impacts that are more difficult to quantify but are no less important to the driving public should also be factored in. The high level of tolerance should not be taken as a sign that everything is copasetic because it is very realistic that the tolerance has been built up through the years of driving on poor quality and congested roads that in turn resulted in high levels of stress leading to incidents of road rage.

FOR MORE INFORMATION CONTACT:	
NJDOT PROJECT MANAGER:	Ms. Nancy Ciaruffoli
PHONE NO.	609-530-6456
e-mail	Nancy.Ciaruffoli@dot.state.nj.us
UNIVERSITY PRINCIPAL INVESTIGATOR:	Dr. Lazar N. Spasovic
UNIVERSITY:	New Jersey Institute of Technology
PHONE NO.	973-596-6420
e-mail	spasovic@njit.edu

A final report is available online at

<http://www.state.nj.us/transportation/research/research.html>

If you would like a copy of the full report, please FAX the NJDOT, Division of Research and Technology, Technology Transfer Group at (609) 530-3722 or send an e-mail to Research.Division@dot.state.nj.us and ask for:

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