



Research Newsletter

Minnesota Department of Transportation
Research Services Section
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Office of Investment
Management

July-August 2006

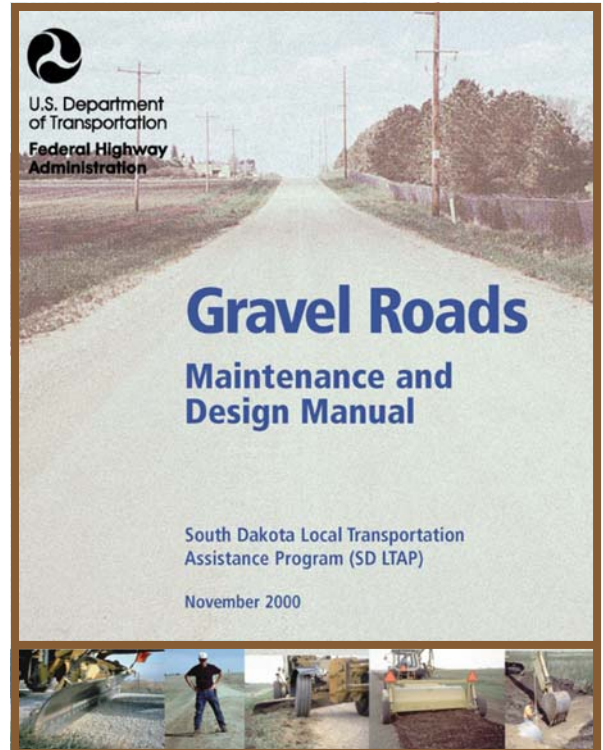
Issue 11

Gravel Road Maintenance: Meeting the Challenge

The Minnesota Department of Transportation's State Aid for Local Transportation Division recently funded a maintenance operations project titled "Motor Grader and Gravel Road Maintenance Techniques Training Video and Suggested Instructional Guide." This toolkit consists of a six-part DVD and two PDF instructional resources and can serve either as a stand-alone tutorial or as an instructor's tool to introduce the topics of gravel road maintenance.

The primary objective of this DVD is to show maintenance workers, supervisors and engineers the right way to perform gravel road maintenance. The secondary objective is to show the public what can be done, what is being done and why it needs to be done. The DVD was designed to be used as a training tool in conjunction with the Federal Highway Administration's "Gravel Roads Maintenance and Design Manual." To request a copy of the complete DVD and instructional documents or to watch a video clip, go to the following link: <http://www.mnltap.umn.edu/resources/videos/GravelRoadMaintenance>.

The Minnesota Local Technical Assistance Program created the toolkit in partnership with SRF Consulting Group and was the topic of a national LTAP Knowledge Roundtable on April 19, 2006. Knowledge roundtables are free conference calls organized by the LTAP Clearinghouse in Washington, D.C. to help the nationwide network of LTAP and Tribal Technical Assistance Program centers learn and share ideas and information.



Gravel roads DVD cover

Calendar of Events

October

4-5	Minnesota Fall Maintenance Expo, St. Cloud Contact, Kathy Warren at 651/351-7432 or kwarren@usinternet .
18	22nd Annual Conference on Policy Analysis, St. Paul Contact, Electra Sylva at 612/624-3708 or conferences5@cce.umn.edu . To register online please visit www.cce.umn.edu/policyanalysis .

November

2-3	Toward Zero Deaths Conference, Duluth Contact, Shirley Mueffelman at 612/624-4754 or smueffel@cce.umn.edu .
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2006 New Jersey Peer Exchange

On June 21st and 22nd, 2006 the New Jersey Department of Transportation hosted a Research Peer Exchange.

Five state DOTs (New Jersey, Utah, North Carolina, Delaware, and Minnesota) and two Federal Highway Administration (New Jersey, New York) representatives were in attendance.

The 2006 New Jersey Department of Transportation's Research Peer Exchange selected topics were:

- 1) Implementation of Research Project Findings and Projects.
- 2) Tracking the Performance of the Innovations.
- 3) Marketing the Research Bureau and Program and Marketing Project Findings and Products.



2006 New Jersey peer exchange meeting

The report detailing the meeting and other information is available at <http://www.state.nj.us/transportation/refdata/research/news.shtm>.

The meeting was broken into four topic areas. Some of the highlights include:

- 1) Background Information on the Research Program:
 - New Jersey uses concept of "pipelines" for different size projects:
 - 1) Full research-long term
 - 2) Rapid research 12 months or less
 - 3) Survey/Literature search
 - New Jersey color coded table of ranking form demonstrates what customer areas/units.
- 2) Project Implementation and Technology Transfer:
 - New Jersey 's implementation database has tabs for marketing, training, and the implementation plan.
 - North Carolina hires professors for up to 80 hours to conduct training; after the research contract expires.
 - Utah requires Principal Investigators to provide PowerPoint presentations with each report.
 - Utah asks project champions to give status of implementation and cost savings 3 to 4 years after the research is completed to publish the benefits.
- 3) Tracking Performance and Innovation:
 - Most of the state DOTs in attendance do not have formal performance measures.
- 4) Customer Relationship and Marketing:
 - Utah annually prepares write-ups for selected research projects and submits to the communications group to run on local television stations.

Additional information on peer exchanges can be found at <http://www.tfhr.gov/services/faq.htm>. A peer exchange is a great way for sharing knowledge among professionals in the field!

Ann McLellan represented Mn/DOT's Research Services Section at the meeting. For more information, please contact Ann McLellan at 651/282-2692 or ann.mclellan@dot.state.mn.us.

July 2006 Research Advisory Committee Meeting

On July 10 – 13th, 2006 the AASHTO Research Advisory Committee held it's annual meeting in Columbus, Ohio. It was hosted by AASHTO Region 3 and by the Ohio Department of Transportation.

RAC provides overall transportation research advice to the Standing Committee on Research and the AASHTO Executive and Policy Committees. RAC helps SCOR accomplish its goals by providing assistance in identifying research needs, defining research emphasis areas, utilizing research findings, maintaining an overview of State-related research activities and funding, and employing the National Cooperative Highway Research Program effectively.

The RAC's annual meeting provides an opportunity for the committee to conduct its annual business and to network with others interested in transportation research. The meeting's theme was "Transportation Research: From Your Doorstep to the Stars". Discussions focused on what needs to be done today to prepare for the long-range future of transportation and the role, if any, the Standing Committee on Research (and RAC as the agent of SCOR) should have in the identification and development of a national research agenda. Sessions covering local as well as national research activities were offered in addition to a variety of exhibits by government agencies, university transportation centers and others.

For agendas and presentations for this year's meeting, please visit <http://www.dot.state.oh.us/AASHTORAC2006/>.

Sue Lodahl and Cory Johnson represented Mn/DOT's Research Services Section at the meeting.

For more information, please contact Sue Lodahl at 651/282-2270 or sue.lodahl@dot.state.mn.us, Cory Johnson at 651/205-4698 or cory.johnson@dot.state.mn.us.

AL Corner



Dan Warzala

The primary role of an Administrative Liaison is to monitor projects for contract compliance. This also entails ensuring all panel members are briefed and familiar with their roles and responsibilities, that project deliverables are submitted in a timely manner and panel meetings are scheduled and held when required. Additionally, the AL coordinates and mediates as necessary.

Dan Warzala is one of the ALs in the Research Services Section and is a Research Program Administrator. He is the AL for more than 40 research projects, with the majority focused on traffic, pavement and the environment. He also has the responsibility for the Research Process Manual and the National Cooperative Highway Research Program

Mr. Warzala holds a Bachelors degree in Mathematics from the University of Wisconsin. He has been with Mn/DOT for 22 years. Prior to coming to Mn/DOT, he worked in private industry.

Dan can be reached at 651/282-2691 or dan.warzala@dot.state.mn.us

Performance Effectiveness of Design-Build, Lane Rental and A + B Contracting

Over the past several years, many government agencies have experimented with new and different contracting methods in the delivery of public infrastructure. Many of the methods have been approved by the Federal Highway Administration. Three of those innovative contracting methods were investigated in this report and they were compared to the traditional contracting methods. The three methods were:

A + B with an incentive option (I/O)

Lane rental

Design-Build contracts

Now that these innovative contracting methods have been used for several years in numerous states and the federal government recognized and defined many standards for innovative contracting, there was a need to investigate and compare the effectiveness of the different methods.

The results indicated that A + B contracts received the highest effectiveness score for each project type. Therefore, for all project types considered in this study, A + B contracts should create the greatest value. The use of lane rental contracting has been underutilized but on recent projects has shown great value in reducing both road user costs and delays.

Use of the design-build contracting was highly effective for urban projects of high complexity; however, the study was too exploratory and relied on such a small sample to allow for definitive conclusions. Technically, design-build could be used for any project type. The study was helpful in delineating the best practices for design-build, as well as areas for improvement. Many of the best practices of design-build contracting can be transferred to other contracting methods.

The entire study resulted in 15 recommendations for improving management practices in the use of innovative contracting for transportation projects. The recommendations will also assist Mn/DOT in determining which contract method will be most effective given particular project criteria and construction options. The study will also determine directions for future research, particularly on emerging methods such as design-sequencing and A+B+C contracting.

To view the report, please go to <http://www.lrrb.org/pdf/200609.pdf>.

For further information, please contact Tom Ravn at 651/296-6599 or tom.ravn@dot.state.mn.us.

A Nonlinear State Space Approach to Arterial Travel Time Prediction

Travel time is the time required to pass through a route between any two points of interest and it is an important parameter that can be used to measure the effectiveness of transportation systems. This information is needed to identify and assess operational problems along highway facilities. It is also necessary in traffic signal timing control coordination, incident detection, traffic assignment algorithms and economic studies, etc. The ability to accurately predict freeway and arterial travel times in transportation networks is a critical component for many Intelligent Transportation Systems applications.

This project studies the arterial Travel Time Prediction using the time series analysis and Kalman prediction techniques. Travel time is used as a performance measure because it is the most common way that drivers measure the quality of their trip and it is also a variable that can be directly measured. The availability of travel time data is essential for the development of "good" model(s), which can further affect the quality of TTP results. The data recorded can be considered and treated as a collection of observations made sequentially in time. Any quantity recorded over time yields a time series. Therefore, in the first part of this study, the time series models and analysis tools are first introduced. Particularly, we focus on the autoregressive integrated moving average, or ARIMA modeling, because travel time data have non-stationary characteristics. The fundamental goal of using time series analysis is to understand the underlying mechanism that generates the observed data and, in turn, to forecast future values of the series.

The test site chosen is a 3.7-mile State Highway 194 corridor between Mesaba Avenue and Haines Road, one of the most heavily traveled and congested roadways in the Duluth area. The Global Positioning System test vehicle technique, which involves collecting data with the aid of instrumented vehicles capable of receiving GPS signals for position and time information, is used to collect outbound peak hour traffic data. The vehicle tracking unit monitors a vehicle's location and travel time information. It utilizes the wireless data network to transmit data to the web server where the data can be accessed and the time stamp data is used to calculate section travel times.

By analyzing the section travel time data, the development of ARIMA modeling is then followed. The analysis includes data transformation and a study of the autocorrelation and partial autocorrelation function associated with the transformed data. Finally, based on the state-space models derived and real-time data measured, the Kalman recursion is used to conduct one-step-ahead TTP.

In addition, the correlation of adjacent road sections travel time data with the information properly weighted when predicting travel time was investigated. That is, the linear regression derived from data correlation is also incorporated with the model to improve our prediction results. This information is used only when the data correlation factor needs to be included. The performance evaluation includes the comparison of the observed and predicted values over different road sections on the corridor. The finding was that ARIMA time series models produce reasonably good prediction results for most of the road sections studied. The predicted values are within the range of our observed travel times and they show very promising results.

In conclusion, the study indicates the potential and effectiveness of using the time series modeling in the prediction of arterial travel time. Furthermore, the results presented here can be easily modified and used in short-term arterial TTP for other urban areas.

If you would like to see the full report please visit <http://www.lrrb.org/pdf/200605.pdf>.

For further information please contact Jiann-Shiou Yang at 218/726-6290 or jyang@d.umn.edu.

Staff Changes

Welcome to the Research Services Section!

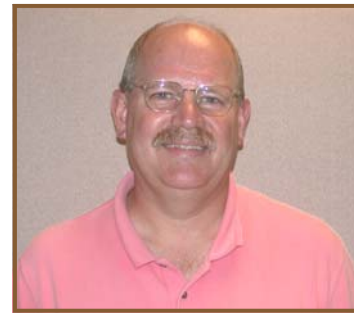


Cory Johnson

Cory Johnson joined RSS on Feb. 8th, 2006 as our Research Program Manager. Among his many duties, Cory facilitates departmental research coordination so that research efforts have the desired impact and are fully and effectively integrated with research being conducted on national, regional, local and interdepartmental levels.

Before joining RSS, Cory was a Water Resources Engineer with the Metro District since August 2004. While there he developed, staffed and operated the NPDES MS4 permit compliance program, among many other duties. For one year, beginning in the Fall of 2003, Cory started his own construction business. Prior to that, he was at Mn/DOT as a Research Senior Engineer with the Metro Office of Maintenance for two years. Cory received his B.S. in Civil Engineering at the Institute of Technology, University of Minnesota in 1992.

Cory can be reached at 651/205-4698 or cory.johnson@dot.state.mn.us.



Alan Rindels

Alan Rindels joined RSS on July 5th as our Program Development Engineer, replacing Barb Loida. He is charged with identifying and developing new research problem statements and proposals as well as performing Administrative Liaison duties for many research projects.

Alan comes to us from the Bridge Office where he was a hydraulic engineer since August of 2004. Prior to that, Alan spent time working for consulting firms as a Senior Water Resources Engineer and Project Engineer. He received his B.S., M.S. and Ph.D. from the University of Minnesota, where he was employed as a research assistant. He was also the recipient of the Alvin G. Anderson Award and the Summerfield Fellowship.

Alan can be reached at 651/297-5292 or alan.rindels@dot.state.mn.us.

Personal Changes Among Partners

There have been many personnel changes among our research partners and below are a few that we were recently made aware of:

- Dave Johnson, MnROAD Manager, has retired. His replacement is Maureen Jensen (651/779-5681).
- Eil Kwon, Director of Traffic Research at Metro Traffic, Security and Operations has taken a new position with the University of Minnesota-Duluth as the Director of their Transportation Research Program. (218/726-8325 or eilkon@d.umn.edu). A replacement has not been named.
- Loren Hill, Metro Traffic, Security and Operations has retired. His replacement is Dave Engstrom (651/634-5100).

We're on the Web!

<http://www.research.dot.state.mn.us/>