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Engineering Technical Information System

EFN Forum

—Sandy Grimm, editor, Washington Office

This issue marks the end of an era. It is the final issue of *Engineering Field Notes*. The wealth of guidance, inspiration, innovation, and troubleshooting tips amassed from 1988 through 2005 are available on the Washington Office Engineering Web site. Archival hardcopy volumes of the periodical from 1969 through 1987 are housed in Washington Office Engineering.

In this issue you can read about the recipients of the *2004 Engineer of the Year* Awards. Authors share information about projects for large-diameter pipe ramming, small-diameter roundwood engineered trusses, and electronic physical security at Forest Service facilities. You also have an opportunity to vote for the top three EFN articles of 2004 and 2005. Just use the electronic links to visit each article and vote for your three favorites.

I retired as the editor of *Engineering Field Notes* and from the Forest Service at the end of September. I have enjoyed working with authors from forests, regions, and the Washington Office. It has been my pleasure to help you share your innovations and insights through *Engineering Field Notes*.

Alexander G. "Sam" Morigeau, former WO deputy director of engineering from 2002 until 2004, died January 30, 2005.

We will long remember Sam's generous spirit, lively sense of humor, and dedication to excellence.

Director's Update: May You Live in Interesting Times

—Vaughn Stokes, director of engineering, Washington Office

This will be our last electronic version of *Engineering Field Notes*. Sadly, as budget impacts affect all of us, we must say goodbye to this periodical.

An often-quoted proverb, "May you live in interesting times," certainly rings true for the times we find ourselves in today. I am not sure if this is a blessing or a curse. Some "interesting" challenges of today, and in the foreseeable future, are declining budgets, an aging and reduced workforce, increased demand on our infrastructure and capital assets, better accountability, and more performance measures for improved efficiency and effectiveness in our programs.

In these times, more than ever, the role and mission of engineering is integral to the success of the Forest Service. Engineering will continue to be a "go-to" organization within the Forest Service that provides high-quality technical services to all functional areas of the organization. A successful engineering organization needs to be flexible so it can adapt to an ever-changing, dynamic world.

Engineering's collective strengths reflect the consistent high-quality performance of our workforce, our dedication to the agency's purpose and mission, and the unique talents that each individual brings to the team. To maintain and enhance our abilities to provide world-class technical service and assistance, our contribution to the organization must be clear and well understood. Attracting and retaining a talented and diverse workforce that consistently functions at optimum performance levels is paramount to successfully meeting our challenges.

I am confident in our ability to build on our strengths and look forward to a Government that performs better and better, encourages more participatory management and open communication, and ultimately reduces barriers and expands opportunities. As I look toward fiscal year 2006 and beyond, I recognize that nothing remains constant and that change is essential to improvement. The collective strength of the engineering staff, the excellent core competencies of each individual, and our ability to articulate engineering's contribution to the Forest Service and the Federal Government will help us meet these challenges and exceed expectations.

We can be proud of some significant accomplishments in furthering two pieces of legislation by clearly articulating engineering's role to Congress. We did not achieve all of our goals, but we were successful in getting pivotal basic legislation passed and in getting additional authorizations in the appropriations bill. These vital tools will enable us to keep moving our programs of work forward.

A top priority has been to position the Forest Service to use tools and funding offered in the Transportation Bill effectively. Although we did not get the Recreation Roads category that we sought, several other desirable items are in the bill. We now have an *Aquatic Organism Passage* category for Public Forest Service Roads; we can compete with other Federal agencies for funding in alternative transportation modes and high-risk rural roads, and our forest highway funds are slated to increase substantially over the life of the Transportation Bill.

New legislation for managing facilities provides two tools for the Forest Service, authorizing a permanent conveyance authority and use of the funds from the sale of properties to maintain existing structures or construct new structures. Although we did not gain Working Capital Fund authority, we did receive authorization for a new Expanded Budget Line Item (EBLI) to cover the cost of buildings and administrative facilities. The new EBLI will be funded from other appropriations and will be managed similar to a cost-pool account. It will retain the incentives to shed excess properties. These successes do come with some costs—Congress will impose targets to reduce our deferred maintenance on facilities by 25 percent by 2010.

Working with Congress on this pivotal legislation has helped members recognize our programs of work and better realize the needs we have. Discussions to inform members of Congress about the engineering program have generated support for the Forest Service and the mission of engineering. Members of Congress now recognize that a support network of roads and facilities is necessary to implement the on-the-ground work for healthy forests. This knowledge will help us in the future.

I want to remind all of you that your number-one job is to be safe in your work and personal lives. All of you are vital members of the workforce, your families, and the communities in which you live. Please take the extra time you need to be safe when you complete all tasks, jobs, or even short trips to the grocery store.

Although this will be the last edition of *Engineering Field Notes*, I will use our Washington Office engineering Web page to keep you informed about issues that will affect you. Take care and be **SAFE**!

Trenchless Culvert Replacement Using a Horizontal Pipe-Driving System: Agness Road, Rogue-Siskiyou National Forest

—Rob Piehl, P.E., geotechnical engineer, Willamette, Suislaw, and Mt. Hood National Forests, Eugene, OR; Gary Freitas, civil engineering technician, Rogue-Siskiyou National Forest, Medford, OR; and Richard VanDyke, P.E., geotechnical engineer, retired, Eugene, OR. Photos by Gary Percy, civil engineering technician, retired, Medford, OR.

Background

Pipe ramming is one method of installing a culvert by driving an open-ended steel casing with a percussive hammer through an embankment. It is much like a steel pipe pile-driving operation, except that the pipe is driven horizontally. After the pipe has been driven, the soil in the pipe is removed by auguring, jetting, or compressed air. For large-diameter pipe, a small machine (a Bobcat or tunnel muck excavator) may be used. Although pipe ramming is relatively new in the United States, rapid advances in the technology are expected.

Pipe ramming generally is more costly than conventional cut-and-cover methods. For Forest Service culvert applications, pipe ramming can work well when:

- Social or political considerations rule out road closure, no reasonable alternate route exists, and providing a temporary traffic bypass, such as a shoe-fly road or bridge, would be too expensive.
- The risk of adverse environmental impacts from excavation are excessive, even when extraordinary mitigation measures are taken.
- A large amount of soil would be excavated using the traditional approach, or other factors make it expensive to remove fill, and a small-diameter pipe is adequate. For instance, a 24-inch-diameter culvert under 40 feet of fill, where the soil needs to be hauled to a stockpile site, would be a good candidate for pipe ramming.

Introduction

The project team replaced a 60-inch-diameter corrugated steel pipe on a tributary to Quosatana Creek that passes under Agness Road in the Rogue-Siskiyou National Forest near Gold Beach, in southwestern Oregon. A 120-inch-diameter, 197-foot-long steel casing, which met the 100-year stormflow requirement, replaced the original pipe. The pipe was not designed for fish passage because a fish barrier exists immediately upstream of the culvert. The culvert passes the stream under a two-lane paved road that is 45 feet above the streambed. Engineers chose a rammed pipe method to place the new pipe so that the road fill would not need to be excavated or replaced.

The Alternatives

Because the road provides access for the mountain community of Agness (population 138) and no acceptable alternate traffic route exists, the road needed to remain open during construction. The traditional alternative of excavating the fill and rerouting traffic over a temporary bridge would have cost about $200,000 less than ramming the pipe. However, because pipe ramming reduced potential environmental effects, it was preferred over traditional excavation. Less soil disturbance meant less risk of fine sediment affecting highly valued chinook, coho, and steelhead salmon habitat. All of these fish species spawn directly downstream from the project site.

The contract was awarded for about $1 million. Price negotiations were key to this project's economic feasibility. Future price negotiations may not be as favorable.

Project Summary

Access

The contractor drove the casing from the downstream side. The road was too narrow and unstable to transport the 60,000-pound hammer and the casing (which weighs 50,000 pounds per 30-foot section). A crane delivered these heavy pieces to the launch pad where the hammer was set up. To keep the crane off the traveled way, the crew drove nine 24-inch-diameter pipe piles and constructed a temporary platform at road level over the fillslope to accommodate the 175-ton, 23-foot-wide crane.

Stream Bypass

The crew installed the new pipe directly beside the old culvert and extended the existing pipe 100 feet to bypass the water beyond the pit where the launch pad was built. After the bypass was in place, resource specialists rescued 84 juvenile fish from the scour pool and moved them to safety. During the initial construction, steelhead could be seen spawning in Quosatana Creek only 200 feet below the launch pad. The crew placed heavy geotextile over the streambed as a separation layer followed by quarried rock to form the launch pad that supported the hammer.

A cofferdam constructed from sandbags kept the stream from washing back onto the launch pad. As the casing emerged on the upstream side, another cofferdam separated the streamflow from the newly disturbed streambank, and workers constructed the new inlet before rerouting the channel. Before water was allowed through the completed culvert, the crew removed the fill from the launch pad, armored the bank, restored the channel, and lined the new stream portions with cobbles and boulders. When the stream was released in its new path, the water downstream was cloudy for about 20 minutes, the only significant period

when turbidity was noticed downstream. The crew took water samples daily and compared turbidity measurements to samples upstream. Figure 1 shows the view from the road.

Figure 1—View from the road: the stream bypass pipe, the access road, and the launch pad.

The Hammer Setup

A modified piledriver hammer with 6 million pounds of thrust drove the casing. This piledriver is designed for high-capacity piles, such as those used in offshore drilling platforms. The contractor modified the piledriver to operate horizontally by changing some of its materials to accommodate the increased friction between the sliding portion of the hammer and the bore. The hammer is powered by compressed nitrogen gas that supplies energy to slide the hammer when it expands. The dynamic force moves through a steel helmet (figure 2) and a specially designed metal cone (the shoe) that fits the hammer to the full circumference of the casing.

In typical large pipe-ramming projects, bentonite slurry is pumped to the outside and inside of the casing wall to ease the hammer's slide through the soil. The high-capacity hammer used at Agness Road did not need lubrication. In fact, the contractor estimated that this hammer used only about one-third of its capacity. During the actual driving, the hammer typically struck 30 blows per minute and the casing advanced about one-quarter inch per blow. The hammer operated for about 7 hours.

Figure 2—The hammer with red helmet attached to the end.

Hammer Size

Selecting the proper hammer capacity for a particular job is important. A hammer that is too large might cost more than a small hammer, but the extra expense could be far less than the cost of a ramming job that failed because the hammer was too small.

The Casing

The new culvert is composed of seven sections of 1.25-inch-thick steel casing. To ensure that the casing wasn't deformed during driving, the steel was ASTM A-36 with a minimum tensile strength of 60,000 pounds per square inch and yield strength of 35,000 pounds per square inch.

To minimize the use of welded joints, the crew used interlocking Permalok pipe sections. Permalok is a brand of computerized, numeric-controlled, machined, integral, press-fit pipe connections. For a more complete description of the Permalok joint system, see the Web site: *http://www.permalok.com*.

Because of the high dynamic forces delivered by the hammer, the contractor designed a modified joint. The new culvert's total weight is about 350,000 pounds.

Grade Control

Gravity can cause the end of a slender pipe driven a long distance through the soil to drop significantly, perhaps several feet. In addition, grade and alignment can be affected by large obstructions, such as boulders, logs, or stumps.

Unplanned deviations in grade and alignment also can cause problems. If the

culvert is being driven upstream, a drop in the target elevation of the culvert's invert (the bottom of the culvert) would result in headcutting of the stream and associated problems. An unexpected drop at a pipe's outfall may reduce the culvert's flow capacity. An increase of the pipe's gradient also would make fish passage more difficult.

Controlling deviations in the casing's gradient and alignment can be difficult. The casing's tendency to drop at the end can be counteracted somewhat by modifying the configuration of the driving shoe. For instance, welding a steel band to the upper outside of the driving shoe may compress the soil along the upper leading edge of the casing and relieve the downward soil pressure on the casing as it is being driven through the ground. Because this type of effect varies with soil characteristics and other driving conditions, the performance is difficult to predict and may be impossible to modify during the driving process.

Sometimes, the project crew can access the casing's leading edge to remove an obstruction or to modify the drive shoe configuration by removing the soil plug inside the casing. However, excavating the soil may be too dangerous because of soil instability at the open face, the potential for ground movement into the casing, and unacceptable ground subsidence above the installation.

The Grade Control System

The Agness Road pipe-ramming project was the contractor's first full-scale test of his proprietary guidance system. Flaps built into the drive shoe adjusted the soil pressure near the casing's leading edge. The contractor, Specialty Contractors and Consultants, Inc., of Tampa Bay, FL, monitored the drive shoe elevation with a pressure transducer and a tube of water (a water level), which was carried forward as driving progressed. This system appeared to work well. The contractor drove the new pipe within 0.2 percent of the design gradient. More information on this process is available at the contractor's Web site: *http://www.sccitunnels.com*.

The Track System

A steel frame supporting two H-beams formed a track to align the hammer and support the weight of the casing. The casing rested on a cradle, which slid along the upper flanges of the H-beams when it was being driven (figures 3 and 4). To keep the casing from bouncing upward, the crew attached the trailing end of the casing to the track with ten 18-inch-diameter pipe piles, designed for soil and pipe friction.

Figure 3—The first section of casing is being lowered onto the cradle with the crane. The blue cone at the right is the shoe, which transfers force from the hammer to the casing.

Figure 4—This view shows the operation from the other side of Quosatana Creek. The green vibratory pile hammer is suspended from the crane as it drives pipe piles.

The Winch System

The crew used the large crane to place the hammer and the casing sections on their cradles. A winch mounted on the track slid the hammer assembly forward and pulled the hammer back to allow casing sections to be added. The crew drove two 24-inch-diameter pipe piles at the toe of the slope to support pulleys to winch the hammer forward. Because the cone that abuts the casing is merely pressed against the casing during driving, the winch must pull the hammer forward after every blow to maintain a snug fit. Figures 5 and 6 show the complete hammer set up and in operation. Figures 7 through 10 demonstrate the final phases of the project.

Figure 5—The hammer setup is complete. The first pipe section is in place before driving starts.

Figure 6—The hammer in action. The casing, shoe, helmet, and hammer are in place on the track. The winch is set up at the end of the track and takes up the slack in the system between hammer blows.

Figure 7—A tunnel excavator completes the job of cleaning out the new casting. It scoops up soil onto a belt between its tracks and transports the soil to the other end of the casing where the soil is loaded onto a truck.

Figure 8—Grouting the old pipe. Note its condition.

Figure 9—The new pipe's inlet. The grouted old pipe is just to the right.

Figure 10—The new pipe's outlet. The grouted old pipe is to the left.

Project Schedule Highlights (2003)

Date	Activity
March 6	Site preparation began
March 19	Water diverted
March 25	Launch pad completed
March 26	Crane being assembled
April 10	Crane platform completed
April 24	First section of casing on the launch pad
April 27	Driving started
May 9	Pipe driving finished
May 29	Demobilization completed
June 3	Water diverted into the new culvert
June 5	Concrete slurry pumped into the old culvert

Rob Piehl is preparing a summary of trenchless technology for Forest Service culverts that will be published by the San Dimas Technology and Development Center.

Electronic Physical Security at Forest Service Facilities

—Andy Trent, project engineer, Missoula Technology and Development Center, Missoula, MT

The physical security of Forest Service facilities is an increasing concern. Facilities include not just district, forest, and regional offices, but many other storage facilities and buildings at remote locations. With the continuing advances of electronic technology, electronic equipment commonly is used to monitor facilities or to deter intruders. Electronic equipment, such as closed-circuit television, can monitor an entire facility or just a building's entrances and exits. Key cards or devices that scan a person's thumbprint or retina can be used to control access to a facility.

Electronic physical security systems may cost from several hundred to thousands of dollars. Determining the equipment that is best suited for a particular situation can be a daunting task for Forest Service facility managers, engineers, law enforcement officers, and others in charge of physical security. Facility managers who do not have expertise in this field may have to rely on the advice of vendors or colleagues. The managers may end up purchasing sophisticated and sometimes overpriced equipment when simpler equipment would have been adequate.

In September and October 2004, the Missoula Technology and Development Center (MTDC) facilities program funded a pilot physical security help desk for the Forest Service. MTDC contracted with R. Grossman and Associates (RG&A) to run the help desk, which provides professional consultation for Forest Service employees who need help designing, documenting, procuring, operating, and troubleshooting electronic security systems.

Purpose of the Help Desk

The physical security help desk should save the Forest Service money on electronic security systems and should educate Forest Service employees about the benefits and drawbacks of different security measures. Additionally, as help desk personnel gain experience assisting with Forest Service security projects, standardized solutions will be developed for specific applications.

Employees can call the help desk with assurance that the consultant will recommend practical solutions, because the consultant is not a vendor with specific products to sell. All project details remain in strict confidence.

Pilot Help Desk Project

The pilot help desk project (figure 1) originally was funded for just a month to evaluate the need for such a service. An e-mail message describing the help desk was sent to Forest Service facility managers, engineers, and law enforcement officers. The project was extended from September through October 2004.

Figure 1—Forest Service employees can get answers to their questions about electronic security at the Web site, *http://www.tech-answers.com/ForestService.htm*.

Employee Questions and Impressions

One employee requested help in comparing color and black-and-white cameras with infrared illuminators and an infrared filter. The help desk answered promptly. The employee commented that unless you stay engaged in the physical security industry, it is easy to fall behind the technology. The employee was confident that information from the help desk would produce savings and was a worthwhile service, even if it was needed just occasionally.

Another employee had questions concerning digital video recorders, wireless transmitters, cameras, and housings. The employee felt the help desk answered the questions thoroughly, gave good advice, and discouraged the purchase of expensive, unneeded equipment.

During an office remodeling project, an employee needed general information regarding the design of a security system. The help desk advised the employee to focus on the required level of security for the facility to determine the equipment that would meet the need. The employee appreciated the help of a consultant who provided unbiased information and recommended cost-effective products. This employee recommended that any employee with questions about electronic security check out the help desk's Web site (*http://www.tech-answers.com*, click on the Library tab). The employee would like to see the help desk continued.

Other help desk inquiries included:

- Review of plans to add cameras and upgrade a closed-circuit television system at an interpretive center
- Information on securing a temporary office
- A high-resolution logo for identification cards
- Suggestions for overall security requirements for a facility
- Questions about controlling access to a headquarters office

Conclusions

Those who used the help desk were pleased with the assistance and recommended that the help desk continue. They felt that having an unbiased consultant who is fully knowledgeable about the latest electronic security equipment saved them time and money.

Based on the results of the pilot program, MTDC continued the help desk through September 2005 for a limited number of hours. This longer trial period allowed employees more time to use the service and also allowed managers more time to alert Forest Service employees to the services provided by the help desk. MTDC will evaluate the help desk's usefulness at the end of the fiscal year to determine whether the service should be continued.

Contacting the Help Desk

RG&A

Phone: 609–926–9264

Fax: 609–601–6190

Web site: *http://www.tech-answers.com/ForestService.htm*

E-mail: *fshelpdesk@tech-answers.com*

Small-Diameter Roundwood Engineered Trusses—A First!

—Nan Christianson, marketing and legislative affairs coordinator for the Northern and Intermountain Regions, State and Private Forestry, Bitterroot National Forest, Hamilton, MT, and Jean M. Livingston, communications specialist, State and Private Forestry, Forest Products Laboratory, Madison, WI

Building with round logs is not a new concept. Our ancestors used large-diameter roundwood (larger than 10 inches) to build their dwellings. These structures required a lot of labor to build and used wood inefficiently. Today, structures built from small-diameter roundwood (smaller than 6 inches) have new fastening systems and connections and are engineered to meet performance specifications.

The new 5,000-square-foot library in Darby, MT, (figure 1) is a demonstration of a structure built with small-diameter roundwood. Partners in this project included the Forest Service; Montana Community Development Corporation; Porterbilt Co., Inc.; Friends of the Darby Library; Bitterroot Rural Conservation & Development; Beaudette Consulting Engineers; and architect Ron LaRue.

The structure includes small ponderosa pine logs as trusses, columns, and

Figure 1—Interior of the new library in Darby, MT, that uses small-diameter roundwood.

parallel cords. Small-diameter roundwood logs are visible under the eaves and throughout the interior. The ceiling is made of blue-stain pine, wood that is often discarded because of the discoloration. The blue stain is caused by a fungus that does not weaken the wood. Some persons find that the blue pattern in the wood makes it more attractive.

Logs used in the round form:

- Retain their strength
- Resist warping
- Maintain dimensional stability
- Minimize processing costs
- Help offset the cost of forest restoration

A variety of softwood species can be used in roundwood construction; hardwoods are also an option. A very weak species of wood might require slightly larger members, especially if snow loads are high.

When small-diameter roundwood is used for structural uses, data are needed regarding log properties and grading. Engineering properties now are assigned to round timbers graded by visual techniques that were developed for large-diameter logs. Little data are available to demonstrate how well these visual grading techniques predict the properties of logs that are 4 to 7 inches in diameter.

However, research is underway to evaluate the applicability of visual and mechanical grading techniques for logs from small-diameter ponderosa pine and Douglas-fir trees. Cooperators in this study are Dr. David W. Green, research engineer at the Forest Products Laboratory; Dr. Thomas Gorman, University of Idaho; and the Timber Products Inspection Service, Vancouver, WA.

Northern Region's Donna Sheehy Receives *Chief's Award*

Donna Sheehy, the Northern Region's civil engineer and sign and traffic surveillance coordinator, won the 2005 *Chief's Award* for safety and occupational health. She was honored for significant contributions to firefighter and public safety. She developed and implemented standardized hazard warning and traffic-control signs for incident camps and the surrounding areas. Donna was recognized by Forest Service Chief Dale Bosworth at a June 23 ceremony in Washington, DC, honoring employees and partners for outstanding achievements that support the mission and strategic goals of the agency.

For more information on Donna's contributions, see the *Engineering Field Notes* article, *Traffic Signs for Wildland Fire Incidents: Meeting National Standards*, by Donna Sheehy and Charles Showers (Volume 36, Issue 1–2004).

2004 Forest Service *Engineer of the Year* Awards

Congratulations to the following winners of the 2004 *Engineer of the Year* awards:

- Managerial engineer—Jim Moe, Rocky Mountain Regional Office, Golden, CO
- Technical engineer—Warren DeBoer, Pacific Southwest Regional Office, Vallejo, CA
- Engineering technicians—R. Duane Swapp, Kaibab National Forest, Williams, AZ, and Patrick Lovejoy, Florida National Forests, Tallahassee, FL
- Engineering applications employee—Brad Quayle, Remote Sensing Applications Center, Salt Lake City, UT

Selected from a list of excellent candidates, the winners were honored at the U.S. Department of Agriculture 2004 Forest Service *Engineer of the Year* awards luncheon in the Secretary of Agriculture's Dining Room in Washington, DC, on April 4, 2005. Before the luncheon, Natural Resources and Environment Under Secretary Mark Rey and Deputy Under Secretary Dave Tenny met with the winners to congratulate them on their achievements. The winners' families joined them at the luncheon ceremony. Director of Engineering Vaughn Stokes presented a special plaque and cash award to the winners, commending them for their outstanding contributions. A summary of the winners' accomplishments appears on the following pages.

Congratulations to the regional candidates for the 2004 Forest Service *Engineer of the Year* awards. The finalists in all categories include:

Managerial	Technical	Technician	Engineering applications
Joseph S. Bonn, R–1	Spring Rosales, R–1	Gary Coats, R–1	Jim Barber, R–1
Gordon L. Cates, R–3	Van H. Chanay, R–2	Kim Earney, R–2	Vicky Duvall, R–2
Bill Fodge, R–5	Sarah Baker, R–3	Ken Goddard, R–4	Thomas C. Mellin, R–3
Jerry Carlson, R–6	Renee F. Flanagan, R–4	Chuck Walt, R–6	Rod Madwell, R–5
Jeffrey D. Orr, R–8	Bill Shelmerdine, R–6		Arlene Foster, R–6
Steve Marchi, R–9	David Velez, R–8		James Ehrlich, R–8
	Gary Sonnenberg, R–10		Chris Hanrahan, R–9
	Alan Yamada, SDTDC		George Jackson, MTDC

Forest Service Director of Engineering Vaughn Stokes is flanked on the left by *Engineering Technicians of the Year* Patrick Lovejoy (far left) and R. Duane Swapp, and *Engineering Applications Person of the Year* Brad Quayle, and on the right by *Technical Engineer of the Year* Warren DeBoer and *Managerial Engineer of the Year* Jim Moe (far right).

Jim Moe, 2004 Managerial Engineer of the Year

Jim Moe is the deputy director of engineering in the Rocky Mountain Regional Office. Jim honed his management skills in engineering and recreation for more than 30 years in the Northern, Rocky Mountain, Eastern, and Alaska Regions of the Forest Service.

Seven awards highlighted Jim's tenure in Alaska. He initiated composite road construction and contractor design, road location, and road maintenance; used innovative contract administration and cross training to accomplish substantial top-quality work; and negotiated with tribal elders from all three southeastern Alaska Native Nations to develop the *Native Traditions* segment of Ketchikan's visitor center.

The Rocky Mountain Region recognized Jim for oversight of real property and for help in achieving the auditor's unconditional approval for its financial records. Awards cited Jim for his National Fire Plan logistics work in 2001, for outstanding work on the contracting and engineering staffs, for partnering with regional and forest fire organizations to establish new facilities and rehabilitate existing ones and to coordinate fleet equipment and fire engine orders, for ensuring that planned projects were funded and that allocated construction and maintenance funds were used, and for receiving the *Regional Forester Honor Award–Financial Excellence 2004*.

He ably managed and developed the region's Capital Improvement Program and budget formulation for the recreation and engineering staffs, and established forest and regional training. Jim also led the Rocky Mountain Region in selecting projects for health and safety and business needs.

Jim developed the road INFRA module, real property costing and inventories, and deferred-maintenance surveys. He spurred the region's reduction of structurally deficient bridges by nearly 50 percent in 5 years, reducing maintenance needs and helping the region meet national priorities, such as improved forest access for fuel reduction.

The regional staff relies on Jim to execute the engineering and recreation programs, identify issues, and tap new funding sources. He spearheaded revisions to guidance for and delegation of authorities to improve regional engineering operations, ensuring that personnel had appropriate skills to accomplish work. Jim fosters communication among forests, where most project work occurs, visiting forests regularly, and encouraging effective project completion, development, and program delivery, despite budget shortfalls.

For new personnel, Jim is a mentor, confidant, and resource, notably on budget matters. His well-crafted budget tables, reports, and technical presentations are invaluable to field units.

Jim is a registered professional engineer in North Dakota and Alaska. He holds a bachelor's degree in civil engineering from the University of North Dakota and a degree in business administration from Boston University. He has completed coursework for a Michigan State University doctorate in resource economics.

Community service in Alaska earned Jim an *Emergency Medical Technician* award in 1989. He was an at-large representative at the University of Alaska and served on the Southwest Medical Council.

During his son's 4 years with the Green Mountain Marching Band, Jim was a fundraiser and supporter. His engineering expertise supported several Ketchikan churches and he continues to wield framing and construction tools to support Habitat for Humanity.

Jim Moe is recognized by his peers inside and outside the Forest Service for establishing partnerships that foster innovative solutions to critical problems, delivering high-quality services, overcoming budget and personnel constraints, and training others to follow in his footsteps.

Warren DeBoer, 2004 Technical Engineer of the Year

Warren DeBoer, regional mechanical engineer for the Pacific Southwest Region, has a history of pioneering innovative, cost-effective and reliable mechanical, architectural, and electrical systems for the Forest Service.

Warren earned awards for designing and constructing the Fresno Air Attack Base (1992) and Minarets Ranger Station (1996); for outstanding work in the engineering facilities program (fiscal year 1999); for consultation on the Mare Island water and heating, ventilating, and air conditioning (HVAC) systems (2002); and for correcting HVAC system glitches at the Forest Service Wildland Fire Training and Conference Center (2002). The region's forest engineers named Warren their top supporter in 2002. The Lassen National Forest supervisor recognized him for planning, designing, and implementing the Chester, CA, airtanker base reconstruction (2002) and for constructing the Susanville Interagency Fire Center (2003).

Some of Warren's innovations have been incorporated into California's energy and building codes, including locking out the outdoor air input to ventilation equipment during setback operation, sealing ducts with cloth-backed duct tape, and requiring a high level of duct insulation. He also helped pioneer inexpensive tropical HVAC systems in Hawaii.

Warren produced mechanical designs for regional facilities and helped develop national standard designs for district and supervisors' offices, airtanker bases, research facilities, laboratories, engine garages, barracks, air operations buildings, and emergency command centers. He conducted energy audits, designed efficient solar domestic hot-water systems, and simplified operation and maintenance instructions.

Warren designed facilities for the U.S. Department of the Interior Bureau of Land Management at the King Range National Conservation Area near Shelter Cove, CA, and for a joint State Department of Transportation and State Parks Department facility at Big Sur, CA. He also was a technical specialist on incident investigation teams. Warren overcame funding and regulatory constraints in designing all mechanical systems at a joint Forest Service-California Division of Forestry and Fire Protection facility.

He applies his expertise on State energy and building codes to expedite approvals in shared and leased facilities and to ensure that the region meets or exceeds all standards. He is a member of the International Code Council.

By employing new technologies, Warren has made many agency-owned and leased facilities more comfortable and energy efficient, while discouraging occupancy in buildings that cannot reasonably be improved. As a Government expert, his testimony has helped resolve contract disputes. His expertise has been distilled in classes and materials used to train facility engineers and maintenance personnel from several different regions and from different agencies.

As a leader in his community, Warren has served on the deacon board of his local church. He donated time and materials to family housing projects, volunteered at a summer camp for inner-city children, and served as school board treasurer. Warren coaches soccer and basketball teams and helps maintain playing fields. He works to improve city facilities.

Warren graduated with honors at the top of his class from California State University, Chico, in 1979 with a bachelor's degree in civil and mechanical engineering. He continues to attend courses and seminars regularly. He is a licensed registered civil engineer in California and holds a general contractor's license with A and B classifications. He is a past member of the American Society of Civil Engineers and of the Phi Kappa Phi Honor Society.

Patrick Lovejoy, 2004 Engineering Technician of the Year

Patrick Lovejoy is the civil engineering technician at Florida's Apalachicola National Forest in the Southern Region. He has served as a firefighter, crew boss, squad boss, helicopter crewmember, and tractor-plow boss in addition to his engineering duties. Pat has honed his engineering skills on three forests in three regions of the Forest Service since 1978, overseeing roads for timber sales and recreation areas; treating timber, concrete, and cable-suspended bridges; and engineering complex major culvert installations.

Pat earned an associate degree in civil engineering technology from Vermont Technical College. He is certified as a U.S. Department of Labor Occupational Safety and Health Administration inspector for buildings and administrative facilities and as a U.S. Department of Transportation Federal Highway Administration bridge inspector.

Pat's awards encompass engineering assistance for recreation development, timber sales, and special-use programs (fiscal year 2003); for the 98 ERFO Contract (2002); for an Office of Inspector General audit (2000); for road management (1990); for exceptional performance in fiscal years 1987 and 1988 and 1990 on the White Mountain National Forest; for designing a cost-saving rock bridge abutment (1990); and for preconstruction activities at trailhead parking areas (1982).

Forest personnel lauded Pat for supplying infrastructure data despite tight deadlines and heavy workloads (2000), for working on the Ocala National Forest's Burnt Out Bridge Road, and for assuming contracting officer's representative duties for the Osceola National Forest bridge replacement project (1999). Pat received superior performance awards from the Apalachicola National Forest (1996 and 1997), and for suggesting and implementing the videotaping of bridge and road reconstruction site surveys (1984) to record actual field conditions quickly and economically. The same forest commended him for 15, 16, and 21 accident-free years and safety commitment (in 1993, 1994, and 1999, respectively), and for Intermountain Region fire support (2000).

The Gifford Pinchot National Forest honored his engineering safety record from December 18, 1978, to October 1, 1990, for individuals and for motor vehicles (1991). In 1990, the New Hampshire Federal Executive Association gave Pat the distinguished *Government Service* award. Pat earned the Eastern Region *Primitive Skills* award (1989) for construction support of the Whiteface River Trail Bridge into the Sandwich Range Wilderness on the Saco Ranger District, White Mountain National Forest.

Pat fosters training and mentoring opportunities, spends extra time to perform duties as an inspector, explains drawings and specifications, sponsors hands-on work with contractors, and encourages thorough review of contracts to avoid costly changes.

Pat serves his community by volunteering at a neighborhood school to support athletic teams. He spends many hours mentoring Boy Scouts. Pat has been president and secretary/treasurer on the board of directors for his local homeowners' association and has served on the association's Architectural Control Committee.

Patrick Lovejoy is known throughout the Forest Service community and beyond for harnessing emerging technology to solve technical engineering problems, for successfully juggling many complex projects, for maintaining an enviable safety record, and for sharing his expertise and standards of excellence with his peers.

R. Duane Swapp, 2004 Engineering Technician of the Year

R. Duane Swapp has served as a civil engineering technician at the North Kaibab Ranger District since 1975 in the Southwestern Region. During his 30-year career, Duane has received numerous awards and uniformly excellent performance ratings for his outstanding contributions to and leadership of a high-quality and fast-paced engineering district program.

Duane earned awards for outstanding work in road maintenance contracting (1984) and for closing more than 50 roads ahead of schedule (1985). He was honored for safety leadership (1989) and commended for exemplary performance for support and inspiration to the para-archeological program (1990).

Recognition for outstanding contributions came to Duane for a variety of functions on different staffs: for packing and cooking for the Saddle Mountain Wilderness PIT project (1992), for supporting the district engineering program and the recreation and heritage programs (1993), and for alleviating difficult circumstances on the Bachelor Fire (1996). More citations touted Duane's efforts for the recreation capital improvements program (CIP), fire support, and for deferred maintenance and real property (2000); for exceeding the district program of work (2001); for implementing a complex district CIP program (2003); and for sustained leadership of a high-quality and substantial engineering program on the North Kaibab Ranger District (2003).

Throughout his district career, Duane has developed, applied, and shared his technical expertise and encyclopedic knowledge in many engineering and resource areas. He also has shared his commonsense approach to caring for and maintaining the district's resources and infrastructure as if it were his own with trainees, summer hires, volunteers, and coworkers.

Duane's contributions cover contract administration, facilities, roads, trails, and recreation sites. With his encyclopedic knowledge of the district, he is mentor, para-archeologist, wilderness packer, and heritage guide.

Because district engineering support at the Coconino and Kaibab National Forests Supervisors' Office is about $3\frac{1}{2}$ hours by car from the North Kaibab Ranger District, Duane works independently. He plans and implements a program of work

for the care and maintenance of the district infrastructure (more than 3,000 miles of roads and 115 buildings), as well as providing engineering support to other disciplines. Duane uses force accounts, contracts, volunteers, and other methods to accomplish the most work for the fewest dollars. His dedication is reflected in one of the best-maintained units in the district.

Duane consistently accomplishes his annual work program and more, completing district capital improvement projects successfully on or ahead of schedule. His effective and efficient obligation of funds for district engineering projects often supports initiating extra work because he knows the district, knows the issues, and knows the needs.

Duane is a graduate of Southern Utah University. He and his wife run a small ranch out of Fredonia, AZ. He is certified in most engineering categories in Utah. Duane has served the local community as a member of irrigation, utility, and water boards; as chief and training officer for the Fredonia fire department; and as a member of the local resource conservation district.

R. Duane Swapp has built a reputation for outstanding engineering and recreation contributions and leadership, for dedication to caring for the land and serving people, and for sharing that ethic with his associates inside and outside the Forest Service.

Brad Quayle, 2004 Engineering Applications Employee of the Year

Brad Quayle is a remote sensing/geographic information system (GIS) specialist for the Remote Sensing Applications Center (RSAC) in Salt Lake City, UT, who has been instrumental in developing and expanding the Forest Service Moderate Resolution Imaging Spectroradiometer (MODIS) Active Fire Mapping program into Canada.

The Utah State University College of Natural Resources, where Brad earned his bachelor's degree in geography, honored him for alumni professional achievement (2004) and the National Interagency Fire Center commended him for fire mapping to support wildland fire suppression (2003). The U.S. Department of Agriculture lauded his development and support of the MODIS program (2002); geospatial analysis, cartographic mapping, and publication production of the Roadless Area Conservation project (2000); and his development of Geospatial Service and Technology Center (GSTC) map graphics and products (1999 and 2000).

The U.S. Army Corps of Engineers (COE) honored Brad for developing and teaching a Wetland Assessment course (1998), implementing strategies to fight the Midwest floods (1997 and 1993), achieving the Omaha District mission (1996), preparing GIS data/mapping briefings for Wyoming's Twin Lakes Reservoir (1994), working on the Readiness Management System (1993), and for participating in the

Oahe Dam Safety Exercise (1992). He received a U.S. Fish and Wildlife Service award for brokering a cooperative agreement with the COE.

During Brad's 1992 to 1998 COE tenure, he implemented and managed a large-scale GIS program, developed resource inventory, mapping, and geospatial analysis applications; implemented high-accuracy reference networks for the global positioning system inventory; and assessed the flood risk of nesting sites for endangered bird species on Missouri River projects. He helped the region assess the cumulative impacts of permit actions by integrating GIS and COE permit data and helped the region assess and manage wetland resources through GIS/remote sensing modeling and analysis.

From 1999 until 2001 at GSTC in Salt Lake City, Brad automated national and center GIS mapping and data processing, including extensive geospatial data for the Roadless Area Conservation project. As an authorized ArcView GIS instructor, Brad trained and provided technical support nationwide to Forest Service personnel on the GSTC National Geospatial Help Desk.

Since 2001, Brad has managed RSAC's MODIS Active Fire Mapping program—the agency's first fully automated satellite image-based wildland fire detection system. He coordinates RSAC's data collection for wildland fire activity in the Western United States with the National Aeronautic and Space Administration and other agencies and universities that collect data for the rest of the United States and Alaska. In 2004, Brad was instrumental in helping Canada implement its own version of the MODIS program. Near real-time wildland fire data and mapping products are posted to the Internet (*http://activefiremaps.fs.fed.us*), to the National Incident Information Center, the public, and the media to help monitor wildland fire activity and plan effective firefighting strategies.

Brad shares his expertise by writing and coauthoring articles, preparing conference posters and presentations, and mentoring student employees on his current remote sensing and geospatial work. He is a member of the American Society of Photogrammetry and Remote Sensing and the American Institute of Aeronautics and Astronautics.

Brad Quayle continues to successfully apply, enhance, and integrate innovative remote sensing and GIS technologies to improve ecosystem and resource management.

2004 and 2005 *Engineering Field Notes* Article Award Nominations

The 2004 and 2005 volume years for *Engineering Field Notes* brought you information based on the knowledge, experience, and insight of practicing Forest Service engineers. Authors discussed traffic signs for wildland fire incidents, the potential impacts of soaring costs for construction materials, the Vesuvius Dam rehabilitation, large-diameter pipe ramming, electronic physical security at Forest Service facilities, small-diameter roundwood engineered trusses, and an accessible handpump for campgrounds.

Please select the top three articles for 2004 and 2005. In this one-person, one-vote system, your vote counts. Tell us which articles you found the most informative, beneficial, and interesting; which articles helped your unit save money; and which articles helped you develop more effective ways of accomplishing your work.

Rate the articles from 1 (best) to 3 (third best). Note whether you believe an article has helped or will help the Forest Service save money or resources. Follow the instructions on the electronic form to send your vote. Please vote by Friday, December 30, 2005.

Award Nominations Form

Article	Author	Choice (1, 2, 3)	Dollars saved
Traffic Signs for Wildland Fire Incidents: Meeting National Standards *http:fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm04713803/index.php*	Donna Sheehy and Charles Showers		
Cost of Construction Materials Soaring *http:fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm04713804/index.php*	Bob Harmon		
Moving Small Mountains—Vesuvius Dam Rehab *http:fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm04713811/index.php*	Susan L. Peterson		
Accessible Handpump for Campgrounds *http:fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm04713813/index.php*	Bert Lindler		
Trenchless Culvert Replacement Using a Horizontal Pipe-Driving System *http://fsweb.mt.dc.wo.fs.fed.us/pubs/htmlpubs/htm05713805/index.php*	Rob Piehl, Gary Freitas, and Richard VanDyke		
Electronic Physical Security at Forest Service Facilities *http://fsweb.mt.dc.wo.fs.fed.us/pubs/htmlpubs/htm05713806/index.php*	Andy Trent		
Small-Diameter Roundwood Engineered Trusses—A First! *http://fsweb.mt.dc.wo.fs.fed.us/pubs/htmlpubs/htm05713807/index.php*	Nan Christianson and Jean M. Livingston		

Washington Office Engineering Staff and Regional Engineers

Director's Staff

E. Vaughn Stokes ..... Director
Ann Ashton ..... Staff assistant
Gary Campbell ..... Deputy director

Programs and Budget

Don Rivers ..... Budget program coordinator
Philomena West ..... Budget coordinator
Patti Witherspoon ..... Budget analyst

Capital Resources

Vacant ..... Assistant Director
Misty Alvarez ..... Engineering information management program manager
Rosanna Barkawi ..... Bridges and tramways manager
John Bell ..... Transportation operations and maintenance program manager
James Demby ..... Geotechnical and water resources program manager
Ellen LaFayette ..... Transportation development program manager

Facilities

Ed James ..... Program manager
Bill Hamele ..... Coordinator

Geospatial Applications

Chuck Dull ..... Assistant director

Geospatial Services

Vacant ..... Supervisory cartographer
Susan DeLost ..... Staff cartographer
Betsy Kanalley ..... Staff cartographer

Geospatial Services and Technology Center (Salt Lake City, UT)

Robin Carroll ..... Manager
Barry Napier ..... Deputy manager

Remote Sensing

Paul Greenfield ..... Program manager
Bill Belton ..... Assistant program manager

Remote Sensing Applications Center (Salt Lake City, UT)

Tom Bobbe ..... Manager

Infra

Tah Yang ..... Program manager
Daryl Herman ..... Assistant program manager

Technology and Engineering Support

Kurt Gernerd ..... Assistant director

Asset Management

Tom Moore ..... Asset management program manager

Technical Information and Support

Wanda Turner ..... Program analyst
Sandy Grimm ..... Technical writer-editor
Eileen Jones ..... Office assistant

Environmental Compliance and Protection

Bobbi Baca ..... Environmental compliance and protection program manager
Craig Lasser ..... National water and wastewater program manager
Wilbur Martinez ..... CERCLA program manager

Fleet Equipment Management

Mike Harper ..... Fleet equipment program manager
Vivian Shreve ..... Equipment management specialist

Technology and Development and Special Projects

Lou Leibbrand ..... Technology and development and special projects manager

Missoula Technology and Development Center (Missoula, MT)

Dave Aicher ..... Center manager

San Dimas Technology and Development Center (San Dimas, CA)

John Fehr ..... Center manager

Regional Engineers

Northern Region (R–1)

Tom Pettigrew ..... Regional engineer
Joel Krause ..... Deputy regional engineer

Rocky Mountain Region (R–2)

Glenda Wilson ..... Regional engineer
Jim Moe ..... Deputy regional engineer

Southwestern Region (R–3)

Al Koschmann ..... Regional engineer
Vacant ..... Deputy regional engineer

Intermountain Region (R–4)

Joe Kennedy ..... Regional engineer
Merv Erickson ..... Deputy regional engineer

Pacific Southwest Region (R–5)

Bob Sutton ..... Regional engineer
Nelson Hernandez ..... Deputy regional engineer

Pacific Northwest Region (R–6)

Richard Sowa ..... Regional engineer
Vacant ..... Deputy regional engineer

Southern Region (R–8)

George Kulick ..... Regional engineer
Elizabeth McMullen ..... Deputy regional engineer

Eastern Region (R–9)

Josiah Kim ..... Regional engineer
Vacant ..... Deputy regional engineer

Alaska Region (R–10)

Keith Simila ..... Regional engineer
Ken Vaughn ..... Deputy regional engineer