

ODOT Research News

Summer Quarter 2002

ODOT Research News is a quarterly newsletter to bring you the latest research and resources from the Oregon Department of Transportation's Research Group. The Research Group manages over 40 active research projects, providing new information and methodologies to improve how ODOT works.

The [underlined links](#) throughout the newsletter will take you to different parts of the [Research Web Page](#). There you will find updates on current projects, links to reports and research notes, information on staff specialties, and links to send us questions or suggestions for research. You can also call us at 503-986-2700.



Project Accomplishments:

This summer, ODOT's Research Group employed two student workers; Chris Braden, a high school student from Sprague High School, and Jeremy Williams, a senior in Civil Engineering at Oregon State University. Chris and Jeremy agreed to share their experience in the following articles.

High School Student Apprentices with Research

by Chris Braden, Junior at Sprague High School.

Generally, a summer job for a high-school student involves activities such as landscaping, flipping burgers, or asking questions such as, "Would you like fries with that?" My experience, however, has been somewhat different from the norm. In January of this year, I applied to participate in a program known as Apprenticeships in Science and Engineering, or ASE. It is thanks to this program that this summer, rather than typing fast-food orders into a cash register, I've been typing up a research report here at ODOT Research.

The ASE program is a part of Saturday Academy, which is allied with Portland State University as well as Oregon Health & Science University. The program was formed to "develop a pipeline of talent now to become our future scientists and engineers, by providing real-world work experiences for bright and motivated high school students." That's me: bright, motivated, and getting paid for three high school credits and a huge boost in my chances of earning college scholarship money. Not to mention the opportunity to submit the research paper I co-authored, "**Three-Cable Median Barrier: Four Year Performance and Cost Summary**," to the Transportation Research Board. I developed a [presentation about the project](#) for the ASE symposium.



Apprentice Chris Braden and Mentor Brett Sposito

Another project was developing a potential buzzer system for training seminars for the Technology Transfer group. I also saw a concrete beam test at Oregon State University, and attended a WASHTO-X teleconference on Highway Noise Abatement.

I am glad to have been able to experience a professional work environment, especially in my first job, and to have been able to work with [Brett Sposito](#), my mentor during my apprenticeship.

Summer Work for Engineering Student by [Jeremy Williams](#), senior at Oregon State University.

As a Civil Engineering major, I was excited to join the Research Group in June of 2002 for a summer internship. I worked on a number of different projects with many people in ODOT.



Jeremy Williams

Developing a methodology to forecast aggregate usage for future OTIA modernization projects was my first task on the **Aggregate Resource Inventory and Needs Forecast Study**. I also co-authored the report body and summary, which is under final review and is scheduled to be published in September.

The **Optimum Deployment of Law Enforcement** study, with [Kevin Haas](#), needed a database to relate law enforcement with speed data collected from various sites within the state. I created databases for the collection sites, and routinely download, format and input data for this project.

Another project, **Evaluation of Latex Polymers to Resist Stripping**, is studying whether latex polymer-treated asphalt works as effectively as lime-treated asphalt to resist stripping. [Eric Brooks](#) and I collected

pavement distress field data from specific sites near Burns, Madras, Warm Springs, and Enterprise. I am creating a database to analyze the results.



For the **Asphalt Pavement Analyzer** study, I am working with [Bruce Patterson](#) in Pavement Materials to create a database to input volumetric, gradation, and density data from paving projects. The goal of this study is to relate results from the Asphalt Pavement Analyzer to pavement performance in the field.

The Technology Transfer Center's [Oregon Roads Scholar Program](#) provides opportunities for public works employees to enhance their knowledge and skills. I helped Liz Hunt create a user-friendly database for tracking class scores, automating correspondence, and updating facility, participant, and contact information.

My previous diving experience gained in the Navy as a submariner and my engineering studies at OSU led to an interest in ODOT's bridge design and inspection work. I've been able to meet with Bridge staff and learn more about structural design and the dive team.

I've enjoyed working with the staff at the Research Group, and am grateful for the opportunity to have worked on a broad spectrum of projects this summer.

WASHTO-X is Underway. ODOT is participating in a pooled-fund project involving a video conferencing network among states within the Western Association of State Highway and Transportation Officials (WASHTO). The project is testing the feasibility of extending the Tel-8 video conferencing network to states outside the original core group of Utah, Wyoming, Montana, South Dakota and North Dakota. New states to the project include California, Washington, Arizona, Oklahoma, Nevada and Oregon.

WASHTO-X is aimed at providing a cost-effective means for federal and state transportation professionals to communicate with colleagues in other states without incurring travel costs. Each video conference consists of a short presentation by the host state on a predetermined topic followed by roundtable discussion by participants.

Three events have taken place to date, including "[Noise Abatement](#)," "[Bridge Deck Rehabilitation](#)," and

"[Pavement Marking Materials](#)." All events were well attended and well received by ODOT staff.

On September 10, 2002, the event topic will be "**Project Delivery**." Additional topics are yet to be decided, but events are tentatively scheduled for the second and fourth Tuesdays of each month after September. Each event will be held from 8:00 AM to 10:00 AM in the FHWA Division office in Salem.



For a list of suggested topics for future events and more information regarding this program, visit the web at [WASHTO-X.org](#). Any questions or future topic suggestions can be directed to ODOT's site coordinator, [Liz Hunt](#).

Shear Capacity Assessment of Corrosion-Damaged, Reinforced Concrete Beams.

Corrosion of reinforced concrete bridges can cause the concrete to fall off and reduce the effectiveness of reinforcing steel. Within Oregon, bridges on the Coast are prone to this kind of damage because of the salt in the marine environment. It is not uncommon to see a large section of a beam with exposed, rusty reinforcing steel. Oregon State University and the Department of Energy's Albany Research Center



are conducting research for ODOT to determine how much of a beam's load capacity is lost when the steel reinforcement corrodes. Corrosion damage is being correlated with visual appearance so that lost capacity can be estimated from inspection data. The information will be used in deciding the level of rehabilitation required in corrosion-damaged structures.

For more information, contact [Steve Soltesz](#).



Railroad Crossing Intrusion

Detection. Under newer high speed rail operating conditions, the need for protecting trains from derailment by vehicles or other objects on the track is

leading to closure, elimination or grade separation of the crossings. There are a number of rural, low volume crossings on the Oregon high speed rail (HSR) corridor, however, where closure, elimination or grade separation is not an option. In order to protect the train on a 100% failsafe basis at low volume grade crossings, a new approach to grade crossing safety is needed. One approach is to protect the crossing with a locked gate and automatic intrusion detection.

Research is underway to evaluate intrusion detection technologies that could be used in partnership with a locked gate on the HSR corridor. Microwave and

video detection technologies will be lab and field tested for their capability to provide the level of intrusion detection needed for this application. Both microwave and video detection systems are currently used on streets and highways for vehicle and pedestrian detection. However, their capability to reliably detect objects dropped on the track (such as fencing, irrigation pipe or building materials) is not known.

The laboratory evaluation of each technology is considering object size, sensing zone size, and sensing zone orientation. A failsafe detection system may need to utilize two or more systems to be effective, since each technology has its limitations. The lab testing should be completed by mid-September; then field testing will begin. The findings of this research may be applied to railroad crossings in urban as well as rural settings. For more information, contact [Alan Kirk](#).

Thirty people from ODOT, concrete suppliers, and contractors attended a half-day workshop on using the ***maturity method*** to estimate the in-situ strength of concrete. The maturity method assists in determining when subsequent construction operations can proceed and when traffic can be allowed onto a highway structure. It is also an important quality assurance tool.

The FHWA Mobile Concrete Laboratory was also on site and available for tours. The Mobile Laboratory provides training in and demonstrations of the latest concrete technology to highway personnel.

Dr. Paul Tikalsky from Penn State University and two of his assistants presented the workshop. The event

was conducted as part of a maturity method demonstration project sponsored by the Bridge Section and Research. The maturity method will be used on the new Wells Creek Bridge under construction on Highway 38. For copies of the workshop slides, contact [Steve Soltesz](#).



A concrete maturity meter.

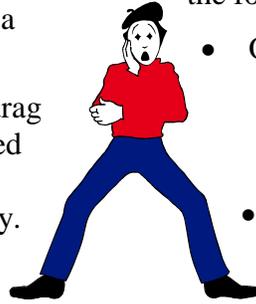
The Dog Ate My Paper!

While we generally use this newsletter to crow about our accomplishments, not every research project goes according to form. In fact, in Research we like to say that if a project does proceed just as planned, it probably was not research. A chronic problem is timeliness. There are a great many ways that a research project can be delayed.

One of the consequences of letting a project drag out over too many years is that as it gets passed from one researcher to another, the project suffers from loss of continuity and consistency. In more than one instance we have witnessed the miracle of self-healing pavement, as pavement condition ratings seem to improve from one inspection to the next.

Among the typical reasons for a project to fall behind are the following.

- Preliminary results indicate that a drastic change in scope is needed.
- Weather conditions or other forces of nature delay critical data collection. For example it may be inadvisable to collect some kinds of data about migratory fish during low water years.
- The research is linked to a construction project, and the construction project falls behind schedule.



- A principal investigator delegates research to a graduate student and the student leaves school without finishing.

However, not all reasons for delay are as mundane. Among the more interesting, unusual and frustrating are the following:

- One project tried to detect reasons for failure of concrete in a specific application. Unfortunately, researchers could not get their test sections to fail.
- Some principal investigators are perfectionists. For them, the process of editing and revising a final report becomes self-sustaining, because the state of knowledge changes between rewrites.
- A principal investigator became pregnant and was elected Department Head in the same month.
- Perhaps the oddest was this. The research was being carried out by a graduate student who was also a foreign national. The student also happened to be in love. The completion of the project meant the completion of the student's graduate thesis. Unfortunately, due to the conditions of the student's immigration status, completing his studies would require him to leave the country and, coincidentally, his woman friend. Consequently, there seemed to be no inducement that would motivate the student to complete the project.



New Research Notes: (click on underlined items to go to the notes)

[*Asphalt Cement Chip Seals –How Have They Done?*](#) describes the performance of chip seals on two highway sections. The chip seals were inspected in 2001 after two years of service, and again in 2002.

For [*The War Against Potholes: New Tools for Maintenance Forces*](#), nine vendor-provided cold mix patching materials were inspected over two years. This Research Note includes a description of requirements for products to be placed on ODOT's Qualified Products List, and recommendations for best-performing products.



Recently Published Reports: (click on underlined items to go to electronic reports)

[*Field Evaluation of a Portable Gyrotory Compactor*](#) documents an evaluation of the device's effectiveness for field quality control purposes. It also describes work to determine the quality of Superpave mixes as measured by Hveem stability. The portable gyrotory compactors are recommended for QC/QA purposes.

[Injected Polyurethane Slab Jacking:](#) This report documents a two-year test of injected polyurethane to raise and stabilize a bridge end panel and adjacent concrete slab.

[Field Verification Process for Open Graded HMAC Mixes:](#) This research tested the viability of using conventional film thickness measurements to field verify the quality of open-graded mixtures. Authors propose using an alternative measure of volume change when asphalt cement is added to uncoated aggregate. This alternative uses readily available field laboratory equipment and provides a simple means of measuring a fundamental mixture property.

[Assessing Public Inconvenience on Highway Projects:](#) Understanding the issues faced by the public when traveling through work zones is key to a safe environment for motorists and workers. This research surveyed key highway user groups to define areas for improvement.

[Using GIS for Rural Public Transit Planning:](#) This report on developing GIS systems for public transportation in rural areas using GIS was recently published by TransNOW, a research and education consortium serving the Northwest states. Copies are [available on request](#).



Other Good Resources:

The ***Transportation Research Board*** (TRB) has a new **[TRANSPORTATION RESEARCH E-NEWSLETTER](#)**, a brief e-mail message full of web links to events, resources, publications and news items. Check out past editions by clicking the link above – the information on how to subscribe is available at the site.

And remember, the Research Group can provide many ***reports from other states***. Here's a **[link to the latest list of reports from other states](#)**. Or if you'd like to find an ODOT report, check this **[link to the latest ODOT Research reports](#)**. Or send us the topic and we'll do the search for you!



T2 – Technology Transfer

The T2 Center has been cleaning house, and has a few CD's to give away:

- The **2002 National Highway Institute Transportation Training Resources Catalog**
- **Safer Journey: An Interactive Pedestrian Safety Awareness** CD-ROM from FHWA
- The **Pedestrian/Bicycle Safety Resource Set**, a CD-ROM from FHWA, and
- The **National Wood in Transportation Program: Information on Modern Timber Bridges in the United States, 1988-2001**. A CD from the US Forest Service, FHWA and the National Wood in Transportation Information Center.

Want a CD? Just call T2 at 503-986-2855. They have other great training resources, too, just ask!



Questions? Problems?

Got a transportation-related work problem that you think should be researched? Need a resource to answer a question? Call or e-mail the Research Group and we may be able to help.

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*For more information on ODOT's Research Program and Projects,
check the website at <http://www.odot.state.or.us/tddresearch/>*