

SOLUTIONS

PROJECT HIGHLIGHTS

Impacts to Eastern Montanan Highways due to Bakken Oil Development

[http:// www.mdt.mt.gov/research/projects/pave/oil.shtml](http://www.mdt.mt.gov/research/projects/pave/oil.shtml)

In the past 5 years there have been increasing oil and natural gas extraction activities in eastern Montana. This oil-related activity has resulted in more commercial vehicle traffic and has accelerated infrastructure deterioration. To better understand and respond to the impacts of oil exploration in eastern Montana, the Montana Department of Transportation (MDT) has conducted eight distinct studies—one research project, two corridor studies, one safety audit, three traffic estimations studies, and one pavement analysis. Based on these analyses, the estimated transportation impacts attributable to energy extraction activities are:

- \$52 million dollars will be needed per year for twenty years to address pavement needs.
- On some oil region highways, AADT will almost double in the next 15 years.
- While commercial vehicle traffic trends were nearly flat historically, increases of 130% in oil region counties since 2007 are noted. This growth is projected to continue in the next 15 years.
- Population may increase by 30,000 in MDT's Glendive District by 2035, with most of the growth in the northeast portion of MDT District 1.
- 20 ±10 oil drilling rigs are estimated to be active in the region over the next 15 years.

To date, MDT has made the following improvements and adjustments in designs and policies to meet the evolving needs in the region:

- MDT had expended \$5.2 million in project change orders to increase the base depth and asphalt thickness on projects let to contract.
- MDT has added passing lanes, increased shoulder widths, and added centerline rumble strips on Montana Highway 16 north of Glendive.



RESEARCH PROGRAMS *Spring 2013*

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- MDT has added a grade-separated crossing to the Fort Peck Northeast project scope—at a cost of \$7.8 million—to address the effect of increased train traffic to and from the oil region.
- MDT has examined capacity along the major oil region corridors. The Culbertson and MT16 corridor studies identify potential capacity issues along these corridors. REMI analysis forecasts Montana Highway 200 from Sidney to Fairview may have potential capacity issues as well.
- MDT Motor Carrier Services (MCS) has increased truck weight enforcement in the region.
- MDT has assisted the Governor’s office in workforce development and retention in the area.

Visit the [research project website](#) for more information. If you have questions, please contact Sue Sillick (406.444.7693 or by [email](#)).

Performance Measures for the Montana Rest Area Usage: Data Acquisition and Usage

Estimation Research Project

The Montana Department of Transportation (MDT) research project, *Montana Rest Area Usage: Data Acquisition and Usage Estimation*, resulted in data collection and analysis to support various aspects of future rest area planning, design, and operations in the state of Montana. Usage data from rest areas throughout the state was used in the research to develop guidance related to various aspects of rest areas including parking, patron visitation, water usage, and wastewater generation. A key piece of guidance recommends a water usage value of 2.0 gallons per patron, which correlated to the same value per patron for wastewater generation. This is a significant departure from the existing guidance provided by AASHTO’s *Guide for Development of Rest Areas on Major Arterials and Freeways*, which recommends the use of 3.5 gallons per patron. This 1.5 gallon difference has significant implications on the sizing and associated cost of each system and advanced wastewater

treatment component, the land area necessary for a drainfield, and resulting operations and maintenance of the constructed system. The application of this finding in designs for new and renovated rest areas was the most immediate outcome from the short-term implementation of the research.

In just the next two years, there are six rest areas scheduled for wastewater system rehabilitation. The savings realized at these sites is over \$1.3 M. When applied in the design calculations of systems at an additional thirty Montana rest areas requiring wastewater system rehabilitation over the next twenty years (through 2032) - the expected life of a rest area wastewater system and mandated system review period via state regulation - the reduced wastewater figure is expected to produce savings of between \$87,000 and \$603,750 per site. The collective savings generated by this revised guidance will total over



\$8,804,295 in present value. The present cost of the research is \$165,905. These savings and the research cost were used to calculate benefit-cost ratio of 53:1 and a return on investment of 52.

Visit the [research project website](#) for more information. If you have questions, please contact Sue Sillick (406.444.7693 or by [email](#)).

Performance Measures for Steel Pipe Pile/Concrete Pile Cap Bridge Support Systems:

Confirmation of Connection Performance

The Montana Department of Transportation (MDT) has found concrete-filled steel tube (CFT) piles connected at the top by a concrete pile cap to be a very cost effective support system for short and medium span bridges. This type of system offers low initial cost, short construction time, low maintenance requirements, and a long service life. From a structural engineering perspective, these systems must provide acceptable performance under gravity (i.e., self-weight and vehicle loads) and lateral loads (i.e., extreme ice, wind, and seismic events). While the gravity load performance of these systems is well understood, their strength and ductility under extreme lateral loads is more difficult to reliably predict using conventional design procedures. Therefore, MDT sponsored three phased research projects at Montana State University (MSU) to investigate the performance of these systems under extreme lateral loads.

Based on the results of the first two phases of research, in conjunction with established structural engineering principles, MDT developed a design procedure to determine the reinforcing steel required in the pile cap to produce the desired system performance under lateral loads. The objective of the project phase reported on herein was to

validate this new connection design methodology by physically testing connections designed according to this procedure. A total of six half-size connection specimens were tested under axial and lateral load until failure. Based on the results of this investigation, several observations were made regarding the efficacy of the MDT design methodology, and suggestions were made to improve its effectiveness. MDT plans on implementing the recommended modifications to this design guide; this process is currently underway.

With the completion of this project, MDT is now more confident using this system in typical bridge projects, and therefore more apt to use it and realize the cost-savings and benefits associated with it.

The potential cost-savings of this system were calculated by comparing the cost of this system to a drilled-shaft system commonly used by MDT. In particular, MDT expects a benefit-cost ratio of approximately 13:1 and a return on investment of approximately 12.

Visit the [research project website](#) for more information. If you have questions, please contact Sue Sillick (406.444.6338 or by [email](#)).

Website Update

MDT Research staff announces a recently redesigned Experimental Project page to better serve our customers by making it easier to locate project specific information. We've categorized these projects based on subject and added subject quick links. The new page may be viewed at: http://www.mdt.mt.gov/research/projects/exp_sub_listing.shtml. In addition, we are in the process of creating a Google map to identify projects based on type (research or experimental), status (pending, active, and completed), and district.



LIBRARY CORNER

Research and Library Customer Appreciation Day

On April 10th, we hosted a Research and Library Customer Appreciation Day as a way to thank our customers for their support; this was also an anticipatory celebration of National Library Week (April 14-20). The event was a success, with about 75 MDT and FHWA employees who were able to attend. In addition to enjoying snacks, games, and door prizes, participants were able to learn more about the services offered through the Research Programs.

This event offered the opportunity to view the new Research and Experimental Projects map, which will be available soon on the Research website. This map shows the locations, statewide or by district, of all of our active, completed, and pending experimental and research projects, with links to each individual project page. It's a great new visual way to learn about projects.

Attendees were able to learn more about the library, including information about our extensive collection and the services we provide, such as literature searches, interlibrary loans, and training.

We also had posters thanking all of those who have, in one way or another, participated in the Research Programs, including the Research Review Committee, Technical Panel members, and Field Research Coordinators. For those less familiar with our program, we had fliers, brochures, and recent reports available for them to learn more.

Again, we want to say thank you to those who attended and to all of our customers. We greatly appreciate your support, and hope to see you at next year's event!





Communities Matter @ Your MDT Library

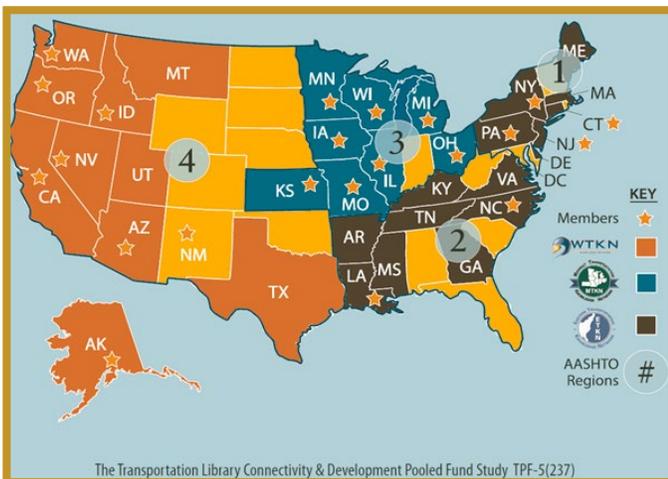
The theme for this year’s National Library Week (April 14-20) was “Communities Matter @ Your Library”. At first glance, it may appear that there is not a great deal of community interaction occurring with the MDT Library, especially since many of our patrons access our materials remotely and electronically. It may, in fact, be difficult to see how this theme applies. The truth is communities are extremely important in supporting the MDT Library. There are a few key communities of which we are a part that make the services we provide not only possible, but successful.

The [Western Transportation Knowledge Network \(WTKN\)](#) is one of these communities. There are currently three main transportation knowledge networks (TKNs) in the U.S. – Western, Midwest, and Eastern, based, to an extent, on the AASHTO regions. You can learn more about the TKNs through this [informational YouTube video](#). We participate in the WTKN, a community of transportation librarians from nearby states in the western region. We meet via teleconference once a month to discuss and brainstorm over issues impacting our libraries. This community provides great support for MDT Library staff; through sharing information, we obtain new ideas on ways to improve MDT Library services. The network also provides points of contact at other state transportation agencies who may be able to help with providing requested information when needed.



On a larger scale, the [Special Library Association’s Transportation Division](#) is a community of transportation librarians with participants from around the country, including MDT’s librarian, and even some international participants. Membership in this community offers tremendous benefits for the MDT Library. One important benefit is resource sharing. We receive announcements about new research reports, and also, when libraries are giving away items they no longer need in their collection, we, sometimes, are able to improve MDT’s collection with donated materials. Another important benefit is knowledge sharing; if we have a question we can’t answer, we can send it out to the division’s email listserv to see if other librarians know the right resources for finding the information. Basically, your questions won’t stop with us if we don’t have the answers. This network also helps the MDT librarian to stay current with trends in the transportation and library worlds; this information is used to improve the efficiency of MDT’s library services.

Another community that impacts the MDT Library is the [Montana Shared Catalog Library Consortium](#). Currently, over 160 Montana libraries of all types (public, k-12 schools, colleges, special libraries) participate in this consortium and work together to





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pay for and use a catalog system called the Montana Shared Catalog. Our [library catalog](#) is possible through this community, and we are able to provide our customers with a high quality system and great technical support at only a fraction of the cost as compared to a stand-alone system.

Finally, our patrons, the MDT community, play an important role in shaping the MDT Library. Through your queries, comments, and suggestions, we are able to improve the program and the services we offer. The purpose of the library is to meet the information needs of this community, so please do not hesitate to contact us if you have suggestions for ways we can better serve your library needs.

Clearly, communities do matter at the MDT Library. They provide support and direction and make possible

much of what we are able to accomplish. National Library Week is about recognizing and celebrating these communities that help us to accomplish our goal of providing high quality information in the most timely and efficient means possible. If you have any questions, please contact the library (406.444.6338 or by [email](#)).



DID YOU KNOW?

New Library Materials

There are a few different options available for finding out about what new materials are being added to the MDT Library collection.

RSS Feed



The library has an [RSS feed](#) available through our catalog system. It's updated every Monday morning, so you can see what items are added on a weekly basis.

For those less familiar with this technology, RSS stands for "Really Simple Syndication". Feeds allow you to see updates in one spot, delivered to you, so that you don't have to re-visit the website on a regular basis to view new content. You can subscribe to the feed so it's available in a folder on your web browser.

When new items are available for you to review, the folder name will be in bold (the bold lettering lets you know there's something new).

If you have Outlook 2010, you can even set up the RSS feed to be delivered directly to your email. It doesn't take up very much space and is relatively simple to configure.

1. Simply go to the File Tab, click on Account Settings, then Account Settings. The third tab in the dialog box is for RSS Feeds.
2. Directly underneath the tab, you'll find options for New, Change, or Delete. Click on "New" to add a feed.



3. You will then need to copy/paste the URL for your feed into the dialog box. In the case of the MDT Library's New Materials feed, go to [this site](#), and copy/paste the URL from there into the Outlook dialog box.

4. Click "Add" and then "OK", and your feed will then be added.

The first time you add a feed, you'll receive all of the notifications available from that feed, so you'll probably want to delete most of them. Following that, when new notifications are available, you can see them directly from your inbox. For the library's new materials, every Monday morning, you'll be able to see if new items have been added to the collection; you can tell if there are new notifications because the Montana Department of Transportation Library folder under RSS Feeds will be in bold. If you need more assistance with setting up a feed in Outlook, [additional information](#) is available online.

New Books Link

The [library catalog homepage](#) has a link on the right hand side under the "Library Info" heading to a list of new books. This list is updated on a weekly basis as new materials are added. New titles are listed back a month, so you can see what materials have been added over a month's time. In addition to the availability of hard copy material, many of the publications we add to the collection are available electronically. Just click on a title in your search list to determine if a record has a link to the full-text.

New Materials List

Another option for learning about new library materials is through the library's monthly New Additions list. This is a web-based list that is created and then modified throughout the month as new materials are added.



This list is currently available to MDT employees through the Interchange, an employee newsletter published every payday. For those unable to access this internal publication, we are currently working on setting up a listserv, which will be available through our Research web page. Those who sign up will receive a monthly email that provides a link to our New Additions list. In the meantime, the New Books link in the catalog is available for those unable to access the Interchange.

These options are available for you to more easily see what new materials are available through the MDT Library. If you have any questions, please contact the library (406.444.6338 or by [email](#)).



CALENDAR OF EVENTS

May

MDT RRC Meeting - 5/29/13

June

NCRRP Research Problem Statements
Due - 6/15/13

TCRP Research Problem Statements
Due - 6/15/13

NCHRP Project and Synthesis Panel Member
Nominations Due - 6/21/13

MDT RRC Meeting - 6/26/13

TRB Overview Presentation - 6/26/13

TRB Staff Visit - 6/26/13-6/27/13

July

AASHTO RAC/TRB State Representatives
Meeting - 7/15/13-7/18/13

MDT RRC Meeting - 7/31/13

August

TRB Annual Meeting

Papers Due - 8/1/13

WASHTO Annual Meeting

8/4/13-8/8/13

MDT RRC Meeting

8/28/13

September

MDT RRC Meeting

9/25/13

October

AASHTO Annual Meeting -
10/17/13-10/21/13

MDT RRC Meeting

10/30/13



NEW RESEARCH REPORTS

[Testing & Evaluation of Recovered Traction Sanding Material](#)

[Monitoring Wildlife Crossings on US93 South - Annual Report](#)

A listing of all past and current projects can be found at
www.mdt.mt.gov/research/projects/sub_listing.shtml.

NEW EXPERIMENTAL REPORTS

[A2000 Polyvinylchloride \(PVC\) Irrigation Line](#)

[Break-out Square Post Breakaway System](#)

[Crack Sealing Milled Asphalt Pavement prior to Overlay](#)

[Crash Attenuator - Smart Cushions Innovations \(SCI\) 100 GM Crash Attenuator](#)

[Hot Laid Thermoplastic Pavement Markings Preparations](#)

[Plant Mix Seal \(.75"\) on PCCP Dowel Retrofit](#)

[Ribbed Aluminum Box Culvert \(ABC\)](#)

A listing of all past and current projects can be found at
http://www.mdt.mt.gov/research/projects/exp_sub_listing.shtml.



NEW RESEARCH PROJECTS

[Montana Weigh-in-Motion \(WIM\) and Automatic Traffic Recorder Strategy](#)

A listing of all past and current projects can be found at
www.mdt.mt.gov/research/projects/sub_listing.shtml.

NEW EXPERIMENTAL PROJECTS

[Geosynthetic Reinforced Soil \(GRS\) IBS Technology](#)

[Polycarb Mark High Friction Bridge Deck Treatment](#)

[Sacrificial Osterberg Cell \(O-Cell\) to Confirm Load Design](#)

[Tapco Radar-activated Chevron Sign System](#)

[Wet-reflective Bead Technology Pavement Marking](#)

A listing of all past and current projects can be found at
http://www.mdt.mt.gov/research/projects/exp_sub_listing.shtml.

REMINDER

Information on research services and products, such as research and experimental project processes and reports and technology transfer services, can be found on the Research web site at www.mdt.mt.gov/research.

MDT's library collection can be searched through the [library catalog](#). The catalog and other information resources are available through the [MDT Library web site](#).

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