



ODOT Research News

FY 2008 RESEARCH PROJECTS PRIORITIZED

Each year, the ODOT Research Advisory Committee (RAC) prioritizes a slate of research projects to begin during the following fiscal year. The project selection process began last fall when ODOT Research solicited problem statements from ODOT and other transportation interests.

As problem statements were received, they were sorted and assigned to one or more of eight general subject matter areas, handled by Expert Task Groups (ETGs).

About 125 “stage one” problem statements were reviewed and prioritized by the ETGs, and 25 were recommended for further development as “stage two” problem statements. During the RAC meeting on March 8, the stage two problem statements were reviewed and prioritized.

Most of the problem statement received by ODOT will also be submitted for funding consideration to the Oregon Transportation Research and Education Consortium (OTREC). By matching ODOT funds with OTREC funds, ODOT Research will be able to stretch its dollars further. The number of projects undertaken by ODOT Research in FY 2008 will thus

be based on the RAC ranking and the outcome of the OTREC project selection process.

The following is a list of the top twelve stage two problem statements, as prioritized by the RAC.

- Evaluating Safety and Operations of High-Speed Signalized Intersections
- Flexural Steel Anchorage Performance at Diagonal Crack Locations
- Multi-Modal Investment Criteria and Freight’s Economic Importance
- Copper Toxicity and ESA Listed Salmon
- Density Measurement Verification for Hot Mixed Asphalt Concrete Pavement
- Assessment of Statewide Intersection Safety Performance
- Identify and Address Institutional Barriers Delaying Incident Clearance
- Fuel Factors Update
- Freight Performance Measures: Approach Analysis
- Work Zone Design and Operation Enhancements
- Fleet Condition Model Review
- Oregon’s ACTs, Cross-jurisdictional Collaboration, and Improved Planning

Projects selected for funding are expected to start in July, the beginning of fiscal year 2008.

For more information on the project selection process and other research currently in progress, visit the [Research Unit Web site](#).

The members of the ODOT Research Advisory Committee include:

- Bernie Jones, Research Manager (chair)
- Jerri Bohard, ODOT Transportation Development
- Ed Fischer, ODOT Traffic Roadway
- Jeff Gower, ODOT Construction
- Bruce Johnson, ODOT Bridge
- Jim Lundy, OSU
- Jim Strathman, PSU
- Paul Wirfs, ODOT Geo-Environmental - Engineering & Asset Mgt.
- Lorna Youngs, ODOT DMV Services
- Satvinder Sandhu, FHWA (ex officio, non-voting)
- Rob Bertini, OTREC (ex officio, non-voting)

WHAT MAKES ENVIRONMENTAL STREAMLINING WORK?

Traditional transportation project planning involves a variety of federal and state laws that can significantly delay project delivery and add to project costs. “Environmental streamlining” is an alternative to conventional planning and permitting to increase project delivery efficiencies and reduce costs. Environmental streamlining generally involves environmental review that runs concurrently with planning processes, utilizing interagency coordination, technologies, and communication tools to improve project delivery.

OSU recently completed a case study which focused on the social and institutional factors that have helped make environmental streamlining into a working program at ODOT. The case study examined the use of environmental streamlining in the State Bridge Delivery Program, related to the efforts undertaken, methods used, obstacles encountered, accomplishments, and lessons learned. Based on case study interviews, there were nine significant lessons learned as a result of developing and implementing the Bridge Program:

- **Take advantage of urgency to bring about change.** Oregon’s bridge crisis forced ODOT and the other agencies to look for innovative ways to handle the workload.
- **Have a solid strategy for selling the program.** Emphasizing near-term, direct economic benefits while tying them to long-term, more indirect environmental benefits helped make the program attractive to those who had the authority to make it a reality
- **Work with stakeholders and partners to create a shared vision.** This included bringing together, first, a full range of stakeholders, then the regulatory and resource agencies needed to help develop environmental streamlining.
- **Ensure leadership commitment at top levels.** ODOT and its consultants brought in executive-level staff together to endorse the process.
- **Involve entrepreneurial, well-regarded staff.** It is important to determine who has a solid understanding of the agency’s mission and objectives, yet is also enterprising about seeing beyond traditional and insular approaches to problem solving.
- **Develop an outcome-based outlook.** An outcome-based approach moves away from the traditional focus on adhering to requirements in the various stages of project delivery and focuses instead on

meeting required results.

- **Create a tiered process for negotiation.** The Oregon Bridge Program used an innovative, tiered strategy for dealing with uncertainty and potential disputes.
- **Be aware of how language, learning, laws and norms may influence interactions.** Differences in professional training, with subsequent divergence in language and problem solving approaches, can create friction.
- **Provide training and education, both externally and internally.** Program development should include sufficient resources to develop an in-house educational plan with a consistent message that will reduce the inevitable doubts and misconceptions regarding program details and potential benefits.



In 2005 the State Bridge Delivery Program received the FHWA Environmental Excellence Award for Environmental Streamlining. The case study results show that creating innovative programs requiring extensive collaboration are more than technical and legal exercises. Building an effective process and structure for environmental streamlining is a social process that takes time, attention and flexibility.

The particular strength of ODOT’s Bridge Program framework is not just how it is changing the way ODOT does business, but its potential to serve as a template for other units of ODOT, other DOTs, and even other agencies looking to improve environmental streamlining. For more information, contact Alan Kirk at 503-986-2843 or by e-mail: Alan.R.KIRK@odot.state.or.us.

Technical Advisory Committee Members: Patti Caswell, ODOT; Geoff Crook, ODOT; William Fletcher, ODOT; Damon Fordham, ODOT; Barnie Jones, ODOT; Tom Lauer, ODOT; Matthew Mabey, ODOT; Alan Kirk, ODOT

OLDER DRIVERS AND DRIVING CESSATION



Oregon currently has over 300,000 drivers age 70 and over. Nationally, by the year 2050, there will be an estimated 60 million drivers over the age of 65. Recent research suggests that elderly drivers have an average life expectancy of 11 years after they cease driving, and Oregon has a higher proportion of elderly citizens than most other states. This information prompted ODOT's Public Transit Division to be concerned about the increased need for public transit services as the 'baby-boomer' generation moves into senior-citizen status.

The "Survey of the Older Driver in Oregon" study focuses

on the reasons for driving cessation among the elderly, and their response to having to stop driving. In cooperation with the Driver and Motor Vehicle (DMV) Services Division, the Institute on Aging at Portland State University has begun a statewide mail survey of a sample of drivers and former drivers.

Oregonians who have stopped driving are being asked for the reasons that they stopped and for information on how they have adjusted to their new situation. Current drivers are being asked to give some thought to what set of circumstances would lead them to stop driving, and how they would adjust their lives and activities afterward.

If funding allows, a small sample from each group will be contacted for an in-depth follow-up telephone survey that will allow for exploring more fully their responses to the mail questionnaire.

Data collection should be completed in the late spring, with a report to be published in the early fall of 2007. Those wanting more information on the project can contact Vince Van Der Hyde at 503-986-3419 or by e-mail: Vincent.A.VANDERHYDE@odot.state.or.us

Technical Advisory Committee Members: Vincent Van Der Hyde, ODOT Research; Sherrin Coleman, ODOT Public Transit; Nick Fortey, FHWA; William Merrill, ODOT DMV Services

INCENTIVE/DISINCENTIVE CONTRACTING

ODOT has traditionally contracted for its major highway work through standard, low-bid procurement. On-time completion has sometimes been encouraged by a clause in the contract that imposes liquidated damages if the project is completed late. This has been only partially successful, however. Starting with the Interstate Bridge repair project in 1996, ODOT began including an incentive/disincentive (I/D) component in some construction contracts that are highly time-sensitive for political, economic, public inconvenience or other reasons.

Significant in I/D contracting is the establishment of the amount of the incentive (and disincentive). It is recommended that the incentive be set at more than the "lower boundary" of contractor's cost of the acceleration (plus a reasonable profit), but less than the "upper boundary" of the cost of the delay to the public. This latter "upper boundary" value is usually established through the calculation of Road User Costs (RUCs).

A recently completed research project, Establishing Guidelines for I/D Contracting at ODOT, responded to the lack of working-level techniques to establish the

incentive/ disincentive amount. A model was developed that establishes the "lower boundary" and "upper boundary" parameters based on evaluations of contractors' costs and RUCs. These boundaries, in turn, provide a range within which incentive amounts would be effective.

The model is demonstrated in Microsoft Excel and is currently being tested on a limited basis by ODOT. The model will help to standardize the process for determining effective values for incentives/disincentives, which will lead to consistency and auditability. The research also provided the basis for a draft operational order that identifies the process for using incentive/disincentive contracting in ODOT. For more information, contact June Ross at 503-986-2846, or by email: June.H.ROSS@odot.state.or.us



Technical Advisory Committee Members: Holly Winston, ODOT Bridge; Jeffrey Graham, FHWA; Mark Joerger, ODOT Research; Thomas Lauer, ODOT Project Delivery; John Riedl, ODOT Tech Services

WHEN IT RAINS IT POURS

When it rains, it pours, and all that water has to go someplace. A recently published ODOT Research report deals with cleaning up that water to protect our environment. Oregon's State Highway System consists of more than 18,000 lane miles of roadway surface that sheds water by design. Back-of-the-envelope calculations show that more than 20 billion gallons of water runs off Oregon highways each year. By comparison, the City of Salem's Willow Lake Water Pollution Control Facility has a capacity of 105 million gallons per day while Portland's Columbia Boulevard Wastewater Treatment Plant has a capacity of 200 million gallons per day.



Stormwater runoff from U.S. Route 26 East of Government Camp looks clean enough to drink, until you notice the roadside litter.

Rain that runs off a highway typically picks up a variety of pollutants. These pollutants include sediment, trash, residue from petroleum products, and heavy metals. Depending on the highway and its geographic setting, Oregon's highway runoff can eventually evaporate, infiltrate into the ground, find its way to a storm sewer system that is treated, or flow into a stream or lake.

Regulations arising from the Clean Water Act include requirements to monitor discharges of pollutants, which basically encompasses everything solid, immiscible, and dissolved that is not water. In contrast to a centralized municipal combined sewer system, the dispersed nature of a highway system requires economical, small-scale methods to clean up storm water, such as detention ponds, check dams, oil-water separators, swales, and dry wells. Monitoring these numerous, dispersed treatment installations was the object of the research project.

The research project compiled a bibliography of literature dealing with methods for monitoring water quality and observations resulting from that monitoring. Four publications emerged from this bibliography as being

most fundamentally useful as references.

To help minimize the time and effort required to comply with the regulatory monitoring requirements, a Microsoft Word template was developed that includes all the common elements of a storm water monitoring plan. The template also included indications of where and what unique information needs to be added to complete the plan. This template can be used by anyone who deals with storm water to facilitate developing a plan to monitor the effectiveness of water treatment installations.

This research project provided information and tools to make it easier to comply with required monitoring. It has also highlighted many obstacles and challenges that must be overcome as part of such an effort. The volume of water treated at a municipal combined sewer wastewater treatment plant increases and decreases during the day and with the weather. But there is always effluent available to be sampled and it is all available at a small number of locations. Runoff coming from ODOT's highways comes only during storms, and most of it comes during a few big storms. That means that collecting samples to monitor the effectiveness needs to take place in a brief period of time at a great many widely separated locations.



Runoff from U.S. Route 20 during a big rain storm in Bend, Oregon pooling in an ODOT storm water detention pond.

Just as new and innovative treatment approaches had to be developed to deal with this situation, new and innovative monitoring approaches will need to be used to monitor all of ODOT's system. For more information about this project, contact Matthew Mabey at 503-986-2847, or by e-mail: Matthew.MABEY@odot.state.or.us

Technical Advisory Committee Members: Ranei Nomura, DEQ; Jeff Moore, ODOT; Paul Wirfs, ODOT; William Fletcher, ODOT; Frank Wildensee, City of Portland; Bill Baechler, Clean Water Services; Elton Chang, FHWA; Jim McNamee, ODOT; Ron Reisdorf, ODOT

PSU TRANSPORTATION SEMINARS – LIVE AND ARCHIVED

The Center for Transportation Studies at Portland State University has been hosting weekly Friday transportation seminars for the past several years. The seminars are open to students, faculty, transportation professionals, and the public. The topics are wide-ranging, including: safety, congestion, traffic management, transit, modeling, ITS, parking, freight movement, land use, finance, planning, and pedestrian and bicycle issues. For the full weekly seminar schedule, see the PSU Center for Transportation Studies web site: <http://www.cts.pdx.edu/seminars.htm>

The seminars are held from 12:00 noon to 1:00 p.m. in Room 204 of the Urban Center at PSU. The Urban Center is located in the block between 5th and 6th Avenue, and Hill and Montgomery Streets. The seminars are open to any ODOT staff wishing to attend.

To make the seminars more accessible, they are webcast in a streaming video format, and past seminars are also archived. Due to network limitations, though, ODOT employees usually cannot view the live streaming video or the archived video stream. To make the past seminars more accessible to ODOT, PSU also provides the video files for download. You may view a video archive file in either of two ways:

- Left-click the “Download” link and the file will open and play in Windows Media Player; or
- Right-click the “Download” link, select “Save Target As...” and indicate a location to save the video file. Then view the file in Windows Media Player.

Archived seminars currently available for download go back to the Fall 2002 term at PSU. For more information, contact Alan Kirk at 503-986-2843.

SPRING 2007 SEMINAR SCHEDULE

Date	Seminar Topic	Speaker
Apr 6	Development of the Bellevue Real Time Arterial Traffic Flow Map	Fred Liang, P.E., City of Bellevue, Washington
Apr 13		
Apr 20		
Apr 27	Combining Climate, Crash, and Highway Data for Improved Ranking of Speed and Winter-Weather Related Crash Locations in Oregon	Christopher Monsere, Assistant Professor, Portland State University
May 4		
May 11	Pros and Cons of a Vehicle-Mile Tax	B. Starr McMullen, Professor of Economics and Agricultural and Resource Economics, Oregon State University
May 18	Using a GPS Panel to Evaluate Travel Behavior Changes	*Peter Stopher, Professor of Transport Planning, Institute of Transport & Logistics Studies, University of Sydney
May 25	Two topics today: Bicycle & Pedestrian Overcrossings Carsharing Payment Integration	Rory Renfro, PSU MURP candidate Max Coffman, PSU MURP candidate
Jun 1	Two topics today: Travel Time Reliability Pedestrian Crossing Behavior	Kate Lyman, PSU MURP candidate Delia Chi, PSU MURP candidate
Jun 8	Two topics today: Spatial Analysis of Bicycling Behavior To be announced	Kim Voros, PSU MURP candidate To be announced, PSU MURP candidate

* Denotes speaker sponsored by Oregon Transportation Research and Education Consortium Visiting Scholar Program

RECENTLY PUBLISHED REPORTS [\(click on underlined items for electronic reports\)](#)

Tsunami Design Criteria for Coastal Infrastructure: A Case Study (OR-RD-07-03)

This study developed the tsunami design criteria for coastal infrastructure using a case study of the proposed Spencer Creek Bridge on the US Highway-101 at Newport, Oregon. The process would generally be applicable to any other coastal infrastructure facility as well. Evolving such a process and applying it to a time-critical real-time project is not only challenging, but also considered as an effort trying to bridge the “gap” between theory and practice. It required multi-disciplinary expertise in fields such as structural engineering, ocean and coastal engineering, simulations, supercomputing, etc. and involved a fruitful collaboration between Oregon State University and University of Hawaii.

Water Quality Facility Investigation (FHWA-OR-RD-07-04)

The genesis for this research project was a desire to comply with the National Pollutant Discharge Elimination System (NPDES) as cost effectively as possible. This project evaluated the state of practice and available data regarding stormwater Best Management Practices (BMPs) and monitoring, devised a streamlined and simplified approach to try and satisfy monitoring requirements, and then attempted to use that approach to evaluate both traditional and innovative stormwater BMPs. The key outcomes of the project were the validation of a novel BMP, the identification of obstacles to monitoring, and a template for developing BMP monitoring plans.

2004 Traveler Opinion and Perception Survey – Summary Report (OR-RD-07-05)

In November 2004 the Federal Highway Administration conducted the Traveler Opinion & Perception Survey (TOPS). This was a nationwide survey with the objective of understanding the needs and expectations of users of the nation’s transportation system. To gain a better understanding of Oregonians’ attitudes about the transportation system,

ODOT funded additional interviews and expanded the survey to cover additional issues. This summary report presents findings of the Oregon survey, compared with results from the Pacific states and the nation as a whole.

Innovation in Environmental Streamlining and Project Delivery: The Oregon State Bridge Delivery Program (OR-RD-07-06)

Surface transportation planning in the United States has become a complex system of intergovernmental planning and environmental requirements over the past several decades. Environmental streamlining is an alternative to conventional planning and permitting as a means to increase project delivery efficiencies and reduce costs. What are some of the critical elements of successful environmental streamlining? What individual, organizational, and institutional features influence the development and implementation of such programs? This case study of the Bridge Delivery Program follows how one such effort went from idea to program and provides insights into factors that helped create an environmental streamlining program.

Establishing Guidelines for Incentive/Disincentive Contracting at ODOT (FHWA-OR-RD-07-07)

This research project explored the use of Incentive/Disincentive (I/D) contracting at the ODOT. The research discovered that this is a relatively rare practice, and there is a lack of working-level techniques to establish the “lower boundary” of the contractor’s cost of acceleration plus reasonable profit. The report proposes a method of economic analysis in determining the contractor’s costs for acceleration. A model is presented which establishes the “lower boundary” and “upper boundary” parameters based on evaluations of contractors’ costs and Road User Cost (RUC) cost techniques. These boundaries in turn provide a range within which incentive amounts would be effective, leading to consistency and auditability.

NEW RESEARCH NOTES [\(click on underlined items for electronic reports\)](#)

Best Practices for Traffic Impact Studies

Traffic Impact Studies (TISs) are used by ODOT and other transportation agencies to forecast future system effects from proposed development projects and to predict the useful life of a transportation project against a future expected land use scenario. The goals of this research project were to examine decisions being made from traffic impact studies and to develop a set of best practices to supplement existing guidelines for developing and reviewing traffic impact studies.

Monitoring Water Quality along Highways

Runoff from highways typically picks up a variety of pollutants from the roadway. Because of the dispersed nature of a highway system, economical, small-scale methods to clean up highway runoff have been developed since the passage of the

Clean Water Act. The Water Quality Facilities Investigation research project was undertaken to improve ODOT’s ability to protect water in Oregon from pollutants carried by highway storm water runoff.

Oregonians’ Views of the Transportation System

In November 2004 the Federal Highway Administration conducted the Traveler Opinion & Perception Survey (TOPS). This was a nationwide survey on the needs and expectations of users of the nation’s transportation system. To gain a better understanding of Oregonians’ attitudes about the transportation system, ODOT funded additional interviews and expanded the survey to cover additional issues. This report provides a summary of the findings of the Oregon survey compared with results from the Pacific Census Division states and the nation as a whole.

IMPROVED ONLINE ACCESS TO NATIONAL RESEARCH

The Transportation Research Board (TRB) of the National Academies recently announced major improvements in their online journal access. Starting this spring, ODOT staff will be able to access the more than 7,600 papers spanning 11 years from the Transportation Research Record, the journal of TRB. New online features will include the following:

- Enhanced search and analysis technology. Search results will be organized with linkable volume, issue, and author details as well as Digital Object Identifiers for easy reference;
- State-of-the-art refinements in navigation to locate content more fluidly; and
- Email and RSS alerting when new content is published.

Laura Wilt, head of ODOT's Library and Resource Center, has been working with TRB to make the new access available to all ODOT staff. For more information, contact Laura by phone at 503-986-3280, or by e-mail:

Laura.E.WILT@odot.state.or.us

T2 CENTER



The Research Unit also manages the Technology Transfer (T2) Center, which provides transportation resources to local governments. Funding for the T2 Center is provided by ODOT, the cities and counties of Oregon, and the Federal Highway Administration under the Local Technical Assistance

Program (LTAP). The Center publishes a quarterly newsletter, distributes or loans publications and videos,

and provides technical assistance to customers. The Center also offers training through its *Roads Scholar* and *Circuit Rider* programs as well as by partnering with other agencies and organizations.

Additional information regarding the T2 Center is available at www.oregon.gov/ODOT/TD/TP_T2/. The current issue of the *Oregon Roads* newsletter providing the latest in T2 news, as well as past issues, is also available on the web site. For more information, contact T2 Center Director Bob Raths at 503-986-2854 or by e-mail at Bob.Raths@odot.state.or.us, or T2 Assistant Beth Hunter at 503-986-2855 or by e-mail at Beth.Hunter@odot.state.or.us.



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What can we do for you?

Let us help you! Do you have a transportation-related problem that you think could be addressed through research? Need help in locating current research on an issue? The Research Unit may be able to help. We are available year-round to help answer transportation-related questions.

We often answer information requests from ODOT staff by locating technical references, conducting literature searches, or conducting a research project.

Check Us Out!

[www.oregon.gov/ODOT/TD/
TP_RES/](http://www.oregon.gov/ODOT/TD/TP_RES/)