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It's A New Day

Vaughn Stokes
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"It is a new day . . . yesterday's obstacles are not necessarily today's obstacles and yesterday's relationships need not be tomorrow's relationships. Do not be encumbered by what was but explore the new possibilities before you and enjoy the results!"

As I reflect upon these thoughts, as recently shared by the Chief's Transition Team, I realize how fitting these words seem in light of the many recent engineering efforts. We have faced some big challenges and successfully turned them into opportunities to help set the course for the future of the Forest Service and of engineering.

In the January-June 1999 edition of *Engineering Field Notes*, I shared with you a "Vision of Opportunity" for helping the Agency meet its mission of caring for the land and serving people. I focused upon four areas in which we could make short- and long-term impacts: buildings and facilities, geospatial data, watershed restoration, and forest roads. Over the past 6 months, Forest Service (FS) leadership, Congress, and our external customers and partners have demonstrated heightened awareness of, attention to, and support of our forest infrastructure. Through our collective energy, creativity, and technical expertise, we have made great progress and set in motion a new plan for the future of our forest infrastructure.

In my 1999 article, I discussed the magnitude of the facilities problem: over 25,000 buildings (not including recreation facilities), most over 30 years old, many beyond their useful life and failing to meet current codes and standards, and at current budget levels, on a 300-year rotation schedule. Our need to manage and fund facilities differently and more effectively evolved into a new and viable alternative, the concept of a Working Capital Fund (WCF) for facilities.

In November 2000, the WCF concept was presented to the National Leadership Team (NLT). Thanks to the hard work and cooperative effort of a number of folks, we developed a detailed recommended alternative that was further refined and presented at the July NLT meeting in Washington, DC. The team decided that:

1. The WCF program will start up in FY 2004.
2. Facilities master planning will be mandatory and must be completed by the end of FY 2003.
3. Collections for WCF will begin in FY 2004 at $.50 per square foot and will increase at the rate of $0.50 per square foot per year. There will be no variations in rates between regions or stations.
4. The initial program will only include WCF for maintenance.
5. The NLT will address replacement of facilities in FY 2005.
6. An implementation team will be chartered to work out the details to successfully implement the program.

I applaud the persistent hard work of the regions, stations, and particularly the facility folks, on laying the groundwork for the NLT discussion, understanding, and demonstrated program support. We identified the need to do business differently and we are well on our way to implementing a long-term solution that will help to reduce our facilities backlog maintenance.

We successfully communicated the magnitude of our infrastructure's critical backlog of deferred maintenance. Between the National Fire Plan for fire facilities–Title IV, and the Land and Conservation Fund–Title VIII, our program funding to address the backlog of deferred maintenance was increased by over $90 million. To accommodate the increased workload for meeting our new program commitments and existing program commitments required us to pool our limited resources. I appreciate the dedication and energy that you have demonstrated in collectively accomplishing a very aggressive program of work.

In 1999 geospatial data was included as one of our areas of opportunity. A lot has happened since then. I've taken the assignment as the Chair of the Geospatial Executive Board (GEB). We've had a couple of very successful conferences, one in Baltimore, MD, and, most recently, one in Salt Lake City, UT, where we hosted over 300 employees from the Forest Service and from other Federal agencies. We are working to integrate all local, national, and international geospatial data for forest and project planning and we've formed a users' group, the Geospatial Advisory Committee (GAC), that has already planned and facilitated training through the Geospatial Service and Technology Center (GSTC) and the Remote Sensing Applications Center (RSAC).

GSTC and RSAC and geometronic and geographic information systems (GIS) units have been providing a lot of training to the field on how to use geospatial information and technologies in solving natural resource management issues through the National Geospatial Applications Helpdesk, Web sites, CD ROMs, and through both onsite and offsite classes. We are working to further enhance the centers' capabilities to effectively produce and acquire geospatial data to serve the field units to support transportation issues, planning and inventory, forest planning, wildland fire suppression, and other major national initiatives and rulemaking efforts.

We've committed to integrating applications with both the INFRA and ALP databases–two areas of immediate concern for engineering through the GSTC/RSAC intranet clearinghouse. On the national scene, we are working to standardize FS geospatial data (fall 2001) through the Federal Geographic Data Committee. My hat is off to all of the technical folks for standardizing their data and their processes. I've been amazed at the substantial progress that's been made across their areas.

I'm proud of you engineering folks who have invested an amazing amount of energy in transportation issues over the past 2 years. Many of you have been involved in the development of a new Road Policy, or the Roads Analysis training, or the Roadless Conservation Rule, or the TEA 21 Seminars for Line Officers. Together you are establishing the Forest Service as a leader in advancing the science and practice of managing a transportation system in an environmentally sustainable way.

Because of your efforts we have substantially completed an inventory of our roads and are well on our way to having the condition and cost data necessary to meet our fiscal accountability goals–Good Work and Thanks to All!

We have made major progress on many forests in reducing the adverse impacts of roads on watersheds. The regions have concentrated their "10 percent funds" on reducing the amount of sediment from roads and trails that is getting into waterways. We have completed several outstanding sedimentation reduction projects. We have been able to demonstrate how forest personnel are working successfully to restore watersheds from the before and after photographs of 10 percent projects that you have submitted. Major progress is being made to identify and replace culverts that are barriers to the passage of fish and other aquatic organisms. You have worked to be full team members in watershed restoration. Through these efforts we are developing better relationships and forging new ones as we continue to find new avenues to further watershed restoration.

We have established ourselves as a public road authority, working to ensure access to National Forest System (NFS) lands by obtaining authorities currently available to other public road authorities. We will begin working with the U.S. Department of the Interior, Congress, and the States to establish clear procedures for providing public road access to NFS lands through RS-2477 and other right-of-way acquisition methods.

Finally, we have worked hard to establish the relationships, educate our stakeholders, and lay the groundwork for funding Public Forest Service roads. Together with our many Federal, State, County, and Tribal partners, we recognize the importance of providing a "seamless transportation system" to the public.

Our new Chief, Dale Bosworth, and our new Associate Chief, Sally Collins, have been very involved with engineering and have made it clear that our roles are critical to the Agency's success as we continue to provide new and better service for the people of the United States.

Road Analysis Process– What Makes It Work?

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Now that the U.S. Department of Agriculture (USDA) Forest Service (FS) new road management policy is released, we will be doing road analysis for every forest within the next 2 years. Some regions and forests have taken this to heart and already have started to define what their process should look like and how it might be implemented. It does not make a lot of sense to have everyone start from scratch and reinvent the same process over and over. Toward that end, we would like to share some of the experience gained in Region 6, Pacific Northwest Region, through the efforts of the Olympic National Forest.

Our intention with this article is not to write a comprehensive outline of the Olympic Road Management Process, ORMS. We want to highlight portions of the ORMS that should help you with the national process. For the full-blown version, the Olympic National Forest has set up a Web site, http://fsweb.f9.r6.us/eng/rms/index.htm, so you can access all the information about their process and what they have learned in the last year.

Because one size won't fit all, the OMRS, or national process, does not provide a cookbook approach to roads analysis. Instead, it allows flexibility where and when it is needed to fit specific local situations. Read it to see what people are using and adapt it to your specific situation.

We believe that before starting any road analysis process, a few critical road management components need to be in place. First, you must have a valid transportation inventory. Second, you need to understand the issues of the forest at a local scale. And third, you need a process that will enable you to compare conditions on one road with another in some repeatable, quantifiable way.

With those road management components in place, you will be ready to begin. To refresh your memories, the Road Analysis Process comprises six steps: (1) setting up the analysis; (2) describing the situation; (3) identifying issues; (4) assessing benefits, problems, and risks; (5) describing opportunities and setting priorities; and (6) reporting.

The ORMS develops step 4 of the national process more than it does the other steps. It focuses efforts on assessing road conditions and uses the road condition information to produce an effective comparison of road segments. Forest decisionmakers can then use this information to develop an effective

road management strategy, which includes setting priorities for road maintenance, restoration, and upgrading.

The ORMS team developed road management strategy factors to rate road segments. The following five critical factors, each incorporating particular indicators, for the Olympic National Forest were developed:

1. **Aquatic Risk**
Geologic Hazard
Proximity (Delivery) to Fish Habitat
Stream Crossing Density
Riparian Zone-Stream Proximity
Upslope Hazard

2. Access Factors
Private Access
Public Access
Administrative Access

3. Wildlife Factors
Threatened and
Endangered Species

4. High-Value Watersheds
Key Watersheds
Municipal Watersheds
Clean Water Act 303(d)
Listed Water Bodies
Habitat for Listed Fish
Stocks

5. Silviculture Factors
Terrestrial Habitat Development (Commercial Thinning)
Terrestrial Habitat Development (Pre-Commercial Thinning)

It is important to recognize that the factors listed are tailored to the Olympic National Forest. Priority issues associated with some may be suitable for use in assessing your roads, while others may not. In addition, other factors might need to be included such as fire risk. You should review the factors that have been developed already, and when they fit, use them. You will still have to take time for your team to understand the factors and what they are measuring, but having a template will save time.

For the sake of brevity we will focus on one type of factor and one indicator developed by the ORMS team to give you a sense of how the process works. You can get the rest of the story from the previously mentioned Web site. Look at **Aquatic Risk** and the indicator **Proximity (Delivery) to Fish Habitat**. We will discuss the indicator first.

The **Proximity (Delivery) to Fish Habitat** indicator combines criteria for sediment delivery efficiency based on landform type and physical distance from fish-bearing portions of the stream network. This indicator is designed to provide an estimate of any road effects to fish and fish habitat. To simplify, the indicator estimates the potential for sediment and the proximity to fish populations; the higher the score, the greater the risk of sediment to fish populations.

One critical component of the Olympic analysis process was the need to use existing data whenever possible. For example, sediment delivery efficiency is rated for all landforms on the forest as part of the Olympic National Forest Ecological Unit Inventory (EUI).

With all of the indicators completed, the **Aquatic Risk** is computed for each road segment in an **Aquatics Matrix** by combining the numeric values of all the indicators. The **Aquatic Risk** is designated as low, moderate, high, or very high accordingly.

The process continues for each factor and indicator and results in the **Summary Matrix**. With the **Summary Matrix** complete, the forest has a tool that can be used to help make management decisions that answer questions such as the following:

- Where should we direct limited road maintenance funds?
- Where should we focus watershed restoration funds?
- Which roads can we walk away from (abandon)?
- Which roads are the best candidates for decommissioning?
- Which roads should we emphasize for storm patrol?
- Which roads will we need to help improve Late Successional Reserve conditions?
- Which roads should we close to reduce disturbance to wildlife?

Some lessons to be learned from the Olympic National Forest's road management process include the following:

1. The unit line officer must support the process. In the case of the Olympic National Forest, the support of the Forest Supervisor was critical in making sure that the forest accepted the responsibility to develop an effective method for evaluating the forest road system.

2. The process must include internal and external collaboration. We cannot understate the need for the process to be interdisciplinary.

3. The factors and indicators used to evaluate the road system must be flexible so a forest can evaluate priority issues that are particular to that forest. For example, ORMS did not assess roads based on the need to access areas for fire management; their major emphasis was on risk to aquatic resources. You need to use factors that are important to your area.

4. The point of the analysis is not to turn the forest into a data-gathering machine but rather to focus efforts on using available information to help make sound decisions. The Olympic National Forest used existing data that could be applied forestwide.

5. We all have something to contribute to developing the road analysis process. The more we share and accept what has already been done, the faster we will be in successfully carrying out this national mandate. Be sure to develop a Web site that enables you to share your processes and information.

Thanks for taking the time to read this article. We hope it succeeded in whetting your appetite for learning more about some of the good things that are happening in Region 6 and in the Olympic National Forest. Most important, however, we hope the article has given you some information to help expedite your efforts in road analysis.

ATV Trail Work on the Allegheny National Forest, Summer 2000

The 513,000-acre Allegheny National Forest (ANF) in northwest Pennsylvania, with its 108 miles of all-terrain-vehicle (ATV) trail, is a popular destination for ATV and trail bike riders. The Allegheny, one of 155 national forests in the United States, is Pennsylvania's only national forest and is located in Elk, Forest, McKean, and Warren counties.

During the summer of 2000, the USDA Forest Service performed heavy maintenance and reconstruction of the ATV trails using new equipment that is small and narrow to keep the finished trail narrow. This narrower configuration results in higher levels of rider enjoyment by keeping the trails more challenging and aesthetically pleasing. The work done with this equipment consisted of 5.4 miles of trail relocation and 7.4 miles of trail restoration on the Marienville Bike Trail.

The Forest Service shaped the tread, installed structures, and restored trail sections, using mini excavators that are 5.4 feet wide, are powered by a 3-cylinder, 33-horsepower diesel engine, and weigh approximately 3.8 tons. Most previous trailwork had been done by using small bulldozers or skid steer loaders equipped with dozer blades. This was the first time mini excavators had been used on the ANF trail system; they proved to be quick and efficient. The excavators often used their bucket to loosen the soil and then used the blade to level and move it off to the side. The mini excavators were capable of building new trail at the average rate of 0.4 miles per day.

Figure 1. *Using mini excavators proved to be quick and efficient.*

The mini excavator disturbs much less ground than a dozer or skid steer does when installing sediment traps, removing stumps, etc., because its arm reaches out to do the work. This feature results in less seeding and mulching. The mini excavator also costs less to rent and operate than does a small dozer.

To harden up the tread surface, the Forest Service placed 4,600 tons of commercial gravel on various portions of the Marienville Bike Trail, using minitracked trail dumpers to transport the stone to those sections of trail. The trail dumpers are 5.2 feet wide and are powered by a 4-cylinder, 46-horsepower Kubota diesel engine. They weigh 2.3 tons and are capable of hauling 3 tons of stone.

Figure 2. *A minitracked trail dumper.*

Because the trail dumpers can be driven with the operator facing either way by reversing the seat, if there is no room along the trail to turn the dumper around, it can be driven in either direction easily. The dumper is operated by a "T" handle, which is pushed either forward or backward for direction and speed of travel and is twisted to turn to the left or right.

This maintenance and reconstruction effort also was the first time that these trail dumpers had been used on ANF trails. They proved to be efficient and durable. Some of the "carries" were up to 1.5 miles one way along the trail, and the dumpers made good time on these long hauls over rough trails. A 3-mile round trip delivering 3 tons of stone to the worksite took about 40 minutes.

Both the mini excavator and trail dumper use rubber tracks, which are a definite advantage over steel-tracked equipment. On rocks and boulders, steel tracks tend to "skate" and slip, while rubber tracks have good traction.

Figure 3. *A mini excavator in action.*

Kightlinger Excavating of Bradford, PA, provided the equipment and performed the trail work under a contract with the ANF. Funding for this trail improvement work was provided by the Pennsylvania Department of Conservation and Natural Resources through ATV registration receipts.

ANF personnel were extremely pleased with the mini excavator and dumpers and with the narrow trail corridors that were achieved using this equipment. Comments from trail riders about the new trail sections have been exceptionally complimentary.

To obtain more information about this equipment, contact either Don Clymer or Mark Conn at Allegheny National Forest headquarters by telephone, 814-723-5150.

The Tale of Two Bridges and a Bean

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Intermountain Region

Iowa farmers raise a lot of corn, soybeans, and hogs. The fertile soil of Iowa also grows trees and nourishes ideas. Ideas for tapping the abundant soybean crop and the abundant underutilized tree species have resulted in wise use of both agricultural and wood resources for structures that are particularly attuned to regional transportation needs.

Farming country throughout the Nation depends on a transportation infrastructure to get materials to the land and produce to market. Many of the farm-to-market roads require bridges across streams and irrigation ditches. Usually the crossings are short, no more than 20 to 50 feet, and a bridge may be as wide as the crossing to accommodate oversized farm equipment.

Figures 4 and 5. *Typical bridges on farm-to-market roads in North Dakota that need to be replaced.*

One goal of the Forest Service is to promote the use of underutilized wood species. The Wood in Transportation grant program (WIT), which is funded through State and Private Forestry (S&PF), encourages the use of underutilized species in transportation structures. Cottonwood is a common underutilized species found in Iowa and in other States. While somewhat weak structurally, it treats well with oil-based preservatives. To promote cottonwood as a bridge-building material, WIT funded five cottonwood panel bridges in Iowa.

One bridge design featured an all-wood superstructure of cottonwood and southern yellow pine for the glulaminated (glulam) stringers with cottonwood panel decking. A second design incorporated recycled steel stringers with cottonwood panel decking. Designers specified a creosote treatment for all wood used in the structures. Bridges employed either guardrails or wheel guards based on the bridge width and on the type of vehicles that would be crossing the bridge. To accommodate oversized farm equipment, designers paired a low wheel guard with "knockover" warning panels (panels that return to a vertical position).


Figure 6 (left). *Panel deck with wood beam design.*
Figure 7 (right). *Panel deck with recycled steel girder design and sheet pile abutment.*

Bridge designs specify crib walls of either concrete, only for pre-existing abutments in good condition, or sheet pile steel. For the steel crib walls, the beams were placed on "H" piles. The crew placed sheet pile steel on the edge of the end panels to keep dirt from flowing over the crib wall. By using steel, a county crew can quickly remove and replace the bridge without waiting for concrete to harden. After installing the deck, the crew applied a rubber membrane and 3 inches of asphalt pavement. To replace a bridge using cottonwood panels took 2 to 3 days.

Designers specified full-dimension 2 by 8, 4-foot wide, 26-foot long kiln-dried wood lumber. Decking was placed on edge and glued into 4-foot wide, 8-inch deep and 26-foot long panels and coated with a creosote preservative. These panel dimensions were chosen for two reasons. First, to allow multiple panels to be treated at one time with the preservative in the treatment pressure vessels. Second, to truck multiple panels side-by-side and maximize space on highway legal transport vehicles.

Builders constructed southern pine and cottonwood wood glulam beams--six pine outside boards on the top and bottom of the beams with a cottonwood middle portion of the beam. They used full-dimension 2 by 8s for beams with a slight camber and treated with creosote. Final beam dimensions were 8 inches wide, 4 feet deep, and the length of the the bridge.


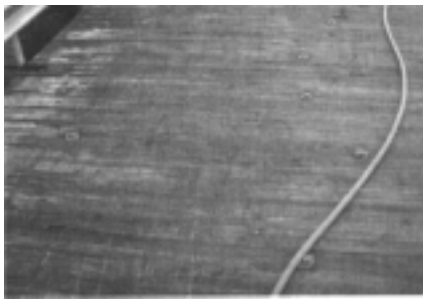

Figure 8 (left). *End view of deck panel attached to steel girder with clips.*
Figure 9 (right). *Bridge deck showing lag bolt attachment.*

The crew drilled and lagged the deck panels to the wooden beams, using friction as the only restraint at the edge where the panels meet. On the steel girder bridges, the crew drilled and attached the deck to the girders with steel clips made from mohr board that had a bolt welded on to go through the wood deck panel with a nut and washer attachment. Workers treated all drilled holes with creosote.

The crew attached guardrails or wheel guards, placed the deck, and glued an impermeable membrane to it. A 3-inch bed of asphalt coated the membrane for a running surface.

Figure 10 (left). *Bridge deck with moisture barrier being placed.*

Figure 11 (right). *Finished bridge with asphalt running surface, guardrails, and knockdown warning signs.*

To provide for efficient use of crew time, the cottonwood bridge deck panels can be ordered and stockpiled before any scheduled construction. The weight of the panels is light enough for a single crane to lift and place them.

All bridges were designed for an HS-20 loading. Design software and instructions for the cottonwood bridges are available from the Forest Products Laboratory. Contact Lola Hislop at 505-572-4505, or by e-mail at lhislop@fs.fed.us. Contact Ed Tice, Ida County engineer, in Ida Grove, IA, at 712-364-2920 for the details and costs for each bridge. A summary of bridge costs and design specifications are also available on the WIT Web site http://wit.fsl.wvnet.edu. The WIT Web site has articles about the use of wood in transportation structures, bridge design plans, and costs.

Another goal of the Forest Service is to promote the use of small-diameter wood. A light prestressed segmented arch (LPSA) design, which employs small-diameter wood, and was used in the recycled steel stringer bridge mentioned previously, is also suitable for many other structures. The pedestrial bridge shown in the photographs uses round wood members, steel connectors, and cables for tensioning the structure. The bridge can be erected rapidly, even at remote sites, because of its simplicity of design and construction. Untreated wood found onsite can be used, if it is debarked. The bridge parts, which may consist only of connectors and cable, can be transported easily to the site by all-terrain vehicles (ATV), by animal, or by helicopter.

This LPSA bridge design uses the wood members in compression and a cable to establish tension for the whole structure. The round wood members have better strength qualities than rectangular members of equal size because the structure and stresses of the round wood are unchanged. The structure consists of small-diameter, short wood members, which eliminates the slenderness factor. The calculations are identical with those used for short columns. In fact, round post material from the local lumberyard or fence supplier works well in these structures.

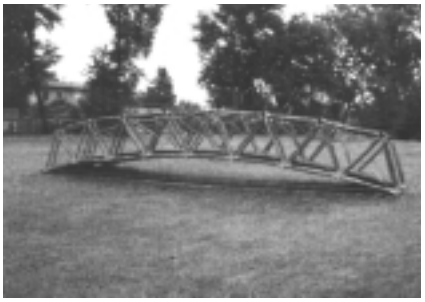

Figure 12 (left). *Side view of LPSA bridge with 35 foot span.*

Figure 13 (right). *End view of bridge.*

The structure shown is an arched truss, 35 feet long with a 4-foot wide deck. It appears to be a combination of a "warren" truss and a "three-hinged arch" without the middle hinge, comprised of interlocking equilateral triangles with a cable tensioning chord. The 222 wood members (posts) of the bridge, which are approximately 2.5 inches in diameter by 4.5 feet in length, are primarily hybrid-polar from a thinned riparian buffer with some additional black walnut poles. The deck is made from 1/2 by 6 inch white oak nailed to deck poles. The bridge is designed to handle a uniformly placed total load of more than 1,500 pounds.

The critical construction elements of an LPSA structure are (1) square ends on the members and (2) a firm, but not tight, fit in the connectors. Therefore, each wood member must have the ends sized to the diameter of the metal connector, which can be done with a handtool onsite or with automated equipment in a processing plant.

The bridge can sit on wood sills or on the ground and can be tied down using any Forest Service standard anchoring methods. Bridge erection is a simple process that can be done from one end of the structure because of the poles' firm fit into the connectors. The structure will support itself and a small erection crew before it is tensioned with the steel cable. The steel cable conforms to American Society for Testing and Materials (ASTM) A-416 standard 7-wire, low-relaxation strand, 270,000 pounds per square inch (psi). The cable is available in 1/4 to 1/2 inch diameters. It is identical to the cable used in construction pretensioned concrete beams, which has little stretch or relaxation once it has been tensioned.

The LPSA technology is partly funded through a grant from S&PF and is in the business incubator program at the University of Iowa. The University of Northern Iowa Recycling and Reuse Technology Transfer Center funded further development of the LPSA technology. See their Web site for ongoing projects at www.rrttc.uni.edu.

The innovation and bridge design were done by Dr. Ibrahim Al-Khattat of Sustainable Science International, which is located on the Oakdale Research Campus, University of Iowa. The LPSA design won the British Design Council's National Business Invention Award in the Toshiba Year of Invention competition and the Merit Award from the British Farm and Rural Buildings Center. Contact Dr. Khattat at 319-335-4505, or by e-mail at ssi@avalon.net. The Web site for this information is www.avalon.net/˜ssi.

Two bridges and a bean? What can a bean have to do with wooden bridges? Now it is time to focus on the combination of wood and agricultural products. Perhaps agricultural products show up in several places, or they could be urban or industrial products. The cottonwood and hybrid poplar came from farm land riparian buffers. The black walnut came either from thinning a farm woodlot or from tree trimming in town.

Can we enhance our bridge by using an agricultural product like soybeans? It might take a lot of glue to make them into a bridge, but what about making them into a wood preservative to make the bridge last longer? We do not have to stretch our minds too far on this; just to Louisiana State University where John Lu and Quinglin Wu combined soy protein with copper to produce a low-toxicity wood preservative They say that the soy protein wood preservative is less costly and has less environmental impact than other preservatives.

The soy wood preservative is being tested on an LPSA bridge that uses eight to ten different species of wood in the construction. Most of the bridge is constructed with hardwood from the South and includes some lodgepole pine from Idaho. The LPSA bridge will be built with a treated and an untreated side so that each species of wood can be compared, treated and untreated, side by side.

As we look at more uses for underutilized wood species and small-diameter wood, remember these two bridges and a bean. Thinking out of the box and expanding our horizons allows us to do more with our underutilized resources. As forest and grassland managers, we have long complained about the weed trees and small wood that remain after management projects are completed.

We've described two uses for small and underutilized wood and a potential, environmentally friendly wood preservative. How many other ideas can help transform our agricultural and wood resources into improved forest products?

Documenting Leased Vehicle Condition During Emergency Events

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INTRODUCTION

As the historic 2000 fire season goes into the history books, it is fitting to reflect on what went right and what could have been done better. The decision to videotape the condition of vehicles used for fire suppression during pre- and post-event inspections of vehicles had a positive impact on the Kootenai National Forest. The results were unequivocally successful in saving inspection time, in clearly documenting vehicle condition, and in quickly resolving most vehicle damage claims against the Government, usually in the Government's favor.

HISTORY

In 1994, and again in 1998, the Kootenai NF had several large fires that required the purchase of support vehicles and equipment to help suppress fires. In both years, prework inspectors documented vehicle body and operating condition by conventional written methods. A few still photographs illustrated any major damage, and overall conditions were recorded as well as possible. We found that much of the minor damage—such as small dents, dings, and scratches—was not noted in sufficient detail to support the post-event inspection and closeout. This lack of detailed information was particularly true when large numbers of vehicles were inspected quickly at the beginning of a large fire buildup. In addition, many of the vehicles were rented from car dealers, who did not have exact knowledge of the condition of the vehicle at the time of the initial leasing. As a result, at closeout time, claims were filed for many dents, scratches, and dings. Contracting officers paid many of these claims because there was no documentation to the contrary.

In 2000, the Kootenai NF decided to begin videotaping each vehicle to document body condition. As a parallel exercise, digital cameras were also used for photographic documentation. This latter effort was soon abandoned, however, because the digital images were less effective in revealing vehicle damage than were the videotapes. After just 1 week into the 2000 incidents, our "experiment" was about to pay off. A pickup truck was demobilized from the fire, and the owner filed a $780 claim for damage to the vehicle—mostly dents and scratches that were going to require repair and repainting. It was typical of the type of claims we had paid in the past. We reviewed the videotape that clearly showed the prefire condition of the vehicle with the contracting officer. He then reviewed the video with the claimant; the claimant withdrew all of his claims for damage and walked out with a stern warning from the contracting officer not to make false claims.

This is not to say that we did not settle any claims for damage. There were ample legitimate cases of vehicle abuse and damage that we settled, usually in a timely manner after reviewing the tapes. Mechanics Bob Kooken and Ray Hammons, who were equipment inspectors for the fires, agree that there is no objection to paying for legitimate damage that occurs to leased vehicles

because the owner is legally entitled to such payment. However, vehicle users who frequently abuse these private vehicles during fire duty are of concern.

As a result of using the video cameras, the Kootenai NF believes that we saved tens of thousands of dollars that otherwise might have been paid by the Government for false claims.

VIDEO TECHNIQUES

The Kootenai NF selected a super 8 video camera to document vehicle conditions for two reasons. First, the camera provided sufficiently detailed images. Second, the camera is easily operated by multiple users, many of whom personally own such a camera.

After viewing more than one thousand inspections, most reviewers agree that the most successful shots included the following basic steps:

1. The best documentation occurs when an inspector, standing in front of the camera operated by another person, does voice documentation as well as pointing at the feature he or she is trying to depict. Often the camera operator can then help by zooming into the feature and pointing out features the inspector may have missed. Wide-angle shots, which are then zoomed down, also help in the documentation.

2. It is best to have a date and time stamp appear at least periodically on the camera, which helps with the video search when a vehicle is returned.

3. During slow periods in the vehicle inspections, one inspector can create an index of vehicles that appear on each tape to help locate a particular vehicle. In our case, 12 tapes were shot, which creates a logistical nightmare without such an index. The index identification included the equipment number (“E” number), the license plate number, and a brief description of the vehicle, such as “Chevy 4x4 pickup extended cab blue.” We found that not all “E” numbers are in numerical order for inspection, and we had five complexes that each created their own “E” numbers.

To make taping easier, we recommend taking the following steps regarding accessories:

1. Keep one set of batteries in the recharger at all times.

2. Have extra batteries on hand. Even rechargeable batteries will not keep a charge after several recharges. It is frustrating to have a long line of vehicles and no working camera available.

3. Acquire a second camera or a playback machine to enhance efficiency. Demobilized vehicles can be viewed at the same time as other vehicles are being signed up, which happens when several fires are burning at once. The second camera can be hooked up to a monitor for better viewing. The second camera can also serve inspectors during extremely busy periods or when one camera is required to document equipment offsite or at another location. This is also a situation in which date and time stamps are essential because two tapes are being created at roughly the same time. Often the tape on the second camera may be used for several days before it is fully used.

4. Locate a dust-free, darker viewing station away from the main inspection area for easier viewing, cataloging, and negotiating with vendors at the end of the event. When vehicles were being demobilized, we found that the owners also wanted to view the tapes. They would inspect their returned vehicles and make notes. The inspector and the owner would then sit down together to review the tape. Often the two of them could agree upon the vehicle's prefire condition versus project damage and document it for the contracting officer. This effort would free up the contracting officer's time so that he or she could negotiate legitimate claims.

SUMMARY

Videotaping vehicles at signup time for emergency events is a cost-saving and time-saving tool. The axiom of a picture being worth a thousand words is true, and a moving picture with narration is a thousand times better than that. The tapes do not have to be professionally done, but attention to the documentation job is essential. The use of a team approach for videotaping is recommended. It is much more effective for one person to operate the camera while another person narrates and points out damage than to rely on a single person to manage the camera while chronicling damage. Both vehicle owners and the Forest Service agree that the tape is an impartial representation of the vehicle's appearance before the incident, because several weeks may go by between the pre-inspection and the final inspection. We also found that fewer claims were filed when the Forest Service used professionals to detail personal vehicles and to buff out brush scratches, especially when personal vehicles on loan were newer model pickups and sedans. Videotaping heavy equipment can help to indicate project damage versus preproject damage conditions—particularly for logging equipment that may be worn and damaged already.

Several buying team members and administrative people from other forests and regions, who observed the techniques firsthand, commented favorably on the videotaped documentation. As a result of the successes during FY 2000 fires, the Kootenai National Forest intends to make videotaping of equipment standard operating procedure. We will be conducting classes for Kootenai NF equipment inspection personnel on how to videotape a vehicle for the best documentation for future claims.

Choices: Installing a Composting or a Vault Toilet

Bill Hamele
Environmental Engineer
Washington Office

Composting toilets usually are installed to eliminate the need for pumper truck visits and to provide a healthy, safe, environmentally sound recreational experience for National Forest System (NFS) patrons. Field experience with composting toilets has increased knowledge about the proper conditions for their use. This article summarizes the potential limitations that have been experienced in installing, operating, and maintaining composting toilets and also summarizes previously published material concerning the advantages and disadvantages of composting and vault toilets.

Frequent information requests to the San Dimas Technology and Development Center (SDTDC) have highlighted previously unrecognized limitations associated with the use of composting toilets. Issues of employee health and safety, proper maintenance, and climatic conditions required for proper operation of the digester have consistently generated questions.

Employee health and safety are of concern because staff must enter the toilet building's basement to access the digester for raking. Staff must open the digester weekly and rake raw feces to facilitate proper operation, requiring close contact with waste and potentially pathogenic organisms. Basements may house rodents and snakes, and access stairways are often steep, poorly lit, and sited in confined spaces.

As performing weekly digester maintenance demands a large amount of staff time, limited staff resources may be a major drawback. Additionally, its unpleasant nature may discourage staff from performing maintenance and raking as frequently as is required. As a result, composting toilet facilities require a substantial resource commitment.

Finally, composting toilets are not operationally robust; they operate well only under climatic conditions conducive to biodegradation of human wastes. To function properly, composting toilets must be located in moderate climates. Considerations for siting composting toilets merit particular attention because the optimal climatic range is fairly narrow. For more detailed information, see the publication *Composting Toilet Systems, Planning, Design, and Maintenance*, 1995, 9523 1803-SDTDC, San Dimas Technology and Development Center, USDA Forest Service, San Dimas, CA.

The following table summarizes information from *Guidelines for the Selection of a Toilet Facility*, April 1991, 9123 1204-SDTDC, San Dimas Technology and Development Center, USDA Forest Service, San Dimas, CA, and knowledge gained from installing, operating, and maintaining composting toilets.

Vault and Composting Toilet Comparison

Vault Toilets	Composting Toilets
Employee Health and Safety	*Employee Health and Safety*
• Contact with feces is limited or nonexistent • Confined space is not an issue	• Close contact with raw feces is required • Confined space and safety are issues because of basement location
Maintenance Requirements	**Maintenance Requirements**
Periodic pumping based on intensity of use	Weekly raking and material addition
Climatic Conditions	**Climatic Conditions**
Impervious, except to extreme cold	Biodegradation processes are very sensitive; easily upset by climatic variation
Patron Satisfaction	**Patron Satisfaction**
Can be impaired by odor	Very good, if functioning properly
Installation Costs	**Installation Costs**
Generally less than composters	Generally more than vault because of basement construction and cost of digester
Residuals Disposal	**Residuals Disposal**
Generally not difficult but can be problematic because of local regulations	Generally not problematic, subject to local regulations
Capacity	**Capacity**
Restricted by frequency of pumper truck visits	Restricted because of limitation on biological process of degradation
Use Limitations	**Use Limitations**
Limited to locations accessible by pumper truck or boat	Can serve all locations if construction is accessible and weekly maintenance is provided

2000 Forest Service Engineers of the Year

From the list of excellent candidates, the winners of the 2000 Engineer of the Year awards were selected. Congratulations to the following winners:

- Managerial Engineer—Gary Garthwait from the Regional Office in Region 1.
- Technical Engineer—Shannon J. Clark from the Coconino and Kaibab National Forests in Region 3.
- Engineering Technician—Elizabeth M. King from the Regional Office in Region 4.

In recognition of their achievements, Forest Service Associate Chief for Natural Resources Hilda Diaz-Soltero and Director of Engineering Vaughn Stokes presented each winner with a special plaque and cash award at a ceremony in Washington, DC, on April 2, 2001. Members of the executive leadership team and the winners' families also attended the ceremony. A summary of the winners' accomplishments is included on the following pages.

Congratulations to those individuals who were selected to represent their region as candidates for the 2000 Forest Service Engineers of the Year. The finalists in all categories include the following:

Managerial

Candace Bogart, *Region 3*

Dan Magallanez, *Region 6*

Hal Peterson, *Region 4*

Greg L. Watkins, *Region 5*

Technical

Jeffrey Alexander, *Region 4*

William H. Clerke, *Region 8*

Nancy Tipton Lee, *Region 5*

Daniel C. Smiley, *Region 1*

Warren F. Sutton, *San Dimas Technology and Development Center*

Kenneth Vaughan, *Region 10*

Donna Wians, *Region 6*

Bob Yoder, *Region 6*

Engineering Technician

Danny Hughes Call, *Region 8*

Steve Esquibel, *Region 1*

Wayne Hamilton, *Region 6*

Ken Pence, *Region 5*

Ronald F. Tissaw, *Region 3*

2000 Forest Service Engineers of the Year. Left-right: Gary Garthwait, Elizabeth (Beth) M. King, Vaughn Stokes, Director of Engineering, and Shannon J. Clark

Gary Garthwait
Managerial Engineer of the Year

Gary Garthwait is a facilities and environmental engineer in Region 1's Missoula, MT, office. He excels at managing recreation and wilderness activities at the forest level, at coordinating trails work at the regional level, and most recently, in developing a fire facilities regional action plan with fire, recreation, and engineering managers. During the past 2 years, he has managed a complex and growing facilities program along with a three-person environmental engineering staff and a three-person historic preservation team.

Through Gary's leadership, the Lolo National Forest pioneered in the historic preservation of buildings, establishing a regional preservation program that is still active. He also coordinated the first facility design charrette in Region 1. He worked closely with regional and forest heritage staff people to reach an agreement on a 2-year preservation program, the first year in the program's 7-year history in which this level of out-year planning has been achieved.

Gary's quest for better, more creative, cost-effective engineering services extends beyond Forest Service boundaries through interagency agreements with the following:

- The U.S. Army Corps of Engineers on facility design and construction projects of more than $11 million in the Northern Region, including Web-based design review, real-time cost accounting, job order contracting, and Indefinite Delivery Indefinite Quantity (IDIQ) construction contracting for new facilities;

- The U.S. National Park Service (NPS) on supplementing the Northern Region's Historic Preservation Program through mutual cooperation on projects and opportunities for access to new technology and the best training available; and through promotion of Contracting services that employ the latest technologies and methods for architectural and engineering needs and services that enhance the Forest Service's communication capabilities for effective technology transfer.

Gary advocates integrating engineering with all resource management areas. His comprehension of engineering's critical role in the complex, dynamic nature of fire management persuaded the regional fire staff to develop a 2-year program for facilities that could exceed $20 million. His ability to meld engineering skills with recreation management has furthered cooperation in both disciplines.

Gary's leadership abilities are apparent in his innovative use of contractors, interagency agreements, and out-of-region employees to implement Region 1 facilities projects, obligate funds, and provide adequate time for completion despite peak demand (an average of more than $6 million annually for construction) without increasing staff. He has inspired teamwork among forest facilities engineers and forest recreation staff people. As a facilitator for the Region 1 Changing Roles in the Workplace course, Gary led affirmative action efforts.

Eight weeks after becoming aware of a substantial increase in facility funding, Gary developed a specific project implementation plan, facilitated a 2-day forest facility meeting to agree on a plan, and engaged the U.S. Army Corps of Engineers to design and construct six new projects. He prepared job descriptions and facilitated advertising for a new fire specialist project team.

In 1999, Gary developed a plan to train the recreation staff to use recreation-meaningful measures on all ranger districts in the Northern Region by assembling a cadre of forest-level trainers, preparing a training plan, and leading a 10-week training effort. In the same year, Gary worked with Region 1 forest personnel, the Bureau of Land Management (BLM), Yellowstone and Glacier National Parks, and the Continental Divide Trail Alliance to prepare a 10-year action plan for completing the Continental Divide National Scenic Trail in the Northern Region. He assembled a list of projects and associated budgets and designed and facilitated a training session in Missoula for all participants to forge agreement on this plan.

Gary also assembled a team of forest supervisors, forest engineers, and regional engineering staff to develop a regional facility management strategy and a multiyear construction list. In 2000, this group succeeded in preparing a 5-year program that includes project design prospectus preparation for all projects, 2 years before construction. This effort has achieved great program stability and generated Forest Supervisor involvement and trust.

Gary serves his community as a volunteer. He led university students in studying agricultural practices and land terracing in the mountainous regions of Nepal; supported Habitat for Humanity in Missoula by directing high school student volunteers in a house-building project in Mexico; led outdoor youth activities such as trips on the Missouri River, backcountry hiking, weekend ski retreats, summer work camps in inner city and migrant work settings; and trained as a facilitator for support groups within the public school system to target substance abuse and offer confidential counseling.

Gary has had a positive influence on the professional growth of subordinates and peers in Forest Service resource management programs. He looks for ways to motivate his employees and encourages ownership of their programs. As a registered professional engineer in Wisconsin, Alaska, New Mexico, and Montana, Gary sends a clear message to his employees to seek professional registration. Currently, four of his six professional employees are registered professionals.

Gary and his staff conduct an average of five classes per year for the Northern Region Training Academy, a key portion of the Region 1 training program. A new class debuts in 2001 for line officers on “Historic Preservation of Facilities for Managers,” and a multiple-day facility engineering orientation session for new Region 1 forest facilities engineers is in the works.

Gary Garthwait has consistently exhibited professional and managerial leadership in his career and in his personal commitments locally, nationally, and abroad.

Shannon J. Clark
Technical Engineer of the Year

Shannon J. Clark is a facilities engineer for the Region 3 Coconino and Kaibab National Forests in Arizona. He has been recognized repeatedly over his 24-year career for contributions ranging from effective management of the facilities engineering section of the Coconino and Kaibab National Forests, service in fighting wildfires, outstanding effort in project completion for INFRA and recreation capital investment, and professional assistance on a variety of projects. Recognition comes not only from the engineering section, but also from forest supervisors, administrative officers, district rangers, the regional office, recreation staff officers, and the Rocky Mountain Research Station.

Shannon is a leader in embracing new technology. He worked with the Arizona Department of Environmental Quality and Northern Arizona University to install an experimental wastewater system adapted to the harsh native environmental conditions; pioneered the use of the "turnkey" construction contract for the Peaks Ranger Station in the mid-1980s; and selected and installed a state-of-the-art, automated well at the Palatki Cultural Site. Shannon excels at technology transfer, often networking with his peers on other forests and regional staffs. He frequently provides solutions to engineering problems by integrating multiresource perspectives, such as contributing technical expertise to the renovation of a historic structure on the General Crook Trail and to concept planning for a wildlife project to transport reclaimed water from a city treatment plant to create a riparian haven for wildlife.

Shannon has exhibited leadership qualities in championing the shared services for the engineering staff of the Coconino and Kaibab National Forests. By earning the respect of both staffs, he has helped make the shared services concept a reality. Despite his heavy workload, Shannon has taken the time to mentor an engineering trainee to become an excellent employee.

Shannon's leadership qualities and organizational capabilities were a major asset in developing and implementing a formal work program for the Coconino NF, which continues to be used today. His assessment of realistic expectations for accomplishments has helped the engineering staff accomplish nearly all of their goals, with record numbers of contracts awarded and strengthened customer relations.

Shannon actively supports recycling efforts, fire suppression activities, and workforce diversity efforts. He has hired or recommended an Asian co-op, a Native American trainee, and a Hispanic team leader.

Shannon also has been instrumental in developing and implementing the Coconino's tool for tracking progress and accomplishments for the recreation capital investment program, "Cocogate." When the engineering services of the Coconino and Kaibab NFs were combined, Shannon developed and implemented an equally successful parallel process for the Kaibab National Forest.

During the merging of the engineering sections of the two forests, Shannon absorbed more and more professional responsibilities, yet he maintained his positive attitude and excelled in producing substantial quality work on both forests with the following:

- Overseeing the design of major recreation projects and of the facilities program deferred maintenance for water/wastewater, buildings, and dams, and support to recreation and mineral management, plus real property inventory for the Coconino National Forest.
- Providing technical input for a dam removal project, land exchanges, recreation concession operations, and special use operations.

- COR responsibility for leases, and Request for Proposal (RFP) preparation on several offices, and preparation of out-year project proposals for Fire, Administratve, and other (FA&O) projects.

- Managing the design and construction of several building projects.

Shannon is equally supportive in his community. He volunteered his engineering expertise to help design the installation of a figure skating jump harness and has served as music coordinator at the rink for figure skating shows for the past 10 years. As a parent coordinator for a Flagstaff High School bank fundraiser, Shannon shared his cooking and organizational skills in preparing 500 dozen enchiladas and created instructions so that others could replicate his success. He lent his talent to refurbishing the playroom of the Flagstaff Medical Center Children's Rehabilitation Center that was adopted by the Forest Service and to reviewing plans for remodeling a building for his church. In addition, he furthers conservation education by participating in the Girl Scouts' Outdoor Odyssey Program.

Shannon hones his professional skills by attending local American Society of Civil Engineers (ASCE) meetings, professional conferences, and management training. He sometimes contributes to presentations of Forest Service projects and hosted the designation of the Kaibab National Forest steel dam as a historic engineering structure. He is a member of the Arizona Water and Pollution Control Association. He continues his professional education by attending courses or workshops on such diverse issues as Federal safety and health, building and electrical codes and system design and inspection, facilities operation maintenance, dams inspection maintenance, reinforced masonry design, hazardous materials first responder awareness, lead exposure in construction, and wastewater management.

Shannon J. Clark has demonstrated leadership in embracing, implementing, and sharing technical engineering skills in the workplace and in the community.

Elizabeth M. King
Engineering Technician of the Year

Elizabeth M. King is a Region 4 technical information specialist in Ogden, UT, with 17 Certificates of Merit/Special Act Awards and 34 peer awards. In August 1999, however, Beth drafted her 12-step program on career rejuvenation, which was to become "Confessions of a Retiree Wannabee," inspiring and motivating employees at all levels of the organization to fine-tune their work skills and attitudes and improve their performance.

Beth's primary responsibilities benefit from her skills in assisting regional personnel in historical research, accessibility information, vegetation typing, and other specialized projects through maintaining a high-quality library of mapping and photography products. She stores and maintains mapping layers and associated databases, negatives for maps and publications printed in the region, digital files for orthophoto maps and other products, and satellite imagery.

Beth continues to take on new challenges such as the following:

- Providing map reading training to rock collecting chapters and sharing information with more than 350 school children and adults on geographic information system (GIS) activities and historical maps at the Intermountain Region's GIS display in November 2000.

- Volunteering to assume map sales and collection officer duties for the regional office; to pursue R.S. 2477 road research on Idaho projects from county files, local museums, districts, and forests for the engineering and lands staffs for several months; to assume maintenance duties and responsibility for the Region 4 history archives of more than 8,000 historical photos located at Weber State University, streamlining and augmenting the collection with new engineering historical files, and maintaining and updating multiple databases.

- Researching historical map and aerial photo files of specific interest to the Intermountain Region at the National Archives and Library of Congress.

- Handling the logistics of a ponderosa pinecone harvest on a 3-week detail to the Idaho City Ranger District, the most successful ever, and was invited to return for spring planting.

- Coordinating the Great Western Trails booklet assembly and a fire award assembly project, using volunteers and students, saving much time and money for the Forest Service.

- Assuming responsibility for the current slides collection and regional photographs. Contracted to capture more than 4,000 slides as high-resolution, digital images on more than 70 CD-ROMs. She will coordinate distribution of an additional black and white photo CD collection throughout the region.

- Organizing and cowriting an Oracle database for the current and historical photo projects for future intranet accessibility.

Beth's foray into the motivational arena with her Retiree Wannabee concept has mushroomed beyond the regional office to include forests within the region and other regions. She presented her program 14 times between August 1999 and November 2000, touching the lives of approximately 2,000 Forest Service employees. She has established a Web site to further her message within the Agency and holds monthly "brown bag" rejuvenation career support groups.

The program is threefold: Value the Past, Deal with the Present, and Prepare for a Successfully Refocused (rather than a retired) Future. On her own time, she developed a series of interesting and informative topics for the support groups with guest speakers from the Service Corps of Retired Executives (SCORE) and the Social Security Administration and a retiree panel for sharing tips and helps for successful retirement strategies.

For the Value the Past portion of the program, Beth set up a liaison to provide mentoring opportunities between employees and retirees. She established an exhibit to display past and current efforts of engineering employees, initially focusing on ski lift safety and avalanche control work, and prepared another exhibit on fire management and the story behind Smokey Bear. She has pledged to change the exhibits two to three times each year and hopes to involve as many retirees as possible.

Because Beth's personal rejuvenation goals closely match the "New Century of Service" national program, which will pave the way for the 100th Anniversary of the Forest Service in 2005, she is now a member of the regional team. She gave the keynote address at the January 2001 national committee kickoff meeting.

Despite her myriad responsibilities, Beth has found time to support firefighting for the past 13 years as a buying team member. She helped write Region 4's manual of standard operating procedures. She has trained new buying team members for several seasons and was instrumental in formatting the waybill that is now used by all local and national buying teams.

Beth strongly supports multicultural awareness and equity for all employees through participation as a committee member for events such as Black History Month. She scripted a puppet show highlighting Kwanza, directed the production, used fellow committee members' voices on the companion audiotape, and taught members to work the puppets.

Beth maintains a high level of commitment in community service. She volunteered as a board member of the Alliance Federal Credit Union, a financial institution for Forest Service and Postal Service employees, from 1989 until 2000. She also has made and donated many quilts, including 18 for the Head Start Community Project in Ogden. She has been an active member of the Forest Service Women's Association for 21 years, providing technical expertise and signing advice for hearing-impaired individuals for various group activities, helping to raise thousands of dollars for various community groups.

Beth has written and produced numerous puppet shows for the community, including Christmas shows at three Davis County libraries and several Davis

Behavior Health's preschool programs to help disadvantaged children deal with bullying and substance abuse. Beth also wrote and produced a benefit Christmas puppet show where she used Forest Service Women's Association members as voices and puppeteers for Ogden's School for the Blind and Deaf Children.

Elizabeth M. King continues to inspire and motivate Forest Service employees with her career rejuvenation program while refining her expertise as a technical information specialist and finding new ways to serve on local, regional, and national fronts.

2000 Engineering Field Notes Article Award Nominations

A special thanks goes to each of our authors and readers for making *Engineering Field Notes* (EFN) 2000 a valuable resource. Articles ranged from managing historical facilities to managing travel on National Forest System (NFS) lands. Authors offered practical suggestions for designing trail bridges and low-water crossings, selecting tree-marking paints for facilities, conserving energy, and using the *Water/Road Interactive Field Guide*. Through *EFN*, authors continue to share their knowledge, experiences, and insight as Forest Service engineers at all levels and from all regions.

Now, we would like you to tell us which of the year 2000 articles you select as the most informative, beneficial, and interesting; which articles helped your unit save money; and which articles helped you develop more effective ways of getting your work accomplished.

After selecting your three favorite articles, please complete the rating sheet on the following page. Rate the articles from 1 (best) to 3 (third best). If you believe an article has helped or will help the Forest Service save money or other resources, please let us know. **Remember, this is a one-person, one-vote system. Your vote counts!**

When you have voted, cut the rating sheet along the dotted line, fold and tape or staple it closed, and mail it back to us. Or e-mail your first, second, and third article selections to Sandy Grimm at SandraGrimm/WO/USDAFS@FSNOTES or sgrimm@fs.fed.us. To be counted, your rating must reach us by November 2, 2001.

If you have never submitted an article, consider becoming an author. We welcome articles about your insights and experiences based on your projects. Next year you could be one of our winners.

2000 Engineering Field Notes Article Awards Nomination Form

Article	Author	Choice (1,2,3)	$ Saved ( )
January-June			
Introduction to the Water/Road Interactive Field Guide	Jeffry Moll	_____	_____
Arch of Middle Fork: A Trail Bridge of Distinction	Bill Renison	_____	_____
July-December			
Jones Wreckum Road Low-Water Crossing Revisited	Steven A. Brink	_____	_____
Blended Tree-Marking Paint for Facilities	Robert Monk	_____	_____
West Fork Energy Audit Synopsis	Jason Neese	_____	_____
Perspective on Travel Management on National Forest System Lands	Glenda Wilson	_____	_____
Barns and Barracks, Offices and Outhouses	Richa Wilson	_____	_____

CUT ALONG THIS LINE→

Comments: _____

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Name _____
(OPTIONAL)

(FOLD HERE)

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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 material through their regional information coordinator for review by the regional office to ensure inclusion of information that is accurate, timely, and of interest Servicewide.

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R-3 Marjorie Apodaca
R-4 Dan Hager
R-5 Gwendolyn Harris-Nishida
R-6 Michelle Clark
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R-10 Betty Wilt
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