Portraying the Forest Service Image—Applying the *Built Environment Image Guide* to Administrative Sites

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Missoula, MT

2E22L61—Built Environment Image Guide

April 2007

Acknowledgments

Thanks to the following people who reviewed this report, provided great advice about content and composition, and contributed information:

Shaun Darragh, Lighting Design Lab

Forest Service employees:

Marc Anderson, Pacific Northwest Research Station
Kevin Colby, Arapaho and Roosevelt National Forests and Pawnee National Grassland
Anna Jones-Crabtree, Rocky Mountain Region
Daryl Dean, Eastern Region
Ellen Eubanks, San Dimas Technology and Development Center
Chris Ida, Arapaho and Roosevelt National Forests and Pawnee National Grassland
Lou Janke, Colville National Forest
Jane Kipp, Northern Region
John Kubitschek, Tahoe National Forest
Nora Laughlin, Alaska Region
Todd Michael, Rocky Mountain Region
Alison Thorne, National Forests in Florida
Ramiro Villalvazo, Eldorado National Forest

Thanks also to the Forest Service employees who contributed photographs:

Shannon Clark, Kaibab and Coconino National Forests
Nola Driskell, Boise National Forest
Steve Eastwood, Cleveland National Forest
Gary Gibbons, Intermountain Region
Mike Godfrey, Institute of Pacific Islands Forestry
Rob Hoelscher, Rochester Ranger District
Wayne Johnson, George Washington and Jefferson National Forests
Debby Kriegel, Coronado National Forest
Dave Leach, Detroit Ranger District
Beth LeClair, Rochester Ranger District
Daniela Pavoni, Detroit Ranger District
Spring Rosales, Watersmeet Ranger District
Juan Vissepo, International Institute of Tropical Forestry
Bud Zanger, Six Rivers National Forest

As always, I am indebted to the MTDC publications and support staff, who turned my raw material into an attractive and easy-to-read report: Jim Kautz, Bert Lindler, Jerry Taylor Wolf, and Ted J. Cote.

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Introduction

The built environment constructed and maintained by the Forest Service, U.S. Department of Agriculture, should reflect the values advocated by the agency. To "walk the talk," the agency must:

- Demonstrate commitment to land stewardship by building in harmony with and complimentary to the natural environment (figure 1) using techniques, materials, and equipment that are sustainable over time.
- Demonstrate commitment to customers by using esthetic design principles applied in a way that reflect local culture and history.

Figure 1—The Red Canyon Visitor Center in the Powell Ranger District of the Dixie National Forest in the Intermountain Region fits its site well. The colors of the building materials, generous use of native rock for both the building and landscaping, and careful placement of the structure among existing pine trees ensure that the structure looks at home in the red rock canyon environment.

The *Built Environment Image Guide* (BEIG) *for the National Forests and Grasslands* was developed to help agency designers and decisionmakers:

- Improve the Forest Service image
- Better serve customers
- Produce transportation systems, sites, and structures that embody sustainability and portray a Forest Service image based on the local ecological, cultural, and economic context.

By following the BEIG principles whenever sites or structures are built or modified, the Forest Service's built environment will be changed over time. The pool of Forest Service structures will become more cost effective and respectful of the cultural and natural environment, and will be more easily identifiable by the public as distinctly Forest Service.

This report explains how to apply the BEIG to administrative site improvement and maintenance projects. Administrative sites include offices, warehouses, crew quarters, homes, utilities, and all other facilities that enable Forest Service employees to do their work. The basic principles of the BEIG are not explained in this report. An electronic version of the BEIG, a PowerPoint orientation to the BEIG, and Web-based BEIG training are available at: *http://fsweb.wo.fs.fed.us/eng/facilities/beig.htm*. All links that begin with *http://fsweb* are on the Forest Service's internal computer network, not the Internet.

Readers who are not familiar with the BEIG are encouraged to take advantage of these electronic resources and other training that is available.

Requirements

Using the BEIG isn't just the right thing to do, it's also required. Retired Forest Service Chief Dale Bosworth's 2001 letter introducing the BEIG (*http://www.fs.fed.us/recreation/programs/beig/Chiefs_Intro_letter.pdf*) directed the employees of the Forest Service to use the BEIG when we "repair, renovate, replace, and expand existing facilities or build new ones." Item 6 in the *Forest Service Manual* section 7313.3—*Design Standards* (*http://www.fs.fed.us/im/directives/fsm/7300/7310.doc*) requires that administrative sites be designed to project the image of an environmentally aware, concerned, professional land management organization—which is exactly what using the BEIG will do.

Many of the practices that enable compliance with the BEIG also are required by Federal, departmental, and Forest Service regulations. Federal regulations requiring energy efficiency or sustainability include:

- National Energy Conservation Policy Act (NECPA), as amended by the Energy Policy Act of 2005 (EPACT) (*http://purl.access.gpo.gov/GPO/LPS65979)*
- Executive Order 13423, January 2007—Strengthening Federal Environmental, Energy, and Transportation Management (*http://www.ofee.gov/eo/EO_13423.pdf)*
- Executive Order 13221, July 2001—Energy Efficient Standby Power Devices (*http://www.whitehouse.gov/news/releases/2001/07/20010731-10.html*).

USDA Departmental Regulation 5500-001, Facilities Energy and Water Conservation and Utilities Management (*http://www.ocio.usda.gov/directives/doc/DR5500-001.htm*), sets specific requirements for energy-use reduction, purchase or generation of renewable energy, energy-use tracking equipment, reduction of greenhouse gas emissions, reduction of water use, and purchase of energy-efficient equipment and appliances. It requires sustainable design, including a Leadership in Energy and Environmental Design (LEED) silver rating in the design and construction or major renovation of USDA facilities.

The Architectural Barriers Act (*http://www.access-board.gov/about/laws/ABA.htm*) became law in 1968. The act mandates that all facilities built, purchased, rented, altered, or leased by, for, or on behalf of a Federal agency must be accessible to people with disabilities. The Forest Service must follow the Architectural Barriers Act Accessibility Standards (*http://www.access-board.gov/ada-aba/*). The *Forest Service Handbook* 7309.11, sections 34.16—*Access for Persons With Disabilities* (*http://www.fs.fed.us/im/directives/fsh/7309.11/7309.11_30.doc*) and 41.3—*Access for Disabled Persons* (*http://www.fs.fed.us/im/directives/fsh/7309.11/7309.11,40.txt*) emphasize that Forest Service facilities must be accessible.

What Is the Forest Service Image?

Most people base the majority of what they believe about a place, thing, or person on the information their eyes convey to their brains. If they didn't, automobile manufacturers wouldn't spend incredible sums on the exterior design of vehicles. They would concentrate instead on comfort, efficiency, and safety—the vehicle's appearance would simply reflect its function. We all know that's not likely to happen! The Forest Service can also benefit by portraying an appropriate image.

Forest Service facilities should project an image that speaks strongly to visitors and cooperators about the values and overall quality of the agency. The basic themes should be:

- We are the Forest Service. Our agency is distinct from other agencies.
- We care about the land. We value special places and protect natural settings, and we show it by minimizing the impact our structures have on existing ecosystems and by using sustainable building practices.
- We care about people. We use universal design principles so that all our employees and visitors have an equal opportunity to participate.
- We offer quality experiences.
- Our facilities will stand the test of time.

The United States is a vast country and the character of its national forests and grasslands varies from tropical to glaciated, from rainforest to desert, from urban fringe to wilderness. To convey an appropriate Forest Service image, all of our structures must portray the basic themes while differing to reflect and respond to their surroundings (figure 2).

This report explains how the overall Forest Service image can be incorporated into the design of facilities on Forest Service administrative sites from Alaska to Puerto Rico, Hawaii to Maine.

Figure 2—The Detroit Ranger District office in the Willamette National Forest of the Pacific Northwest Region clearly conveys a quality Forest Service image that looks at home in the Cascade Mountain foothills. The use of heavy timbers, stone, and an "industrial" building shape express the character of the still-forming landscape of the North Pacific province.

Thinking Before Doing

The Forest Service is a "can do" organization. Give us a problem or challenge, and we jump right in and attack it. Unfortunately, we sometimes jump before considering where we want to land. In the long run, a little time spent identifying and recording the project requirements, constraints, and influences will save time and resources. The result will be structures that are easier and cheaper to manage and maintain and that are better suited to their purposes.

Of course, any structure must be the right size and have the appropriate features to be useful. But that's not enough. Forest Service structures also should be durable, efficient, kind to their occupants, gentle on the land, and portray an appropriate Forest Service image. The following tools and practices can help designers make better decisions. They work together with the BEIG to describe how a structure should look, where it should be located, and how it should be constructed. They can also help guide operations and maintenance decisions.

Recreation Opportunity Spectrum

Recreation Opportunity Spectrum (ROS) classifications identify settings appropriate for various activities on National Forest System lands and sites along a spectrum of settings from primitive to urban. Descriptions of the appropriate settings within each classification provide guidance on how much development is acceptable at any given site. Most National Forest lands have been classified using the ROS. Maps showing the ROS classifications should be available at ranger district or forest supervisor's offices.

Most large new administrative sites probably should be within urban or rural ROS classes. Some smaller administrative sites may be in areas classified as roaded natural or roaded modified. Any development planned for sites within semiprimitive motorized, semiprimitive nonmotorized, or primitive ROS classifications should prompt some serious discussions with decisionmakers about the location of the development and the validity of the ROS classification.

Chapter 4 and appendix C of the BEIG, available electronically at *http://www.fs.fed.us/recreation/programs/beig/*, explain how facility design should be guided by the ROS. More information about the ROS is available electronically on the Forest Service's internal network at *http://fsweb.wo.fs.fed.us/eng/facilities/recopp.htm*.

Scenery Management System

The Scenery Management System (SMS) provides guidance concerning desired scenic integrity on national forest lands. Most Forest Service lands were evaluated and classified years ago. Maps showing landscape character goals should be available at ranger district or forest supervisor's offices.

The SMS uses the framework of regional landscape character, place attachment, and scenic classes to identify the form, line, color, and texture that will allow a structure to "fit" within the landscape. Any proposed development that doesn't conform to the site's landscape character goals should be discussed with the unit's landscape architect and decisionmakers to determine whether the project should be changed.

A printed copy of Agriculture Handbook 701, *Landscape Aesthetics: A Handbook for Scenery Management*, should be available at most Forest Service offices. An electronic copy is not available. The SMS is complex. Your unit landscape architect can help you understand what it means for your site.

Universal Design and Accessibility

All new and reconstructed Forest Service facilities and programs must be accessible to people with disabilities. Universally designed facilities meet the needs of most people without "special" segregated features for persons with disabilities. The result of universal design is independence, integration, and dignity for everyone. It is easy to incorporate accessibility and universal design principles into a new structure. It may be more challenging to bring existing structures up to standards.

All existing structures that are not already accessible must have an accessibility evaluation survey and transition plan. Surveys and transition plans should have been completed in the

early 1990s, and should be available at each Forest Service unit office. For existing structures, measures identified in transition plans should be incorporated whenever building modifications are made. More information on universal design, accessibility, accessibility evaluation surveys, and transition plans is available in the *Accessibility* section of the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/acc/*.

Facilities Sustainability

The goal of sustainable development is to meet the needs of the present without compromising the ability of future generations to meet their needs. Sustainable structures lay lightly on the land, allowing the natural environment to remain as intact as possible. They use renewable manufactured materials that don't take a lot of energy to make or transport. Their systems are designed to minimize energy and water use. People occupying sustainable buildings enjoy natural lighting and a connection with the outdoors. These factors have been shown to increase productivity.

Sustainable development is required for all Federal agencies. More information on sustainability is available in the *Sustainability* section of the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/sus/*.

Site and Landscape Planning and Design

Site and landscape planning and design often are ignored until the very end of the design or construction process and then treated as "prettying up" around the outside of a building. This approach bypasses benefits that can be realized when landscape planning and design are considered at the beginning of the design process. Site conditions such as soils, slopes, climate, solar orientation, views, proximity to roads, and existing vegetation should be identified and included in the project design prospectus, so the building can be designed to take maximum advantage of the opportunities at the site. Doing so can lead to a structure that is more sustainable and has a lower operating cost.

Good landscape design places plant materials and other site elements where they reduce a building's energy consumption. Visitors can be guided to the places they need to go and discouraged from going where they shouldn't without the use of unattractive or unfriendly devices. Landscape design even can present or reinforce important messages about the Forest Service or the environment (figure 3). It is important to identify landscape and site requirements and include the landscape architect on the design team from the time the project is begun.

Figure 3—The supervisor's office at South Lake Tahoe, serving the Lake Tahoe Basin Management Unit in the Pacific Southwest and Intermountain Regions, was set carefully among the existing trees and landscaped deftly using native plants. Visitors can't help but notice how well this structure fits into the natural environment.

Electrical and Mechanical Design

Similarly, electrical and mechanical design often are ignored until the building layout and structure have been determined. A better approach is to involve mechanical and electrical engineers from the earliest stage of design. Basic building configuration provides the most opportunity for energy and lighting efficiency. Less than optimal configuration choices can double or triple energy use and the cost of necessary mechanical systems. It is difficult to incorporate comprehensive energy-saving systems after the basic building layout and structure have been determined.

Life-Cycle Cost Effectiveness

Due to limited funding, Forest Service designers and facilities managers traditionally have focused on minimizing initial costs. Unfortunately, this practice often has produced inefficient, short-lived structures with unnecessarily high operations and maintenance costs. The initial cost is only about 10 to 40 percent of the total cost of building ownership. Over the life of the building, operations and maintenance cost more than initial construction. With energy costs on an upward trend and most Forest Service buildings long past their low-maintenance early years, ignoring ongoing operations and maintenance costs when making design and replacement decisions does not make sense. Durable, efficient materials and systems frequently cost much less over the entire life of the structure than materials and systems that cost less initially. This is true both for new construction and for major maintenance and improvement projects.

Life-cycle cost estimates use maintenance and replacement information to estimate the total cost of owning a building for its expected life. Although private industry commonly plans for a 30-year building life, more than 60 percent of Forest Service buildings are more than 30 years old. In fact, about 10 percent of Forest Service buildings are more than 75 years old, and a few are more than 100 years old. From a practical standpoint, this suggests that it may be wise to select a structure life well beyond 30 years when comparing life-cycle costs of alternatives for Forest Service structures. If the Forest Service is going to continue to use old buildings, new buildings should be designed to be sound and useful at an advanced age. Executive Order 13327 of February 4, 2004 (*http://www.whitehouse.gov/news/releases/2004/02/20040204-1.html*), recognizes the wisdom of making decisions based on life-cycle costs and requires that life-cycle cost estimates be used for priority investment decisions and actions.

Getting the Best Value

In 1943, Larry Mills, working for General Electric, developed a systematic process for evaluating an item, a project, or a system to achieve the required function at the lowest cost. The process has been refined over the years and is described by terms such as value engineering, value management, or value analysis.

A value analysis (VA) is performed by a team of trained people with a broad range of technical expertise who have not been involved in the project and can take a fresh look at it. They break the project down into its constituent objectives and quickly evaluate a wide range of possible ways to accomplish the objectives. They look for a combination of the most effective methods and lowest cost. A competent VA team will produce recommendations for performance improvements and cost savings that "pay" the cost of the VA many times over.

In the Forest Service, decisionmakers are not bound by the recommendations of the VA team. Factors unknown to the VA team may make some recommendations unworkable. Decisionmakers must document their reasons for rejecting VA team recommendations.

Information about VA is available in the *Value Management* section of the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/uva/*. Use of the process is required by *Forest Service Manual* section 1300, chapter 1349—*Value Management* (*http://www.fs.fed.us/im/directives/fsm/1300/1340.doc*) for projects over $1 million to help ensure that scarce facilities capital investment funding is well spent. Some regions have more detailed guidelines for the

use of VA. Check with your region or station's value management coordinator for requirements in your area (*http://fsweb.mtdc.wo.fs.fed.us/toolbox/uva/documents/vmcoord.doc*).

Historically Significant Structures

Special requirements govern how the Forest Service must treat historically significant structures. A summary of these requirements is available in the *Historic Facilities* section of the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/his/*. The historical status of each Forest Service building is recorded in the INFRA (infrastructure application) database. The BEIG builds on these requirements by using local historical architectural character, such as intact historically significant structures, as one of the main guides for determining the desired architectural character of new structures. Whenever work on a significant historic structure is contemplated, consult the unit's archeologist or architectural historian. They maintain files on each historic structure and can provide valuable guidance and assistance.

Utilitarian Structures

It is not reasonable to design utilitarian structures such as warehouses or utility buildings to the same standards of detail and finish as public buildings, such as offices or visitor centers. The primary considerations for utilitarian structures should be sturdiness and practicality. However, that doesn't mean that BEIG requirements should be ignored completely. Even utilitarian structures that are out of public view should have scale, rooflines, color, texture, and architectural style similar to adjacent public buildings and to those identified in the local design theme (figure 4). Utilitarian structures that are in public view must incorporate more of the detailing and other image standards that have been established for the site (figure 5).

Figure 4—The three-bay engine garage and office on the Sayler compound in the Lower Trinity Ranger District of the Six Rivers National Forest in the Pacific Southwest Region is a well-designed utilitarian structure. It is a cost effective preengineered structural steel building with cement fiber siding and steel roofing. Although the scale is larger than the surrounding historic offices and residences, the materials, colors, and roofline are appropriate for the site. The translucent exhaust skylights at the peak of the roof would be inappropriate if the structure was next to the road and in plain view of the public.

Figure 5—The new three-bay engine garage and office at Oak Grove in the Palomar Ranger District of the Cleveland National Forest in the Pacific Southwest Region is more architecturally detailed than the Sayler garage because it is in full public view. The structure echoes elements of the historic 1930s-era ranger station.

Site Design Theme

Form (including scale and massing), line, color, and texture are the basic elements of design. These elements can be incorporated to produce a structure that announces its presence boldly, compliments its surroundings, is bland and uninteresting, or is anything in between. Forest Service structures are required to harmonize with their environment. Because national forests and grasslands vary so greatly, the buildings that support work on these lands also must vary.

The BEIG recognizes eight general ecological/cultural provinces in the United States. Buildings in each province must have distinct visual and structural characteristics so that they work well and look like they belong in their settings (figure 6). The province boundaries are shown in figure 7 and at the beginning of part 2 of chapter 4 of the BEIG, on page 52. The map can be viewed online at *http://www.fs.fed.us/recreation/programs/beig/40_chapter4_pts.pdf* (5.8 megabytes). Chapter 4 of the BEIG also defines appropriate architectural character in each of the provinces.

In many cases, the general principles for each province are adequate to guide structure design or renovation for a specific site within the province. In other cases, more specific design themes should be developed based on the province theme. Site or unit design themes generally are appropriate for designated areas such as national recreation areas, national volcanic monuments, other special management areas, or places where the

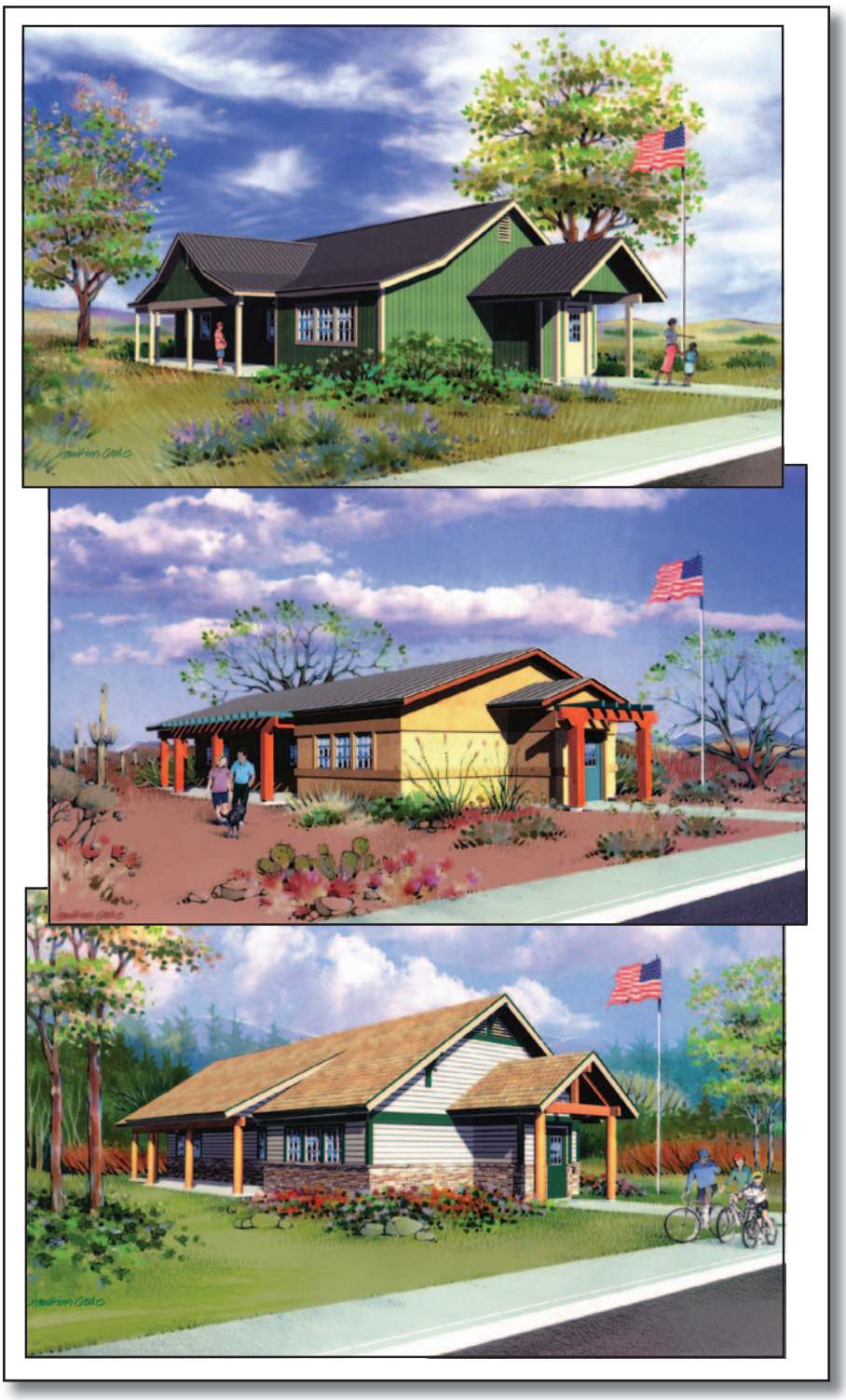

Figure 6—This series of renderings illustrates how the same bunkhouse floor plan can be constructed with facades that conform to design guidance for different provinces. The top rendering shows the horizontal massing, narrow vertical lines, and grassy color appropriate for the Great Plains province. The middle rendering shows how shade structures, a less prominent roof, and adobe materials help the building blend with the desert environment. The bottom rendering shows the steep, prominent roof and visible heavy timber structure appropriate to the North Pacific province.

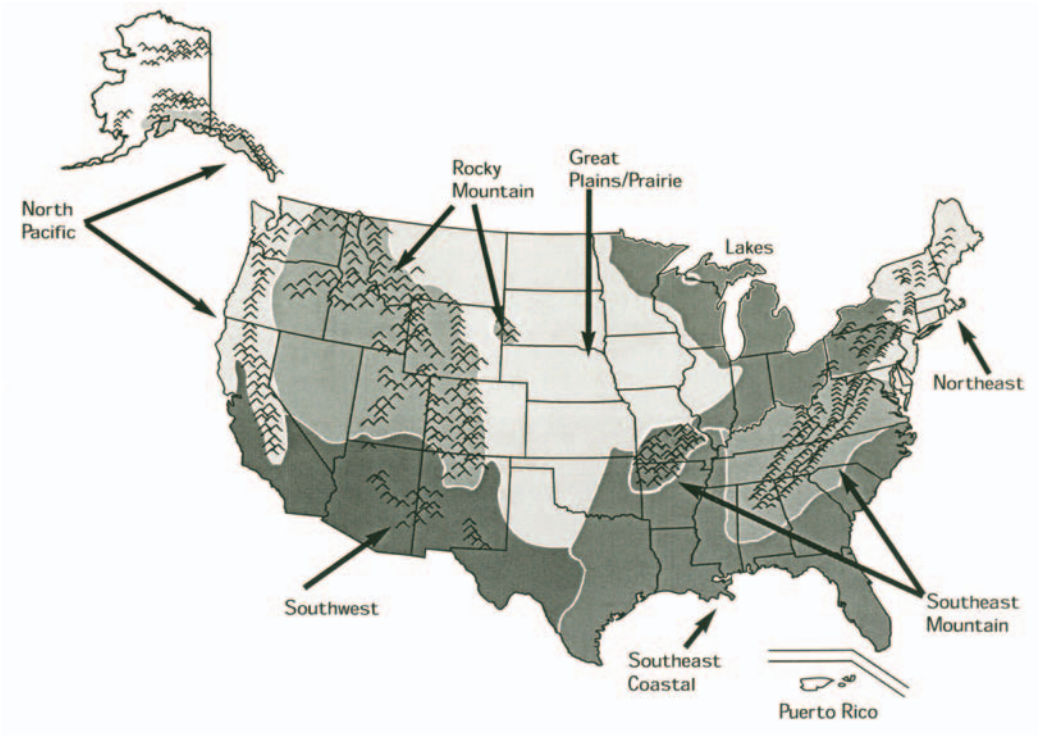

Figure 7—This map shows the general boundaries of the eight BEIG provinces.

environment is not typical of the province or unit.

For example, the Arapaho and Roosevelt National Forests and Pawnee National Grassland are located in north-central Colorado, spanning the boundary of the Rocky Mountain province and the semiarid western edge of the Great Plains/Prairie province. Separate architectural design standards were developed for the grassland and for the forests. You can view the *Architectural Design Standards for the Pawnee National Grassland* at *http://fsweb.wo.fs.fed.us/eng/facilities/pawnee.htm*.

The Midewin National Tallgrass Prairie is also within the Great Plains/Prairie province, but is on the lush, eastern edge of the plains. The thematic design guidelines for the Midewin, a former military site, are different than those of the Pawnee. The Midewin is primarily tallgrass prairie at the edge of the Chicago urban area, while the Pawnee is a shortgrass prairie in a sparsely populated rural area about 60 miles from the Rocky Mountains. You can view information about the *Midewin Thematic Design Guidelines* at *http://fsweb.wo.fs.fed.us/eng/programs/facilities/ppt_html/midewin/*

Some units have included information from the BEIG or their unit's architectural thematic design guidelines into their land resource management plans. This action formally incorporates built environment guidance into the document that steers resource management on the unit and ensures that the built environment will be considered as carefully as other resources. The *Midewin National Tallgrass Prairie Plan*, available at *http://fsweb.midewin.r9.fs.fed.us/special/planning/PRAIRIE PLAN.pdf* (25.7 megabytes), incorporates this guidance. Sections 2.7, 3.3, 4.2.5, and 4.4.2 contain language concerning architectural thematic guidelines. Unit plans completed under the new planning rules will need different wording because the new plans focus more on vision than prescription.

Applying the BEIG to Operations, Maintenance, and Minor Improvement Projects

Ordinary operations and maintenance work can provide a great opportunity to improve a site's conformance to the BEIG. Minor improvements can make a major difference in how a structure or site works and looks. The key is to keep the vision of the site's desired appearance and the function it serves when planning projects. Take every opportunity to move toward the desired appearance and function. Many small, incremental changes can make big improvements in image, customer service, and sustainability over time—without a major capital outlay.

Figure 8—The residences at the Fenn Ranger Station in the Northern Region's Nez Perce National Forest were constructed by the Civilian Conservation Corps around 1940. The original siding was Douglas-fir lap siding cut with a Dolly Varden-type rabbetted bottom edge and stained orange-brown with green trim. The original siding was repainted many times and later covered with cedar shingles during the 1960s. This photo was taken in the early 1990s.

Improving Image

Rather than simply replacing existing materials during maintenance work, take the time to consider whether something different will move the facility closer to conformance with the BEIG or site-specific architectural thematic guidelines. It may not cost any more over the life of the structure or site to choose materials and colors that present an appropriate image (figures 8 and 9).

Consult your unit's facilities architect or facilities engineer and landscape architect before finalizing decisions that alter the appearance of a structure.

Roofing—When roofing reaches the end of its life and must be replaced, change to roofing materials compatible with the province or local design theme. The initial cost of the replacement roofing may be higher, but the life-cycle cost may be lower because the new roofing may be more durable. Check to make sure that the structure can accommodate the weight of the new roofing. Roofing replacement also provides a great opportunity to improve the building's thermal performance by adding insulation or by switching to a roofing material that won't absorb the sun's heat in the summer.

Siding—When siding reaches the end of its life and must be replaced, change to siding products compatible with the province or local design theme. In many cases, you may be able to increase the durability of the siding and enhance the compatibility of the building with the design theme. For instance, many Forest Service buildings constructed or renovated during the 1960s through 1980s used inexpensive T1–11 plywood siding or lap siding formed from early composite materials that are not very durable. Unless very creatively applied, these products probably aren't compatible with the design themes of any of the eight provinces. When these products begin to fail, consider changing to siding that is more compatible with the site's design theme. Different siding, if carefully chosen, could lower routine maintenance costs and enhance the visual quality of the building. Using a different material on the lower half of the building's walls or an accent material on gable ends can make a dramatic difference in a building's appearance.

Exterior Paint Colors—Color can make an incredible difference in the way a structure is perceived. When

Figure 9—By the late 1990s, the cedar shingles on the residences at the Fenn Ranger Station needed major repairs. The visual plan for the site included showcasing the CCC-era buildings. Instead of repairing the siding shingles, they were removed. The original siding was restored and painted a color similar to the original stain. The deteriorated plastic gutters also were removed and replaced with more historically accurate galvanized gutters.

repainting, follow color schemes established for the site. Generally, these colors will be similar to colors found in the surrounding natural and historical environment (see figures 8 and 9). Using colors that conform to the site's color scheme will help the buildings visually "fit in" to their surroundings. Some units have identified color schemes for each site or for each common ecological environment within the unit. The Intermountain Region's *Paint Schemes and Color Samples for Historic Structures and Sites* is a good example of a color scheme document. It is available at *http://fsweb.mtdc.wo.fs.fed.us/pubs/htmlpubs/htm07732807/paint.doc*

Doors—Doors deliver messages (figure 10). A solid steel flat panel door says "security is important—stay out unless you belong here." A door containing a large window says "Welcome." A wood door sends a message that natural materials are valued. A plain door indicates practicality or prudence, while a highly decorated door shows extravagance or luxury. Rather than simply replacing a damaged or wornout exterior door, consider substituting another style of door that delivers the desired message. Be sure the new door provides a good weather barrier to increase the building's energy efficiency.

Figure 10—Each of these doors conveys a different message to people entering the building.

Windows—Windows are more than holes that allow us to look through walls. They help define a building's visual character. A lot of single- or double-hung wood windows in older buildings were replaced in the 1960s and 1970s with smaller aluminum-framed windows that don't fit the desired character of the building or the architectural theme of the site. Many of these replacement windows are beginning to reach the end of their useful life. They are not energy efficient. Whenever possible, restore the original window proportions and the building's character by installing windows that are more energy-efficient and that are configured like the original windows. This may require removing framing between the larger original window opening and the smaller replacement window. The original wall structure may have to be recreated.

Integrated Site Sign Plan—Many Forest Service sites contain an uncoordinated mishmash of signs. An integrated site sign plan presents even disparate looking structures as part of a cohesive unit to visitors.

For instance, in Missoula, MT, a large campus called the Missoula Fire, Science, and Technology Center is occupied by the Forest Service's Northern Region Aerial Fire Depot (smokejumper center, visitor center, airtanker base, and the Northern Rockies incident support cache, coordination center, and training center), the Missoula Technology and Development Center, and the Rocky Mountain Research Station's Fire Sciences Laboratory. It also includes the Bureau of Indian Affairs fire engine assembly operation and the Missoula office of the National Weather Service. These units will be joined by the privately funded and operated National Museum of Forest Service History in the near future. A single site sign plan helps visitors and commercial vendors find their destination and provides a unified, professional image. You can view this site plan at *http://fsweb.wo.fs.fed.us/eng/documents/pdf/sign_sm.pdf*

You can implement an integrated site sign plan by accomplishing a little each year. Complex sites almost always benefit from an integrated site sign plan. If there is no plan, assemble a team that includes a unit or regional sign coordinator, landscape architect, facilities engineer, and a maintenance person. It also can include one or two other unit personnel with an interest in sign plans. The site sign plan is more specific than the overall unit sign plan, and should include any necessary interpretive signing for the site. Follow the guidance provided in EM–7100–15, *Sign and Poster Guidelines for the Forest Service*, available at *http://fsweb.wo.fs.fed.us/eng/roads_trails/signs_ 05/*, unless there is an approved variation for a special designated area. Chapters 3 and 4 of the *Sign and Poster Guidelines* conform to the *Manual of Uniform Traffic Control Devices* (*http://mutcd.fhwa.dot.gov/*). These chapters must be followed for traffic signs. State or local highway department approval may be required for signs on roads under their jurisdiction. Interpretive signs should follow a consistent theme throughout the site.

Improving Customer Service

Most Forest Service administrative sites are contact points for people visiting public lands and for people who have business with the agency. Our public structures must contribute to serving the public. Everyone should be able to find and use the front door of public buildings and access visitor and business services.

Accessibility Modifications—Entries and restrooms are the two most crucial components in providing access to public buildings. When setting priorities for accessibility improvements detailed in evaluation surveys and transition plans, concentrate first on these two building elements. Whenever modifications are made, look for opportunities to incorporate accessibility improvements. For instance, when the front steps begin to deteriorate, replace them with a sloped sidewalk if possible. Other ideas to make existing buildings more accessible can be found in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/acc/acc14.htm*.

Entry Porch or Veranda—Often, mid-20th century buildings don't have a clearly defined main entry. Visitors may have a hard time figuring out which door leads to the reception desk (figure 11). Adding an entry porch or veranda

will identify the visitor entry clearly. If a vestibule "air lock" entry is included to reduce the volume of conditioned air that escapes each time a visitor arrives, the entry porch may improve sustainability. The building's conformance to the site or province's design theme also may improve. Be careful to use a porch style appropriate to the character of the site (figure 12).

Self-Service Visitor Information Pamphlets and Maps—Most Forest Service offices have limited hours of operation that don't necessarily conform to visitors' schedules. A covered outside area or an area that can be locked off from the rest of the building allows visitors to enter and get information and maps, providing an important service even when the office is closed.

Lobby and Reception Area—It is important to welcome visitors into our public buildings. Even a small lobby area with a few chairs, access to maps and informative pamphlets, and convenient restrooms can help visitors stay comfortable while they are waiting. When lobby and reception areas are renovated, arrange the space so that the receptionist can see and be seen from the entry door. The reception counter can be configured to provide an effective barrier between staff and public. Counters with sections at different heights may improve visitor convenience and accessibility. When possible, locate several employee work stations near the reception counter so that backup for the primary receptionist is convenient and noticeable (figure 13).

Figure 11—Visitors had so much trouble finding the front door at this ranger station that a large sign was added beside the "correct" entry.

Figure 12—The front entry of the Slate Creek Ranger District office in the Nez Perce National Forest of the Northern Region was renovated to provide an accessible entrance that included a clearly defined main door, vestibule, and porch. The porch design compliments the existing building and adds timber elements appropriate to the Rocky Mountain province.

Figure 13—The pleasantly skylit reception area of the Superior Ranger District office in the Lolo National Forest of the Northern Region contains two work stations and is adjacent to three interior doors to other staff areas (only one door shown in photo). The counter contains interpretive displays and provides a barrier between staff and the public.

Improving Sustainability

Making sustainability improvements to existing facilities is the right thing to do. In addition, these improvements can save money by improving durability and lowering maintenance, operations, and energy costs.

Some ideas are summarized below. These methods and others are explained in depth (including costs, practical tips, and links to outside resources) in the MTDC report *Incrementally Greener—Improving Sustainability Over Time Through Operations and Maintenance* (*http://www.fs.fed.us/t-d/pubs/htmlpubs/htm06732843/ Username: t-d Password: t-d*).

Energy and Water—An energy audit, which may be free through your local utility or State Department of Environmental Quality, can identify cost-effective measures to reduce energy use. Larger buildings with complex heating, ventilating, air conditioning, or control systems also may benefit from retrocommissioning. Retrocommissioning is a process that examines all of a building's operating systems and identifies changes needed to optimize building performance and satisfy the owner's operational needs.

Making changes to buildings, sites, and landscaping can be an inexpensive way to reduce energy and water use. If done carefully, the changes will pay for themselves over a few years in reduced utility costs. The best time to make a change is usually when materials, fixtures, or equipment wear out or break. Replacing serviceable items may be cost effective if the new items provide an extraordinary reduction in water or energy use. Be sure that replacement materials, appliances, and equipment not only improve sustainability but also reflect the structure or site's desired visual image.

Consider the following measures to help lower operations, maintenance, and energy costs:

- Create clear space around buildings to increase siding life and provide protection from wildland fires.
- Provide shade for structures to reduce cooling costs.
- Convert to water-wise landscaping (Xeriscaping) or rainwater harvesting to reduce water use and operations costs.
- Add insulation.
- Install plumbing fixtures that conserve water, such as low-flow toilets, waterless urinals, and faucets with infrared sensors.
- Create "air lock" entry systems.
- Insulate and weatherseal exterior doors.
- Install energy-efficient windows.
- Install durable siding.
- Choose roofing materials that cut energy use.
- Repaint the inside of the building with white or light-colored paint.
- Replace old, inefficient light fixtures and light bulbs.
- Install photocell and occupancy-sensor light switches (figure 14).
- Improve the effectiveness of exterior illumination.

Figure 14—It is easy to replace standard switches with occupancy sensor switches. This occupancy sensor switch is in an office that had two switches to make it possible to light one, two, or all three fluorescent tubes. Since few people used all three tubes at once, only the most-used switch was replaced. Energy savings should equal the cost of the switches in about a year.

Materials—Where practical, remove materials carefully and reuse salvaged materials for repairs. When repainting or replacing wornout materials, check to see whether you can get natural materials (wool, jute, coconut fiber, and so forth) or materials with recycled content that meet your requirements for a similar price. Natural materials usually don't give off irritating fumes, so they tend to be better for employee health. Using materials with recycled content conserves nonrenewable resources. For the best life-cycle value, be sure to compare the materials' durability, cleaning, and maintenance requirements.

- Whenever possible, use low volatile-organic-content (VOC) materials, including sealants, adhesives, and paints.
- Purchase low-VOC and low-toxicity cleaning supplies—many work as well as the standard products, and the price premium is vanishing.
- Provide convenient recycling containers to make it easy for people to "do the right thing."

Equipment and Systems—When energy was cheap, it didn't matter whether equipment and systems were efficient, so most of them weren't. However, even older equipment works better and costs less to run if it's clean, well maintained, and serviced regularly.

- Replace old thermostats with programmable thermostats in buildings that receive little use during evenings or weekends.
- When appliances and equipment wear out, replace them with energy-efficient models.
- Install VendingMisers (figure 15) on soda and snack vending machines to cut power use.
- Make sure that kitchen and bathroom fans exhaust outside the building.
- Renewable energy-generating equipment such as solar panels, wind turbines, or wood chip boilers may be worth considering in areas where renewable resources are particularly abundant or when grants or partnerships can offset some or all of the initial costs.

Financing—It is usually difficult for Forest Service units to finance major improvements without assistance. However, resources are available outside the Forest Service to help finance energy efficiency improvements, such as Energy Saving Performance Contracts (ESPCs), Super ESPCs, Utility Energy Service Contracts, and State or utility company energy incentives.

Figure 15—VendingMisers (at top of machines and inset) limit power use by vending machines when no customers are present. The fluorescent tubes in the door of the Coke machine have been removed, although you can't tell it by looking at the machine. The lights in the door of the Pepsi machine are still in place. The Pepsi machine door does not need to remain lighted in this bright lunchroom. This photo has been digitally altered.

Applying the BEIG to New Leases, New Construction, and Major Improvement Projects

The BEIG should not be used as a "kit of parts," with features that can be selected and added to an otherwise ordinary structure. Instead, develop a unified vision of the desired image and performance of the structure and site so design characteristics can be created in response to that vision. Using this process, the structure and site are treated as a single entity whose features are chosen because they will achieve optimum appearance and performance through synergy (where the whole is greater than the sum of its parts). This process is called integrated design or whole building design (*http://www.wbdg.org/wbdg_approach.php*).

The most effective integrated design solutions are achieved by a multidisciplinary design team that works together from the earliest stages of planning. The design team should include architects, landscape architects, engineers, maintenance staff, representatives of the people who will occupy the building, and perhaps even the builder. Although team members who are not designers play a less intense role than the designers, the entire team works together to find optimum solutions.

Before any design work begins, the design team discusses and comes to a common understanding of how the building should look and function. Design goals and characteristics are discussed, agreed to, and recorded as part of the project documentation. These goals should be referred to while the design progresses and used when design conflicts occur, helping keep the design focused on the original goals instead of just fitting the systems and structures into the building envelope.

Implementing new leases, new construction, and major improvements is a complex process that often begins years before people can occupy the new or improved building or site.

Planning Stage

The first steps in each major project are gathering information about environmental and human factors that may affect the project and making basic decisions that will guide project development. The Pacific Northwest Region's *Site Development Checklist* (*http://fsweb.r6.fs.fed.us/eng/firefac/site_checklist.htm*) can be used to track progress and make sure that no important documentation or information is left out of the planning process.

Facilities Master Plan—Each unit's facilities master plan identifies generally where and what sort of facilities will best support the work program of the unit. The plan includes goals for acquiring, disposing, or changing the uses of facilities. Broad-brush BEIG goals should be included in the inventory and recommendation sections of a facilities master plan. Include language specifying which province or site design themes should be used and general goals for energy efficiency and green building, such as LEED certification. Information on developing a facilities master plan is available in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/fmp/index.htm*. The Missoula Fire, Science, and Technology Center Facilities Masterplan (*http://fsweb.mtdc.wo.fs.fed.us/about/masterplan.pdf*) shows one way to incorporate BEIG goals into a facilities master plan. The BEIG goals are in section III.A—*Design Themes*.

Preliminary Project Analysis—A preliminary project analysis identifies and evaluates a broad range of alternatives for accomplishing specific facilities changes recommended in the unit's facilities master plan. When establishing minimum requirements for alternatives, include BEIG principles to make sure that alternatives incorporate appropriate esthetics and function. Information about conducting a preliminary project analysis is available in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/fmp/fmp06.htm*.

Site Development Plan—As the broad guidance contained in the facilities master plan is refined into a site-specific development plan, use BEIG principles to guide placement and orientation of improvements on the site. Information about site development plans is available in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/fmp/fmp09.htm*.

Prospectus—The project prospectus, sometimes called a design narrative, describes project criteria and functional needs that are used to analyze alternatives, support funding requests, and design and develop the project. Detailed information about

what should be in a prospectus is available in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/fmp/fmp08.htm*.

For small projects, the prospectus often is written by the facilities engineer with input from the managers and staff who will be using the building. For large or important projects, a charrette process may be the most effective way to identify parameters and assemble the information needed for the prospectus. A charrette is a creative, intense, collaborative process that harnesses the talents and energies of designers and others with an interest in the project to create a conceptual plan or design parameters for landscapes and/or structures. Because the charrette is a collaborative process, it also creates support for the conceptual plan or design parameters. Although considerable effort is required to set up a charrette and to record all the consensus decisions, a lot of work is accomplished in a very short time, usually just a day or a few days.

Charrette participants may include just the design team or may include people from the local community when there is high public interest in the project. A charrette with public involvement can help achieve community consensus on general project parameters while providing a chance for an interactive learning process between design professionals and the public.

More information on charrettes is available at the *Facilities—Charrette* Web page (*http://fsweb.wo.fs.fed.us/eng/programs/facilities/charette.htm*). The page includes a link to the Web site of the National Charrette Institute, a summary of a Forest Service design team's charrette for the Lake George Ranger Station office renovation, and an explanation of the Eastern Region's public involvement charrette process.

Final project prospectuses should contain language that identifies:

- The desired relation of the structure to its site, occupants, and customers
- Sustainability and energy efficiency goals
- Life-cycle cost effectiveness requirements
- Province or local thematic design and architectural character guidelines

The prospectus for the Republic Ranger District office on the Colville National Forest in the Pacific Northwest Region incorporates specific references to the BEIG and BEIG principles, especially in section I. *Introduction*, part H. *Forest Service Built Environment Image Guide (BEIG)* and section III. *General Requirements*, parts A. *Site* and B. *Architectural*. The Republic prospectus can be viewed in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/fmp/prospct2.htm*.

Leasing—Lease proposals seldom get the same level of design attention as construction proposals. This is unfortunate because office leases tend to remain in effect for 10 years or longer. The public doesn't know whether our offices are owned or leased (figure 16), but they do notice whether our offices express our mission of caring for the land and serving people. The image portrayed by any Forest Service structure, owned or leased, should be in harmony with and complimentary to the natural environment and should reflect local building traditions. To make sure that this happens, the planning process should be just as rigorous for leased

Figure 16—The Nez Perce National Forest supervisor's office was one of several similar leased offices in the Northern Region. This building served as the forest headquarters from 1983 through 2007. Leased offices should conform to the BEIG so that a uniformly positive Forest Service image is portrayed through our administrative structures.

space as for owned space. Esthetic and sustainability requirements should be included in the project prospectus and transferred to the call for lease proposals. Including the requirements has two advantages:

- Prospective lessors will be more likely to offer appropriate space.
- The requirements from the prospectus can be used during the selection process to compare advantages of the proposals that are submitted.

The relevant requirements from the prospectus should also be transferred to the lease contract. Doing so assures the requirements will be implemented as the structure is erected or outfitted for use by the Forest Service and as it is maintained over time.

The U.S. General Services Administration (GSA) developed standard language regarding sustainability and appearance for lease proposals (available through the Office of the Federal Environmental Executive at *http://www.ofee.gov/eo/energy.htm*). The standard language should be revised as necessary for each Forest Service project. For instance, section 4, *General Architectural*, contains a paragraph on the quality and appearance of the building. That paragraph should be modified to include a requirement that the building conform to the BEIG.

Other agencies have already used sustainability provisions successfully in leases. We can use their lease provisions, although some editing may be required. For instance, the U.S. Environmental Protection Agency's (EPA) new 250,000-square-foot regional office in Denver, CO, is a leased building that meets LEED silver standards. The sustainability provisions of the lease solicitation for that building are available at *http://www.epa.gov/greeningepa/content/projects/denver_sfo_environ_508.pdf* and *http://www.epa.gov/greeningepa/content/projects/denver_sfo_environ2_508.pdf*. To learn more about the building, visit the EPA's Web site at *http://www.epa.gov/region8/about/newbldg.html*.

Design Stage

The focus on BEIG principles can be lost if the design parameters emphasizing the BEIG don't get carried over from the planning stage into the design stage.

Design Prospectus—BEIG requirements must be included in the design prospectus. It is particularly important to do so when the design will not be done by Forest Service personnel. The design prospectus can be assembled relatively easily by adding information about required design work, process, timelines, and contacts to the project prospectus developed during the planning phase. The information in the design prospectus should be carried over into the design contract. Giving the designer a copy of the BEIG or a link to the Web version of the BEIG (*http://www.fs.fed.us/recreation/programs/beig/*) is an effective way to ensure access to the information they will need to conform to the BEIG principles identified in the contract.

Integrated Design—Involve all members of the interdisciplinary design team from the beginning of the design process to ensure an integrated design. Designers can do a far better job of minimizing costs and maximizing building performance and esthetics when they work as a team. For example, site orientation (landscape architect), building configuration and envelope (architect), and electric- and day-lighting choices (lighting engineer) have a much larger effect on electrical, heating, ventilation, and air conditioning system costs than the mechanical and electrical engineers' choices of mechanical and electrical systems. For optimal building performance, all specialists need to collaborate on design choices and discuss the effects of the choices on building components throughout the design process. The *Whole Building Design Guide* explains more about integrated design (*http://www.wbdg.org/*).

Designing To Conform to the BEIG—Design professionals are just that—professionals. They should be familiar with all the techniques, technology, terminology, and principles of their profession. The BEIG is easy for competent professionals to understand. It contains plenty of information to help them design buildings that convey an appropriate Forest Service image, fit within each province, and incorporate sustainability. However, design professionals have a

tendency to prefer certain systems, structures, and esthetics with which they are comfortable or which they regard as effective or desirable. Sometimes these preferences conflict with BEIG principles.

If a contract for design work includes the BEIG information from the design prospectus, it's fairly easy to redirect the designers during reviews if they have strayed from the desired design goals. The design prospectus can help Forest Service designers as well. There is more information on design reviews in the *Design Reviews* section of this report.

Designing for Sustainability— Sustainability is a big part of the BEIG. Information about sustainable design is available on the *Whole Building Design Guide* Web site (*http://www.wbdg.org/*) and in the *Sustainability* section of the *Facilities Toolbox* (*http://fsweb.mtdc.wo.fs.fed.us/toolbox/sus/*). The *Forest Service Handbook* 7309.11, 06.3.k (*http://www.fs.fed.us/im/directives/fsh/7309.11/id_7309.11-2007-1.doc*) requires all new Forest Service district offices, supervisor's offices, visitor centers, research facilities, and climate-controlled warehouses with 2,500 gross square feet or more to be registered and certified under the LEED rating system at the silver certification level. The Forest Service maintains a corporate membership in the U.S. Green Building Council (*http://fsweb.wo.fs.fed.us/eng/programs/facilities/sus_green/usgbc.htm*), the organization that developed and administers LEED. A number of Forest Service design professionals are LEED accredited, which means they've passed a test and are recognized by the U.S. Green Building Council as having a thorough understanding of green building practices and principles. These individuals are listed at *http://fsweb.wo.fs.fed.us/eng/programs/facilities/sus_green/leed_acc.htm*.

Designing a building to LEED silver standards sounds like a daunting task, but it doesn't need to be. For new construction, the following LEED prerequisites (requirements) and credits (points granted for sustainable practices that are not required) are available for items that already are standard practice in the design of Forest Service buildings:

- Prerequisite: Construction activity pollution prevention
- 1 credit: Site selection
- 1 credit: Protect or restore habitat
- 1 credit: Stormwater design
- 1 credit: 20 percent water use reduction (low-flow fixtures)
- Prerequisite: Minimum energy performance
- Prerequisite: Fundamental refrigerant management (CFC Reduction)
- Prerequisite: Storage and collection of recyclables
- 1 credit: Use locally/regionally produced materials
- Prerequisite: Minimum indoor air quality performance
- Prerequisite: Environmental tobacco smoke control
- 1 credit: Indoor chemical and pollution source control
- 1 credit: Thermal comfort—ASHRAE 55–1992
- 1 credit: Daylight and views for 75 percent of spaces

In addition, the following LEED credits are available for items that are relatively easy to incorporate into the design of Forest Service buildings:

- 1 credit: Bicycle storage and changing rooms
- 1 credit: Parking capacity and carpooling
- 1 credit: Maximize open space
- 1 credit: Landscape to reduce heat islands
- 1 credit: Light pollution reduction
- 1 credit: Water-efficient landscaping (reduce 50 percent)
- 1 credit: Water-efficient landscaping (no potable water used)
- 1 credit: 30 percent water-use reduction (waterless urinals)
- Prerequisite: Building systems commissioning
- 1 credit: Optimize energy performance
- 1 to 3 credits: Building shell reuse
- 1 credit: Construction waste management (divert 50 percent)

- 1 to 2 credits: Reuse building materials
- 1 to 2 credits: Specify recycled content materials
- 1 credit: Use rapidly renewable materials
- 1 credit: 2-week ventilation flush before occupancy
- 1 credit: Increased ventilation
- 1 to 4 credits: Low-emitting adhesives and sealants, paints, carpet, composite wood, and agrifiber
- 1 to 2 credits: Controllability of systems

These credits alone are worth 26 to 34 LEED points. Silver certification requires 33 to 38 points. The requirements for earning points are very specific and the documentation requirements are complex, so LEED certification is not simple. Learn more about LEED at *http://www.usgbc.org/DisplayPage.aspx?CategoryID=19*.

Design Reviews—At each design review, make sure that BEIG requirements are being met. For example, during the design process for the new Republic Ranger District office (figure 17), designers were redirected at the 10-percent design stage and again at the 80-percent stage. Refocusing the designers on the requirements clearly laid out in the prospectus helped produce an office that met the District's needs. At the 10-percent stage, the architectural firm presented three building design options. One design option clearly met the BEIG requirements better than the others, but the architects preferred an option that they considered to be more adventurous. The architects were instructed to proceed with the option that met BEIG requirements. Despite their preference, they complied with the instruction because the BEIG requirement was in the prospectus and the design contract. A number of functional requirements also were not accommodated in any of the options. Because the requirements were recorded in the prospectus and included in the design contract, the unit was able to require the architect to change the design to include them. Changes made at the 80-percent stage are discussed in the *Value Analysis* section of this report.

Figure 17—The Republic Ranger District office in the Pacific Northwest Region's Colville National Forest was constructed in 2005. It incorporated BEIG principles into the design process, beginning with the project prospectus. This view of the side entrance shows design details and materials appropriate for the site and the Rocky Mountain province. The entry allows fire personnel to enter and exit their work area outside normal business hours without compromising the security of the rest of the building.

Specifications—Specifications should include requirements for materials and methods essential to implementing the design intent. They must be especially clear about materials and methods that differ from usual construction practices. If the specifications aren't adequate, contractors will use whatever methods and materials they prefer. The following Web sites contain specifications specifically written for sustainable design projects.

- The *Federal Guide for Green Construction Specifiers* is a joint product of the Federal Environmental Executive, the EPA, the National Institute of Building Sciences, and the Whole Building Design Guide. It contains "green" language that can be added to project specifications and is organized using *MasterSpec* numbering and conventions. The draft version is available at *http://www.wbdg.org/design/greenspec.php*.

- The following sections of *MasterSpec*, produced by the Construction Specification Institute and American Institute of Architects, are oriented toward sustainably designed buildings, although sections in every division cover newer, sustainable products, LEED submittal requirements for various materials, and so forth:
  - 017419—Construction Waste Management and Disposal
  - 017823—Operation and Maintenance Data
  - 017900—Demonstration and Training
  - 018113—Sustainable Design Requirements
  - 019113—General Commissioning Requirements

  MasterSpec is available at *http://www.wbdg.org/design/masterspec.php.*
- The Bessey Ranger District office in the Rocky Mountain Region was designed to receive LEED silver certification. Specifications for the Bessey office project are available as an example at *http://fsweb.wo.fs.fed.us/eng/programs/facilities/leedspec/leed_01a.htm*. Other standard specifications used by several Forest Service regions are available at *http://fsweb.wo.fs.fed.us/eng/facilities/drawspec.htm.*

Cost Estimation—The *Life-Cycle Cost Effectiveness* paragraphs in the *Thinking Before Doing* section of this report explain the value of and reasons for using life-cycle cost estimation. Where several design options are being considered, life-cycle cost estimates should be required for both inhouse and contracted design work.

The Rocky Mountain Region found that the initial cost of their modular bunkhouses increased about 20 percent when they improved the design by applying BEIG principles (figures 18 and 19). They chose to improve energy performance by meeting the International Energy Conservation Code requirements (*http://fsweb.wo.fs.fed.us/eng/code_council.htm*) and required the contractor to supply ENERGYSTAR (*http://www.energystar.gov/index.cfm?fuseaction=find_a_product.*) appliances, light fixtures, heating and

Figure 18—This is one of the standard Rocky Mountain Region bunkhouses that were constructed before publication of the BEIG. The bunkhouses were functional but didn't look like Forest Service buildings and weren't particularly energy efficient.

Figure 19—The Monument bunkhouse on the Pikes Peak District of the Rocky Mountain Region's Pike and San Isabel National Forests is one of several bunkhouses constructed after the standard design was modified in accordance with BEIG principles. Both the image projected by the building and its sustainability were improved substantially.

cooling systems, and windows. They anticipate the higher initial cost will be recovered over the life of the building through lower electrical, heating, and cooling costs.

A life-cycle cost estimate would show the total cost of building construction and operation for both versions of the standard bunkhouse over the expected life of the building. It would allow comparison of the total cost of building and operating each version, rather than just the initial cost. Life-cycle cost calculation formulas are available in GSA publication, P-100, *Facilities Standards for the Public Buildings Service* (*http://www.wbdg.org/ccb/GSAMAN/p100.pdf,* 20.7 megabytes), on pages 24 and 25. Features that make estimated life-cycle cost comparisons relatively easy to accomplish also are included in the value analysis study workbook form that is available in the *Facilities Toolbox* (*http://fsweb.mtdc.wo.fs.fed.us/toolbox/uva/*).

Value Analysis—The *Getting the Best Value* paragraphs in the *Thinking Before Doing* section of this report explain the value analysis (VA) process. During the VA process, alternatives are evaluated against the performance criteria identified by the VA team. If BEIG principles have been incorporated into project documents throughout the planning and design process, conformance with the BEIG should be one of the VA performance criteria. For instance, during the VA at the 80-percent design stage for the new Republic Ranger District office, the team identified several changes to improve compliance. Among those accepted and carried forward to the final design were:

- Interior walls were relocated slightly to provide more light from the ridge skylights to the office areas (figure 20) and the building

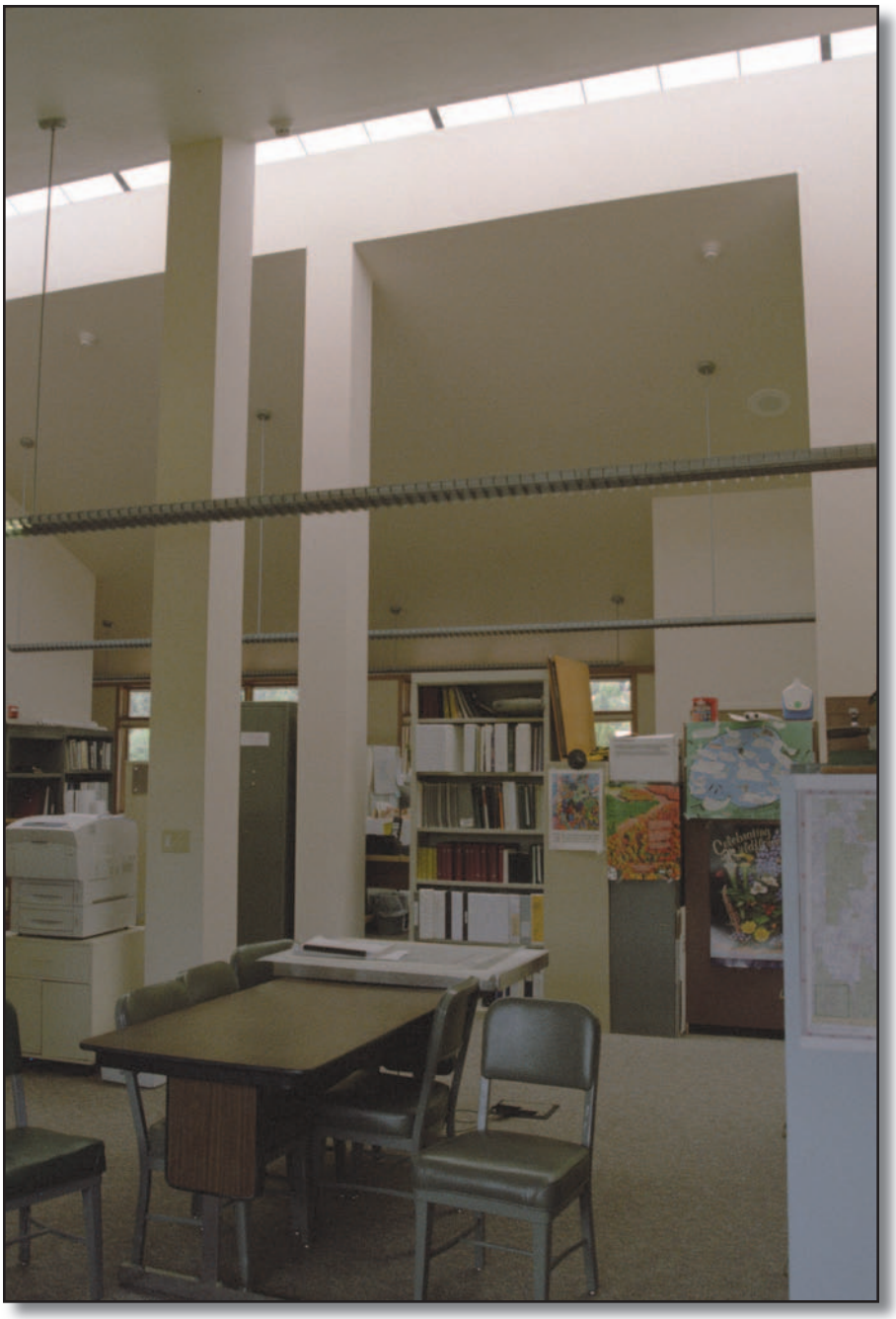

Figure 20—The skylights on the ridge of the roof of the Republic Ranger District office in the Pacific Northwest Region's Colville National Forest provide plenty of daylight to the middle of the building even on a cloudy day.

was rotated 22 degrees for better exposure to sunlight. These changes improved daylighting (the light that comes through windows and skylights), exterior views (figure 21), and the occupants' connection to the out of doors. They also will lower the building's life-cycle cost by reducing electricity costs for lighting and by providing some free solar heat during the winter.

- The floor plan was modified so that the reception area has a better connection to the office areas and affords better views of people entering the building.
- The footing elevation was raised to reduce excavation into bedrock and provide a better access grade at the entries.

More information about VA, including an electronic copy of the *VA Study Workbook*, is available in the *Facilities Toolbox* at *http://fsweb.mtdc.wo.fs.fed.us/toolbox/uva/*.

Contracting Stage

During the contracting stage, planning and design become reality. Details are extremely important. Poor contract documents, inadequate construction engineering, or failure to ensure that the building staff understands how the equipment works can undo the best intentions of those who planned and designed the structure.

Contract Documents—Besides the construction specifications, contract documents contain many pages of standard language that define the relationship between the contractor and the Government. They also define what happens if surprises occur during construction and if the Government and the contractor see things differently. Before the package goes out for bid, work with your contracting officer to

Figure 21—The views from the Republic Ranger District Office of the Pacific Northwest Region's Colville National Forest connect employees to the outdoors, improving their morale and productivity. This view is from one of the open office areas.

make sure that nothing in the standard language conflicts with BEIG requirements. For instance, in some cases a clause concerning "value engineering" is included. If used, this sort of clause should clearly state that the Government is not required to accept the contractor's proposal even though it might save on initial cost if the proposal does not reduce the life-cycle cost of the structure or if it conflicts with esthetic or other design features that are important to the function or sustainability of the structure or that are important to portraying a Forest Service image based on the local ecological, cultural/social, and economic context (figure 22).

Construction—During construction, make sure that change orders, substitutions, and finish choices don't compromise architectural character or sustainability. Often, contractors will ask whether they can substitute a cheaper or more readily available alternative material. A proposed substitute material that looks similar to the material that was specified might be less durable or less sustainable. Always check with the designer before finalizing any changes or choosing materials. This is particularly important if the building is to be LEED certified. One or two materials changes that don't meet LEED requirements could make the building ineligible for certification.

Waste Management and Recycling—Construction and demolition waste has value. "Gleaning" subcontractors sort leftover materials at construction sites and remove useful items, reducing landfill fees for disposal of unused and unwanted materials. Some construction companies have returned to the old practice of sorting materials at the end of each day for reuse rather than putting all the waste in the dumpster. For example, carpenters can use framing "ends" for blocking rather than cutting little pieces from fresh stock, saving material costs and landfill fees.

Bulldozing or burning an unwanted building gets results quickly, but doing so is often more expensive than

Figure 22—The stained wood siding and gently sloping metal roof of the National Children's Forest Visitor Center at the Mountaintop Ranger District of the San Bernardino National Forest in the Pacific Southwest Region are appropriate for the dry pine forest environment of southern California's mountains in the Southwest BEIG province. The tower looks just a little like an old schoolhouse bell tower—appropriate for a structure dedicated to educating children about forest management and providing opportunities for them to share in real forest management work. This structure also houses the Forest Service's Deerlick fire station. The engine bays are at the rear of the structure facing away from the visitor center entrance.

deconstruction. Deconstruction means taking a building apart carefully so that useful components such as lumber, windows, doors, hardware, fixtures, drywall, flooring, and so forth can be reused or recycled.

Building deconstruction and construction site gleaning are profitable businesses in many parts of the country. The Forest Products Lab's *Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies* (*http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf*) lists companies that may harvest antique wood or salvage nearly any component bigger than a nail in unwanted buildings.

The EPA's *Construction and Demolition Debris* Web site (*http://www.epa.gov/wastewise/targeted/challenge/cbuild.htm*) and the GSA's *Construction Waste Management Database* (*http://www.wbdg.org/tools/cwm.php*) also contain information on companies that haul, collect, and process recyclable and reusable debris from construction projects. These resources don't list every company that does this work, so check your local phone book, too.

Commissioning—Commissioning is a comprehensive, systematic investigation and tuneup process that examines all of a building's operating systems and ensures they are working as they should. The commissioning process also may include shepherding the entire design process to make sure that the building owner's needs and design parameters are met. Commissioning can include ensuring sustainable products are used, water is protected and conserved, indoor environmental quality is enhanced, and appropriate operations and maintenance practices are well understood and implemented.

Ideally, commissioning begins at the predesign stage and continues through construction and acceptance. It ensures that the building is constructed and will operate as intended and that it satisfies the owner's operational needs. A certified commissioning agent (*http://www.bcxa.org/certification/index.shtm*) usually is hired either by the construction contractor or the building owner to perform or coordinate the commissioning.

Commissioning is required for LEED certification and is beneficial for all complex projects. More information about commissioning is available at the Northwest Energy Efficiency Alliance's Web page (*http://www.betterbricks.com/default.aspx?pid=commissioning*). The GSA's *Building Commissioning Guide* (*http://www.gsa.gov/gsa/cm_attachments/GSA_DOCUMENT/BCG_3_30_Final_R2-x221_0Z5RDZ-i34K-pR.pdf,* 15.5 megabytes) explains standard commissioning practice for Government buildings.

Besides ensuring that the building is constructed properly and works as intended, the commissioning professional also may have responsibility for:

- Ensuring that the maintenance staff understands how the heating, ventilation, and air conditioning system works, as well as other sustainability and energy-efficiency equipment and their controls.
- Ensuring that operations and maintenance manuals are complete and useful.
- Including a brief architectural character description in the operations and maintenance manual so future staff will understand the design performance standards and why the original equipment and systems were chosen. This will help the staff choose replacements that perform appropriately for the building design when the original equipment or systems must be replaced.
- Identifying specific materials (such as paint or shingles) that were used, so they can be maintained and replaced appropriately.

Commissioning isn't free—it usually costs about ½ to 1 percent of the construction cost. However, that is a relatively low cost to ensure that the building is energy efficient, environmentally responsible, seismically safe, accessible, secure, responsive to client needs, and that all the equipment and systems work well.

Applying the BEIG Is Worthwhile

It's often a lot easier to identify goals than to produce structures that meet them. Funding construction of any but the most basic Forest Service structures is difficult, and lack of maintenance funding is a constant problem. As a result, the Forest Service has a large stock of uninspiring, inefficient buildings and only a few that really serve their occupants and customers well. We can and will do better on new construction and even improve existing buildings significantly (figure 23). The BEIG is one of the tools that can help us do so.

Figure 23—An addition and renovation to the Detroit Ranger District office in the Pacific Northwest Region's Willamette National Forest included a new main entry and visitor information area that dramatically transformed the image of the office and improved public service. The massive log columns and steep roof that dominate the structure make the design appropriate for the Cascadian region of the North Pacific province.

About the Author

Kathleen Snodgrass came to MTDC as a project leader in 2001. She graduated from Washington State University in 1974 with a bachelor of science degree in architectural studies, then spent about 10 years in highway design and construction with the Idaho Division of Highways. She began her career with the Forest Service in 1984. Kathie worked in facilities, landscape architecture, land line, and general engineering on the Nez Perce National Forest for around 10 years, and was the forest's facilities architect for about 7 years before coming to MTDC.

Notes:

Library Card

Snodgrass, Kathleen. 2006. Portraying the Forest Service image—applying the Built Environment Image Guide to administrative sites. Tech. Rep. 0773–2807–MTDC. Missoula, MT: U.S. Department of Agriculture Forest Service, Missoula Technology and Development Center. 28 p.

This report explains how to apply the *Forest Service's Built Environment Image Guide for National Forests and Grasslands* (BEIG) to administrative site improvements and maintenance projects. The BEIG was developed to help agency designers and decisionmakers better serve customers and produce transportation systems, sites, and structures that portray a sustainable Forest Service image based on the local ecological, cultural/social, and economic context. If the BEIG principles are followed whenever structures are created or modified, the Forest Service's built environment can change over time. Administrative sites include offices, warehouses, crew quarters, homes, utilities, and all the facilities where Forest Service employees work.

Keywords: accessibility, BEIG, commissioning, construction, design themes, energy efficiency, improvements, integrated design, landscapes, leases, LEED, life-cycle cost, maintenance, operations, recycling, sustainable, sustainability, universal design, value analysis, waste management

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Additional single copies of this document may be ordered from:

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For additional information about applying the *Built Environment Image Guide* to administrative sites, contact Kathleen Snodgrass at MTDC:

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