

United States
Department of
Agriculture

Forest Service

Engineering Staff

Washington, DC



Engineering Field Notes

Volume 33
July–December
2001

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Director's Update

Vaughn Stokes
Director of Engineering
Washington Office

It has been an exciting few months since I last reported to you. During the holiday season the Office of Inspector General auditors requested verification of our real property—an integral part of achieving a clean audit of our financial welfare. Despite the unfortunate timing of the unanticipated request, the volume of work, and the attendant safety issues, you rose to the occasion and completed the surveys safely and effectively, completing more than 98 percent of the required records. All of you deserve a round of applause!

Although we did not receive a clean bill of health on the FY 2001 financial audit, your efforts have brought us much closer to that goal. With your continued effort, we expect to achieve a clean bill of financial health in the near future.

We have had a few surprise personnel moves over the last few months. Mike Ash has left his duties as the Deputy Director of Engineering to lead a team in reviewing the Sierra Nevada Framework in Region 5. Chief Bosworth and Regional Forester Blackwell personally requested Mike's services. Mike will be missed tremendously in this office, but our loss is the region's gain.

Sam Morigeau has been appointed as Mike Ash's successor in the Deputy Director position. Sam brings a wealth of experience to Washington Office Engineering from the private and Government sectors. The next edition of *Engineering Field Notes* will feature an article on Sam to let you know more about him. Please congratulate Sam and wish him well in representing us in the future.

We are still moving forward on our journey to implement the Working Capital Fund (WCF) for facilities. Although typically we are the primary caregivers of our buildings and utilities, we are not the owners. The field line officers are ultimately responsible and accountable for the facilities condition. Line officers from the field led the WCF team in developing the policy and are now providing team leadership in directing its implementation. As team members, we at the Washington Office, with regional assistance, provide information to the line officers leading the teams.

What changes are in store for you? An integral part of the WCF policy is identifying which facilities we need to keep and maintain. Most units have a facilities master plan (FMP) in place that was completed primarily by engineering personnel. A key change under the new policy stipulates a second-level review and approval of the forest FMPs by the regional offices. It is strongly urged that all plans be reviewed by an interdisciplinary team and updated to reflect future needs. We are required to have an updated FMP by the end of 2003.

The Washington Office is also providing direction to clarify significant misunderstandings about issuing permits for commercial use of National Forest System Roads (NFSRs) through an interim directive to the Road System Operations Handbook (FSH 7709.59). The directive makes it clear that the public, including commercial users, is authorized by 36 CFR 212.6c to use open NFSRs. There is no decision to be made regarding whether to allow commercial use of open roads in the National Forest System.

This changes the practice of the last 10 years. During that time, it was incorrectly believed that there was a decision to be made about allowing commercial use of open roads and that any ramifications of activities on private land facilitated by the use of NFSRs had to be analyzed through National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) procedures. The Interim Directive (ID) will end the era of lengthy consultations with the U.S. Fish and Wildlife Service and National Marine Fisheries Service prior to issuing road use permits. The ID also clarifies when NEPA and ESA procedures are applicable to road use permits, such as when a commercial hauler requests to reconstruct a road to facilitate a proposed haul. Requirements in FSH 7709.59 for commercial haulers to perform and/or share maintenance will remain in effect. (For more details, see our Web site at <http://fswweb.wo.fs.fed.us/directives/fsh/7709.59/>)

The regional engineers and I continue to work with outside interests to promote the concept of seamless transportation through the use of the Public Forest Service Roads (PFSR). Based on your hard work, we have produced a booklet for each State that shows the proposed PFSR system. This thorough documentation should greatly further efforts to encourage funding support for PFSRs under the next reauthorization of the Transportation Act in FY 2003.

With our summer field season rapidly approaching, I want to place special emphasis on working safely. **Safety is our number one priority.** Don't hesitate to stop an action immediately if you see an unsafe action unfolding. It is always best to err on the side of safety to prevent a possible accident rather than having to deal with a fellow employee's injury or death or a trauma to yourself.

Thanks again. Keep up the hard work, but do it **safely.**

2000 Engineering Field Notes Award Winners

Thanks to everyone who took the time to vote for their favorite *Engineering Field Notes* articles published in 2000. We appreciate your efforts to let our authors know that their articles are read and valued.

Putting your thoughts and experiences on paper takes time, energy, and dedication, so we especially appreciate our authors' willingness to submit articles. To remain a valuable resource to our field personnel, we rely on people willing to share their time, knowledge, experiences, successes, and even their failures. According to our readers, your articles continue to save the U.S. Department of Agriculture (USDA) Forest Service time and resources.

Here are the winning authors who will receive cash awards for *Engineering Field Notes* articles for 2000:

- Bill Renison for "The Arch of Middle Fork: A Trail Bridge of Distinction"
- Richa Wilson for "Barns and Barracks, Offices and Outhouses"
- Jasen Neese for "West Fork Energy Audit Synopsis"

Congratulations to all our winners and to all the authors who make this publication possible. To encourage you to keep those articles coming and to have an opportunity to become an award-winning author, see the information on how to submit an article to *Engineering Field Notes* on page 20.

Transformers: From Student Vision to Engineering Marvel

Editor's Note: The author describes one Forest Service unit's novel and effective approach for exposing young students to real-world technical scientific and engineering applications. The students' idealized settings became canvases for engineers to illustrate a variety of particular engineering applications.

John R. Kattell, P.E.
Northern Region Transportation Structures Group Leader
Missoula, MT

As an engineer or a technician for the USDA Forest Service, have you ever tried to explain engineering's role and the USDA Forest Service's mission to young children? The Northern Region Engineering staff did just that with some elementary school students.

Every month, the regional office engineering staff in Missoula, MT, holds a family meeting with a 30- to 40- minute program. In February 2000, the program involved a fourth-grade class from Hellgate Elementary School in Missoula.

In January 2000, Nita Kattell's class (see figure 1) produced some artwork depicting a natural forest or mountainous setting. It was understood that at their family meeting the engineering staff would add to the artwork by illustrating various aspects of the USD Forest Service's mission and their own engineering contributions. Twenty-one kids did artwork on 11- by 17- inch white construction paper with colored chalk. They produced great pictures of mountains, streams, trees, and wildlife.



Figure 1. Nita Kattell's fourth-grade class from Hellgate Elementary School exhibits its artwork.

The engineers were asked to add to the artwork with black charcoal pencils and to write descriptions of their illustrations in a corner the students left blank (see figure 2). The engineering staff's general consensus was, "Do we really want to mess up these great pictures with our poor illustrations?"



Figure 2. Northern Region Engineers add illustrations to the students' drawings.

The Engineers illustrated a wide array of engineering applications including signage, roads, trails, a hand pump and vault toilet, a public lands boundary survey system, satellites and airplanes representing our mapping capabilities (see figure 3), a fish ladder and bottomless culvert, a lookout tower, a ranger station, a dam and landslide, various USDA Forest Service vehicles, and smoke jumpers. One student drew a picture of a landscape viewed from the sky, creating a perfect setting for an engineer's rendition of a winding road leading to a bridge and ski lift (see figure 4).



Figure 3. Satellites illustrating GPS and remote-sensing applications.



Figure 4. An engineer has added a winding road and a bridge leading to a ski lift. Note the oblique view that was drawn by a student.

John Kattell, the Northern Region Structures Group Leader and Mrs. Kattell's husband, presented the pictures with the engineering staff's additions to the fourth graders and encouraged them to ask questions. Some of the students said, "What a neat bridge!" "Cool!" and "Sweet!" as they received their augmented artwork. And they asked plenty of questions (see figure 5 and 6).



Figure 5. John Kattell hands back a picture.



Figure 6. John Kattell explains the engineering applications one engineer contributed to a child's artwork.

They wanted to know about latitude and longitude with respect to the mapping and boundary survey illustrations; what a fish ladder is; and what a vault toilet is. (The students understood the latter after Mr. Kattell used the word "outhouse.") They also asked what lookouts are used for.

Mr. Kattel showed the students photographs of various USDA Forest Service vehicles. For real-life examples of ranger stations, the fourth graders visited the Nine Mile Ranger Station in Huson, MT, and viewed a photograph of Fenn Ranger Station, which is located 30 miles east of Kooskia, ID.

The artwork exchanged sparked discussion about the importance of vault toilets and clean water and how necessary they are at campgrounds and trailheads. The 4th Graders truly seemed to enjoy getting their artwork back with the engineers' additions.

Special thanks goes to Mrs. Kattell's fourth-grade class at Hellgate Elementary School for encouraging some USDA Forest Service engineers to connect with the community. They had fun sharing practical science applications with the students.

The Vault Evaporator Toilet System— An Innovative Alternative for Waste Disposal

Marina S. Connors, P.E.
Civil Engineer
Center for Design and Interpretation (CDI)
Rocky Mountain Region

Due to rapid development in Colorado, the cost of vault waste disposal is increasing significantly. In addition, as wastewater treatment plants near capacity, finding locations that accept vault waste is becoming more difficult. One solution to these problems is to construct composting toilets instead of vault toilets. Composting systems, however, require significantly more maintenance and a building with a basement.

Biological Mediation Systems' (BMS) patented Vault Evaporator, an innovative waste disposal alternative, avoids many drawbacks of both standard vault toilets and composting toilets. This system uses mechanical ventilation to effectively control odors and substantially reduce waste volume and, therefore, pumping frequency. One vault with a vault evaporator system can accommodate up to eight toilets, as well as multiple drinking fountains and sinks. For several years, the Colorado Department of Transportation and the National Park Service have successfully used Vault Evaporators at highway rest areas and national parks, respectively.

PROJECT DESCRIPTION

Fish Creek Falls Recreation Area is a very popular year-round day-use site in Steamboat Springs, CO, on the Routt National Forest. The site's existing vault toilet is inaccessible and undersized. Development at this site included designing and building an accessible toilet to handle 750 visitors a day on weekends and 300 visitors a day on weekdays during high-use season. (see figures 1 and 2.)

POTENTIAL WASTE DISPOSAL SOLUTIONS

The alternatives evaluated for this site included standard vault toilets, a vault toilet with a vault evaporator (BMS Vault Evaporator), composting toilets (Clivus Multrum), and evaporation/dehydration toilets (BMS Devap2000 System and Bio-Sun System). Factors weighed in the selection of the preferred alternative included cost, the building's visual impact with or without solar arrays, fitting the building to the site topography, and minimizing maintenance.

The composting system was immediately eliminated as a viable alternative because the visitation patterns would require many composting units. Vault toilets using Sweet Smelling Toilet (SST) design principles would have required two separate buildings some distance apart, which the site could not accommodate.

A life cycle cost comparison done on feasible alternatives included a comparison of waste systems and grid versus solar power. Capital construction costs included the waste system, the building cost, earthwork, and site work. Annual costs included replacement parts, maintenance, and vault pumping.

**VAULT EVAPORATOR:
THE MOST
ADVANTAGEOUS
ALTERNATIVE**

The preferred alternative was the grid-powered Vault Evaporator. It was the most effective waste reduction system with the least amount of maintenance. It further met the project's needs by permitting the location of all the toilets in a single building that did not require a full basement and therefore could be sited more conveniently for maintenance and visitor access. As a bonus, the building could be customized to suit other structures, the site, and architectural guidelines in the U.S. Department of Agriculture (USDA) Forest Service's Built Environment Image Guide. It fell in the middle of the total present-worth cost range, but was clearly the most advantageous solution for the site.

SYSTEM DESCRIPTION

The vault evaporator waste system has a 3-foot-deep concrete vault beneath the building floor slab and an 18-inch-diameter pipe around the vault's inside perimeter. The pipe is slotted in one section to allow liquids to enter and has two vents fitted with fans that force air down the toilet risers and through the pipe. The pipe provides a large surface area for liquids evaporation, reducing the amount of waste that collects in the vault. The evaporation process is estimated to reduce vault waste volume by two-thirds. Although the forced-air system is designed for evaporation, the waste remains aerobic, which reduces odor problems.

The toilet building at Fish Creek Falls Recreation Area is a rustic, 234-square-foot structure containing two women's toilets, one men's toilet, one urinal, and a hose bibb for cleaning. A 4,000-gallon vault lies under the building. Each of the two vent fans connected to the evaporator pipe blows 640 cubic feet of air a minute. It is estimated that the vault will have to be pumped only once a year, compared to three times a year for two double standard vault toilets.

The vault system can be purchased by itself from BMS, or the company can build a custom building on top of the vault. The Fish Creek Falls toilet building has a log exterior and a 3-foot stone wainscot. It was constructed by BMS at its plant with input from the district and regional offices. The building's total cost was \$88,716, including delivery to the site from Ft. Collins, CO. This cost did not include the stone wainscot or site work.

The building was completed in September 2001. Feedback thus far has been very positive. Arguments in favor of the vault evaporator system have been so compelling that construction of another one began in this region just a few months later. Time will tell whether the toilets are as odor- and maintenance-free as anticipated.

For further information and evaluation of available toilet systems, please see Guidelines for the Selection of a Toilet Facility, April 1991, 1923–1204 SDTDC, San Dimas Technology and Development Center. This document can be requested via the SDTDC Web site at fsweb.sdtdc.wo.fed.us.



Figure 1. Fish Creek Falls Recreation Vault Evaporator Toilet Building (front view)



Figure 2. Fish Creek Falls Recreation Vault Evaporator Toilet Building (side view)



Figure 3. Installation of the vault evaporator. Liquid enters the perimeter pipe and fans force air through the pipe to promote evaporation.

Using Lotus Notes to Share Information on Water and Wastewater Issues

Do you ever feel like you are working on a water or wastewater issue that you are certain someone in the USDA Forest Service has already figured out? Do you ever need water or wastewater information that you are sure someone in the USDA Forest Service must know about?

Use the Lotus Notes Water and Wastewater Engineering Discussion Database to post or answer questions and share information. This database has been set up by Region 2 employees but can be accessed by anyone who has access to the USDA Forest Services' Lotus Notes System. Anyone in the recreation or engineering staffs who is responsible for water and wastewater systems would find this database especially useful.

Access the database the first time, bookmark it manually by going to File → Database → Open → server = R2DATA01 → database = <fsfiles\unit\engineering\engwater.nsf> → Bookmark; then choose a navigational icon under which to bookmark the database. If R2DATA01 doesn't appear on the server pulldown list after selecting Open, select Other and navigate to it.

To find the bookmarked database, move your cursor to the Notes navigation column (the gray column on the left side of the Notes screen) and find the icon called Databases. Click on that icon and a list of bookmarked databases will show up in the Notes navigation pane (the block just to the right of the gray column). Notes adds databases to the bottom of the list when it automatically bookmarks them.

Another: When you're in this database (and, actually, most of the Notes databases the USDA Forest Service is creating right now), you'll see a list of several views in the navigation pane (just as in your e-mail database you see inbox, trash, etc.). By Category is one of the most commonly used views because it's a good way to sort messages by topic. This particular database opens with the same view you used the last time you were in the database; if you are in the By Category view when you leave the database, it should open in that same view the next time you access it.

For some other good hints on using a discussion database such as this one, see at Help → Using This Database, as well as Help → About This Database.

If you have any comments or questions about this database, please contact Marina Connors by e-mail Marina.Connors/R2/USDAFS@FSNOTES or mconnors@fs.fed.us or by phone at 303-275-5186.

Bibliography of Publications from Washington Office Engineering and Detached Units

This bibliography contains information on publications produced by the Washington Office Engineering staff and its detached units. Arranged by series, the list includes the title, author or source, document number, and date of publication.

This issue lists material published since our last bibliography (*Engineering Field Notes*, Volume 32, July–December 2000). Copies of *Engineering Field Notes*, and most Engineering Management Series documents can be obtained from the Washington Office Engineering staff. Copies of project reports, *Tech Tips*, and special and other reports can be obtained from the technology and development center listed as the source.

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909-599-1267

USDA Forest Service
Missoula Technology and Development Center
Fort Missoula, MT 59801
406-329-3978

Publications

Engineering Management Series and Other Publications

The Engineering Management (EM) Series contains publications serving a purpose or reader and publications involving several disciplines that are applied to a specific problem.

Engineering Field Notes (EFN)

This publication, which is published every 6 months, provides a forum for the exchange of information among U.S. Department of Agriculture (USDA) Forest Service personnel. It contains the latest technical and administrative engineering information and ideas related to forestry.

EFN by Title (Volume 33)

2000 <i>Engineering Field Notes</i> Article Award Nominations	Editor (January-June 2001): 29
2000 <i>Engineering Field Notes</i> Article Award Winners	Editor (July-December 2001): 3
2000 Forest Service Engineers of the Year	Editor (January-June 2001): 20-27
ATV Trail Work on the Allegheny National Forest, Summer 2000	Clymer, Don and Conn, Mark (January-June 2001): 7-9
Bibliography of Publications from Washington Office Engineering and Detached Units	Editor (July-December 2001): 13-19
Choices: Composting or Installing a Vault Toilet	Hamele, Bill (January-June 2001): 18-19
Director's Update	Stokes, Vaughn (July-December 2001): 1-2
Documenting Leased Vehicle Condition During Emergency Events	Votapka, Frank (January-June 2001): 15-17
The Evaporator Vault System—An Innovative Alternative for Waste Disposal	Connors, Marina S. (July-December 2001): 8-12
Guidelines for Authors for Engineering Field Notes	Editor (July-December 2001): 20
It's A New Day	Stokes, Vaughn (January-June 2001): 1-3
Road Analysis Process—What Makes It Work?	Horn, Dale and Sowa, Richard W (January-June 2001): 4-6

	Tale of Two Bridges and a Bean, The	Schnare, J. Keith (January-June 2001): 10–14
	Transformers: From Student Vision to Engineering Marvel	Kattell, John R. (July-December 2001): 4–8
EFN by Author (Volume 33)	Clymer, Don and Conn, Mark	ATV Trail Work on the Allegheny and National Forest, Summer 2000 (January-June 2001): 7–9
	Connors, Marina S.	Evaporator Vault System— An Innovative Alternative for Waste Disposal, the (July-December 2001): 8–12
	Editor Article Award Nominations	2000 <i>Engineering Field Notes</i> (January-June 2001): 29–32
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	Hamele, Bill	Choices: Composting or Installing a Vault Toilet (January-June 2001): 18–19
	Horn, Dale Sowa, Richard W.	Road Analysis Process— What Makes It Work? (January-June 2001): 4–6
	Kattell, John R.	Transformers: From Student Visioin to Engineering Marvel ((July-December 2001): 4–8

Schnare, J. Keith	Tale of Two Bridges and a Bean, The (January-June 2001): 10-14
Stokes, Vaughn	Director's Update (July-December 2001): 1-2
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Votapka, Frank	Documenting Leased Vehicle Condition During Emergency Events (January-June 2001): 15-17

Reports

Project Reports

Title	Number	Source	Date
Packaged Surface Water Treatment Plant for Campgrounds and Other Very Small Water Systems (by Brenda Land)	0123-1201	SDTDC	01/01
Effective Aerial Reseeding Methods: Market Search Report (by Ryan Becker)	0151-1204	SDTDC	07/01

Tech Tips

Title	Number	Source	Date
Tree Marking Paint (video)	0124-1401	SDTDC	08/01
Skyline Cable Yarding— A Tool for Resource Management (video)	0124-1402	SDTDC	12/01
Helicopter Yarding— A Tool for Resource Management (video)	0124-1403	SDTDC	12/01
Cruising—A Tool for Resource Management (video)	0124-1404	SDTDC	12/01
Fluorescent Lamp Retrofits: Savings or Fantasy?	0171-2310	MTDC	06/01
Science-Based Roads Analysis Process for the National Forests	0171-2312	MTDC	01/01
Chest Harness for the Fire Shelter	0171-2313	MTDC	02/01

Tent Bag for the Personal Gear Bag	0171-2314	MTDC	02/01
New Fire Shelter Training Materials	0151-2320	MTDC	03/01
A Survey of Fuel Gelling Agents	0151-2324	MTDC	03/01
Personal Safety in Remote Work Locations: General Awareness Video	0167-2327	MTDC	06/01
Comparison of Commercial Deer Repellents	0124-2331	MTDC	07/01
Personal Backpacks for Carrying a Chain Saw	0123-2334	MTDC	07/01
Demonstration of Aerial Spray Aircraft Navigation Systems in Deep Mountain Valleys	0134-2336	MTDC	12/01
Field Evaluation of the Magellan GSC-100 Global Communication Device	0167-2337	MTDC	09/01
MTDC Air Quality News: No. 1 (electronic only) http://fsweb.mtdc.wo.fs.fed.us/programs/wsa/air_news/issue.htm	0151-2338	MTDC	09/01
Flagging for Firefighting Escape Routes and Safety Zones	0151-2339	MTDC	09/01

Special Reports

Title	Number	Source	Date
Manufacturer Submission Procedure for the Qualification of Multi-position Small Engine Spark Arrester Exhaust Systems (by Ralph Gonzales)	0151-1801	SDTDC	06/01
Manufacturer Submission Procedure for Qualification Testing of Water Handling Fire Equipment (by Lois Sicking)	0151-1802	SDTDC	01/01
Specification 2400-400 Paint, Tree Marking With Tracer (by Bob Monk)	0124-1803	SDTDC	03/01
Manufacturer Submission Procedure for Qualification Testing of General Purpose Screen and Locomotive Spark Arrester Exhaust Systems (by Ralph Gonzales)	0151-1804	SDTDC	06/01

Guidelines on the Use of Thermistor and Time Domain Reflectometry Instrumentation For Spring Thaw Road Management on Low-Volume Asphalt Roads (by Gordon Hanek and Mark Truebe)	0177-1805	SDTDC	12/01
Innovative Approaches to Transportation—A Guidebook	0177-1806	SDTDC	12/01
National Tree Climbing Guide	0167-2802	MTDC	09/01
Ground Pattern Performance of the California Department of Forestry Bell S205 Helicopter With the 300-Gallon Sims Rainmaker Collapsible Helibucket	0157-2803	MTDC	01/01
Ground Pattern Performance of the National Guard Black Hawk Helicopter With the 770-Gallon SEI Industries Bambi Helibucket	0157-2804	MTDC	01/01
Ground Pattern Performance of the Forest Service Bell 206 Helicopter With the 100-Gallon Sims Rainmaker Helibucket	0157-2805	MTDC	01/01
Ground Pattern Performance of the Siller Brothers S-64 Helicopter With the 2,000-Gallon SEI Industries Bambi Helibucket	0157-2806	MTDC	01/01
Ground Pattern Performance of the California Department of Forestry Bell S205 and National Guard UH-1 Helicopters With the 240-Gallon SEI Industries Bambi Helibucket	0157-2807	MTDC	01/01
Ground Pattern Performance of the Forest Service Bell 206 Helicopter With the 100-Gallon SEI Industries Bambi Helibucket	0157-2808	MTDC	01/01
Comparison of GPS Receivers Under a Forest Canopy After Selective Availability Has Been Turned Off	0171-2809	MTDC	05/01
Wildland Fire Safety Collection CD	0151-2811	MTDC	05/01
Wildland Firefighter Health & Safety Report No. 3	0151-2817	MTDC	04/01

Health Hazards of Smoke: Spring 2001	0151-2821	MTDC	06/01
T&D News: Winter 2001	0171-2822	MTDC	01/01
Investigating Wildland Fire Entrapments: 2001 Edition	0151-2823	MTDC	03/01
Accident Investigation Guide: 2001 Edition	0167-2825	MTDC	04/01
Fixed Anchors in the Wilderness (electronic only) (http://fsweb.mtdc.wo.fs.fed.us/pubs/1c/1c01232826.htm)	0123-2826	MTDC	05/01
Urgent Fire Shelter Alert (electronic only) (http://fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm01512828)	0151-2828	MTDC	06/01
T&D News: Spring 2001	0171-2829	MTDC	07/01
2000 MTDC Documents (brochure)	0171-2830	MTDC	08/01
Real-Time Smoke Particulate Sampling: Fire Storm 2000	0125-2832	MTDC	10/01
Wetland Trail Design and Construction	0123-2833	MTDC	09/01
Engineering Level One	0171-2835	MTDC	12/01
Wildland Firefighter Health & Safety Report No. 4	0151-2840	MTDC	10/01

Engineering Field Notes

Guidelines for Authors

Proposed articles should be submitted in double-spaced text in 10- or 12-point Arial or Helvetica type fonts, left-margin justified. To ensure that design layout conforms to USDA Forest Service publication standards, submit graphic elements, such as tables, charts, and photographs, as separate files. Manuscripts should be submitted as Microsoft Word documents (either Macintosh or Windows formats) on 3.5-inch floppies, Iomega products (ZIP 100), or recordable CDs, or can be sent by e-mail.

When soliciting photographs for your document, encourage photographers to capture the sharpest image possible by moving close to the primary subject so that it fills at least three-quarters of the frame. Request vertical and horizontal photos of at least three different exposures for each subject to ensure maximum design flexibility. (For cameras without adjustable F-stop lens settings, use the +/- exposure adjustment for different exposures.)

Photographers must use digital cameras that provide print- or publication-quality images. Provide 1-megabyte .jpeg files (for electronic use) or 5-megabyte .tif files for print publications. Designers can convert jpegs into .tif files for professional page layout.

The use of Kodak photo CDs, Agency-provided desktop scans, or images from online sources is not recommended. Such images often lack sufficient clarity (required minimum resolution is 300 dpi or dots per inch.) Internet photos generally only have a resolution of 72 dpi.

Provide sources for all photographs and secure written permission for the use of non-USDA Forest Service material. (Standard permission forms are available.) The EFN editor will clear all photographs through the USDA Forest Service-Office of Communication and USDA Photo Division.

Follow USDA guidelines on including photographs in your document.

See www.usda.gov/agency/oc/design/ for current information.

- 1. Slides** (originals or first-generation duplicates, preferably multiple frames of each subject) should be housed in a protected box or archival slide sheet.
- 2. Transparencies** (4 by 5 inches or larger, preferably multiple frames of each subject) should be housed in archival slide sheets.
- 3. Prints** (4 by 5 inches or larger, glossy finish, black-and-white format) are preferred for Engineering Field Notes and other one-color publications

For additional information on preparing documents for the Engineering Management Series, contact Sandy Grimm, Engineering Publications, by phone 703-605-4503 or by E-mail: SandraGrimm/WO/USDAFS@FSNOTES or sgrimm@fs.fed.us.



Engineering Field Notes

Administrative Distribution

The Series ENGINEERING MANAGEMENT SERIES is published periodically as a means of exchanging engineering-related ideas and information on activities, problems encountered and solutions developed, and other data that may be of value to engineers Servicewide.

Submittals Field personnel should send proposed articles for Engineering Field Notes through their regional information coordinator for review by the regional office to ensure inclusion of information that is accurate, timely, and of interest Servicewide. (See Engineering Field Notes Guidelines for Authors on page xx.)

Regional Information Coordinators	R-1	Marcia Hughey	R-6	Cheryl Clark
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	R-3	Marjorie Apodaca	R-9	Cliff Denning
	R-4	Walt Edwards	R-10	Aaron Weston
	R-5	Gwen Harris-Nishida	WO	Tom Moore

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