

ODOT Research News

Spring Quarter 2002

Welcome to ODOT Research News, 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:

Concrete Repair Guide

ODOT uses a wide variety of materials to repair concrete pavements and structures. The materials are often used in situations with demanding requirements such as rapid strength gain, vertical or overhead positions, and various weather conditions.

Oregon State University and ODOT are preparing a tool to help crews decide what concrete repair material to use. A person will answer a series of questions about the repair type, size, and environment, and the



condition of the substrate. Based on this input, the repair guide will provide a list of possible products to use from the Qualified Products List.

From user surveys and a literature review, a decision tree has been developed for the repair guide.

Currently, the decision tree is being incorporated with the Qualified Products List. The prototype repair guide will be field-tested and revised where necessary before its final release, which is expected in October. For more information, contact [Steve Soltesz](#).

Several reinforced concrete bridges on the coast use **cathodic protection systems** to stop the structures from corroding. The systems are expensive, but the alternative is to replace the structures. A key part of these systems is the zinc metal that is melted and sprayed onto the bridges in a thermal spraying process to create what is called an anode.

The Department of Energy's Albany Research Center completed an ODOT research project to characterize the **zinc anodes** in these cathodic protection systems. From the research, we now have an estimate of how long the anodes will last, what is needed to make them operate efficiently, why they will eventually need to be replaced, and measures to determine how much life remains. The report, "[Performance of Zinc Anodes for Cathodic Protection of Reinforced Concrete Bridges](#)" is available from the Research Group's Web site.

To find out more about ODOT's research on bridges and structures, contact [Steve Soltesz](#).



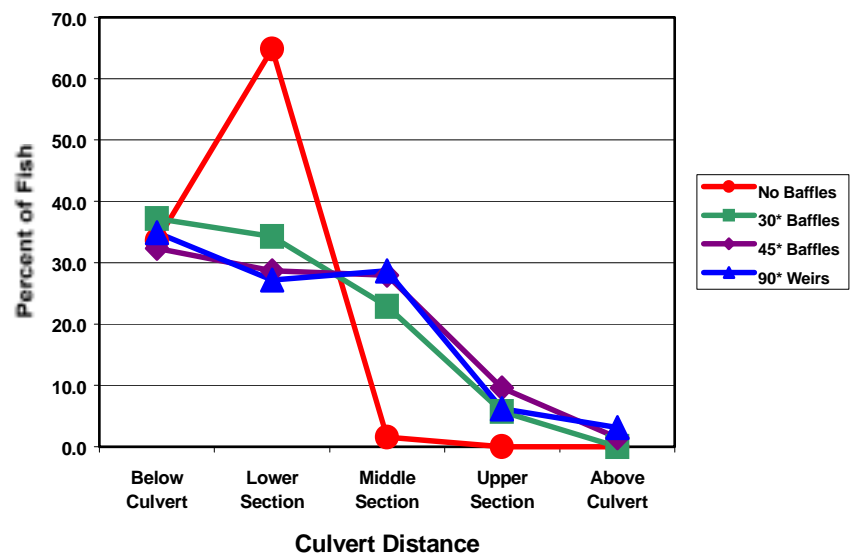
Thermal spraying zinc onto a bridge

The *Fish Passage Through Culverts* project has measured fish distributions and movement in and around retrofitted culverts in 7 streams. Additionally, graduate students are investigating the effectiveness of different baffle configurations. In February and March, 32 releases of steelhead trout in a reinforced concrete box culvert on Big Noise Creek on Highway 30 were used to test 3 baffle configurations and a control (with no baffles). For each trial, 20 juvenile steelhead trout were released in the middle of the culvert. Screens upstream and downstream of the release point were lowered into the stream at the end of a 3-hr period. With traps at the top and bottom of the culvert, the culvert was divided into 5 zones through which the trout could move.

The graph shows the percent of fish counted in each zone after the 3 hour period for each baffle configuration. Before adding baffles, no fish moved upstream in the culvert and 98% moved downstream. Fish successfully passed through the culvert to the upstream section only with the 45° baffle deflectors and 90° baffle weirs.

Preliminary conclusions are: 1) addition of baffles to a culvert increases the ability of steelhead trout to maintain position or swim upstream under winter base

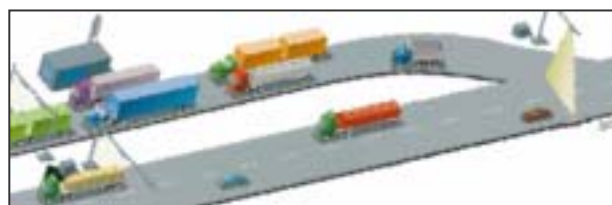
flows, 2) 45° baffle deflectors and 90° baffle weirs are slightly more effective than 30° baffle deflectors in improving fish passage, and 3) movement incentives (baiting, fright, crowding) do not change movement patterns.



This spring, tagged fish will be collected at the 7 culvert sites and their movement will be recorded. Summer flow studies on Big Noise Creek will be conducted. Contact [Brett Sposito](#) to learn more.

The Research Group has been coordinating several projects concerning *freight issues*. While conducting the [Freight Shipper and Motor Carrier Survey](#) project, ODOT collected a sampling of opinions from over 1,800 freight shipper and carrier firms about problems they perceive on Oregon's freight transportation system. [ODOT Planning](#) staff are now exploring how freight problem locations might be mapped and compared with other infrastructure needs.

The [Weight Enforcement and Evasion Study](#) examined the incidence of overweight trucks before, during and after an extended closure of an I-5 weigh station at Woodburn. When the weigh station was closed it was thought that in the absence of enforcement, trucks might increase the weights they carried. The data showed that truck weights and the incidence of overweight trucks increased slightly during closure and decreased following



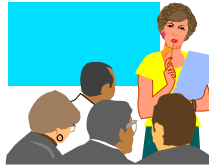
reopening. Participants in ODOT's Green Light preclearance program were less likely to increase the weights they carried than non-participant vehicles.

A project with Washington State University will look into more effective ways to collect data on truck trip origins and destinations, particularly in metropolitan areas. ODOT's data on truck movements comes from traffic counts, which are inadequate for transportation modeling and freight planning. ODOT has limited information on truck trips, routes traveled and commodities carried. Further, little is known about truck trip chaining and the use of distribution centers. This project will review data collection methods currently being used and development of a method that is best suited for metropolitan areas. The project is expected to run through next June.

For more information on these studies or freight-related research, contact [Alan Kirk](#).

The **Research Project Selection Process** resulted in seven new projects that will begin in July. They are:

- [Deterioration Models for Shear Cracked Bridges](#)
- [Models of Project Delivery](#)
- [Measuring Impacts of Speed Reduction Technologies](#)
- [Monitoring Bioengineering Stabilization Projects](#)
- [Latex Polymers to Resist Stripping in Asphalt Pavements](#)
- [Detailed Geotechnical Analysis of Large Transitional Landslides in Sedimentary Soils](#)
- [Transportation Plan Performance Measures](#)



Research coordinators are developing project work plans and recruiting Technical Advisory Committee members to guide and direct project work. If you are interested in participating on a project, find out the name of the project manager via the [New Project Development link](#) on the Research web page.

If you have a work-related problem that needs some research, you don't have to wait for next year's process. Your questions and research problems can be [sent in anytime](#). Use these links to a [description of the process](#) and to a [form](#) for problem submission. Find out [who represents your area of expertise](#) and our [research priorities](#).

Events:

The **Showcase of Innovations** contest continues through September 1, 2002. Oregon transportation professionals from federal, state and local agencies can [submit maintenance and construction innovations](#).

To date, several innovations have been put forward by cities and counties. Although several [ODOT innovations](#) have been collected and shared over the years, so far, no ODOT employees or crews have submitted innovations for the Showcase competition.



A short form and some photos or drawings are all that's needed. If you'd like to submit an idea, [Glenn Boyle](#) will be available later this summer to help document your innovation. All innovations will be shared with cities and counties, and [can be seen](#) on the Research web site.

Awards will be presented in the fall for the best tool, best equipment and best process innovations. And one person or crew (maybe you) will be the first to win the traveling trophy for the best overall innovation for 2002!



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

Survey Methods for Assessing Freight Industry Options: conducted by Portland State University, this research produced a survey methodology that yielded a 61% response rate with a telephone survey of freight firms on problems they encounter while moving freight in Oregon. Past freight survey efforts have yielded response rates of no more than about 43% and often much less. This survey method will be useful to other states and metropolitan areas as they seek to involve the freight industry in transportation planning efforts.

Evaluation of Microwave Traffic Detector: This project compared the performance of a microwave traffic detection sensor to regular traffic loops to see if the microwave sensor could function as a detection device in a signalized intersection. Although the system counts differed, the microwave provided reasonable detection for signal extension and call functions. Long-term performance or costs were not evaluated.

Weight Enforcement and Evasion: Oregon Case Study: This study looked at enforcement and truck weights during the closure of a weigh station on I-5. Results include: 1) With more weighings and stiffer fines, a temporary suspension of weighing activity at one site has low impact on trucking operations; 2) Enforcement activity at one site may have little impact on interstate and international shipments; and 3) Green Light program participants may be either compliant or unwilling to jeopardize the benefits of the program by overloading.

Crumb Rubber Modified Asphalt Concrete in Oregon: Seventeen rubber modified asphalt and asphalt concrete sections have been monitored since 1993. Performance was best in open-graded mixes using a rubber modified asphalt. Sections using the dry process (rubber modified asphalt concrete) performed poorly.

Performance of Zinc Anodes for Cathodic Protection of Reinforced Concrete Bridges: In the late 1980's, ODOT began testing two methods to protect reinforced concrete bridges – impressed current cathodic protection and sacrificial anode cathodic protection. This report summarizes the performance and requirements of these systems. A research note, **Zinc Anodes to Protect Coastal Bridges**, provides a brief summary of the findings.



A Fitness-for Purpose Evaluation of Electro-slag Flange Butt Welds: A report on the evaluation of electroslag flange butt welds of the I-205 George Abernethy Bridge, over 23 years. The serviceability of the weldments was assessed and retrofit or monitoring requirements were developed.

Development of Maintenance Practices for Oregon F-Mix: This report documents the results of surveys of ODOT maintenance staff and field evaluations of specific maintenance projects for several years. It presents recommendations for improving preventative maintenance, corrective surface maintenance and winter maintenance practices.

Strain Monitoring for Horsetail Falls and Sylvan Bridges: Fiber optic sensors were installed on two reinforced concrete bridges that had been strengthened with fiber reinforced polymer composites. This report summarizes the installation and monitoring procedures and the strain results after the composite retrofit.



Other Good Resources:

A new electronic Transportation Research Board (TRB) Circular E-C037, **Glossary of Highway Quality Assurance Terms**, has been posted on TRB's website at: <http://gulliver.trb.org/publications/circulars/ec037.pdf>. This circular (a third edition) contains highway quality assurance terms of common usage and accepted practice. It was generated by TRB Committee A2F03, Management of Quality Assurance, to provide a reference document containing a recommended standard for usage of highway quality assurance terminology.

Transportation Research Information Services (TRIS): TRIS Online is a great resource for information on transportation topics. <http://ntl.bts.gov/tris>. At the TRIS search engine, enter key words to get a list of books, reports, articles and Web sites related to that subject. For more information on using TRIS, check our Research Note, **Information at Your Fingertips**.

The Arizona Transportation Research Center provides 2-page reviews of research reports on a wide variety of topics. Their database can be searched by date, subject, key word or transportation mode. These reviews can be found in the **Transportation Research Digest**, at <http://www.dot.state.az.us/ABOUT/atrc/Publications/DocRev/TRDtest.htm>.

The Research Group receives many **reports from other states**. Here's a [link to the latest list of reports](#). Or if you'd like help finding a report, send us the topic, and we'll do the search for you.



T2 – Technology Transfer

The T2 Center is growing – they recently moved to larger quarters within the Research office. Stop by to see their new digs! The Technology Transfer Program provides resources for local governments on transportation, particularly roads, streets and bridges. [Liz Hunt](#) of T2 recently implemented the ***Roads Scholar Program***, and offers ***training, publications*** and ***videos*** on safety, maintenance and other transportation topics.



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/>*