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Sign Installation Guide

Forest Service employees, contractors, and volunteers will have an easier time installing road signs properly, thanks to the *Sign Installation Guide* (0371-2812-MTDC). This revision of the guide includes information needed to install traffic control signs on National Forest System roads in accordance with the *Manual of Uniform Traffic Control Devices* (MUTCD) and *Sign and Poster Guidelines* (EM-7100-15). The guide includes most of the signs and markers used on National Forest roads and gives workers a clear picture of how signs should be installed. This guide by Andy Trent and Donna Sheehy replaces the *Sign Installation Guide* (9771-2813-MTDC). It was prepared by MTDC in cooperation with the U.S. Department of Transportation, Federal Highway Administration.



To order the new guide, contact Cailen Hegman, MTDC publications (phone: 406-329-3978; fax: 406-329-3719; e-mail: cahegman@fs.fed.us). An electronic version can be found on the Internet at: <http://www.fs.fed.us/eng/t-d.php?link=pubs/pdf/pubs/pdf03712812dpi72.pdf> (777-kilobyte Acrobat file)

National Airtanker Base Program

The San Dimas Technology and Development Center (SDTDC) is wrapping up the 4-year National Airtanker Base Program. This program has developed standard plans and specifications for buildings, retardant mixing and storage plants, aircraft loading and handling facilities, and other base amenities. Several design teams were involved with upgrading 22 bases at a cost of more than \$40 million.



Information about the program, including the standard plans and specifications, can be found on the Forest Service's internal computer network at: <http://fsweb.sdtc.wo.fs.fed.us/programs/atb/>

National Airtanker Base Program, *(continued)*

index.shtml. This site includes examples and forms that can be used to write a prospectus, document a National Environmental Policy Act (NEPA) decision, perform a value analysis, or conduct a source selection panel. A Web site is also available for fire support facilities standard plans and specifications on the Forest Service's internal computer network at: http://fsweb.sdt dc.wo.fs.fed.us/programs/fire_fac/index.html. This site includes designs for barracks, engine stations, and helicopter and hot shot facilities.

For more information, contact Ed Gillland, project leader (phone: 909-599-1267, ext. 237; fax: 909-592-2309; e-mail: egilliland@fs.fed.us).

Backcountry Road Maintenance and Weed Management

Roads and noxious weeds seem to go hand in hand on most public lands in the United States. It is difficult to maintain or improve backcountry roads without spreading weeds. A new MTDC report by Leslie Ferguson, Kootenai National Forest, Celestine Duncan, Weed Management Services, and Kathleen Snodgrass, MTDC, may help. *Backcountry Road Maintenance and Weed Management* (0371-2811-MTDC) includes information that will help engineers, foresters, and road maintenance personnel understand weed biology and the ways normal road maintenance increases weed infestations. The report explains how the spread of noxious weeds can be reduced or eliminated during road improvement or maintenance projects. It stresses the importance of washing all vehicles and motorized equipment before and after a road project, planning the project to minimize the disturbance of adjacent soils, and maintaining desirable plant species along roadsides.



This report can be ordered by contacting Cailen Hegman, MTDC publications (phone: 406-329-3978; fax: 406-329-3719; e-mail: cahegman@fs.fed.us). For more information about road maintenance and weed problems, contact Kathie Snodgrass, project leader (phone: 406-329-3922; fax: 406-329-3719; e-mail: ksnodgrass@fs.fed.us). An electronic version can be found on the Internet at: <http://www.fs.fed.us/eng/t-d.php?link=pubs/htmlpubs/htm03712811>

Handpump Chlorinator/Filter System

The San Dimas center has been evaluating a new water treatment system at the Umpqua National Forest in Oregon this summer. This chlorinator/filter system for remote sites was designed by Saxon Research Systems to provide potable water from a handpump. The proprietary design mixes a controlled ratio of concentrated chlorinated water with well water. The unit is a stand-alone system with overall dimensions of 42 by 19 by 42 inches. It has a dry weight of 160 pounds, including the 30-gallon detention tank. The standard diverter chamber is designed for direct installation into the Baker Monitor handpump. A custom diverter chamber is needed for other handpumps.



For more information on handpump water treatment systems, contact Brenda Land, project leader (phone: 909-599-1267, ext. 219; fax: 909-592-2309; e-mail: bland@fs.fed.us).

Latest Wildland Firefighter Health and Safety Report Now Available



Issue No. 7 of the Wildland Firefighter Health and Safety Report (0351-2818-MTDC) focuses on the medical standards for arduous firefighting positions. These standards are being pilot tested in some areas of the country.

For more information, contact Brian Sharkey, project leader (phone: 406-329-3989; fax: 406-329-3719; e-mail: bsharkey@fs.fed.us). An electronic version can be found on the Internet at: <http://www.fs.fed.us/eng/t-d.php?link=pubs/htmlpubs/htm03512818>

Road Surface Stabilization With Chlorides

The Forest Service maintains thousands of miles of roads surfaced with aggregate. If chlorides were used to stabilize these roads, maintenance might be reduced significantly, saving the agency a lot of money. The Unpaved Road Surface Stabilization Project is a 3-year study evaluating the effects of stabilizing aggregate roads with chloride products. In the spring of 2003, construction was completed on 79 short test sections of 12 different Forest Service roads in Montana, Idaho, and Oregon. Of these sections, 39 were treated with various chloride products and 40 were left untreated as control sections. The treated sections were stabilized by mixing chloride products to a depth of 2 inches into the aggregate surfacing.



Over the next 3 years, traffic counts, weather conditions, and performance ratings will be collected for each road section. These data will be used to determine chloride's effectiveness as a stabilization agent. The test will also determine the most cost-effective and desirable form of chloride-brine (flake or pellet) and the most effective application rate and construction methods.

Data collected during the first field season indicate a significant difference in performance between the treated and untreated sections. The serviceability level of the treated sections is two to three times higher than the untreated control sections. As this study progresses, SDTDC will prepare an interim report summarizing the results.

For more information about this project, contact Mike Mitchell, project leader (phone: 909-599-1267, ext. 246; fax: 909-592-2309; e-mail: mmitchell@fs.fed.us).

Fence Post Drivers for Tall Posts

The Missoula center will soon distribute a new tech tip covering the selection and testing of commercially available fence post drivers that can handle 10-foot-long metal T-posts. These posts were needed for a project testing various fence enclosures designed to keep elk, moose, and deer out of overgrazed aspen and willow groves. The project was completed on the Dillon and Phillipsburg Ranger Districts with the cooperation of the Beaverhead-Deerlodge National Forest.



The 10-foot-long metal T-posts were used to construct the 7- to 8-foot-tall enclosures. Manual post drivers available at local hardware and farm supply stores required installers to stand on a platform or in the back of a truck to drive these long posts. This was impractical and unsafe in steep terrain, so MTDC began a market search to see if an inexpensive, acceptable tool was available. This tech tip lists three commercially available manual post drivers and one designed by MTDC. All four were tested by the center and the results

will be presented in the tech tip, which will be available early in 2004.

For more information, contact Gary Kees, project leader (phone: 406-829-6753; fax: 406-329-3719; e-mail: gkees@fs.fed.us).

Trenchless Technology for Replacing Culverts

Many thousands of culverts installed below Forest Service roads during the 1950s and 1960s must be replaced or rehabilitated. In some cases, a culvert's design won't allow enough water to pass. Sometimes a culvert is replaced to improve fish passage. Trenchless technology (culvert installation or relining without excavating the road prism) can alleviate many problems. Traffic will not be blocked while the culvert is being replaced or relined and far less soil will be disturbed.



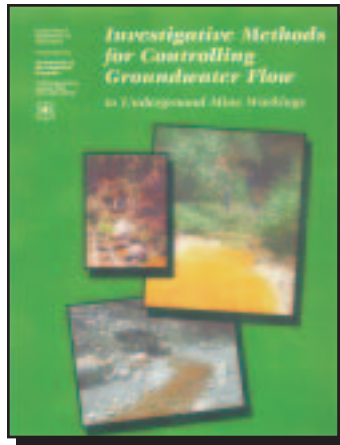
SDTDC is studying the use of trenchless technology and will review pipe ramming, tunneling, microtunneling, horizontal auger boring, pipe busting and jacking, and other techniques. Rehabilitation technologies, such as sliplining, cured-in-place, spot repair, and grouting, will also be reviewed.

This review will address guidelines for deciding when the trenchless option should be considered. The review will include environmental effects, site geometry, geotechnical considerations, site disturbance, spoils, access, and relative costs. This report should be available during the spring of 2004.

For more information on trenchless technology, contact Charles Aldrich, project leader (phone: 909-599-1267, ext. 281; fax: 909-592-2309; e-mail: caldrich@fs.fed.us).

Controlling Groundwater Flow to Underground Mines

Extracting the ore from an underground mine site requires a shaft or adit to access the workings or tunnels used to excavate the rock and ore. During the active period of a mine's life, miners often encountered groundwater that had to be drained. Drainage may continue long after mining has ended, causing serious environmental problems.



Groundwater circulating through a mine interacts with mineral-rich rock exposed by mining. Metal-bearing ore can produce high concentrations of harmful metals in the discharge water. Many mines also contain abundant iron pyrite. Interaction of pyrite, oxygen, and water can produce an acidic discharge. A pyrite content of only a few percent by volume can produce acid for thousands of years. Controlling or stopping groundwater from entering the workings of a mine diminishes the pollution problems associated with abandoned mines. *Investigative Methods for Controlling Groundwater Flow to Underground Mine Workings* (0371-2801-MTDC) is an MTDC report available electronically at: <http://www.fs.fed.us/eng/t-d.php?link=pubs/htmlpubs/hm03712801>

This report, by Phyllis Hargrave and John Metesh of the Montana Bureau of Mines and Geology and Ken McBride of the Bitterroot National Forest, reviews the methods of controlling groundwater flow to underground workings. The first step requires identifying and characterizing the source of both surface and groundwater. Infiltration controls may include grouting from outside the workings, soil or streambed treatment to reduce infiltration capacity, runoff management, and recontouring of natural recharge areas. Two abandoned mines in Montana with typical discharge problems are examined in detail to illustrate the process of mitigating groundwater flow.

For more information, contact Charlie Showers, project leader (phone: 406-329-3945; fax: 406-329-3719; e-mail: cshowers@fs.fed.us).

Answers to Frequently Asked Questions About Personal Digital Assistants (PDAs)

The San Dimas center has prepared answers to questions Forest Service users might have about the Dell Axim X5 and Hewlett Packard IPAQ PDAs. The Frequently Asked Questions are on the Forest Service's internal computer network at: http://fsweb.sdtc.wa.fs.fed.us/programs/im/fy03/ppc/faqs_071003.htm Forest Service employees must have technical approval to buy these PDAs.

SDTDC is evaluating 16 mobile computing devices. The FSCruiser and Common Stand Exam data collection software also are being examined. GIS and GPS applications are being evaluated by combining the Arcpad mapping software with a GPS unit and digital maps.

The latest wireless technology products are also being tested. Wireless technology



Answers to Frequently Asked Questions About Personal Digital Assistants (PDAs) *(continued)*

will allow computers to be truly mobile. File sharing and wireless networking are being conducted using the popular Bluetooth and 802 wireless network protocols.

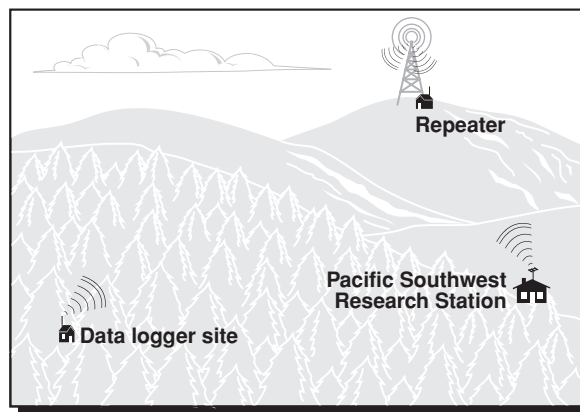
For more information, contact George Broyles, project leader (phone: 909-599-1267, ext. 277; fax: 909-592-2309; e-mail: gbroyles@fs.fed.us).

A Flexible VHF Telemetry System for Remote Sites

The Missoula center has developed a system that permits digital data to be transmitted over Forest Service VHF radio frequencies. This system uses the existing infrastructure of Forest Service FM radios, broadcasting on the least-used channels. It will allow data to be retrieved automatically from remote forest sites.

In July of 2002, the Pacific Southwest Research Station in Fresno, CA, asked MTDC to find a way to retrieve research data from remote sites in the Sierra National Forest. The research station was about to begin a 15-year study monitoring conditions in the Kings River watershed using four weather stations and eight stream-flow monitors. Visiting each site periodically to retrieve the necessary data would be very time consuming. This would be especially true in winter when most of the sites are accessible only by snowmobile.

MTDC investigated the options, addressing three problems: location, compatibility, and cost. The center immediately ruled out UHF spread-spectrum communications because of the line-of-sight and distance limitations. Satellite modems were eliminated because the volume of data to be transferred made the cost prohibitive. In addition, the data loggers transmitted data using a format that was incompatible with the satellite modems. Another problem was that different brands of data loggers had unique protocols for initiating a data download. The communications package and its support software needed to operate with all types of data loggers.



The research station had access to a VHF repeater maintained by the Sierra National Forest. One channel on the repeater received very little use. The research station's data could be downloaded during the early morning hours using that channel. A modem from Teledesign Systems of San Jose, CA, solved the problem of shipping data over a channel designed for voice communication. This modem

has several features that allow it to work with radios, such as generating a push-to-talk signal to key the transmitter.

The problem of selecting which data loggers would communicate with the host transmitter and managing the power consumption of the modems was solved by using dual-tone, multifrequency (DTMF) signals, such as those used by touch-tone telephones. A Bendix-King VHF-FM GPH5102 radio is used for communication at each site. This system could be readily adapted to other Forest Service applications where data needs to be retrieved from remote locations. The initial costs are between \$1,400 and \$1,800 per site. Depending on the terrain between the host station or repeater and the remote sites, the 5-watt Bendix-King radios can transmit signals up to 50 miles.

For more information on this remote data retrieval system, contact Ted Etter, project leader (phone: 406-329-3980; fax: 406-329-3719; e-mail: tetter@fs.fed.us).

MTDC Fabrication Shop

Any Forest Service unit that needs to have a specialized tool or piece of equipment fabricated should contact the MTDC staff. The center has a 17,000-square-foot prototype fabrication shop that includes machine tools such as mills, lathes, drill presses, and welding and wood fabrication equipment, and a paint booth that can accommodate medium-sized vehicles.

More importantly, the shop's staff — Mike Huey, Chuck Harding, and Scott Gilmour — have years of experience in metal fabrication, welding and machining, engine modification, and repair. Their innovative ideas and ability to work closely with the center's engineers have proven invaluable.

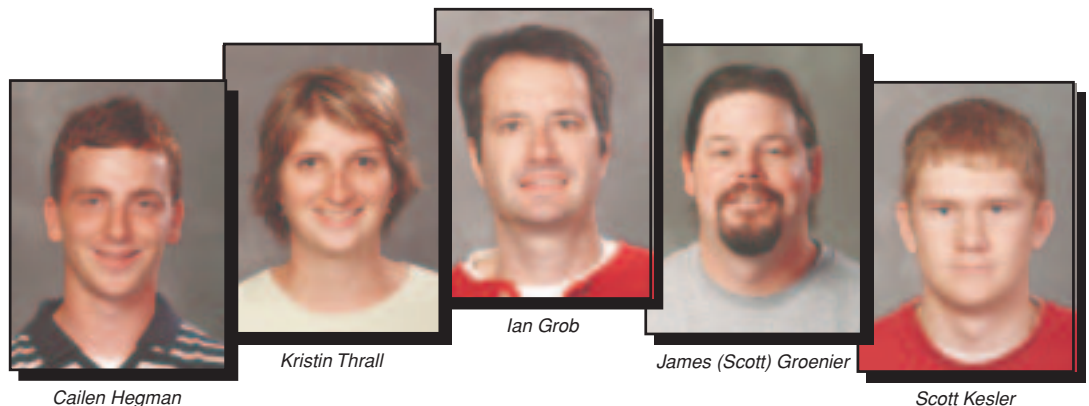


If your organization needs this kind of experience and fabrication capability, contact Andy Trent, project leader (phone: 406-329-3912; fax: 406-329-3719; e-mail: atrent@fs.fed.us).

New Faces at MTDC

Cailen Hegman joined MTDC in May as a publications assistant. He is responsible for filling the many orders that come in daily to MTDC's publications department, and getting out mass mailings throughout the year. Cailen is in his second year at the University of Montana.

Kristen Thrall began working for MTDC in September as an information assistant. She started her Forest Service career as a student employee with the Content Analysis Team last fall. Before working for the Forest Service, Kristen was a research assistant at the School of Forestry and Wood Products at Michigan Technological University. She spent 2 years in Paraguay working in agroforestry as a Peace Corps volunteer. Kristen has a bachelor's degree in Fine Arts from Albion College and a master's degree in Forestry from Michigan Technological University.



Cailen Hegman

Kristin Thrall

Ian Grob

James (Scott) Groenier

Scott Kesler

Ian Grob joined MTDC in August as a photographic technologist. After graduating from the Rochester Institute of Technology with a bachelor's degree in imaging and photographic technology, Ian worked for Failure Analysis Associates, in Phoenix, AZ, documenting automobile and motorcycle crash tests. In 2000, Ian became the photographer for Harley-Davidson Motor Company at Harley's Product Development Center in Milwaukee, WI.



New Faces at MTDC

(continued)

Scott Groenier began working for MTDC in November as a civil engineer project leader. Scott earned a bachelor's degree from the University of Wisconsin at Madison and a master's degree from Montana State University. He worked for the Wisconsin and Illinois State Departments of Transportation before starting his career with the Forest Service. He worked as the east zone structural engineer for the Eastern Region and as a civil engineer for the Ashley and Tongass National Forests.

Scott Kesler, a geography and business student at the University of Montana, has begun working as an editorial assistant at MTDC. Scott grew up on a ranch along the foothills of the Rocky Mountains near Choteau, MT.



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