

LTAP MATTERS

Montana's Answer To Technical
Education of Roads & Streets

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Montana State University-
Bozeman

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Work Zones in Montana

By Steve Jenkins, LTAP Director

Recently, a great deal of effort has been placed on improving Montana's Work Zones. The Montana Department of Transportation (MDT) has provided training for employees, work zones have been made more uniform, and local governments are making improvements. The following is a brief list of efforts made over the past several years.

- Course developed for MDT by Dan Williams, MDT and Craig Genzlinger, FHWA,
- Course expanded for Local Governments by LTAP, Dan Williams, MDT and Craig Genzlinger, FHWA,
- Work Zone Pocket Guide developed for Utilities Section of MDT by Walt Scott, MDT and LTAP,
- Work Zone Safety Committee, Pierre Jomini, MDT, LTAP, Local Governments, Contractors,
- Flagger Certification Program Developed by LTAP and MDT,
- Flagger Certification Reciprocity Agreement between Oregon, Washington, Idaho and Montana.



In addition to these efforts, the Labor Union with the help of Felicity McFarren continues strong efforts in Work Zone Flagger Training.

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The Cost of Occupational Injuries

Among all occupational injuries and illnesses, dislocations and carpal tunnel syndrome result in the most days of work lost, according to the American Academy of Orthopedic Surgeons.

A worker who dislocates a shoulder or other joint is out of work an average of 28 days. People who get carpal tunnel syndrome will be off the job an average of 25 days, while those who suffer from a fracture will be out an average of 17 days.

One out of seven Americans suffer from a job-related musculoskeletal injury, which ranks first among impairments and costs the United States \$215 billion every year. In 1998:

- 48 million Americans had back pain that lasted nearly four weeks.
- 9 million had knee pain, which lasted at least six weeks.
- 9 million had hand pain, which lasted at least six weeks.
- 6 million suffered hip pain, which lasted at least six weeks.



Source: USA Today

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Work Zones in Montana

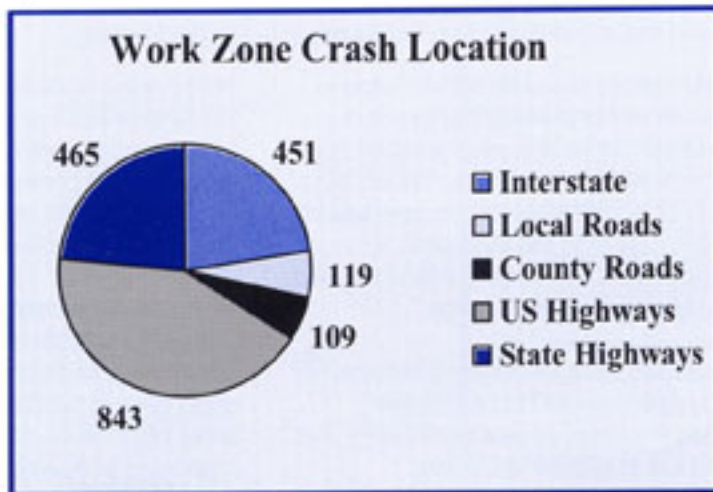


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The Bureau of Indian Affairs (BIA) accepts and uses the flagger program to instruct tribal members with the support of Cordell Ringel, BIA and Bob Ranneberger, OMO Construction.

Work Zone courses put on by LTAP are currently offered for MDT at twelve locations. In the future it is hoped that a Work Zone Supervisors Course will be improved and taught for those with responsibilities to set up and maintain safe work zones. It is also hoped that work zone packages of signs, cones, stop/slow paddles and vests will be provided for local agencies so that work zones can be more uniform around the state.

- Most work zone crashes occur when the weather is clear.



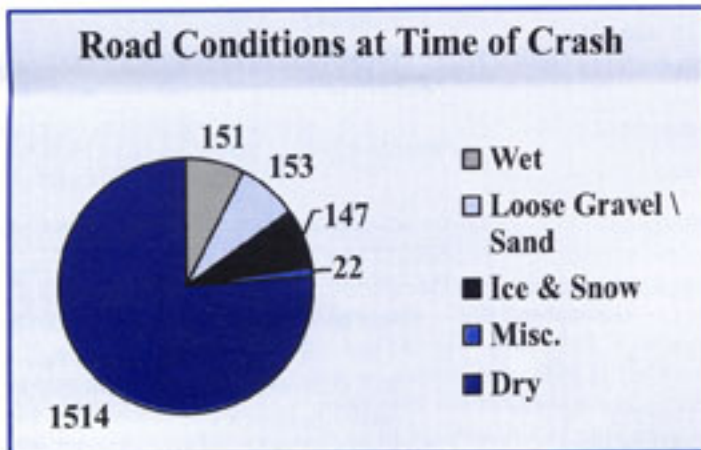
- Nearly 75 percent of accidents happen when the roads are bare and dry.

It is felt by many that although volumes of traffic continues to rise in Montana, work zones are becoming safer. There are many certified flaggers available

in all areas of the state, and awareness of work zone safety has been improved by local officials and the general public.



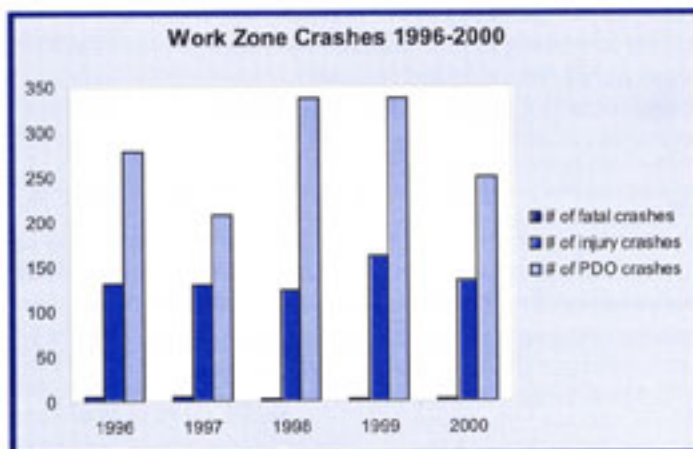
Motor vehicle research shows that crash rates increase when we exceed drivers expectations. Let's not put the drivers in unexpected situations.



LTAP recently updated the Flagger's Handbook to meet MUTCD Millenium Edition Standards. To receive a copy of this updated version please contact Karyn Tietz at (800) 541-6671. The cost is \$3.50 per book.

With all of the effort put in to Montana's work zones do we see any improvements? The following data was taken over the past five years and shows trends of accident rates.

- The total number of crashes has decreased in work zones since 1996.
- Very few of the accidents involve fatalities. Fatalities have decreased from 5 in 1996 to 3 in 2000.
- The majority of work zone accidents occur on US or State highways.



Work Zone Traffic Control: Survey of Contracting Techniques

by **Angela Johnson** (FHWA-Montana), **Lloyd H. Rue, P.E., P.T.O.E.** (FHWA-Montana),
Dick Clark (Montana Department of Transportation), **Ted Burch, P.E.** (FHWA-Montana)

Estimated quantities and contract amounts for work zone traffic control devices often vary from final quantities and payments. An increase in quantities and payments adds to an increasing share of the total contract costs. These facts stimulated a recent survey of Department Of Transportation (DOT) practices across the nation by the Montana Department of Transportation (MDT) and the Federal Highway Administration's (FHWA) Montana division office.

This article summarizes findings from a survey conducted in the spring of 2000. Thirty-five state DOTs responded, reflecting a view of current practices across the country. An analysis of survey results will assist the MDT with implementing improvements.

SURVEY RESULTS

Methods of Payment

Nine of 35 states use unit price (per each device or per each day), eight use lump sum for all traffic control, 15 use a combination of lump sum and unit price, and three states use up to three methods including lump sum, unit price, pre-established unit price, and incidental cost to the project.

Unbalanced Bids

Eighteen states responded that there is no evidence of unbalanced bids. Ten states indicated that unbalanced bids are rare. According to these 28 states, this rarity in unbalanced bids is largely believed to be due to subcontracting work zone traffic control.

Some states with evidence of unbalanced bids feel that the amount is too small to pursue and unbalancing is therefore not considered a problem.

Techniques to address the potential for unbalanced bids include having a detailed TCP for each phase, accurate estimating, carefully analyzing bids to detect reasons for unbalanced amounts, rejecting bids and re-advertising when unbalancing occurs, disqualifying the bidder, and setting minimum bid amounts on certain items.

Change Orders

Eighteen states do not require change orders unless there is a change in the scope of the project, and nine rarely see change orders. A method of negotiation (between the state and the contractor to find a reasonable new price) or written justification from the Project Engineer to support the changes in traffic control items are used in states where changed

orders are not used. Of the states that use change orders to adjust quantities or payments for traffic control devices, change orders are typically issued when the change is +/-25 percent of the contract amount, when a value-engineering proposal is used, an item has been omitted, or the project time has been extended.

Estimated Quantities

Contractors estimate quantities for traffic control items in only ten of the responding 35 states. All ten states are currently using a lump sum method of payment. Contractors in a few of the other responding states estimate quantities when proposing a phasing or sequencing change, to estimate the additional signs needed above and beyond the state's standard signs, when extra work occur, and under value engineering proposals.

Conclusions

These survey results establish a baseline for the Montana Department of Transportation and the FHWA Montana division office to jointly plan and implement improvements to estimation, bidding, and contract administration.

Three actions are planned over the next year to improve the process in Montana.

1. Different bidding techniques for traffic control items will be evaluated on selected projects.
2. Estimators from each highway district will convene to discuss practices and map an ideal process for estimation.
3. Project nomination guidelines will present recommendations for appropriate bidding techniques for work zone traffic control items dependent upon work type.

The Montana Department of Transportation is committed to increasing the quality of work zone traffic control from three perspectives: the highway user, the project manager, and the contractor. Improvements in bidding and estimation techniques will permit project personnel to concentrate on work zone application and layout. These same improvements can result in efficiencies to the contractors. Contractors can tailor work zone traffic control to their production rates and construction methods. A final benefit is reducing the relative share of costs for work zone traffic control through improved bidding and contract administration.

2001 Calendar of Events

MACRS Annual Conference	April 3-6, Missoula, MT
Gravel Roads II - Back to the Basics	April 11-12, Bozeman, MT
BIA - WorkZone Traffic Control	April 17, Billings, MT
Loader Training	May 1, Yellowstone County May 3, Flathead County
LTAP Advisory Board Meeting	June 13, Bozeman, MT
Welding	July 10, Billings, MT July 12, Great Falls, MT
Snow Rodeo	September 5-6, Great Falls, MT
Montana Association of Counties	September 23-26, Glendive, MT
League of Cities and Towns	October 3-5, Great Falls, MT
MACRS District Meetings - Winter Maintenance	October 8, Missoula, MT October 9, Great Falls, MT October 10, Billings, MT October 11, Miles City, MT
Winter Safety, Leadership for New Commissioners, Work Zone Traffic Control	On Request

New Publications

p-363 Flexibility in Highway Design – This Guide is about designing highways that incorporate community values and are safe, efficient, effective mechanisms for the movement of people and goods. It is written for highway engineers and project managers who want to learn more about the flexibility available to them when designing roads and illustrates successful approaches used in other highway projects. It can also be used by citizens who want to gain a better understanding of the highway design process.

p-617 Roadside Use of Native Plants – This book opens with short essays on principles of ecological restoration and management. It is followed with a state by state listing of native plants, scientific and common names, a color map and resources to find more information on noxious species as well as local experts.

p-766 Snow Removal and Ice Control Technology – TRB Conference Proceeding 16 – This publication contains selected papers presented at the Fourth International symposium in Reno, Nevada sponsored by TRB, NDOT, AASHTO, World Road Association-PIARC, and FHWA. The conference was held on August 1-16, 1996.

p-780 Roundabouts: An Informational Guide – This publication contains information for both public and private organizations regarding introductory material through design detail as well as applications of roundabout intersections. Topics include definition, what distinguishes roundabouts, public acceptance and legal issues, identifying sites, estimating capacity and delays, design principles, illumination and landscaping.

p-926 Effective Countermeasures to Reduce Accidents in Work Zones – This report summarizes a national review of work zone countermeasures. A panel of

experts was convened and discussed six principal countermeasures for implementation. They were: work zone speed limits, police presence, speed limit enforcement, public education, sign credibility, and temporary pavement markings in work zones.

p-927 Work Zone Operations: Best Practices Guidebook – This guidebook is the first release of a resource designed to give state and local transportation agencies, construction contractors, transportation planners, trainers and others with interest in workzone operations access to information and points of contact about current best practices for achieving work zone mobility and safety. The guidebook includes three forms to make the guidebook more useful. They include a registration for, a best practices submission for and a best practices review and comment form.

p-928 Meeting the Customer's Needs for Mobility and Safety During Construction and Maintenance Operations – This review focused on the Federal Highway Administration's (FHWA) leadership role in providing mobility and safety during construction and maintenance operations, the principles and approaches presented in the report are equally applicable to all transportation agencies.

p-364 Recycled Materials in European Highway Environments – A.U.S. delegation met with more than 100 representatives from transportation and environmental ministries, research organizations, and industries in Sweden, Denmark, Germany, the Netherlands, and France. The purpose was to review and document policies, programs and techniques that promote the use of recycled materials in the highway environment.

p-628 NACE Action Guide Volume III-5 Drainage – This guide was developed to assist local officials in their efforts to develop rational plans for roadway drainage. It should help create a practical uniform and systematic approach to the problem. This will provide the county engineer with a format for the investigation of existing drainage patterns, analysis of rainfall frequencies and intensities, determination of probable flow requirements, hydraulic design of the necessary channels, conduits and structures, and the legal implications of artificial drainage systems.

New Videotapes and Publications

p-627 A Landowners' Guide to Montana Wetlands – The purpose of this guide is to provide information for Montana landowner's informed use and management of their wetlands, bringing to life options for wetland protection, enhancement, and restoration. Simplified charts are provided to help private landowners pursue the options for themselves, by identifying and accessing the wealth of technical and financial assistance available for wetlands. And also a guide to wetland laws and regulations.

p-626 Who Does What With Montana Wetlands: A Directory – This directory provides useful information for landowners, public employees, and natural resource managers to help them navigate the diverse terrain of wetlands resources, agencies and information materials. This directory includes financial and technical information for federal and state, general information for federal and state, and regulatory information for federal and state.

p-625 A Catalog of Wetlands Education Materials for Montana – This is a second edition catalog of wetlands education materials available to Montana's teachers, students, educators and interested citizens. It contains region specific sources of information on wetlands.

p-624 Operation, Maintenance and Management of Stormwater Management – In this publication stormwater systems operation maintenance and management are covered. Topics include stormwater management practices, planning and design considerations, programmatic and regulatory aspects, maintenance considerations for facility owners, construction inspection, inspection and maintenance after construction, costs and financing of stormwater facility operation and maintenance, disposal of stormwater sediments and finally, information sources.

p-623 Economic Benefits of Runoff Controls – The purpose of this report is to show that certain urban runoff management controls can be incorporated into a development in a way that provides aesthetic and economic benefits. Urban runoff controls that are pleasing to the eye and safe for children can lead to increased property values. For existing runoff controls that are unsightly, corrective renovations can be made to increase the property value and quality of life.

p-622 Clearing and Grading Strategies for Urban Watersheds – This guidance report discusses the problems with clearing and grading activities that precede land development. For example, excessive sediment loads and recommendations for their minimization.

p-621 Riparian Buffer Strategies for Urban Watersheds – This report provides guidance on riparian buffer programs used to mitigate the impact of urban areas on nearby streams. It utilizes the results of a national survey of riparian buffer programs, as well as a comprehensive review of riparian buffer literature to make recommendations on buffer design. It also discusses analyzing buffer pollutant removal potential and pollution prevention techniques, via chemical, biological and physical processes.

p-620 Urbanization and Streams: Studies of Hydrologic Impacts – Discusses the resulting impact on stream health and hydrological impacts after urbanization. Includes finding and analysis, case studies and conclusions.

p-619 Soil Erosion and Water Pollution Prevention: NACE Action Guide Volume III-8 – This publication covers the problem of soil erosion. Topics include water erosion, prevention, control during construction, permanent stabilization, maintenance and repair, and winter salting.

p-618 Montana Sediment and Erosion Control Manual – This manual is designed to assist contractors, engineers and consultants with designing and implementing an erosion control plan as required by a MPDES general permit for storm water discharges associated with construction activity. Many practices may be used in mining sites, logging activities, agriculture and small development or homeowner projects.

Videotapes

PAG-107 Adult Learning – This program provides tips for success when teaching adults including the concepts of "just in time training."

M-132 Dealing with Stress: Stress Management in the Workplace – Feeling strong and well-rested will not only make your employees happier people – but it will make them better workers too. This award-winning video program highlights the stress-producing scenarios unique to industrial environments.

SG-174 Hazardous Materials Transportation – Everyone involved in shipping, handling, transporting and/or storing hazardous materials must be trained in HazMat procedures. This video program will help supervisors and employees understand the DOT regulations and comply with 49 CFR 171-180.

SG-175 Safety Meetings: Give'em What They Want – This new video shows managers, supervisors and team leaders how to conduct the best safety meetings. Your organization will learn how to get the most from your safety meetings, whatever their length.

SG176 Forklift Compliance Package – In an effort to decrease the staggering number of injuries and fatalities, OSHA recently finalized the new Powered Industrial Truck Standard. This best-selling Forklift Compliance Package offers you the chance to comply with the latest training requirements. The compliance package includes two video programs, ten employee handbooks that correspond to each video program and a compliance guide.

EO129 Cat H-Series Motor Grader Government Applications – This tape demonstrates motor grader uses and techniques in the following areas: ditch building and cleaning, back sloping, shoulder grading, roadway maintenance, and spreading borrow.

EO130 Cat H-Series Motor Grader Contractor Applications – This videotape covers typical operations that contractors take on and offers you ways to increase your productivity, lower your costs, and increase satisfaction in the results. Several

operations are featured in this tape including: maintaining haul roads, placing fill, finishing back slopes, cutting sidewalk and curb grade, and finish grading.

EO131 Advanced Motor Grader Operating Techniques – This tape is designed to help the experienced motor grader operator to be more efficient. The tape discusses: general road maintenance, ditching techniques, and re-shaping deteriorated roads.

EO132 Medium Wheel Loader Operator Orientation and Training– This tape shows how the operator can get the most out of the loader. It helps them optimize loader performance to get more done.

EO133 Track Type Tractor Operator Tips – This video is designed to help train operators on correct operating techniques for track type tractors. It includes information on safety, the walk-around inspection, the operator's compartment and start-up, dozing, ripping, pushing scrapers and shutting the machine down.

EO134 Backhoe Loader Operating Tips – This videotape covers the recommended operating tips for the Caterpillar Backhoe Loaders. The tape details the following topics: Safety, walk-a-round, loader controls and start-up, loader operating techniques, backhoe controls, backhoe operating techniques and shutting the machine down.

EO135 544E/624E/644E Operation and Maintenance Overview – This tape discusses the features and specification of all three models. Also included are steps for basic maintenance, specific time use maintenance and operation instructions.

EO136 John Deere 444E Operation and maintenance Overview – This video covers specifications and features of the 444E as well as daily and as needed maintenance, time use maintenance and operating instructions.

EO137 544G, 624G, and 644G 4WD Loader Operational Overview – This tape provides a review of operational guidelines and primary service points for the three models listed. Also included are important features, specifications, starting and operating.

EO138 710D Operation and Maintenance Overview - This tape provides a review of operational guidelines and primary service points for the 710D model. Also included are important features, specifications, starting and operating.

EO139 John Deere D-Series Backhoe Loader Safety, Maintenance and Operation – This video is safety focused with topics including everyday maintenance and operation of

the D-Series backhoe loader. It is provided as a supplement to the owner's manual and includes a section on pre-start walkabout and daily service, controls and safety systems, and safety tips.

EO140 Deere 300 H-Series 4WD Loader Safety, Maintenance and Operation – This video is safety focused with topics including everyday maintenance and operation for the 300 H-series 4WD Loader. It is provided as a supplement to the owner's manual and includes a section on pre-start walkabout and daily service, controls and safety systems, and safety tips.

EO141 John Deere 690E-LC Excavator Safety, Maintenance and Operation – This video is safety focused with topics including everyday maintenance and operation for the 690E-LC excavator. It is provided as a supplement to the owner's manual and includes a section on pre-start walkabout and daily service, controls and safety systems, and safety tips.

EO142 Lockout/Tagout of Construction Equipment – This tape focuses on controlling hazardous energy for the service and repair of construction equipment. Main topics include sources, methods and lockout/tagout procedures. Also included are OSHA guidelines for program formulations that are specific instructions, training and periodic audits.

RM721 Cat H-Series Motor Grader Snow Removal Applications – This tape covers typical snow plowing operations and offers you ways to maximize your grader's production potential, and provide well maintained roads at lower overall costs. Operations featured in this tape are: ground level winging, tapered bank, benching, reversible plow, and the v-plow.

Software

SW132 Work Zone Operations: Best Practices Guidebook – This software is designed to give state and local transportation agencies, construction contractors, transportation planners, trainers, and others access to information and points of contact about current best practices for achieving work zone mobility and safety. Topics include policy and procedure, public relations, educational and outreach, prediction modeling and impact analysis, methods and practices, traveler information, feedback and more.

SW133 Performance-Related Specifications for PCC Pavements - This CD-ROM contains a four-volume report presenting guidelines and recommendations for developing and using performance-related specifications to portland cement concrete pavement construction. Includes Pave/spec 2.0 software. (Requires 486 MHz or Pentium, video card, Windows 3.1 95/98/NT, and a web browser)

Request for Videotapes & Publications

The publications and videotapes listed in LTAP MATTERS are available free or for a nominal charge upon request. Publications and Software marked *Lending Library may be borrowed for several weeks, but must be returned to LTAP. Anyone may borrow up to three videotapes at a time rent-free for two weeks.

You may order any of the advertised tapes by calling toll-free (800) 541-6671. Contact Karyn Tietz if you have any questions or concerns.



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The Local Technical Assistance Program Newsletter is published quarterly. Funding for this program is provided by the Federal Highway Administration through the Montana Department of Transportation, Montana State University and a portion of Montana's gas tax revenues. This newsletter is designed to keep you informed about new publications, new techniques and new training opportunities that may be helpful to you and your community. Individuals wishing to receive future copies of the newsletter at no cost may send their request to LTAP, 416 Cobleigh Hall, PO Box 173910 Montana State University-Bozeman, Bozeman, MT 59717-3910, or call 1-800-541-6671.

Contributions Welcome

LTAP welcomes contributions to LTAP MATTERS. Those wishing to submit relevant material to be published in the next newsletter can submit their ideas/articles to:

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