USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

2223–2803–NTDP | 2300–Recreation | April 2024

SUSTAINABLE RECREATION

SITE DESIGN GUIDE

U.S. Department of Agriculture, Forest Service
National Technology and Development Program

2223–2803–NTDP | 2300-Recreation | April 2024

Cover image—Camping in the Bridger Teton National Forest. Photo credit: Katherine Hawkins.

SUSTAINABLE RECREATION

SITE DESIGN GUIDE

AUTHORS

Nancy Brunswick
Regional Landscape Architect
U.S. Department of Agriculture, Forest Service, Intermountain Region

Daniel Cressy
Public Services Staff Officer
Forest Service, Lake Tahoe Basin Management Unit

Jessica Dole (retired)
Landscape Architect
Forest Service, Siuslaw National Forest

Jessica Dunn
Regional Recreation Planner and Landscape Architect
Forest Service, Southwestern Region

Jesse English
Recreation Program Manager and Landscape Architect
Forest Service, Cherokee National Forest

Ilia Fiene
Landscape Architect
Forest Service, Intermountain Region

Susan Jenkins
Project Manager
Forest Service, National Technology and Development Program

CONTENTS

CONTENTS

CONTENTS

CONTENTS

> ***Note*** *that many of the hyperlinks in this guide are internal Forest Service websites and are not accessible outside the Forest Service network.*
>
> *All images are USDA Forest Service photos unless otherwise noted.*

ACKNOWLEDGMENTS

Many individuals, over multiple years, helped develop, draft, review, and finalize the "Sustainable Recreation Site Design Guide." The interdisciplinary input from these individuals played a critical role in bringing the design guide from concept to reality. The core team would especially like to acknowledge the following individuals:

Matt Arnn, chief landscape architect, U.S. Department of Agriculture, Forest Service, Washington Office

Sarah Baker (retired), professional engineer (P.E.), facilities engineer, Forest Service, Office of Sustainability and Climate Change

Beth Bramhall, visual information specialist, Forest Service, National Technology and Development Program (NTDP)

Ruth Doyle (retired), landscape architect, Forest Service, Southwestern Region

Autumn Ela, assistant lead, forest plan revision, Manti-La Sal National Forest

Lauren Marshall, Ph.D., landscape architect, senior manager, Arbor Day Foundation

Eva Masin, technical writer/editor, Forest Service, NTDP

Donna Mattson, landscape architect, Forest Service, Enterprise Program

Andrew D. McLean, technical writer/editor, Forest Service, NTDP

George Toyama, visual information specialist, Forest Service, NTDP

Francisco Valenzuela (retired), recreation planner, Forest Service, Southwestern Region

Robert Wetherell (retired), supervisory program manager, Forest Service, NTDP

Martha Willbee (retired), project leader, Forest Service, NTDP

ABSTRACT

The “Sustainable Recreation Site Design Guide” (SRSDG) is a technical guidebook that describes the best practices and processes for implementing sustainable recreation design into U.S. Department of Agriculture, Forest Service recreation projects at the site scale. The SRSDG helps field staff with planning and designs for new construction and for reconstruction of existing recreation facilities and sites, while also considering the three spheres of sustainability—social, environmental, and economic. It addresses the unique challenges associated with recreation design in national forests and grasslands, translating policy, abstract concepts, and best-available science to guide tangible, project-level actions. The SRSDG offers the tools, examples, and context necessary to guide Forest Service staff in their efforts to develop a sustainable recreation future.

A Message from the Project Sponsor

Many people can trace their ecological consciousness to the recreation experiences they have had on public lands. Past interventions—what has been built, where it has been built, and how it has been maintained—are integral to defining the character of our national forests and grasslands and have greatly influenced the quality of those recreation experiences. As Forest Service design and planning practitioners, it is our responsibility—and opportunity—to engage and ignite a stewardship ethic within others.

The “Sustainable Recreation Site Design Guide” is a tool to help us do just that. We can use this technical guidebook as we repair, replace, renovate, and reimagine our existing developed recreation sites, or create new ones. It will also allow us to better respond to the reality that our landscapes are changing. Climate change, natural disasters, and other disturbances are altering the health of our public lands and, in turn, how they appear. These changes are forcing us to examine, and in some cases reconsider, how we design and manage recreation.

I urge you take some quality time with this exceptional resource to understand how it compliments, builds on, and aids us in implementing key sustainability policies and direction. When we prioritize recreation sites to respect the natural systems in which they reside, we send a strong message about our values as an agency, and we open the door to the public to join us in imagining and realizing even more resilient recreation landscapes.

—Matt Arnn, Professional Landscape Architect, American Society of Landscape Architects
Chief Landscape Architect, U.S. Department of Agriculture, Forest Service

PART 1

SUSTAINABLE RECREATION SITE DESIGN

Lower Falls National Scenic Area, Saco Ranger District, White Mountain National Forest.

Introduction

For more than a century, the U.S. Department of Agriculture, Forest Service has managed, on behalf of the public, landscapes that are integral to the social, ecological, and economic well-being of the Nation. Often, recreation settings are the first encounter visitors have with national forests. Nature-based recreation experiences provide the public with valuable connections to the outdoors, demonstrating both the value of national forest recreation sites and the Forest Service's commitment to caring for the land and serving people.

The "Sustainable Recreation Site Design Guide" (SRSDG) is a technical guidebook describing best practices and processes for implementing sustainable recreation design into national forest recreation projects at the site scale. The SRSDG helps forest and district staff with planning and design for new construction and for reconstructing existing recreation facilities and sites, while also considering the three spheres of sustainability—social, environmental, and economic (figure 1–001). It addresses the unique challenges associated with recreation design in national forests and grasslands, drawing from design traditions and expertise within the agency. The SRSDG translates policy, abstract concepts, and best-available science to guide tangible, project-level actions. As the Forest Service continues its mission of sustained conservation leadership, the SRSDG offers agency staff the tools, examples, and context to guide efforts toward developing a sustainable recreation future.

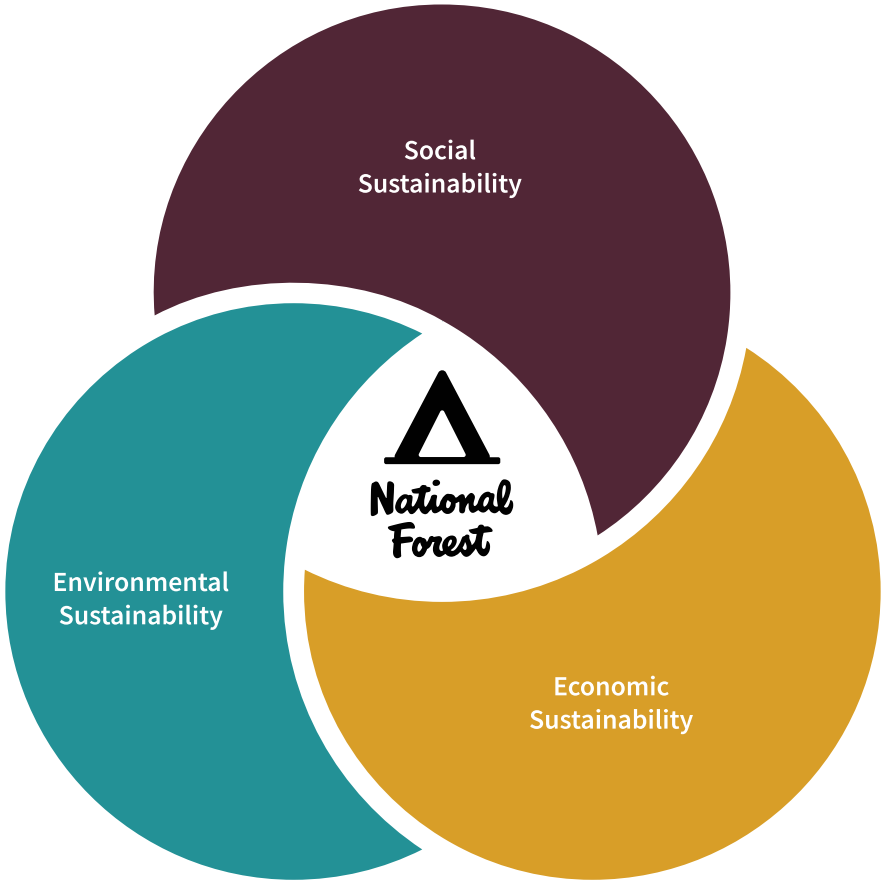


Figure 1–001—The U.S. Department of Agriculture, Forest Service plays an essential role in integrating the social, environmental, and economic spheres of sustainability to support local landscapes and communities.

Audience, Scope, and Intent

The SRSDG does not offer design prescriptions—no particular design or template will apply across all locations, settings, or site conditions. It does identify general principles of sustainable design that apply to recreation settings, site-specific considerations for implementing sustainable recreation design, and agency requirements and processes associated with making improvements to developed recreation sites. The SRSDG focuses on design of developed recreation sites, such as Forest Service campgrounds, picnic areas, and trailheads with development scales 3 to 5. More broadly, every recreation site design project, regardless of type or scope, will benefit from the guidance provided in the SRSDG. The SRSDG covers new construction, renovation projects, and site retrofits, regardless of the setting or development scale (see Table 2–1—Recreation Site Development Scale, Recreation Opportunity Spectrum, and Facility Characteristics).

This "how-to" guide is for recreation planners, landscape architects, engineers, and other recreation professionals. These individuals plan, design, and implement developed recreation projects, making sustainable recreation a reality for the Forest Service and recreation site users. The SRSDG is part of the suite of Forest Service guidance on sustainable recreation and relates directly to Forest Service Handbook (FSH) 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13>. The guide supports implementation of the 2012 Planning Rule and Directives (Title 36, Code of Federal Regulations [CFR], Part 219.19), and the broad concepts described in the 2010 "Framework for Sustainable Recreation."

A Framework for Sustainable Recreation: Guiding Principles, Goals, and Focus Areas

Guiding Principles

- Connecting people with their natural and cultural heritage is a vital thread in the fabric of society.
- Recreational activity in the great outdoors promotes healthy lifestyles.
- Sustainability underlies all program decisions.
- Community engagement is essential.
- National forests and grasslands are part of a larger landscape.
- Forest Service recreation programs are integrated with the larger agency mission.

Goals

- Provide a diverse range of quality recreation opportunities that allow people and communities to connect with natural and cultural resources.
- Protect the natural, cultural, and scenic environment for present and future generations to enjoy.
- Partner with public and private recreation benefit providers to meet public needs and expectations.
- Perform and plan by implementing systems and processes to ensure effective decisions, sound investments, accountability, collaborative approaches to integrated solutions across the landscape, and enhanced professionalism of our workforce.

Focus Areas

- Restore and adapt recreation settings.
- Implement "green" operations.
- Enhance communities.
- Invest in special places.
- Forge strategic partnerships.
- Promote citizen stewardship.
- Know our visitors, community stakeholders, and other recreation providers.
- Provide the right information.
- Develop a sustainable financial foundation.
- Develop our workforce.

How to Use the Sustainable Recreation Site Design Guide

The SRSDG supports decision making at every step of a project:

- **Part one** supplies the context for sustainable recreation and site design, including a discussion of general principles.
- **Part two** outlines the development process, covering the critical steps of a project from conception to construction.
- **Part three** describes elements of sustainable recreation site design that apply to most projects and site types. This section identifies some design best practices for accomplishing desired outcomes, following the principles described in part one.
- **Part four** provides details for specific types of developed recreation sites and gives an overview of sustainable recreation strategies for all common site types.

Working Definitions

Sustainability

Everything we need for our survival and well-being depends, either directly or indirectly, on our natural environment. The concept of sustainability describes a healthy, productive relationship between ecological, social, and economic values, which can persist and improve over time. The 2012 Planning Rule (36 CFR 219.19) defines sustainability as the "capability to meet the needs of the present generation without compromising the ability of future generations to meet their needs." The Forest Service mission echoes these sentiments, challenging us "to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations."

Sustainable Recreation

The 2012 Planning Rule relates directly to recreation, defining sustainable recreation as "the set of recreation settings and opportunities on the National Forest System (NFS) that is ecologically, economically, and socially sustainable for present and future generations." Sustainable recreation integrates and sustains recreation settings, their scenic character, access to them, and the opportunities, experiences, and community benefits they provide (figure 1–002).

Figure 1–002—Sustainable recreation is the nexus between landscape settings, scenic character, public access, recreation opportunity and experience, and community benefit.

Planning

Planning provides the foundation of the design process. The planning phase defines goals, challenges, budgets, and constraints. It requires an interdisciplinary process that involves resource specialists, the project team, decision makers, stakeholders, and anticipated site users. The planning phase integrates sustainable design principles and establishes a common vision that can be communicated and integrated with project design.

Design

Design develops positive solutions that respond to identified needs, values, and desires through an integrative, creative, iterative process. These identified design needs, along with the essential function of a recreation site, comprise a "program." Inputs during recreation site design affect outcomes from visitors who later use the recreation site. Recreation site design influences how people interact with built improvements and their natural surroundings. Sustainable recreation design considers social, ecological, and economic needs and values when planning for recreation facilities and their operation. Investment in careful, considerate design in the early stages of a project can produce long-term benefits and lasting, sustainable outcomes. Figure 1–003 illustrates the basic visual aspects of form, line, color, texture, balance, proportion, sequence, and scale that describe design. For site design, structure (physical space) and function (how the site interacts with its environment, and how people interact with the built and natural setting) serve as descriptors. Recreation site design outlines the way visitors use the site and how the site integrates with the natural environment.

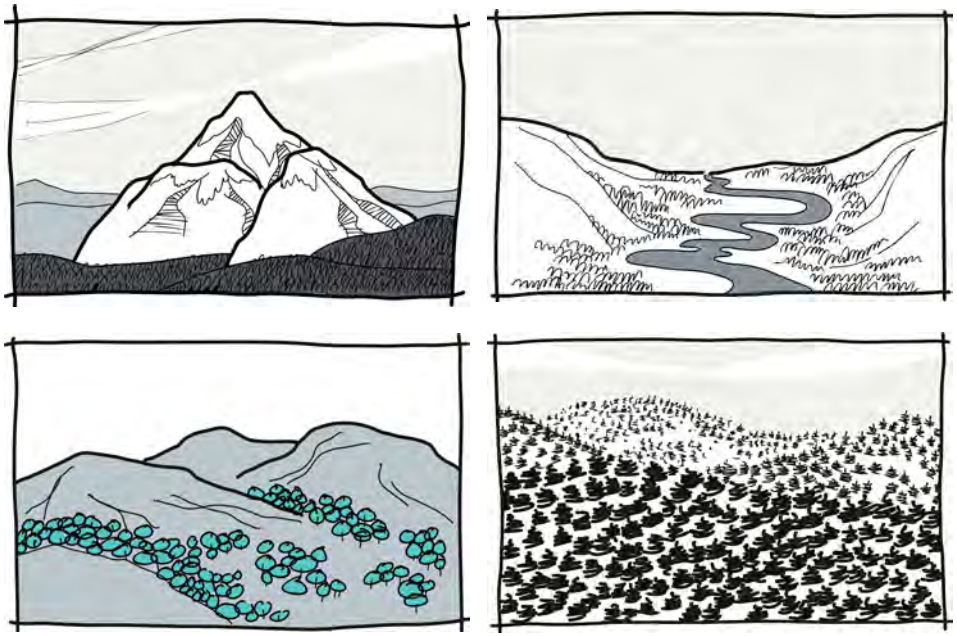


Figure 1–003—Recognizing these basic visual aspects of the natural environment will inform design decisions for built environments: form, line, color, texture, balance, proportion, sequence, and scale. These illustrations are from the "National Forest Landscape Management, Agricultural Handbook 434, Volume I-General Concepts."

History of Developed Recreation in the Forest Service

The history of developed Forest Service recreation facilities reflects the cultural adaptations and technological innovations of Americans and their relationship with the outdoors. Understanding the factors that influenced original design helps inform contemporary design choices. Recognizing these historical site designs provides an opportunity to carry history and tradition forward, connecting contemporary recreationists with their heritage and enriching their recreation experience. Sustainable recreation design can borrow from unique design features or materials used in the past, reference historical influences through interpretation, or use elements in the surrounding setting to provide historical context.

1891 to 1916: The Roots of National Forest Recreation

By the late 19th century, American society had developed an appreciation for the aesthetic and recreational aspects of nature. Even before the presidential proclamation in 1891 established the forest reserves, recreation represented an important use of America's forests. Urbanization, the cultural changes of the Industrial Age, and increased leisure time motivated people to spend time outdoors, initiating a budding conservation movement. Gifford Pinchot, the first Chief, or forester, of the fledgling Forest Service, noted in his 1905 "The Use Book: Regulations and Instructions for the Use of the National Forests" that the national forests served many purposes, some of which were related to early recreationists: "The following are the more usual rights and privileges...trails and roads to be used by settlers living in or near forest reserves...and summer residences." In "The Use of the National Forests" (1907), Pinchot elaborated on the value of America's forests for recreation: "...national forests serve a good purpose as great playgrounds for the people. They are used more or less every year by campers, hunters, fishermen, and thousands of pleasure seekers from the near-by (sic) towns. They are great recreation grounds for a very large part of the people of the West, and their value in this respect is well worth considering."

During the 1910s, the Forest Service began to consider recreation benefits, influenced by national park designations and the widespread interest in recreation. Development of the first national forest recreation sites and the transfer of some lands to the U.S. Department of the Interior, National Park Service further propelled the agency's increasing interest in developed recreation.

1917 to the 1940s: The Influence of the Civilian Conservation Corps and Introduction of Recreation Management

Though recreation has long been a recognized use of national forests, small and rudimentary road systems initially kept most recreational activity local and limited. Construction of improved road systems in the early 1900s changed the nature of developed recreation. Eagle Creek Campground, located in the Columbia River Gorge on the Mount Hood National Forest in Oregon, became the first "modern" campground constructed in a national forest. Originally accessed by steamboat or railroad, in 1916 the Forest Service built the Eagle Creek Campground after transportation planners and community members recognized the new Columbia River Highway would bring more visitors to the area and increase the need for camping facilities. The site included 100 campsites with concrete camp stoves, picnic tables, toilets, a parking lot, and a ranger station (figure 1–004). During its first year of operation, 1916, the site saw an estimated 15,000 visitors, and by 1919 the visitor count swelled to some 150,000 (Hale 2016).

Figure 1–004—Eagle Creek Campground, the first modern campground in the Forest Service.

Gradually, the Forest Service developed recreation sites with easy vehicle access via roads built on national forest land as well as from the growing network of State and county roads nationwide (figure 1–005). A number of these early recreation sites remain in use today. Some of these historical sites served as the foundation for developing modern Forest Service recreation facilities.

Figure 1–005—The types of vehicles available dictated early campsite design.

Early pioneers of Forest Service recreation planning and management included landscape architects Frank Waugh and Arthur Carhart. Waugh, hired in 1917, worked on the first comprehensive national recreation study. He played an instrumental role in developing campgrounds on national forests throughout the Rocky Mountain West. Carhart joined the Forest Service in 1919 as its first landscape architect (figure 1–006). His appointment as a "recreation engineer" marked official agency recognition of the importance of planning and managing recreational resources to meet public demands. In the booming post-World War I era, Carhart developed the first Forest Service-wide comprehensive recreation plan that considered the key role of the automobile in recreation (Colorado Office of Archaeology and Historic Preservation 2008).

Figure 1–006—Arthur Carhart, first landscape architect hired by the Forest Service.

The Great Depression and the creation of the Civilian Conservation Corps (CCC) led to a new national focus on design and construction of recreation facilities. President Franklin D. Roosevelt mobilized the CCC in 1933 to provide work relief during the national economic crisis by funding public works to promote conservation and improve access to America's public lands. Within 6 months, more than 200,000 young men were working on national forests across the country, constructing roads, trails, and developed recreation sites (figure 1–007). A 1936 report detailed improvements across the agency and recommended hiring landscape architects to manage each region.

Figure 1–007—A Civilian Conservation Corps team constructing a picnic pavilion from materials found onsite.

More elaborate than earlier Forest Service recreation facilities, the CCC-built sites featured sophisticated designs and included pavilions, playgrounds, and other sites that conveyed a sense of permanence. The CCC primarily used local materials to construct these facilities. Today people associate this "rustic" style of built features with the character of developed Forest Service recreation sites (figure 1–008).

Figure 1–008—Extensive rock work was a common element of Civilian Conservation Corps recreation sites.

Contributions of the Civilian Conservation Corps

By the late 1930s, recreation became a major priority for the Forest Service, with increased funding and national direction. During 1937 and 1938, the Forest Service created 3,587 developed campgrounds (Tweed 1989). World War II and the end of the Civilian Conservation Corps (CCC) in the early 1940s slowed the development of new recreation facilities.

Many campgrounds, picnic areas, and other facilities the CCC designed and constructed display the artisanship of the era in the stone walls, shelters, and pavilions at recreation sites still in use today. These facilities also retained the original footprint for accommodating the automobiles of the 1930s.

The Rise of the Recreational Vehicle: 1950s to the Present

The recreation site design of the 1930s required some substantial revision with the advent of the recreational vehicle (RV) (figure 1–009). The modern RV and travel trailer became popular in the late 1950s. By 2010, an estimated 8.3 million American households owned RVs (Morrison 2010). Many campers now prefer large RVs and travel trailers, and campground layouts need to accommodate longer and wider spurs with a level parking area. Overall, the popularity of these large vehicles has meant dramatic changes to the entire configuration of the campground, including road systems, scenic overlooks, trailheads, and parking areas (Tweed 1989).

Figure 1–009—Recreational vehicles (RVs) became popular during the 1950s and 1960s. The "Operation Outdoors" initiative in 1957 began the reconstruction and modernization of many sites to accommodate RVs.

A national movement in the 1950s provided financial resources to expand and update developed recreation sites on public lands throughout the country. The National Park Service's initiative from 1956 to 1966, called "Mission 66," expanded developed recreation infrastructure in national parks. The Forest Service launched a similar initiative in 1957, "Operation Outdoors," which aimed to modernize facilities (figures 1–010 and 1–011). This new initiative departed from the CCC's rustic style to incorporate functional modern designs and international influence that featured simple forms with clean, straight edges and little ornamentation or decoration. During this time, the Forest Service reconstructed and renovated many of the 1930s sites to accommodate RVs and other modern vehicles, frequently using manufactured rather than local or handcrafted materials.

Figure 1–010—A young child holding a poster proclaiming, "Another Operation Outdoors National Forest Recreation Improvement Project."

Figure 1–011—A typical design of the 1960s "Operation Outdoors."

Making Facilities More Accessible

During the 1950s and 1960s, the U.S. Government began an effort to provide opportunities and improved access to facilities for people with disabilities. With passage of the 1968 Architectural Barriers Act (42 United States Code [U.S.C.] 4151), section 504 of the 1973 Rehabilitation Act (29 U.S.C. 794), and, later, the 1990 Americans with Disabilities Act (42 U.S.C. 12101), the Forest Service developed policy and guidelines for making facilities and programs more accessible. These guidelines and policy changes initiated new requirements in designs and plans for recreation facilities, including increased dimensions to accommodate visitors using wheelchairs (figure 1–012).

Figure 1–012—A focus on improving accessibility in the early 1990s led to many new design features at recreation sites.

From the 1960s to the 2000s, the number of United States campers grew from approximately 13 million to 83 million and featured a number of demographic changes. In the 1950s and 1960s, many campers were families looking for inexpensive lodging while on vacation. By the 21st century, more people chose to camp in motorhomes for ease of access to specific locations. Technological advancements in gear and electronics have changed how people camp, and their connection to the outdoors (figure 1–013). For many campers, comfort and convenience enhance their experience (Garst et al. 2010).

Figure 1–013—The increased size of recreational vehicles and other passenger vehicles, along with technological innovations, continue to influence design to meet the needs and expectations of users.

Understanding History Improves Design

The history of developed facilities provides a context for understanding existing site design. The site designs used by the Forest Service reflect the use, transportation, and technology at the time of construction. The agency reconstructed many sites originally built in the 1930s at approximately 30-year intervals,

making many of the campsite spurs longer and wider, with additional amenities and updated furnishings. Even so, the original sites and later revisions remain evident.

Changing cultural motivations and desires also change how people recreate. Since the 1950s, camping has provided an escape from the stresses of everyday life, an opportunity to experience a sense of restoration, and interaction with the natural world. Social interaction has also been a particularly vital part of the camping experience. Frequently, people return to the same campgrounds for many years and build an affinity for and an emotional attachment to these campgrounds, which become an integral part of their experiences and memories (Garst et al. 2010). Recognizing public attachment and shared history can help with maintaining the valued character of a site to enable informed choices and appropriate approaches for reconstructing or altering sites (figures 1–014 and 1–015).

Figure 1–014—Understanding the history of a place can inform richer design decisions and allow for creative continued use, such as this fire lookout tower repurposed for overnight accommodations.

Figure 1–015—Trips to the national forest can become generational traditions.

The 1960s Outdoor Recreation Resources Review Commission (ORRRC) noted that, "What people now do for outdoor recreation is not necessarily what they want to do in the future." Anticipating new trends and taking proactive rather than reactive steps plays a crucial role in managing visitors' expectations for recreational sites (Outdoor Recreation Resources Review Commission 1962).

Goals and Objectives of the Sustainable Recreation Site Design Guide

During 2019, the Forest Service celebrated the centennial of professional recreation management. Sustainable recreation will define the next century of recreation planning, design, implementation, operations, and maintenance. Sustainable

recreation design enhances public benefits, connecting people to the outdoors and providing opportunities for positive, memorable experiences while sustaining the ecological character and vitality of natural settings.

The goals of the SRSDG are to:

- Provide a knowledge base in sustainable recreation design concepts
- Provide technical guidance in support of policy, planning, and design processes
- Improve design decisions during planning, reconstruction, and maintenance for all developed site types to implement sustainable recreation outcomes

General Principles of Sustainable Recreation Design

Project-level decisions regarding developed recreation site design require balancing increasing demands for access and opportunity with concerns related to limited financial resources. Several founding principles guide each stage of project development (figure 1–016). To achieve sustainable outcomes, sustainable recreation planning and design decisions should be:

- Relevant
- Local
- Flexible
- Holistic
- Strategic
- Inclusive

Figure 1–016—Sustainable recreation site design is holistic, flexible, inclusive, strategic, relevant, and local.

Relevant

Recreation site design affects the quality of visitor experiences and tells the story of how the Forest Service respects the public and natural landscapes. Sustainable recreation design is responsive to changing expectations, desires, and constraints—providing meaningful benefits into the future.

Desired outcomes:

- Connect people to the outdoors.
- Enable diverse populations to access recreation opportunities.
- Provide high-quality opportunities and settings for recreation.
- Provide valued benefits to users and local communities.

Local

The ecology and scenic character of a natural setting and its social context serve as starting points for management and design decisions.

Desired outcomes:

- Maintain and enhance a sense of place and the scenic character of a site.
- Ensure the community engages with and benefits from investing in sustainable recreation.
- Reduce the carbon footprint by sourcing materials locally.

Flexible

Sustainable recreation site design incorporates an understanding of the past, present, and reasonably foreseeable future. Choices made with foresight increase resiliency over time, allowing recreation sites to adapt and meet future challenges and opportunities.

Desired outcomes:

- Create recreation sites that can adapt to changing environmental, social, and economic conditions.
- Improve sustainable recreation design through shared experiences and lessons learned.

Holistic

Integrating knowledge and creativity, along with practical constraints, provides context for decisions that affect current and future generations. Recreation site design that considers a broad perspective of interrelated site conditions, social concerns, and emerging trends can positively affect change.

Desired outcomes:

- Employ design to protect and enhance natural systems and processes.
- Ensure a durable and useful built environment for the long term.
- Minimize energy and water consumption, greenhouse gas emissions, and utility expenses.
- Incorporate maintenance and operations considerations into the planning and design process.

Strategic

Sustainable recreation design optimizes limited resources to implement desired programs and improve recreation settings. It leverages resources using partners, community engagement, and creative, nontraditional approaches. Sustainable recreation design exhibits Gifford Pinchot's adage of achieving "the greatest good for the greatest number for the longest time."

Desired outcomes:

- Deliver recreation facilities that provide social and economic benefits at the local and regional level.
- Make design choices that enhance the environment and serve the needs of visitors and Forest Service management.
- Incorporate (into the design choices) life-cycle implications related to maintenance, resilience, and adaptability to changing conditions.
- Reduce or eliminate the need for deferred maintenance.
- Ensure that evaluation of facilities and their location validates the appropriateness of future reinvestment.

Inclusive

Sustainable recreation design provides an opportunity for public participation involving a wide range of interested recreation users and potential users. It allows people to discuss the values, perspectives, and understandings they associate with the site. The design process incorporates input from individuals who recreate in the area or have an interest in engaging throughout the process to improve outcomes when practical. Sustainable recreation design reflects the diversity of a site's surrounding social context and offers opportunities for people—from local, national, and international locales—to experience the site's cultural and natural settings (figure 1–017).

Desired outcomes:

- Engage key stakeholders at the local and national level.
- Engage people with diverse backgrounds, ideas, and experiences when developing the design.
- Ensure that projects are responsive to recreationists' values and expectations.
- Develop designs that integrate interdisciplinary resource needs.
- Confirm that designs make a range of recreation opportunities available to people with varied abilities.
- Increase collective ownership and trust of national forest design decisions.
- Engage organizations that advocate for underrepresented communities.
- Develop designs that reflect inclusivity by creating welcoming spaces.

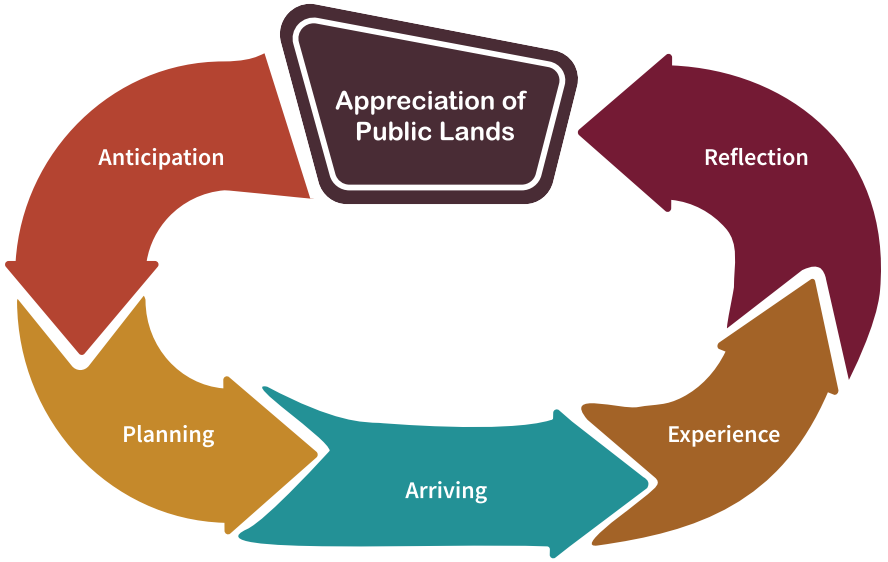


Figure 1–017—Planning and design for sustainable recreation outcomes should consider the visitor's "cycle of recreation experience," including anticipating a visit, planning a visit, arriving, experiencing the outdoors, and reflecting on their experience and appreciation of public lands.

Laws, Regulations, and Policy

Federal laws and regulations, as well as Forest Service policy, provide a regulatory framework for managing public lands sustainably. For example, the Architectural Barriers Act (ABA) outlines clear and legally enforceable agency requirements that directly affect project design. Regulations in the CFR provide enforceable, uniform direction for Federal agencies. The Forest Service Manual (FSM) and FSH include policies (known as "directives"), the primary source for administrative direction used by all Forest Service employees.

The SRSDG offers technical guidance, giving Forest Service staff specific resources for developed recreation site project-level design work. It sets important context for staff efforts and provides practical interpretation of the directives presented in FSH 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13>.

Sustainable recreation planning and design is a creative, iterative, and collaborative process. Understanding the implications of law, regulation, and policy provides the sideboards (parameters) and management intent necessary to develop sustainable recreation outcomes. The following sections provide some examples of law, regulations, and policy that influence recreation site design.

Laws

- **Architectural Barriers Act (ABA)**—requires that Federal or federally funded facilities provide integrated access for people with disabilities.
- **Clean Water Act (CWA)**—provides standards for water quality protection, including stormwater runoff and erosion control.
- **Endangered Species Act (ESA)**—provides for the protection of habitat for endangered plants and animals.
- **National Environmental Policy Act (NEPA)**—requires an interdisciplinary evaluation of environmental effects and public involvement for all projects on Federal lands and federally funded projects.
- **National Forest Management Act (NFMA)**—requires development of, and compliance with, forest plans.
- **National Historic Preservation Act (NHPA)**—encourages the preservation of historic properties (e.g., buildings, sites, structures, districts) eligible for or listed on the National Register of Historic Places by applying standards and guidelines issued by the Secretary of the Interior.
- **Rehabilitation Act**—requires that Federal or federally funded programs do not discriminate based on a person's disability (Section 504).

Regulations

- **2012 Planning Rule**—provides direction and requirements for land management planning.

Policy

- **FSH 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities**—provides direction for designing and implementing recreation facility design.
- **FSH 7309.11—Buildings and Related Facilities Handbook, Chapter 40—Management**
- **FSH 7309.11—Buildings and Related Facilities Handbook, Chapter 70—Sustainable Buildings**—provides direction for reducing the operational and environmental costs of the built environment.
- **FSM 2330—Forest Service Planning, Design, Operation, and Maintenance of Developed Recreation Sites**—provides direction for implementing and managing recreation facilities on NFS lands.
- **FSM 6440—Real Property Management**

- **FSM 7300—Buildings and Other Structures**—provides direction for engineering requirements for buildings and includes recreation facility requirements.
- Appendix A: Directives contains additional directives from FSH and FSM that relate to organization and management, management services, and engineering.

Guidelines with Regulatory Requirements

- **Architectural Barriers Act Accessibility Standards (ABAAS)**—applies to facilities designed, built, altered, or leased with Federal funds.
- **Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG)**—legally enforceable standards for accessibility at national forest recreation sites.
- **Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)**

Guidelines that Provide a Framework for Management, Design, and Analysis

- **American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Very Low-Volume Roads**
- **The Built Environment Image Guide for the National Forests and Grasslands**—sets design guidelines for built features on NFS lands to complement local landscape character within bioregional "design provinces."
- **FSH 7709.56—Road Preconstruction Handbook**
- **Recreation Opportunity Spectrum (ROS) Technical Guide**—provides a framework for a range of recreation setting standards on NFS lands.
- **Sign and Poster Guidelines for the Forest Service**
- **U.S. Department of Agriculture Handbook 701, Landscape Aesthetics**—establishes the Scenery Management System (SMS) for NFS lands.

PART 2

THE PROJECT DEVELOPMENT PROCESS

Introduction

Part 2 provides guidance on the project development process. Project development defines how a set of design objectives apply to a specific site to achieve specific goals. This section guides the process from site analysis and decision to construction for all sustainable developed recreation site types.

Site character, ecological processes, and facility program requirements inform site planning and design choices. These choices provide for visitor needs and recreation experience, protect and enhance recreation sites, and maintain connections to forest settings for the long term.

In designing a site, you will need to engage a range of perspectives about the site's condition and use. Understanding the public's experience within recreation settings and the diversity of cultures, values, concerns, and preferences they bring to those experiences provides a foundation for sustainable planning and design choices. Planning and design should demonstrate responsiveness to site conditions and character, as well as user concerns, values, and experience. Applying sustainable recreation principles throughout the project development process guides the Forest Service as we "care for the land and serve people."

Site Planning and Design

Designers and managers should consider the level of complexity, investment, and site values as they apply the processes outlined in this guide. Simple projects can follow simple processes; however, even simple projects should help advance the unit toward a sustainable recreation future (figures 2–001 and 2–002).

Sustainable recreation site design should:

- Respond to the functional needs of the users and how they use the site
- Be sensitive to the natural and cultural setting
- Maintain and enhance the sense of place
- Positively represent the national forests and public land stewardship

Project development for all projects and site types, from concept to implementation, must follow a series of steps or phases (figure 2–003). The "Sustainable Recreation Site Design Guide" (SRSDG) primarily addresses project planning and design. Forest Service Handbook (FSH) 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13!..> describes the identified phases and required products:

1. Proposal
   a. Needs assessment
   b. Site selection
2. Planning
   a. Site inventory and project program analysis
   b. National Environmental Policy Act (NEPA) and other required compliance reviews
   c. Design narrative
   d. Technical reports and investigations
   e. Preliminary cost estimate

Figure 2–001—Varying levels of recreation site development.

3. Design
   a. Site analysis
   b. Conceptual development plans and alternatives (30-percent design)
   c. Design development plans (50-percent design)
   d. Final site development plans (95-percent design)
   e. Contract documents (100-percent design)
4. Implementation
   a. Designer/construction coordination
   b. As-built drawings

Depending on the type and scale of the project, these steps may not require much effort—but working through each one reinforces consideration of each design element and incorporation of the general principles of sustainable recreation design.

Design and project development entail an iterative process. Exploring one scenario or alternative often leads you to explore and evaluate another. This creative process facilitates and leads to sustainable design outcomes. However, this also often means revisiting earlier steps to clarify or refine conclusions or assumptions (figure 2–004).

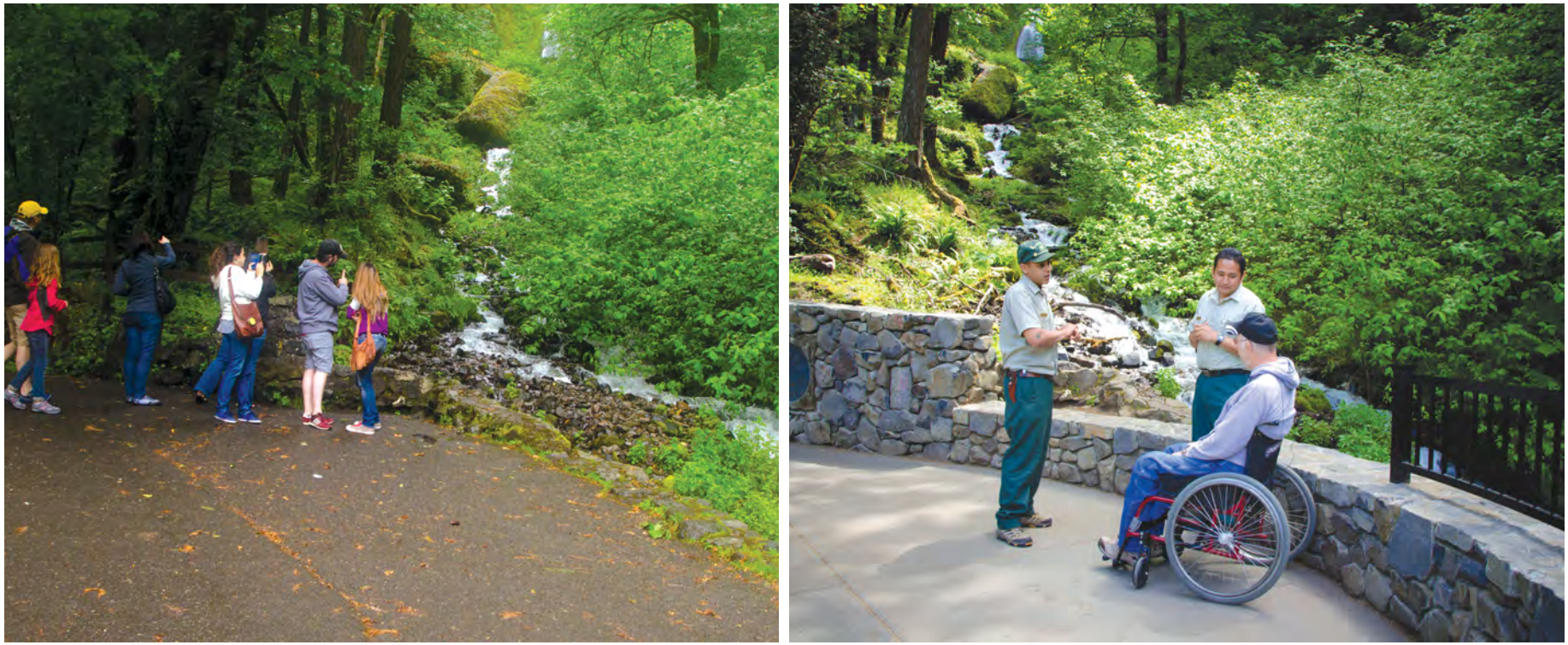


Figure 2–002—A recreation facility before redevelopment (left) and after (right).

RECREATION SITE PROJECT DESIGN: DEVELOPMENT & DELIVERY PROCESS

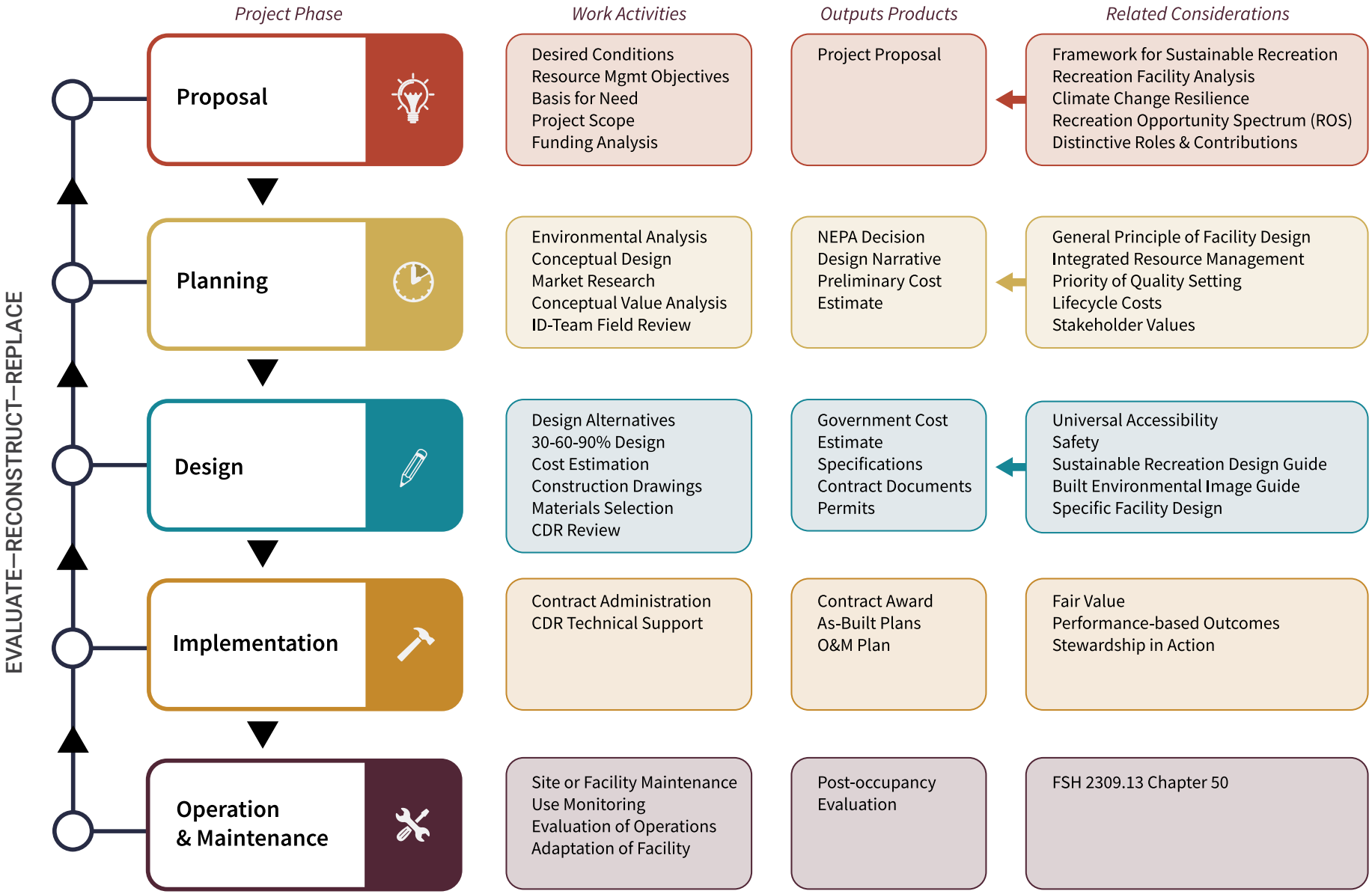


Figure 2–003—The project development process includes proposal development, planning, design, implementation, and operations and maintenance. Each project phase informs subsequent phases. This image is from Forest Service Handbook, 2309.13—Recreation Site Handbook, chapter 10, section 11.1.

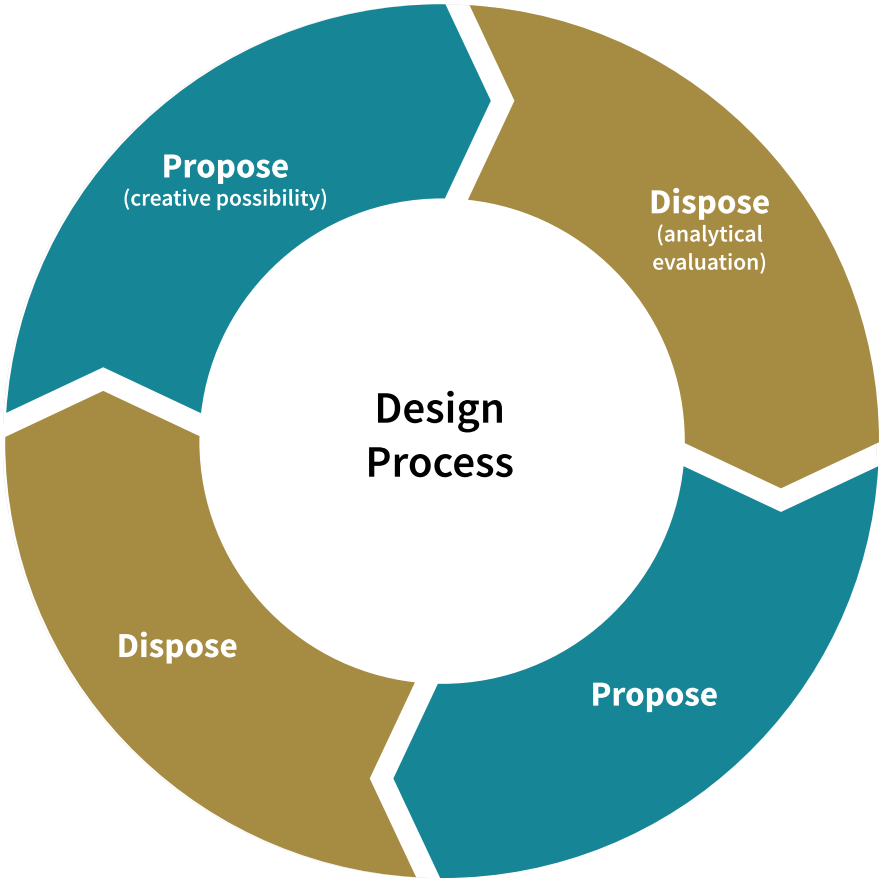


Figure 2–004—Design is an iterative process that alternates between creative idea generation and analytical evaluation and refinement. The concept for this diagram is from "The Alternating Current of Design Process" by John T. Lyle.

The people involved in the interdisciplinary project development effort may include the forest decision makers, landscape architects, architects, engineers, natural resource specialists and land planners, recreation specialists, and those who operate and maintain the site. These specialists contribute to the creative effort and design solutions found throughout the process. Ideas also come from people the agency serves—individuals, communities, local groups, and national interest groups who care about recreation on public lands. Involving a wide range of public representatives and agency staff in the planning and design processes contributes to a successful and sustainable project.

The following sections walk you through the four phases of project design development, including specific tips and strategies. This begins with a well-defined proposal that considers the identified need for the project and its managerial and financial sustainability. From this critical step, this section outlines the process for site planning, design, and implementation.

Phase 1—Proposal

Needs Assessment

All projects start with an identified need. Articulate the reason a project is a priority investment and describe the discrepancy between the existing condition and desired condition. Identify the scope and scale of the effort required to respond to the need. Identify criteria against which to measure success. This information will also form the foundation for the design narrative.

Tips for assessing project needs:

- Clearly articulate and document the need.
- Can non-Forest Service partners effectively address the need?
- Can you address the need at an existing site, or is the need addressed elsewhere? Are there alternatives to construction/reconstruction of a recreation site to meet the need?
- Determine if the need responds to future ecological, social, and economic trends.

Document financial implications:

- Identify potential strategies for project funding, such as the Capital Investment Program (CIP), appropriated funds, fee collections, and/or grants.
- Assess potential long-term maintenance funding, including financial reinvestment mechanisms such as fee receipts or special-use permit offset costs.
- Document financial capability assumptions for large projects and verify them with national forest and regional leadership. Develop a cost-benefit analysis to evaluate the viability of the project.
- Document whether a phased approach would work for the project.
- Identify and document the anticipated lifespan of the facility or site investment.
- Identify potential operating partnerships or project sponsorship opportunities.

Understanding the User in Program and Design Decisions

The project proposal and design should begin with an understanding of the needs of recreation site visitors for a site that facilitates quality experiences. These visitors may represent a variety of distinct user groups, such as families with children, long-distance backpackers, multigenerational families and groups, and the elderly.

Tips for being responsive to recreation site visitors:

- Listen to visitors. Discuss with them their motivations for coming to a site. Engage with current visitors, long-time site users, community members, and national recreation groups to understand values and expectations. Address use patterns throughout the year and investigate future recreation opportunities for the site.
- Engage employees, permittees, and volunteers to gain perspective on user values and needs.
- Communicate and partner with local Tribes.
- Refer to relevant user satisfaction levels and expectations from recent national visitor use monitoring (NVUM) survey results. Collect information on the anticipated types of uses, use patterns, and user demographics.
- Aim to reach a broad and diverse audience of engaged stakeholders and site visitors.
  - Engage national as well as State and regional visitor groups, youth organizations, schools, afterschool activity groups, universities, and high schools.
  - Use multilingual messaging and multicultural approaches and a variety of outreach efforts to engage the public, including members of under-represented populations.
  - Consult with existing collaborative groups used by the national forest for restoration and planning work and other partners—regional, State, and private forestry representatives, community groups, landowners, and State governments.
  - Consider the recreation site's context within the district, national forest, and available nearby State and regional recreation opportunities.
  - Give specific consideration to people's needs and preferences related to cultural heritage, income level, age, and ability.

Site Selection

Identify and consider characteristics of a potential site. If you have not determined a specific site, identify the landscape qualities that best match the identified need. Before developing a new site, consider whether an existing site modification can meet the identified need.

Tips for site selection:

- Visit the site with people representing a variety of perspectives to discuss and document opportunities and constraints.
  - Document initial spatial information on a topographic base map, at a scale no smaller than 1 inch equaling 100 feet. The base map should cover the site and the surrounding area's influences. Add an aerial photograph under the base map.
  - Determine any initial concerns, such as historic features that require preservation.
- If available, consult the forest's National Forest Recreation Survey (NFRS) documents. While old and often not subject to the same level of environmental review expected today, these records can be a good starting point in a site selection process.
- Identify which portion of the site best meets the needs of the project.

Qualities of an Ideal Recreation Site

- Minimizes the need for additional site work and infrastructure while meeting recreation program objectives
- Is associated with natural amenities or cultural features, such as lakes, streams, rivers, meadows, or historical recreational uses that offer quality recreation experiences
- Is accessible by existing or planned public or National Forest System roads or National Forest System trails, waterways, or airstrips
- Has adequate capacity and visitor demand for economical operation and maintenance
- Permits mitigation of known hazards or conditions
- Is resilient for proposed use and changing conditions—such as flooding, climate, vegetation—and offers flexibility for changing energy needs, visitor demographics, and economic outlook

Project Proposal

A project proposal describes the what, why, where, when, and how of a project. It clearly defines project needs and proposes how to meet those needs.

Tips for project proposals:

- Identify direction and guidance that influence the proposal, such as forest plan direction, a forest sustainable recreation strategy, regional and forest priorities, recreation opportunity spectrum (ROS) class, forest recreation site analysis (RSA), the Statewide Comprehensive Outdoor Recreation Plan (SCORP), and any local policy.
- Define and communicate the role of the project in meeting a forest's overall sustainability goals and objectives.

- Relate the scope of the project to managing the setting and providing for visitors.
- Document any specific amenities or site alteration required to address constraints and challenges.
- Define the site's proposed development scale (table 2–1).
- Establish the proposed site use capacity and planned level of site management. Design to meet the level of use on an average season weekend instead of peak use. Provide overflow facilities as necessary for site sustainability.
- Provide adequate amenities (parking, toilets, garbage collection) to meet design capacity, consistent with the area's ROS class and appropriate to site constraints and resources.
- Consider ways in which the project can positively influence desired visitor behavior.
- Refine the project proposal as new information and insights become known.

Phase 2—Planning

Site Inventory and Program Analysis

The scale, scope, and complexity of the project determine the information required to analyze environmental effects and inform design.

Use existing information as a base map to collect data about site characteristics. Existing base maps may include:

- 7.5-minute topographic quad maps
- Existing site plans or construction documents
- Geographic information system (GIS)-produced forest maps
- Aerial photographs
- Light detection and ranging (lidar) data
- Detailed topographic surveys

Collect relevant information regarding:

- Physical attributes, including:
  - **Geology**—landforms, seismic hazards, rock outcrops, depth to bedrock.
  - **Climate**—solar access, fog pockets, prevailing and seasonal winds, seasonal average temperatures.
  - **Hydrology**—surface drainage, water quality, depth to seasonal water table, seeps and springs, 100-year floodplain data.
  - **Topography**—elevation, slope, aspect.
  - **Soils**—bearing capacity, porosity, stability, erodibility, fertility, acidity (pH).
- Biological attributes, including:
  - **Wildlife**—especially protected species habitats.
  - **Vegetation**—plant communities, specimen trees, character trees, invasive species, protected habitats.
- Cultural attributes, including:
  - **Land use**—prior land use, land use on adjoining properties.
  - **Legal**—political boundaries, land ownership, land use regulations, easements, deed restrictions.
  - **Historic**—existing cultural/heritage characteristics and features, including buildings, landmarks, archaeological sites.

Table 2–1—Recreation site development scale, recreation opportunity spectrum (ROS), and facility characteristics

Development scale	Typical ROS consistency	Typical site and facility characteristics	Typical management emphasis
0	May occur in any ROS setting	• User-created dispersed-use. • No Forest Service investment or amenities.	User-created dispersed use
1	May occur in any ROS setting	• Primarily user-created dispersed-use area. • Informal vehicle routes and parking. • Minimal Forest Service investment, may include signage.	Resource protection
2	May occur in any ROS setting	• Defined vehicle circulation and parking with minimal Forest Service investment to accommodate user-created dispersed-use area. • Limited amenities may include signage, tables, fire rings. In rare instances, may include vault toilets.	Resource protection
3	Roaded natural	• Designed developed site with significant Forest Service investment and delineation. • Amenities may include signage, fire rings, tables, toilet, waste collection, drinking water. • Roads are surfaced; maintenance level 3 or 4.	Visitor comfort and resource protection
4	Roaded natural, rural, urban	• Designed, developed site with significant Forest Service investment and delineation. • Amenities include signage, interpretive materials, fire rings, grills, tables, waste collection, drinking water, flush toilets. • Roads, parking, and paths are surfaced and may be paved; maintenance level 4 or 5.	Visitor comfort and resource protection
5	Rural, urban	• Designed developed site with significant Forest Service investment and delineation. • Amenities typically include signage, interpretive displays, fire rings, grills, tables, waste collection, drinking water, flush toilets. May include utility hookups, showers, and laundry facilities. • Roads, parking, and pathways clearly delineated and often paved; maintenance level 4 or 5.	Visitor comfort and resource protection

Source: Forest Service Handbook, 2309.13—Recreation Site Handbook, chapter 10, section 10.8. Note: Dispersed site scales 0 to 2 can occur across all ROS settings; however, developed site scales 3 to 5 are limited to more developed ROS settings.

- Recreational attributes, including ROS setting, recreation use levels, activities, patterns, trends.
- Potential safety issues, including hazard trees, floodplains, avalanches.
- Existing constructed features, including overhead and underground utilities.
- Boundaries of natural shorelines, floodplains, wetlands, and other riparian areas.
- Scenic character description, key scenic attributes of project area (character trees, rock outcroppings, viewsheds), existing scenic integrity, desired scenic integrity, and ecological trends that could affect scenic character.
- Access routes to, from, and within the site.

Tips for designers:

- Define a larger area of analysis than the initial site to gather information about site influences.
- Identify relationships to other recreation facilities and opportunities.
- Use map layers to synthesize inventory information.

National Environmental Policy Act

NEPA requires Federal agencies to consider, disclose, and seek to minimize effects to environmental and social resources associated with project-level work. The law requires designers to consider effects from an interdisciplinary perspective and highlights the importance of "design arts" professionals within the process.

The project proposal drives the NEPA decision. The proposal must analyze effects associated with potential actions. Enough project-level design is needed to effectively consider and describe potential environmental impacts. Once made, a project-level NEPA decision informs design as the project moves forward from a proposed action to a set of plans for implementation. A NEPA decision establishes parameters (such as purpose, need, and analyzed environmental effects) to implement that decision through subsequent design development. The decision itself does not dictate a design.

The project area addressed in the analysis should be large enough to meet the purpose and need. A thorough and holistic analysis gives the decision maker and design team more room to find a sustainable outcome.

Tips for environmental analysis:

- Articulate an integrated purpose and need statement that addresses ecological, social, and economic aspects of sustainability.
- Avoid advocacy for a position; focus on the objective description of effects.

Design Narrative

Early in the design process and in preparation for developing the design narrative, the designer and program manager should discuss and document the management objectives, design criteria, and limiting factors for each proposed developed recreation site. Preparing a design narrative is typically a post-NEPA effort. The narrative describes how any conditions identified in a NEPA decision will be met. The level of effort focused on preparing a design narrative should relate to the level of complexity and controversy

associated with the project. Use detailed physical and social surveys, if available, in crafting the design narrative. The approved design narrative should produce attractive, sustainable facilities that highlight special features of the site and its sense of place.

A well-written design narrative helps establish a common understanding about the project and serves to guide the design team in project development. At a minimum, the design narrative for a developed recreation site must address the project's responsiveness to the following factors, as outlined in FSH 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities, section 11.12c, <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13>:

1. Existing forest plan direction relevant to the site, including context and sideboards.
2. Site location, including a site map.
3. Management objectives, relevance to recreation niche, and criteria for the site.
4. Existing physical conditions, social trends, and use patterns.
5. Minimization of impacts on soils, vegetation, wildlife, cultural resources, and natural resources.
6. Minimization of potential hazards to public safety, to the extent practicable.
7. Past, present, and proposed recreation opportunities and other uses.
8. Actions outlined in the program of work in the applicable recreation facility analysis or an equivalent document.
9. Market analysis and demographics for the user base, including references to SCORP and Tribal use.
10. Development scale, applicable ROS setting, current and proposed persons at one time (PAOT) to be served by the site, and operational and maintenance requirements. Consider the lowest facility development scale to meet program needs. Document a rationale for maintaining or altering the development scale of an existing site.
11. Desired water, sanitation facilities, site furnishings, and other constructed features or amenities.
12. Design criteria and the architectural theme for the site. Identify specific values, functions, and characteristics of the site that contribute to the local sense of place. Define characteristics of the setting and amenities that contribute to a high-quality experience.
13. Preliminary implementation and life-cycle cost estimates and possible facility reinvestment mechanisms (e.g., fees, Federal Energy Regulatory Commission (FERC), or Granger-Thye offset).

The design narrative also serves a role beyond the design of the project. For example, by updating information on materials used, it becomes a useful resource for information such as stone sources or the type and color of paint used at the site. It also helps ensure continuity of the design intent throughout the planning, design, and construction process and can serve as a touchstone for monitoring adherence as the project progresses. "Appendix B: Design Narrative Template" and "Appendix C: Recreation Design Narrative" provide examples of design narratives used in various regions of the Forest Service.

Technical and Engineering Report

A technical engineering report for each project, prepared in accordance with relevant direction, pairs with the design narrative to help the design team refine the design and examine design alternatives.

Evaluate any existing infrastructure and consider updating or removing underused facilities to promote conservation and to reduce long-term costs and environmental effects. For example, consider replacing existing inefficient components such as single-paned windows, incandescent lighting, and manually operated lights. Evaluate potential energy sources, considering efficiency, greenhouse gas emissions, and other environmental costs in calculations. Identify the stormwater design event (e.g., a 95th-percentile storm event) and associated considerations that influence design.

Phase 3—Design

National forest recreation site design aims to enhance and protect the sense of place and natural features of a site while facilitating public use and enjoyment of that site. A location's natural characteristics (the natural spaces and features) and cultural characteristics (the vernacular form, style, and meaning of the site and setting to people) provide the basis for the design (figure 2–005).

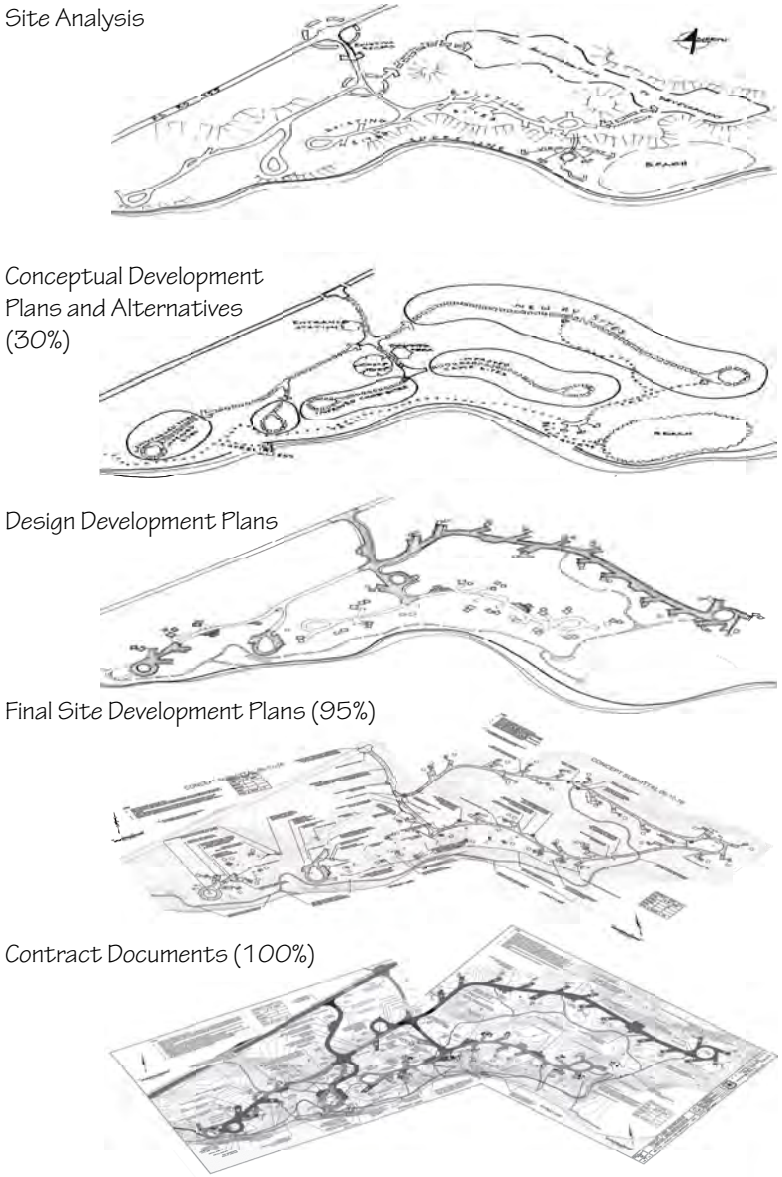


Figure 2–005—Site design occurs through a series of steps, including site analysis, concept development, schematic design, preliminary site design, and final site design. Individual plans displayed here are shown at a larger scale on pages 34, 36, and 37. These illustrations are from plans created for the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

Site planning and design, at all scales, requires an interdisciplinary team effort that includes the support of the forest management team and technical assistance from designers, planners, and other resource specialists. The staff who operate and maintain the site also provide valuable knowledge and perspectives. The creative process and design solutions benefit from the contributions of all specialists (figure 2–006).

Site Analysis

A site analysis provides an understanding of a site in its entirety, informing project design and shaping sustainable design choices. It differs from the site inventory in that it draws conclusions about the site's attributes and problem areas, relationships of various site elements, and how the proposed project and use could fit the site (figure 2–007). The site analysis synthesizes observations about the site and differs from the environmental analysis in the context of NEPA.

Figure 2–006—Sustainable recreation site design requires interdisciplinary engagement and creative integration of ideas.

Figure 2–007—Sustainable recreation site design complements the local setting.

The site analysis serves as the basis for developing the concept plan. Use a topographic map at a scale no smaller than 1 inch equaling 100 feet that includes site boundaries and surrounding areas that may influence site uses or design. Adding a referenced aerial photo beneath the topo map can help with identifying features and concerns.

Tips for site analysis:

- Note topographic features on the site and adjacent land. Assess site topography and identify slope areas that are:
  - Less than 3 percent
  - 3 to 8 percent
  - 9 to 15 percent
  - More than 15 percent
- Identify key vegetation features and any needed buffers that may protect them.
- Note natural character areas such as meadows, grasslands, groves of trees, rock outcrops, shore or beach areas, key views to retain or enhance, and areas likely to become visitor destinations.
- Determine primary drainage patterns, how drainage crosses the site from adjacent land, any existing drainage or erosion problems, and note areas to avoid. Identify floodplains, wetlands, other water features, and any buffers needed to protect them. Identify any pollutants that may impact the site in a rain event.
- Describe weather conditions, precipitation timing and intensity, prevailing wind directions, frost depths where applicable, and other characteristics that may influence design.
- Recognize cultural/historic features such as barns and associated yards, Civilian Conservation Corps (CCC)-era structures, historic fencing, and walls. Note how the project might enhance long-term preservation of heritage values.
- Identify built structures and infrastructure such as restrooms, picnic shelters, trails, roads, etc., and any design considerations related to them.
- Note any areas or locations that might be particularly appealing or suited for proposed project features.
- Determine existing circulation patterns of pedestrians, vehicles, and any known wildlife corridors or habitat areas. Note entry and exit points and how each circulation pattern crosses the site. Note adjacent site use and patterns and how they influence site conditions and design choices.
- Identify areas of degradation that could benefit from restoration or enhancement.
- Document site features and conditions. Take many photographs of the "character areas," positive attributes, and any problem spots.

Tips for designers:

- Walk the site with a map or site plan and record what you observe. The site analysis often provides inspiration for the design (figure 2–008).
- Consider how various aspects of the site interrelate, the characteristics of different areas within the site, how parts of the site might or might not fit with the proposed use of the site, and how adjacent land and land use affects the site.
- Engage multiple perspectives and perform numerous on-the-ground visits to observe the site under various conditions.

Site Analysis

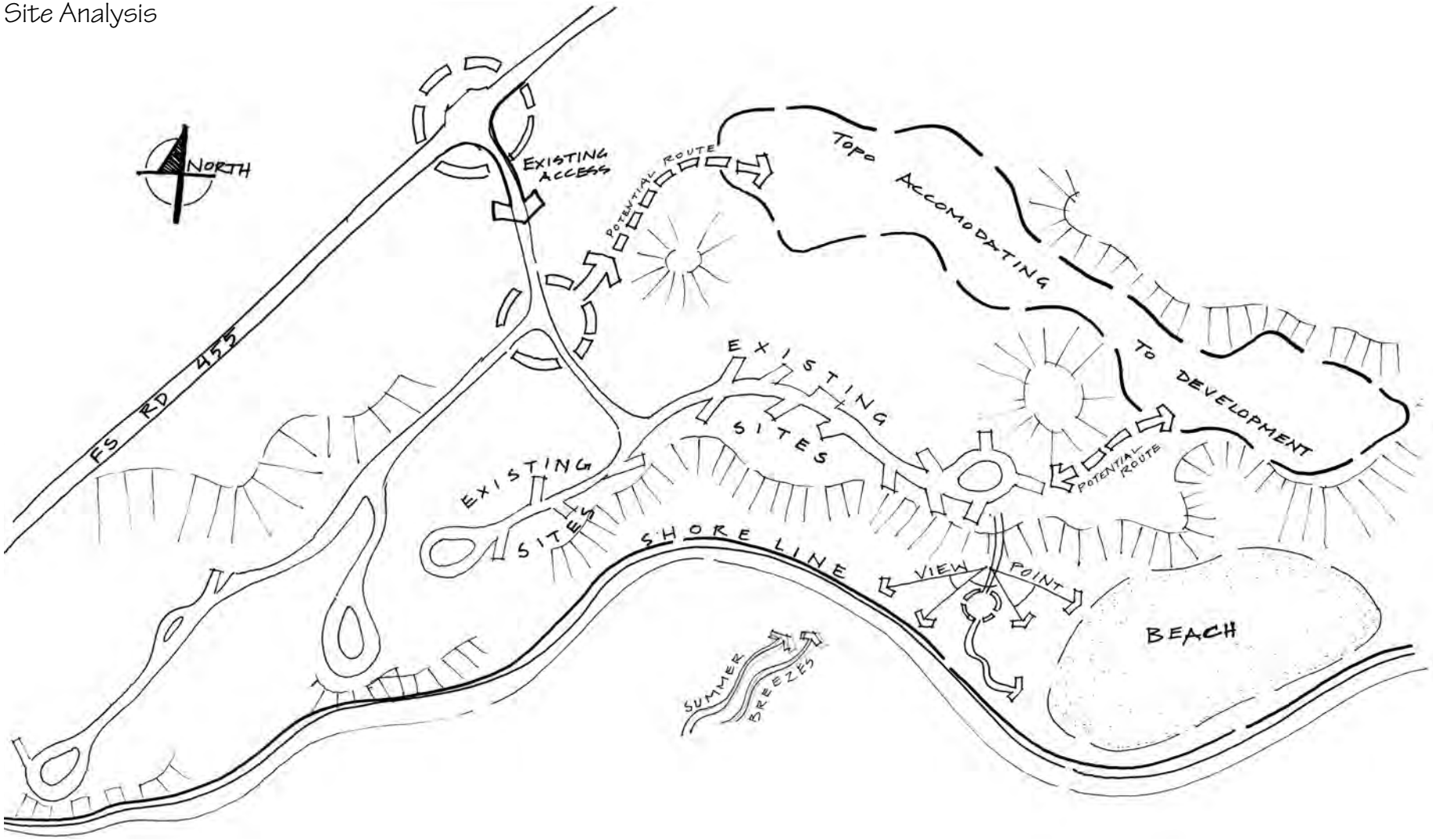


Figure 2–008—The site analysis captures important features and key characteristics in the field, usually with notes, arrows, and points or descriptions of locations on a plan or map. It becomes a reference for site design. This illustration is from plans created for the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

- Incorporate the observations and input of diverse stakeholders, as well as those of the interdisciplinary team and design teams, to better understand site function and needs. Where possible, review and refine the site analysis while onsite.

Conceptual Development Plans and Alternatives (30-Percent Design)

Conceptual design adapts the project program to the unique features of the location. It begins to define the overall layout and configuration of the site and arranges the components of the proposal within the site.

Design Charrettes

In a **design charrette** team members use a short, collaborative meeting to quickly collaborate and sketch designs to explore and share a variety of diverse design ideas (figure 2–009).

Figure 2–009—Design charrettes can engage diverse stakeholders in rapid generation of design ideas.

Concept Plan

A concept plan often begins by showing use areas and their relationships (a "bubble diagram") based on the conclusions of the site analysis, so that areas defined in the draft echo the boundaries of various natural elements of the site. The concept plan loosely shows the circulation patterns through the site. Generating multiple configurations or alternative diagrammatic plans of site elements from the design narrative allows the team to evaluate alternative diagrams to find those that best meet objectives. Conceptual site design should explore ways to reduce overall paving, the built area, and developed footprint of the site (figure 2–010).

Schematic Plan

The schematic plan—a fully drawn concept plan—takes the best configurations from one or several concept alternatives and defines proposed locations of site features, including existing circulation and adjustments to it (figure 2–011). The plan shows the basic layout, forms, spaces, and arrangement for the site. As design development continues, the plan provides the basis for the final site plan and serves as the reference for design decisions. Using layers of information and ideas about the site, the site analysis—with concept plan—allows the team to refine a schematic design to best fit the site.

Conceptual Development
Plans and Alternatives (30%)

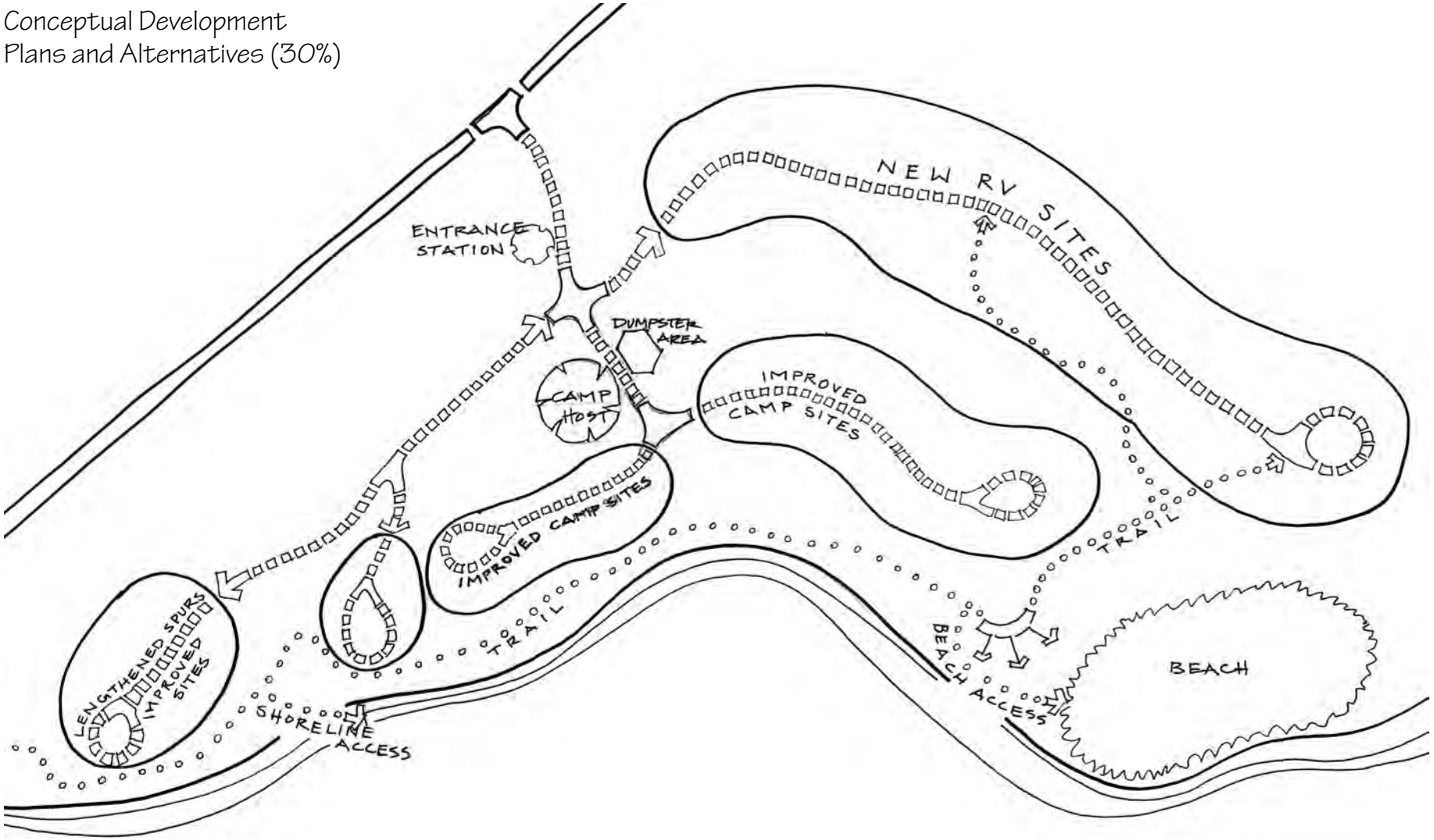


Figure 2–010—This site diagram shows the relative scale and relationships of site development areas. A concept plan illustrates a central theme or a combination of central themes or objectives for the site. For example, a concept for a site with a beach might be, “Highlight beach access and campsite loops.” This illustration is from plans created for the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

Design Development Plans

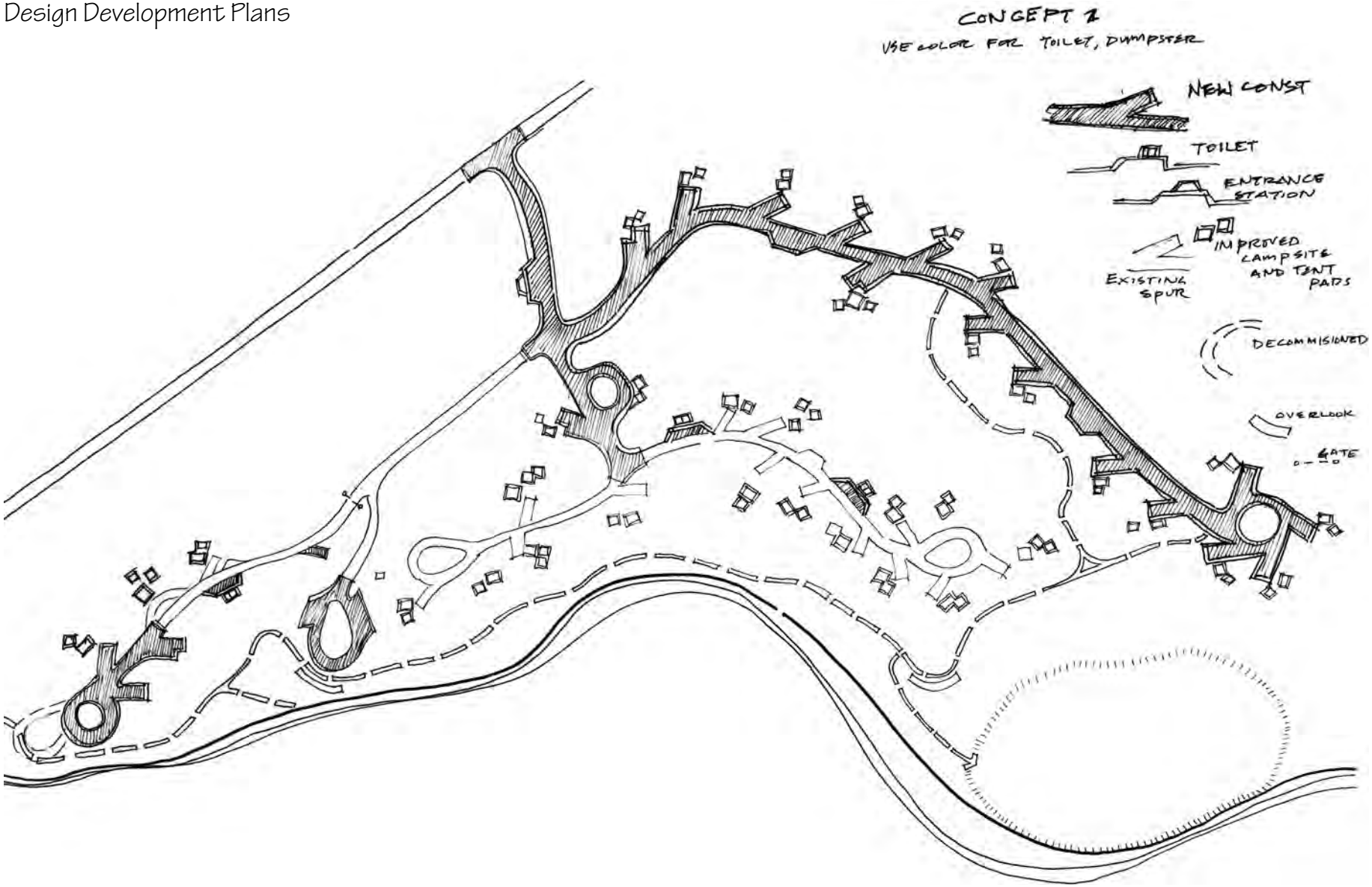


Figure 2–011—An example of schematic site plans and exploration of alternative site configurations. This illustration is from plans created for the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

A schematic plan should include a north arrow, scale, and date, and should indicate general locations and sizes of:

- Buildings and infrastructure
- Parking areas
- Planting or restoration areas
- Use areas and other amenities
- Valued natural features
- Vehicular and pedestrian circulation patterns

Review the design narrative to ensure it meets the project's goals and design approaches. The concept and schematic plans may bring deficiencies in the project to light. This examination helps with program revisions that address the identified constraints.

Topographic Surveys

A professional land surveyor, qualified landscape architect, or engineer should produce a topographic survey and base map with all site information needed to prepare a site plan. In some areas, light detection and ranging (lidar) may provide the information. At minimum, this includes:

- Baseline, elevation, and survey control points
- Ownership and jurisdictional boundaries
- Elevation contours at 1-foot intervals
- Location and elevation of existing constructed features, including overhead and underground utilities
- North arrow, scale, date, and identifying information
- Digital file location information

Tips for designers:

- Plan a spatial pattern that relates to the location's natural and cultural features. Emphasize and highlight natural features, including rock outcrops, meadows, waterfalls, rivers, groves of trees, and views (figure 2–012).
- Design the visitor's sequence of experiences through the site, including arrival, orientation, destination, views, and amenity use.
- Use site-based asymmetry in layout to reference patterns in a natural setting; avoid symmetrical and geometric forms that evoke urban settings. Paths and access routes should respond to the site, taking advantage of natural slope and contour, rock outcrops, and vegetation.
- Minimize parking, road areas, and built facilities while meeting program needs. Locate features and facilities to minimize impacts to the setting and visitor experience.
- Confirm that the schematic design complies with relevant NEPA decisions and the design narrative.

Before the design process proceeds to the preliminary site development phase, the design team should refine a rough estimate of construction cost. Based on this estimate, they may need to adjust the project scale, explore alternative design approaches, or revise the plan to develop the project in stages.

Figure 2–012—Example of site and building design integrated within the landscape. These illustrations are from design plans made for the Maroon Bells Scenic Area, White River National Forest.

Preliminary Site Development Plans (50-Percent Design)

The preliminary site development plan includes the basic components that will eventually comprise the construction documents (figure 2–013). At this stage of design:

- Complete the basic road layout
- Identify any utility layout
- Provide drafts of all details
- Select site furnishings
- Refine the construction cost estimate
- Draft specifications for the construction package

Current requirements specify that projects estimated to cost more than $5 million must undergo a value assessment (VA) (Office of Management and Budget Circular A-131). Verify this requirement when developing and updating project schedules. The VA aims to reduce program and acquisition costs, improve performance, enhance quality, and foster the use of innovation. A team with a broad range of expertise in technical areas and trained in VA techniques reviews the project at this stage and may recommend changes.

The preliminary site development phase requires detailed, accurate, fine-scaled topographic site survey data:

- Review preliminary site development plans onsite, if possible, for refinements. The more detailed survey data may improve your understanding of potential site impacts and design opportunities. Further adjust the design to fit the site more closely and to include specific design measures that enhance site values and reduce impacts.

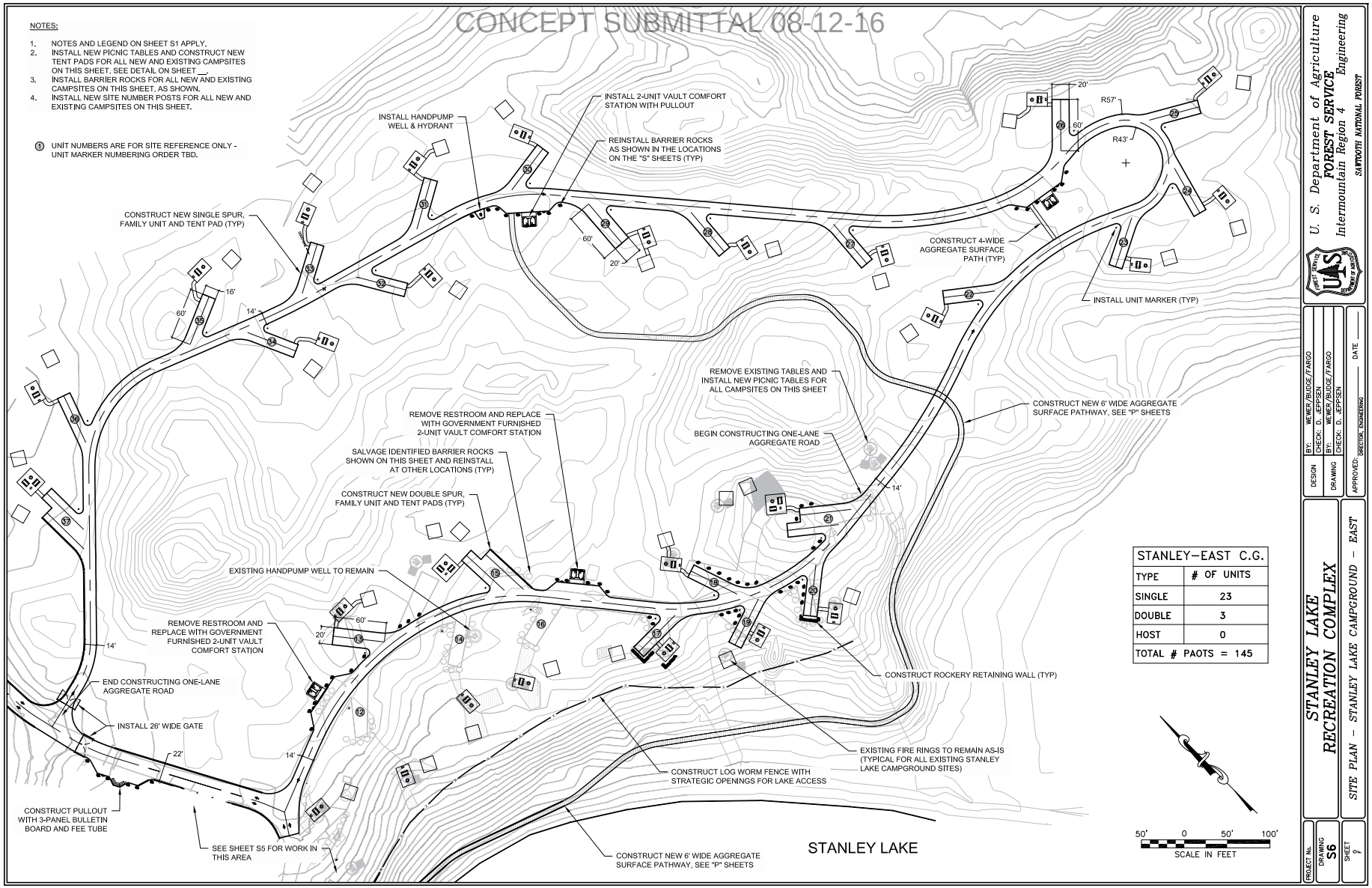


Figure 2–013—The preliminary site development plan shows most of the proposed development, but without complete details such as final grading. Adjustments to the design may still occur following review and discussion. This figure is from plans created for the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

- Alter existing sites or built features to bring those altered sites or features into compliance with accessibility standards.
- Engage the contracting officer's representative (COR) early to incorporate their expertise in the design process and inform them of project goals and rationale as part of the design development.

Contracting Architectural-Engineering Design Services

If agency staff does not have the capacity to carry a design to a final product, they may contract architectural-engineering (A-E) design services. Forests should always work closely with contracting staff when deciding to pursue A-E design services from an outside vendor. Contracted design does not remove all design responsibilities from the Forest Service; the planning and design process requires substantial involvement from agency personnel to accomplish successful and sustainable outcomes.

You can pursue a range of options for contracted A-E design services, depending on project scope, complexity, available agency skills, and budget. For example, you can complete the preliminary site design in-house and contract out the final design, construction details, and specifications. This gives the agency time to develop the desired outcome of the project while giving the contracted firm a clearer picture of its scope of work. In all A-E contracts, agency staff must develop a total construction cost estimate for the project, as this number guides the maximum allowable cost for design services for the project.

With all contracted design work, the agency project team must be involved and proactive in developing and managing the contract to achieve successful outcomes:

- Allocate adequate time and budget for design contract administration. Planning for design contracts should allow the Forest Service specialist to devote at least 10 to 20 percent of the total person/days allocated to the contractor for:
  - Developing a project statement of work and contract solicitation
  - Evaluating bids
  - Administering the contract
  - Reviewing and guiding the work
  - Gaining acceptance of the contracted design
- Meet commitments to the contractor on Government-provided information or material. Research and verify the availability of data and materials the contractor needs before including their provision in the design contract. This helps avoid delays, change orders, cost overruns, and compromises in the quality of the design deliverables.
- Allocate adequate time for Forest Service reviews and responses to the contractor. Consider potential requirements for multiple levels of review and potential travel needed for review.
- Review and adapt any standard specifications to the specific site and project; do not accept or include boilerplate or otherwise inadequate specifications. Require and verify consistency between the specifications and the plans and details. In contracting, specifications take precedence over drawings, so the specifications dictate the requirement if they conflict.

- Explicitly outline expectations for the contracted design work. Recognize the associated costs for contractors to meet expectations. For example, unless specified, design firms may not travel to the site to collect base information or field-verify provided information or conditions.

Depending on the experience of the contracted firm, achieving acceptable design results can take a great deal of communication and shared understanding. Beyond the basic principles of site planning, the many differences in Forest Service policies, design philosophies, development levels, remote locations, and users can be confusing when a design firm has little experience working on these types of projects. Use the SRSDG with contracted firms to help achieve sustainable recreation design outcomes.

Remember the adage, "If we don't know where we're trying to get to, we probably won't get there." Contracting design work can sometimes be seen as a solution to a project without a fully determined outcome. Recognize the risks associated with moving forward with contracted design work with an unclear scope of work or expectations for deliverables.

Site Restoration Plan

A site restoration plan identifies strategies and actions for restoring natural conditions to the site, where possible. The plan should include the entire recreation site, along with adjacent land needs, and draw from information identified during the site analysis. The plan also provides guidance for long-term care of the site.

Tips for designers:

- Walk through the site and visualize it without development. Experience the site with others representing a variety of resource stewardship specialties.
- During a site visit, define the following on a site plan or a copy of the topographic survey:
  - Existing areas to retain in a natural condition, as continuous as possible with surrounding areas. Retain as much of the site as possible in a natural condition.
  - Riparian areas to protect from impact. Define access points and use areas.
  - Areas in need of restoration to reestablish a more natural appearance and condition. Efforts could include revegetation to extend areas of native vegetation, reducing the amount of existing paving, or decompacting areas of impact. Locate temporary (site-appropriate) fencing as needed to protect plants during establishment.
  - Note any vegetation restoration needs on adjacent land.
  - Identify any needs to reestablish natural drainage patterns across the site.
  - Note and include measures to address observed pollution or potential pollution, including from road and parking lot stormwater runoff to surface water.
- Refer to "Guidance for Sustainable Practices for Designed Landscapes" <https://www.fedcenter.gov/Bookmarks/index.cfm?id=29189&pge_prg_id=0&pge_id=3605>.

Landscape and Vegetation Management Plan

For most national forest recreation sites, the goal of vegetation management is to retain and restore native vegetation and natural vegetation patterns continuous with the surrounding natural setting. The vegetation management plan establishes desired site vegetation characteristics within the developed recreation site and immediate surroundings and identifies planting and other vegetation work needed to restore and retain those characteristics.

Tips for developing a landscape and vegetation management plan:

- Identify desired vegetation.
  - Base the vegetation plan on the area's natural plant associations and boundaries.
  - Consult with a Forest Service botanist or silviculturist to develop a list of plants appropriate for the site.
  - Retain vegetation character areas—meadows, tree groves—identified on the site.
  - Identify plants or plant associations that contribute to cultural landscape values.
  - Identify individual "character trees" that contribute to the site's sense of place (figure 2–014).

Figure 2–014—Example of preserving valued vegetation in a developed recreation site.

- Identify vegetation management needs.
  - Evaluate the health of the existing vegetative cover and determine whether existing vegetation is appropriate and sustainable by onsite water regimes and conditions.
  - Identify potential impacts to vegetation from facility use and ways to protect and enhance desired vegetation.
  - Identify actions needed to sustain each plant association area.
  - Identify locations and the need for invasive plant removal and management.
- Evaluate how wildlife interacts with site vegetation and identify treatments to create fire resiliency/defensible space.
  - Identify vegetation that provides critical habitat for protected species, pollinators, birds, and insects. Identify any buffers required to protect these areas.
- Identify resolutions to any vegetation-related safety issues.
  - Evaluate tree hazards and mitigation actions.
- Identify necessary regeneration to sustain desired vegetation into the future.
- Identify vegetation-related actions to enhance visitor experience.
  - Identify trees to remove to maintain or enhance key viewpoints.
  - Consider using plants as screening between contiguous sites or providing shade for visitors and facilities. Work with a botanist to identify appropriate trees for shade when no shade trees naturally occur at the site.
  - Consider that it may take 2 or 3 years of supplemental water to establish the plants.

Tips for designers:

- Consider anticipated changes in climate, such as increasing temperatures and changes in precipitation, when selecting revegetation species.
- Select plant species or seed stock collected from nearby sites or those with similar conditions.
- Place temporary barriers around planted or seeded areas if needed to ensure revegetation success.
- Include contract clauses and specifications in development plans to minimize disturbance within the root zone of trees and to protect desired existing vegetation.

Performance-Based versus Prescriptive Specification

Performance-based specification outlines the functional requirements of a component or installation. It spells out for the contractor what the final installed product must be capable of doing and other performance requirements. The contractor has flexibility in how to meet the specification. This places the focus on the project outcome and offers greater latitude to the contractor to accomplish the project.

Prescriptive specification contains detailed descriptions of the specific materials for the project and the installation instructions. It provides greater design control over the project but can reduce contractor innovation and potentially lead to higher costs.

Final Site Development Plans (95-Percent Design)

The final site development plans should show all proposed facilities and improvements and address all review comments from evaluation of the preliminary site development plans. Final site development plans should have the following set of components:

- **Existing conditions**—Identify the preconstruction site conditions, such as the topographic and site survey, at the same scale as the proposed site plan.
- **Demolition and construction staging plan**—Identify contractor access points, storage areas for equipment and materials, and any features of the site that may be removed as part of the project.
- **Resource protection and erosion control plan**—Identify specific measures the contractor must take to protect resources and valued features during project implementation. Describe resource protection measures in either prescriptive or performance-based specifications.
- **Site plan**—Illustrate the type and placement of all facilities and improvements, including layout details. Label all facilities or use a key with plan set sheet numbers.
- **Construction layout plan**—Ensure that the layout plan provides placement information for all improvements on the site. Illustrate the road layout and major proposed facilities and structures. Include centerline geometry and typical cross sections, if necessary, to illustrate how the road, major facilities, and structures fit the site.
- **Grading plan**—Ensure that proposed grading plans include all contour changes necessary for grading and drainage of the site. Include spot elevations at key locations and in instances where contour changes may not be clear. Also include typical sections in extensively developed areas. Use arrows showing the direction of surface water flow. Indicate desired grading profiles, grading (cut/fill) quantities, and any required import or export of material. Show detailed final grading plans with spot elevations accurate to within an inch at the following locations:
  - Building entrances
  - Top and bottom of each flight of steps
  - Corners of paved areas and buildings
  - Low points and high points
  - Tops and inverts of drainage structures
  - Tops of walls
  - All other significant points
- **Planting plan**—Show, when applicable, the type, number, and placement of all plant materials to be installed. Typical installation details or specifications include prescriptions for soil preparation, watering, and mulching, as necessary. Plans can also show temporary or permanent irrigation.
- **Sign plan**—Show the location of all regulatory, directional, and informative signs used in the project and construction details for installation.

- **Utility plan(s)**—Provide detailed location, materials, and installation specifications for water, sewer, and electrical systems. Water and sewage system design must show the plan and profile of the pipes, along with the location of valves and hydrants, and clearly indicate the complete facility. For additional information, see FSH 7409.11—Sanitary Engineering and Public Health Handbook, Chapter 10—Planning <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?7409.11>.
- **Architectural plans**—Provide complete details for buildings and other structures, including structural engineering, mechanical, electrical, plumbing, and other components.
- **Details**—Provide individual detailed illustrations of key project components, including all amenities. Identify details shown on other plans and clearly reference where to find the details (figure 2–015).

Forest Service Facility Drawing Library

The online National Recreation Facilities Drawing Library <http://fsweb.sdtdc.wo.fs.fed.us/programs/rec/recdrawing/landscape_elements.html> offers many examples and site details for Forest Service staff. This link is only available within the Forest Service network.

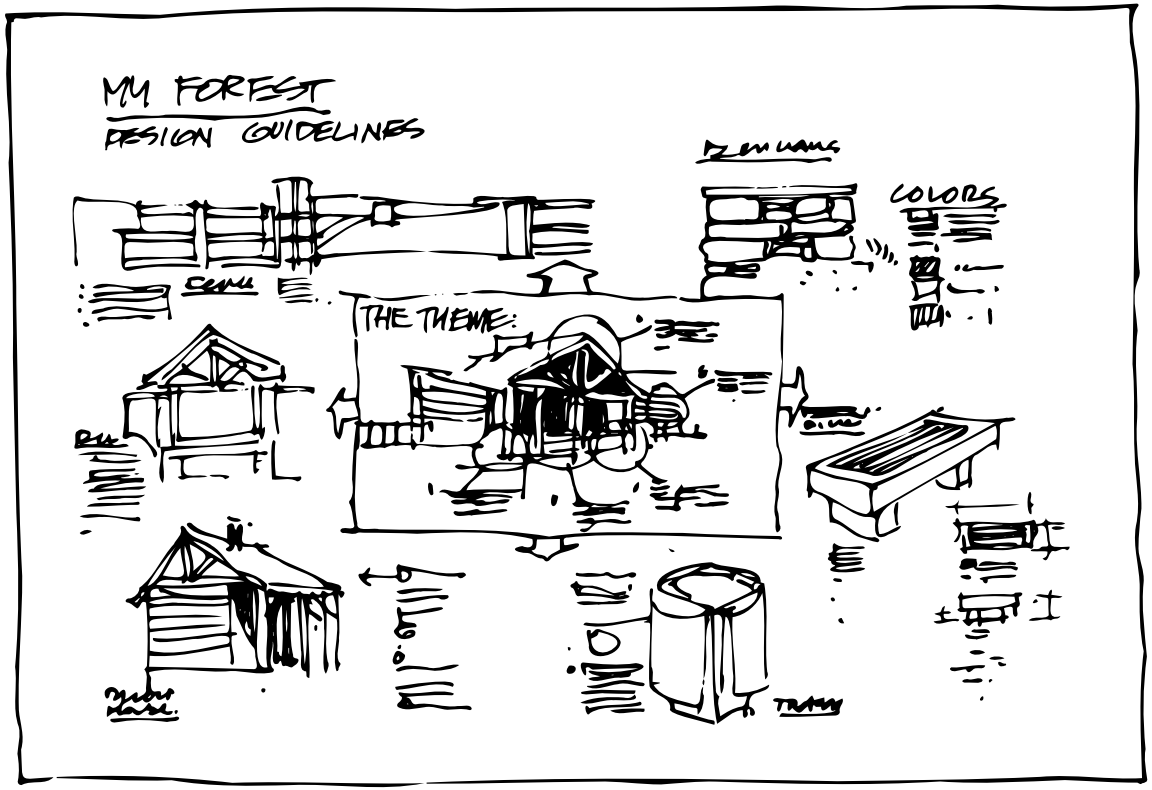


Figure 2–015—Sustainable recreation site design should implement a coherent design theme across many aspects of the development to reinforce scenic character and site identity. This illustration is from "The Built Environment Image Guide for the National Forests and Grasslands."

Tips for improving the quality of final development plans:

- Provide only enough detail to ensure expected end results. Too much detail can add unnecessary complexity to the contract package and may increase costs.
- Use conventional structural systems and standard sizes, finishes, and angles wherever possible.

- Provide clear drafting and lettering to ensure proper interpretation for both the contractor's bid proposal and the intended implementation results. Often, full-size construction drawings are printed at 50-percent scale for contractor use during the project; drafting and lettering should be clear at this reduced scale (figure 2–016).
- Develop drawings at scale. Site plans should not exceed 50 feet per inch and architectural drawings are typically scaled at ¼ inch per foot.
- Establish a local office file of design details for future use and reference. Maintain evaluation data on the relative success of these details and update them as appropriate for future use. Share copies and evaluations with other forest and regional office personnel.
- Carefully coordinate construction details with the specifications. Conflicts between details and specifications can cause loss of time and increase contractor pricing.
- Review and adjust the details and designs for site-specific needs and expectations. Washington Office Engineering and several agency design teams maintain libraries of existing facility designs and specifications.
- Review final site development plans onsite for corrections, additions, or subtractions.
- Document final approval of plans by the responsible official based on the protocols of your region. Include the COR in final reviews if they are not part of the design team because that individual has the responsibility of working with the contractor to oversee implementation of the project design.

Estimating Costs

Estimating construction costs presents challenges. Bid prices on individual items vary for numerous reasons. Try to keep up to date by coordinating cost estimations with adjacent forests and other agency personnel. When preparing a cost estimate, be aware of factors that influence bid prices:

- Construction systems or methods.
- Clarity of drawings and specifications. The contractor may increase pricing to allow for potential financial risk in the face of uncertainty about the work. Or, lack of clarity can lead to costly changes after contract award.
- The mix of required worker skills.
- Availability and cost of temporary housing for out-of-town workers.
- Size and complexity of the total contract.
- Remoteness of the site, including material hauling distances and limited vehicle access. This includes proximity to material sources such as concrete mixing or hot-mix asphalt suppliers and aggregate borrow sources.
- Requirements for public access to parts of the site during the contract period.
- Time of year designated for work, which is often related to site conditions or use.
- Month of contract award and working days allowed for completion.
- Number and workload of potential contractors and degree of publicity on advertisement for bids.
- Rigidity of damage clauses within the contract.

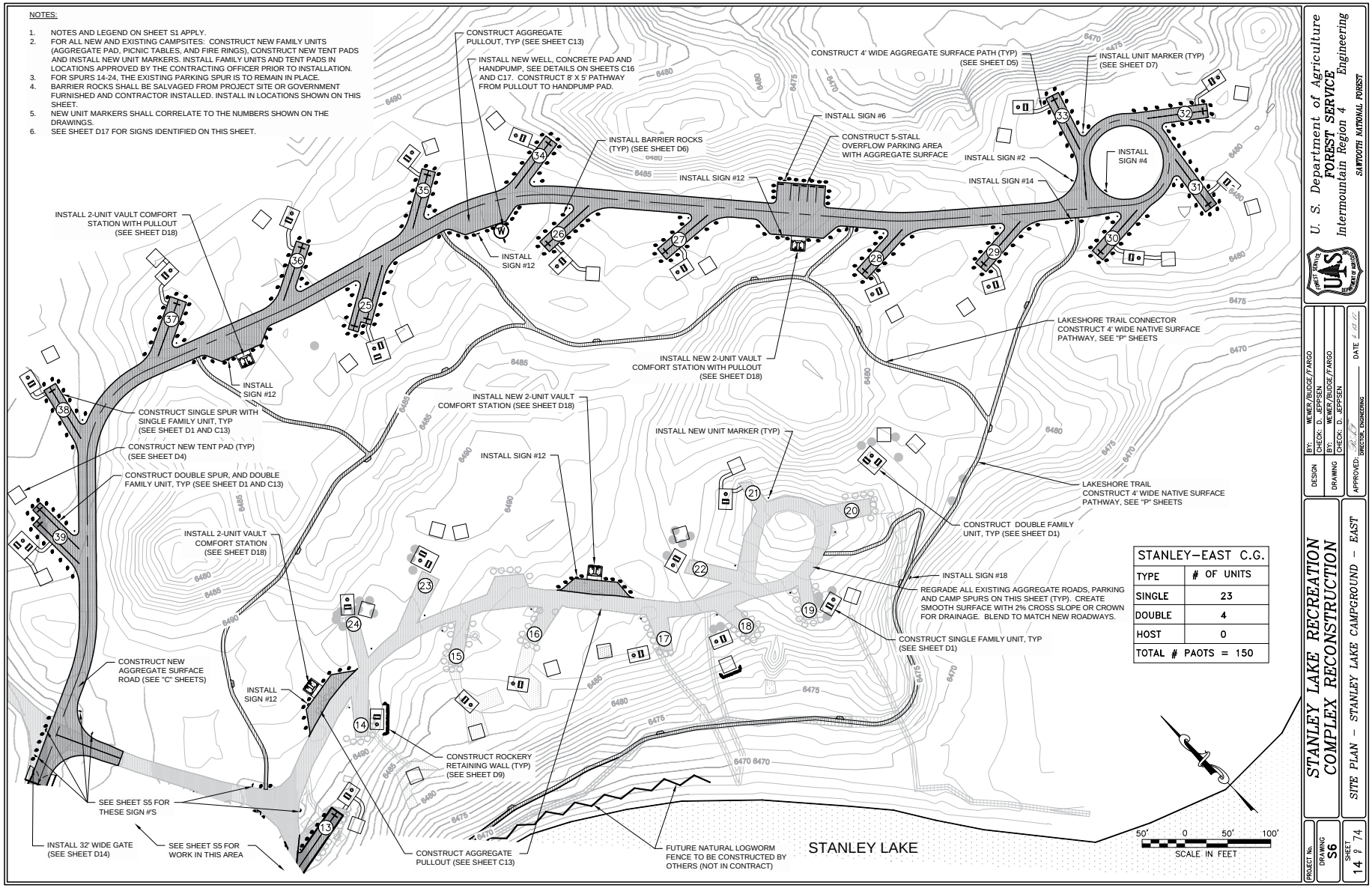


Figure 2–016—Example of a final site development plan showing all detail needed to construct the project. This figure is from plans created for the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

Contract Documents (100-Percent Design)

The specifications and drawings communicate the design and expectations to those responsible for implementation, whether a contractor or Forest Service staff (such as a road crew). Construction drawings show the work to complete and the site limits. The specifications detail required materials and workmanship for something to build or install (figure 2–017). The documents complement each other and provide the substance for the contract. Any design elements important to the project and sustainability of the site that are not included in these documents will not be covered in the contract.

Drawings and specifications constitute legal, binding documents that are part of the contract when completed. After contract award, any changes require a contract action through modification by the contracting officer (CO); only that individual has the authority to obligate the Government. The construction drawings, specifications, and/or statement of work also indicate when the COR or CO must approve submittals and the latitude afforded the contractor for submitting substitutions.

Federal Acquisition Regulation (FAR) clauses give precedence to specifications over drawings if there is a conflict or discrepancy. Forest Service Manual (FSM) 7300 and FSH 2309 provide direction on the process and content of drawings and specifications. Review this direction when preparing contract packages.

The plans, elevations, details, and sections, together with the written specifications and contract forms, comprise the contract documents.

48 Code of Federal Regulations 52.236-21(a)

Specifications and Drawings for Construction. "Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern…"

Specifications

The Forest Service frequently uses two specification formats. The most common follows the Construction Specifications Institute (CSI) format. The other format, particularly for road and civil works projects, follows the "Standard Specifications for the Construction of Roads and Bridges on Federal Highway Projects" (FP-14). If the specification package uses both formats, ensure it clearly defines to which parts of the project each format applies.

Schedule of items

The schedule of items lists all items included in the contract. The contractor uses it to submit a bid and, later, to invoice for progress payments.

Cost estimates

Create the Government's estimate of probable construction cost. Use it to determine if the design falls within the funding available and to guide the CO in determining if bids are reasonable. The estimate influences which solicitation and contract mechanism the CO employs for the project. Because cost estimates constitute sensitive information, do not share them with contractors.

STANLEY LAKE RECREATION COMPLEX RECONSTRUCTION

SAWTOOTH NATIONAL FOREST — SAWTOOTH NATIONAL RECREATION AREA, ID

LIST OF DRAWINGS

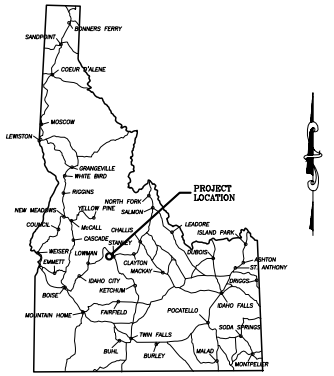
SHT.	DWG.	SHEET TITLE
		GENERAL
1	G1	COVER SHEET
2	G2	VICINITY MAP, PROJECT DESCRIPTION AND PROJECT LOCATION
3	G3	SCHEDULE OF ITEMS
		EXISTING CONDITIONS AND DEMOLITION PLAN
4	DE1	EXISTING CONDITIONS AND DEMOLITION PLAN – OVERVIEW
5	DE2	EXISTING CONDITIONS AND DEMOLITION PLAN – EXISTING BEACH AREA
6	DE3	EXISTING CONDITIONS AND DEMOLITION PLAN – STANLEY LAKE INLET CAMPGROUND AND TRAILHEAD
7	DE4	EXISTING CONDITIONS AND DEMOLITION PLAN – LAKEVIEW AND STANLEY LAKE (WEST) CAMPGROUNDS
8	DE5	EXISTING CONDITIONS AND DEMOLITION PLAN – STANLEY LAKE (EAST) CAMPGROUND
		SITE PLAN
9	S1	SITE PLAN – OVERVIEW
10	S2	SITE PLAN – EXISTING BEACH AREA
11	S3	SITE PLAN – DAY USE AREA
12	S4	SITE PLAN – TRAIL CONNECTION
13	S5	SITE PLAN – STANLEY LAKE CAMPGROUND – WEST
14	S6	SITE PLAN – STANLEY LAKE CAMPGROUND – EAST
		DETAILS
15	D1	FAMILY UNIT AGGREGATE PAD LAYOUTS
16	D2	WOOD PLANK PICNIC TABLE (EMBEDDED POST)
17	D3	METAL FIRE RING DETAIL
18	D4	TENT PAD AND TREATED TIMBER RAILING DETAILS
19	D5	PATH AND PATH PULLOUT DETAILS
20	D6	BARRIER ROCKS, WHEEL STOPS AND CROSSWALK DETAILS
21	D7	FEE TUBE AND UNIT MARKER DETAILS
22	D8	RECYCLING RECEPTACLE AND DUMPSTER PAD DETAILS
23	D9	ROCKERY RETAINING WALLS
24	D10	1 PANEL BULLETIN BOARD – SHEET A
25	D11	1 PANEL BULLETIN BOARD – SHEET B AND TURNPIKE DETAIL
26	D12	3 PANEL BULLETIN BOARD – SHEET A
27	D13	3 PANEL BULLETIN BOARD – SHEET B
28	D14	32' GATE FABRICATION DETAILS
29	D15	32' GATE INSTALLATION DETAILS
30	D16	MINOR SITE IDENTIFICATION SIGN DETAILS

LIST OF DRAWINGS

SHT.	DWG.	SHEET TITLE
31	D17	SIGN LIST AND INSTALLATION DETAILS
32	D18	COMFORT STATION INSTALLATION – VAULT TOILET
33	D19	HOST UNIT UTILITY LAYOUT
34	D20	HOST UNIT PROPANE TANK
35	D21	HOST SEWAGE HOLDING TANK
		CIVIL
36	C1	ROADS OVERVIEW
37	C2	ROADS PLAN AND PROFILE – TRAILHEAD
38	C3	ROADS PLAN AND PROFILE – DAY USE ENTRANCE AND BOAT RAMP
39	C4	ROADS PLAN AND PROFILE – DAY USE AREA AND BOAT RAMP
40	C5	ROADS PLAN AND PROFILE – OLD LAKEVIEW CAMPGROUND
41	C6	ROADS PLAN AND PROFILE – CAMPGROUND ENTRANCE ROAD
42	C7	ROADS PLAN AND PROFILE – DUMPSTER STATION LOOP
43	C8	ROADS PLAN AND PROFILE – NEW CAMPGROUND STA. 0+00 TO 7+00
44	C9	ROADS PLAN AND PROFILE – NEW CAMPGROUND STA. 7+00 TO 14+00
45	C10	ROADS PLAN AND PROFILE – NEW CAMPGROUND STA. 14+00 TO END
46	C11	ROADS PLAN – EXISTING CAMPGROUND RENOVATIONS
47	C12	TYPICAL ROAD AND PARKING CROSS SECTIONS
48	C13	TYPICAL SPUR SECTION AND DETAILS
49	C14	TYPICAL SPUR SECTION AND DETAILS
50	C15	CULVERT DETAILS
51	C16	WELL INSTALLATION DETAIL
52	C17	HANDPUMP INSTALLATION DETAILS
53	C18	CONCRETE BOAT RAMP SECTIONS
54	C19	BOAT RAMP LAYOUT, EXPANSION JOINT AND CUTOFF WALL DETAILS
55	C20	PRECAST CONCRETE PLANK AND RAIL SYSTEM – PROFILE AND TYPICAL DETAILS (BOAT RAMP)
56	C21	BOAT RAMP – RAIL SYSTEM CONNECTION DETAILS
57	C22	BOAT DOCK
		PATHWAY:
58	P1	LAKESHORE TRAIL OVERVIEW
59	P2	LAKESHORE TRAIL PLAN AND PROFILE – STA. 0+00 TO 4+50
60	P3	LAKESHORE TRAIL PLAN AND PROFILE – STA. 4+50 TO 11+75
61	P4	LAKESHORE TRAIL PLAN AND PROFILE – STA. 11+75 TO 19+00

LIST OF DRAWINGS

SHT.	DWG.	SHEET TITLE
62	P5	LAKESHORE TRAIL PLAN AND PROFILE – STA. 19+00 TO 26+00
63	P6	LAKESHORE TRAIL PLAN AND PROFILE – STA. 26+00 TO 33+00
64	P7	LAKESHORE TRAIL PLAN AND PROFILE – STA. 33+00 TO 40+00
65	P8	LAKESHORE TRAIL PLAN AND PROFILE – STA. 40+00 TO 47+00
66	P9	LAKESHORE TRAIL PLAN AND PROFILE – STA. 47+00 TO END
67	P10	LAKESHORE TRAIL CONNECTOR PLAN AND PROFILE – STA. 0+00 TO 7+00
68	P11	LAKESHORE TRAIL CONNECTOR PLAN AND PROFILE – STA. 7+00 TO END
69	P12	TRAILHEAD CONNECTOR TRAIL PLAN AND PROFILE – STA. 0+00 TO END
70	P13	TYPICAL BOARDWALK FRAMING PLAN
71	P14	BOARDWALK DETAILS
72	P15	BOARDWALK DETAILS
73	P16	TYPICAL BOARDWALK AND GUARDRAIL DETAILS
		ELECTRICAL SYSTEM
74	E1	HOST SITE BATTERY CHARGING



IDAHO

APPROVED

Kit Mullen — 4/11/2017

FOREST SUPERVISOR — DATE

Regina A. Freel — 4/13/17

DIRECTOR, REGION 4 ENGINEERING — DATE

Figure 2–017—A final contract package includes all required elements to implement the project and achieve sustainable recreation outcomes. This figure is from contract plans created for the Stanley Lake Recreation Complex, Sawtooth National Forest.

Contract Package and Solicitation

A CO assigned to the project formally designates a COR. The CO prepares the final contract package for solicitation. The package includes the contract process and timelines. Be sure to incorporate any important timing related to resource concerns in the contract package. If a contractor's bid is accepted, the CO makes the award. That CO is responsible for administering the project through to completion and closeout.

Not all projects fall within stringent contract requirements. Sometimes, Forest Service employees, partners, or volunteers construct projects. Even in these instances, include construction drawings and specifications to ensure that a project construction proceeds as planned and designed.

Other Factors that Influence Contractor Bid Proposals

- **Insurance**—The larger the job and the more people (labor) needed to perform the task, the more costly the contractor's insurance.
- **Bonds**—All Government construction contracts require completion bonds, which cost the contractor 2 to 5 percent of the total contract amount.
- **Profit**—Contractor profits run 10 percent and more.
- **Overhead**—Contractor overhead costs account for 10 to 20 percent of the anticipated costs.
- **Mobilization/demobilization**—Contractors often front-load the cost of moving in equipment and setting up a jobsite to receive upfront money to support project work.

Tips for improving the sustainability of contracted projects:

- Assess if Forest Service staff or contracting office personnel have the skills and availability to perform work in the desired timeframe.
- Ensure local contractors and vendors are aware of pending solicitations.
- Develop a construction operation plan—or request that contractors submit a plan—to conserve and protect resources such as fuel, energy, and water, and to implement other waste-reduction measures. Consider using this plan as criteria for evaluating contract proposals for award.
- Schedule construction to implement permanent site best management practices (BMPs) early during the project so that these BMPs can provide site protection during construction and minimize the need for additional temporary measures (figure 2–018).
- Include contract bid option items to allow some negotiating room in the contract award (within available funding amounts) and to position the project to take advantage of end-of-year funds that may become available.
- Provide flexibility in contract schedules to account for environmental changes, such as large, unseasonable storms.
- Minimize unnecessary construction travel. For example, identify closer staging areas and consider onsite camping areas for contractors and inspectors. Locate borrow sites as close to the construction site as possible without impacting scenic quality (or look for visual screening and quick reclamation of the borrow site).

Figure 2–018—Including resource protection measures within contract documents, such as tree boards to protect against accidental damage from heavy equipment, can improve sustainable recreation site outcomes.

Phase 4—Implementation

This section covers the designer's role in construction as it relates to supporting the CO and the COR to achieve sustainable outcomes.

Once a contracted project begins, only the CO and the COR have a direct and formal relationship with the contractor (except for direct safety issues). Any changes to the project scope, details, or schedule can result in additional costs to the Forest Service. At this stage of the project, the designer provides technical assistance to the COR, especially working through any project design changes.

New conditions encountered during construction may necessitate adaptations or changes to the project. Contractor ideas for changes may also lead to overall project efficiency, improvement, or savings, if approved by the CO. Identifying any required changes at the earliest possible time greatly improves the chance that the project will achieve its objectives within budget.

Communicating and Working with the Public During Construction

Develop a communication plan to notify the public in advance of the general project scope, benefits, and any potential construction impacts to site access. Work with forest public affairs staff to proactively tell the story of the project and the people involved, and to respond to public concerns. Manage expectations and share how the project relates to a recreation and/or site need.

Ideas for Engaging the Public During Project Implementation

- Provide public information, including signs onsite, explaining the work that is occurring, anticipated benefits, and alternate recreation destinations nearby if the project implementation limits public access.
- Provide advance public notice of construction events that may impact use of the site.
- Engage universities and high schools through service-learning opportunities. For example, consider academic departments focused on engineering, architecture and landscape architecture, recreation management, and natural resources.
- Consider hiring local youth corps (Job Corps, Youth Conservation Corps, etc.) or other partners to complete part or all of the project needs.
- Develop a blog or video log of the construction project from beginning to end.
- Publicize the role of local contractors, tradespeople, artists, and innovative technologies in project construction.
- Consider opportunities to provide tours of construction work. Where conditions are safe, offer tours to local schools, community, and media to discuss incorporating sustainable methods into the project.
- Plan a "grand opening" ceremony celebrating sustainable features of the site and community involvement. Share the ceremony festivities on blogs, internal and external media, and agency and/or partner web pages.

Offsite Construction Management Support

Contract administration, including reviews of the work by the design team, must respond to any changing conditions and contractor issues. Develop and maintain a good working relationship with the COR and remain flexible in meeting the project's goals.

Change Orders

A change order modifies the contract. Identification of improved configurations, materials, or techniques can occur during construction. Affordable changes that meet the design intent and work with the site setting, development scale, and character can justify a change order.

A contractor or the Forest Service can propose substitution of materials or products for those listed in the contract. Both parties must agree to this contract substitution. To implement a contract substitution, the design professional consults with the COR to prepare the change order. Substitutions can affect the quality of the site and the appropriateness of the project to the setting. Review all proposed substitutions and encourage contractor suggestions for more durable, higher performing materials, if they are appropriate to the recreation opportunity setting, site character, development scale, and other elements of the design. Ensure the COR understands the design rationale for choices in the contract package to prevent substitutions that negatively affect project outcomes.

Onsite Construction Management Support

Staking and Layout

The designer should review the initial marking of the project on the ground. Physically marking or staking the project before construction activity begins often results in minor changes that benefit the project (figure 2–019).

Figure 2–019—Staking out construction limits before breaking ground can often result in small improvements to a project.

Tips for staking and layout:

- Physically locate the limits of construction and communicate the importance of these limits to protect site values.
  - Define construction staging areas and work area limits.
  - Flag or otherwise identify historic landscape features for protection.
  - Delineate buffer zones for construction activities away from surface water and/or vegetation, in accordance with site protection plans.
  - Flag trees and vegetation to protect during construction.

Construction Observation

The design team should regularly visit the site during construction, anticipate changes, and report any suggestions based on their observations to the COR. Consider being designated as a contract inspector and serving in a formal construction observation role supporting the CO or COR.

Final Walkthrough

- The final inspection walkthrough provides a chance to verify that everything agreed to in the contract is complete. Prepare a punch list of any contract items that require correction.
- Include recreation and design staff, as well as the line officer who has responsibility for maintaining the completed site.
- Create a list of followup items, outside the contract scope, that the unit and other resource specialists can use to begin to enhance sustainability and other project goals. These followup items usually occur after construction ends.

Project Closeout

- Identify responsibilities for post-construction monitoring of any items under warranty.
- Ensure as-built plans are complete, received, cataloged, and all documents relevant for future use are easy to locate and retrieve for the forest. Include electronic copies for long-term filing and access. Include materials or products used in the project and sources to match future purchases as needed.
- Salvage excess materials for reuse at this or other sites.

Evaluation

- Bring the interdisciplinary team and stakeholders together to review the project. Ask, "How well did we accomplish what we set out to do?"
- Document lessons learned from the process for future projects and to share with others.

Transition to Operations and Maintenance

- Communicate design features and site operational goals with the staff responsible for operations and maintenance.
- Request feedback from operations and maintenance staff about what works and any improvements related to the design.
- Create an operations and maintenance plan for the site.

PART 3

THE ELEMENTS OF SUSTAINABLE RECREATION SITE DESIGN

Introduction

> *"…the national forest areas offer some of the largest and most fascinating problems ever presented to the landscape-engineering [architecture] profession, whether considered in their social aspects or in view of the technical problems involved."*
>
> **– Frank Waugh, "Recreation Uses on the National Forests," 1918**

Part 3 outlines sustainable recreation features recommended for all developed recreation projects and provides specific guidance on all aspects of site design, from siting and layout to circulation and materials. It also identifies design features that relate to law, regulation, and policy. Many sections in part 3 provide references to more indepth information on specific aspects of the design process (figure 3–001).

Sustainable recreation site design in national forests:

- Honors natural and cultural settings
- Respects and restores ecological processes
- Provides features that facilitate high-quality, nature-based experiences
- Offers community benefits
- Creates long-lasting facility development with reasonable operation and maintenance requirements

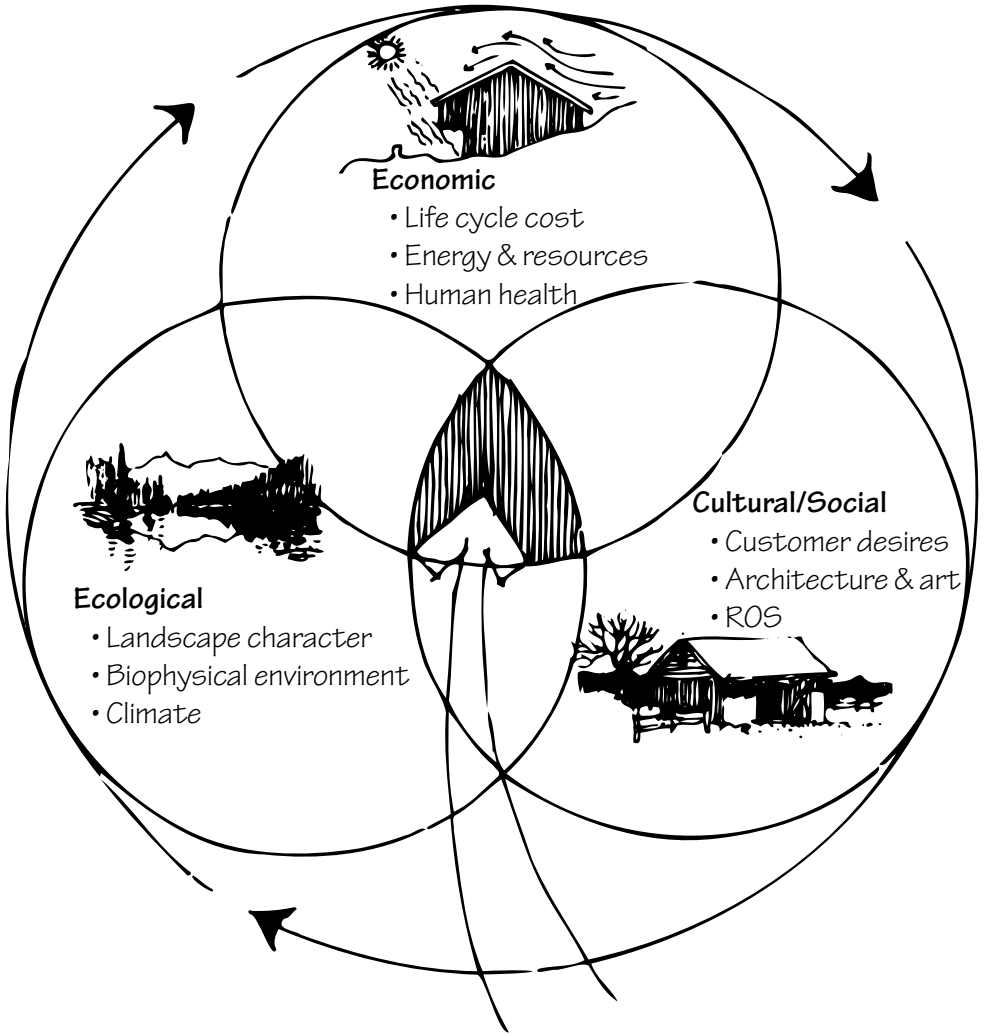


Figure 3–001—Three spheres of sustainability. This illustration is from "The Built Environment Image Guide for the National Forests and Grasslands." ROS = Recreation Opportunity Spectrum.

Design choices respond to identified needs. Depending on their quality, design choices can improve or detract from the quality of the recreation experience and the ecological integrity of the setting. Sustainable recreation design creates relevant facilities that align visitor experience with stewardship of the recreation setting (figure 3–002).

Figure 3–002—Landscape settings, scenic character, public access, recreation opportunity and experience, ecological benefits, and economic and other community benefits contribute to sustainable recreation, as defined in the 2012 Planning Rule and associated directives.

This section describes elements of sustainable recreation site design that apply, in varying degrees, to all design projects and site types (figure 3–003). The elements described are:

- Character & Aesthetics
- Siting & Layout
- Circulation
- Grading & Drainage
- Soils
- Vegetation
- Lighting & Dark Skies
- Energy Use
- Drinking Water
- Toilets & Waste
- Materials
- Signs & Interpretation

Adapt and expand these elements to address the specific project needs, constraints, and opportunities you encounter.

For each design element, look for:

- A brief introduction to set context.
- A desired sustainable recreation outcome.
- Recommendations for designers with examples and best practices to accomplish desired conditions and outcomes that support the principles of sustainable recreation site design.

Figure 3–003—Apply principles of all the site elements to achieve sustainable recreation site design.

Character & Aesthetics

The combination of natural and cultural features gives a recreation site character and contributes to a sense of place—unique qualities, identities, and meanings that represent a highly valued resource of national forest lands. The heritage of national forest land managed for public recreation and the experiences of its users amplify the deep public connections to these places.

Desired Sustainable Recreation Outcome

Design choices preserve and enhance the characteristics that make a recreation site special: natural and cultural features, scenery, built environment, points of interest, and other unique features. They help visitors make meaningful connections to the landscape (figure 3–004).

Site and Setting

- Visit and explore project locations to document the characteristics of each project site and setting.
  - Define the desired landscape condition.
  - Define areas of use and natural characteristics to retain and enhance.
- Define areas to protect from impacts of use or to restore to a natural condition to maintain continuity with the surrounding landscape.
- Consider a site's desired recreation opportunity spectrum (ROS) class when making decisions regarding the degree of site development (figure 3–005). See table 2–1 in this guide for more information about the ROS.
- Identify and use existing "character areas" of the site and adjacent setting—such as viewsheds, historic landscapes or cleared areas, character trees, rock outcroppings, and stone walls—to reinforce site and scenic character (figure 3–006).

Figure 3–004—Design choices responsive to the setting help reinforce scenic character and improve visitor experience. In this example, rock from the site and color selections harmonize with natural features.

Figure 3–005—Recreation Opportunity Spectrum classes describe a range of settings from primitive to urban.

Figure 3–006—Preserve the site's healthy "character trees" (trees of unusual size or structure).

Forest Service Manual 2309.13, Chapter 10–12.3 Site Character, Aesthetics, and Appearance

Capitalize on the unique character of the landscape. Designs should express the inherent beauty of the site and should yield facilities that provide enjoyment for visitors but are simple to maintain, sturdy, safe, and appropriate for the applicable recreation opportunity spectrum. Facilities should visually harmonize with the surrounding landscape (as much as possible), in accordance with the site's scenery management objectives and "The Built Environment Image Guide for the National Forests and Grasslands" (figure 3–007).

Figure 3–007—Facility design should be responsive to the character of its surroundings.

- Identify materials and site layout configurations that reinforce site and scenic character.
- Use the characteristics and aesthetic qualities of the immediate setting and surrounding landscape (form, scale, pattern, texture, and color) to inform design decisions and to reinforce the site's scenic character (figure 3–008).
- Preserve and highlight valued natural, cultural, and historic attributes (including views to features within and beyond the recreation site) to foster a connection for forest visitors with the landscape and the site's history. For example, consider framing views of a historic building or culturally significant landscape features, as seen from paths or viewing areas.

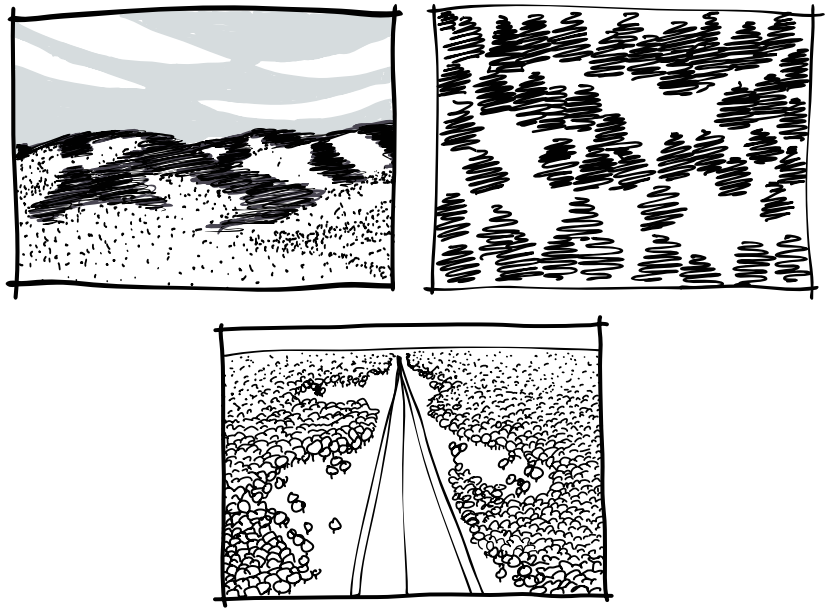


Figure 3–008—Variety in the form, texture, and pattern of vegetation play an important role in defining scenic character. These illustrations are from the "National Forest Landscape Management, Agricultural Handbook 434, Volume 1-General Concepts."

Type and Character of Spaces

Consider the type and character of individual spaces. The linear features of natural or built edges and the scale, form, proportion, sequence, surface and texture, workmanship, detailing, and color all inform and define the aesthetic character of a space (figure 3–009).

Figure 3–009—The pattern and colors in the weathered steel used here reflect the rocks and boulders of the setting and reinforce scenic character.

- Minimize disruptions to the vegetation patterns, topography, and the natural features of the site to maintain seamless connections with the surrounding natural setting (figure 3–010).
- Provide accessible facilities without fundamentally altering the setting, site, cultural, and natural values. Accessibility standards do not require recreation settings to be fundamentally altered to the detriment of their natural character. For instance, it may be technically possible to build an accessible path at a recreation site, but if the topography would require the path to become the dominant visual feature of the site, you do not have to construct the path to meet accessibility standards.

Built Environment Image

- Design additions and renovations to facilities to relate to existing site features and character, as described in "The Built Environment Image Guide for the National Forests and Grasslands" (figure 3–011).
- Adjust the design to the site, not the site to the design (figure 3–012).
- Consider views of the site from nearby areas and roads, as well as views from the site itself. Maintain uninterrupted views of the most desirable features—lakes, rivers, waterfalls, rock outcrops, meadows, and vistas—while reducing unwanted views through strategic siting and screening (figure 3–013). Orient facility locations or vehicle circulation to draw attention to a site's special features or views. Avoid interrupting or blocking dominant, valued views with infrastructure.
- Consider locating constructed facilities in the general vicinity of the road to have minimal impact on views and valued site features. Strategically remove vegetation and use grading to highlight the location's positive attributes. Screen parking areas and utilitarian buildings—such as maintenance sheds or garages—from public view (figures 3–014 and 3–015).

Figure 3–010—Burying electrical and communication wires underground improves scenic quality and reduces risks from wildfires. Photo credit: Scenic America.

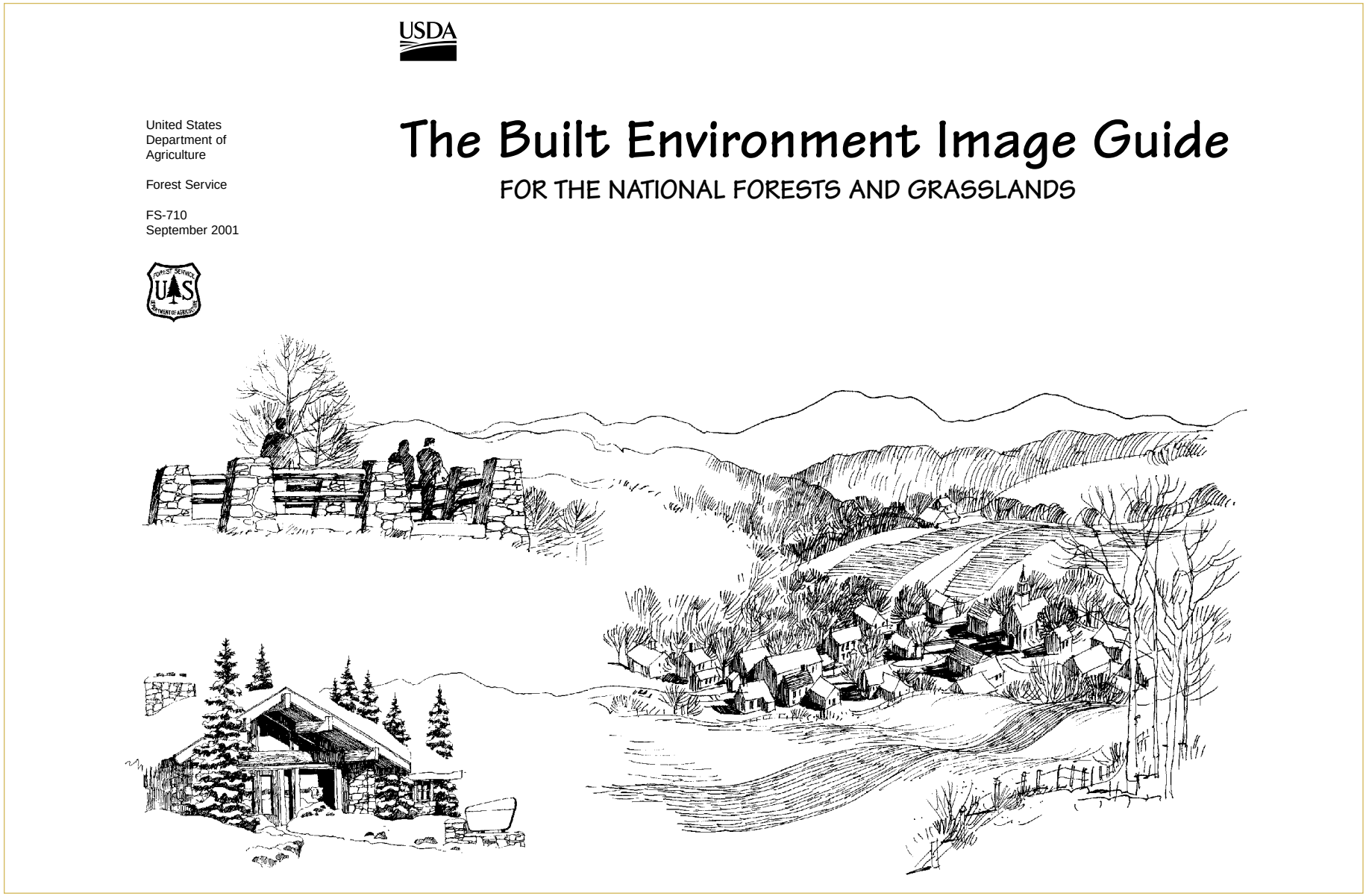


Figure 3–011—"The Built Environment Image Guide for the National Forests and Grasslands," published by the Forest Service in 2001, extensively covers design topics related to Forest Service facilities and how they should relate to their local setting.

Figure 3–012—Design hardscape features to work with—not against—the natural setting. In this example, a boardwalk prevents impacts to sensitive wetlands, avoids alterations to natural drainage, and provides visitors with the experience of being near water.

Figure 3–013—Construct amenities and locate features to fit within their natural setting. For example, locate picnic tables in a wooded area at the edge of an opening.

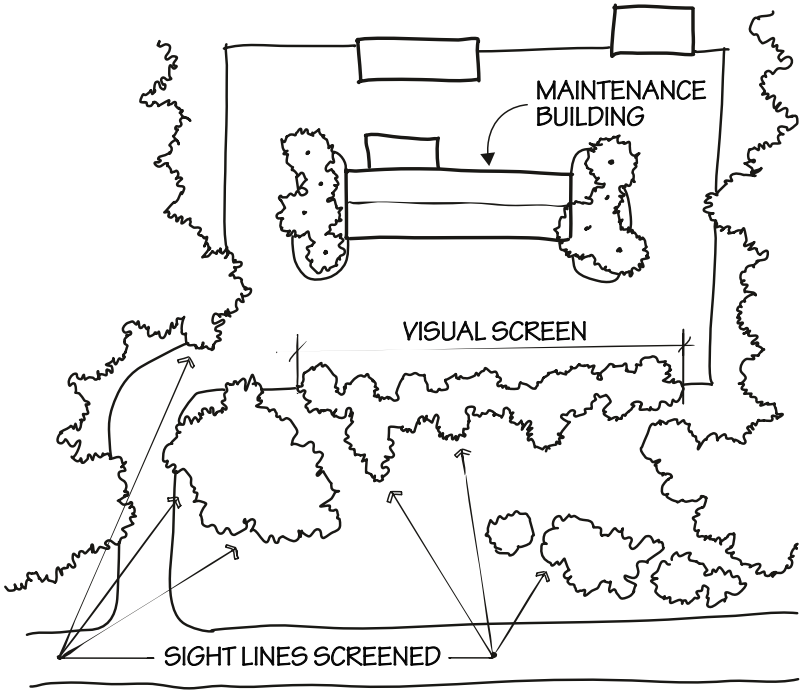


Figure 3–014—Screening development from view can protect scenic character and improve the visitor experience. This illustration is adapted from "The Built Environment Image Guide for the National Forests and Grasslands."

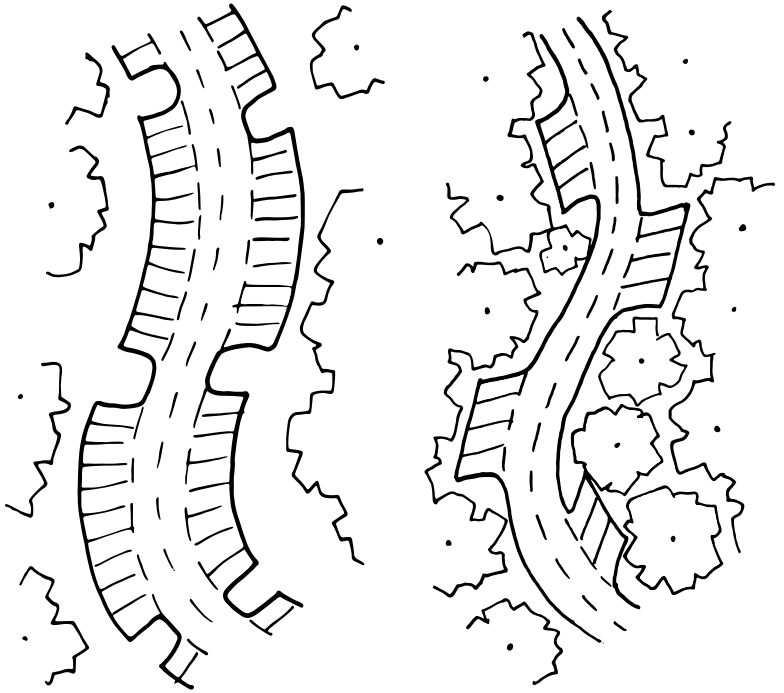


Figure 3–015—Use existing vegetation, topography, and other natural site features to help divide parking into a series of smaller parking areas. In the illustration on the left, the parking dominates the experience. In the illustration on the right, vegetation reduces the visual dominance.

Natural and Created Space

- Identify a natural setting or historic reference to guide design choices. Take design cues from natural features and contours of the site. Avoid arbitrary forms and geometric shapes, except when appropriate for preserving historic or cultural characteristics.
- Design created spaces to focus attention on the natural areas; all recreation sites have natural areas and cleared or created spaces with specific functions (figure 3–016).

Figure 3–016—Use existing cleared areas within a site, fitting development into the setting rather than dominating the setting with development.

Design Narrative

Develop a design narrative at the beginning of the project to document a site's scenic features and scenery objectives. Refer to Phase 3—Design in part 2 of this guide for more information and for guidance regarding the site's cultural and historical character and attributes (figure 3–017).

Figure 3–017—Using Civilian Conservation Corps plans for constructing the log picnic table (top) allowed the designers to preserve the character of this historic site. When the site with historic stone table legs (bottom) is restored in the future, it will be important to find design solutions to maintain the historic character of the site.

- Use natural vegetation and topography to form edges and define spaces within sites. When removing vegetation to create a cleared area, consciously continue a natural shape and pattern of remaining vegetation to reinforce the site's scenic character (figures 3–018 and 3–019).

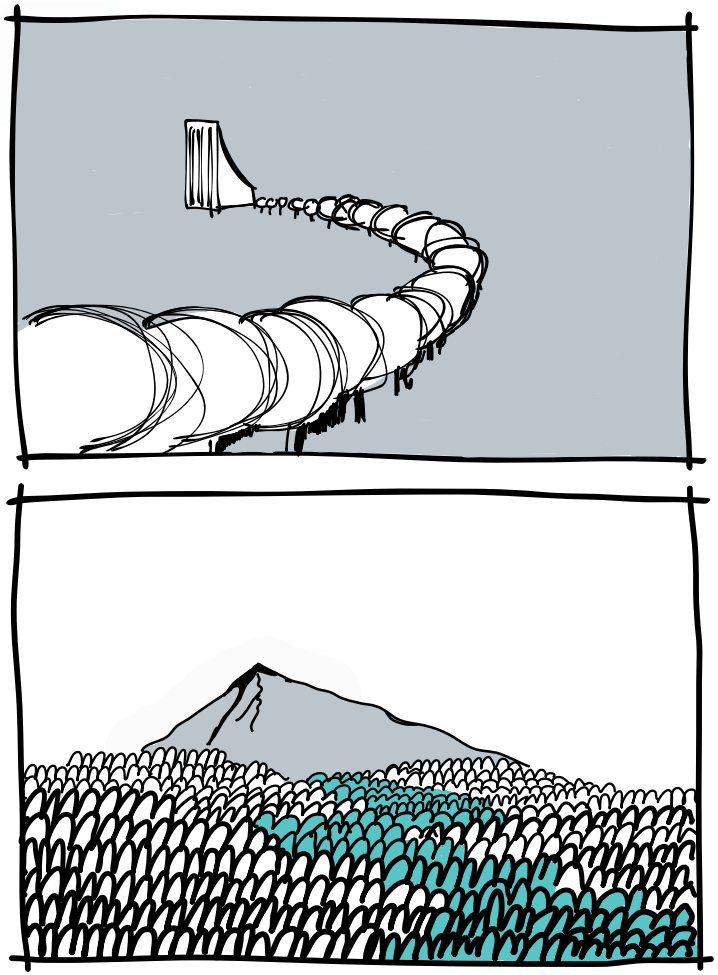


Figure 3–018—When removing or establishing vegetation, use sequences of line and color to create forms and patterns that complement the scenic character. These illustrations are from the "National Forest Landscape Management, Agricultural Handbook 434, Volume 1-General Concepts."

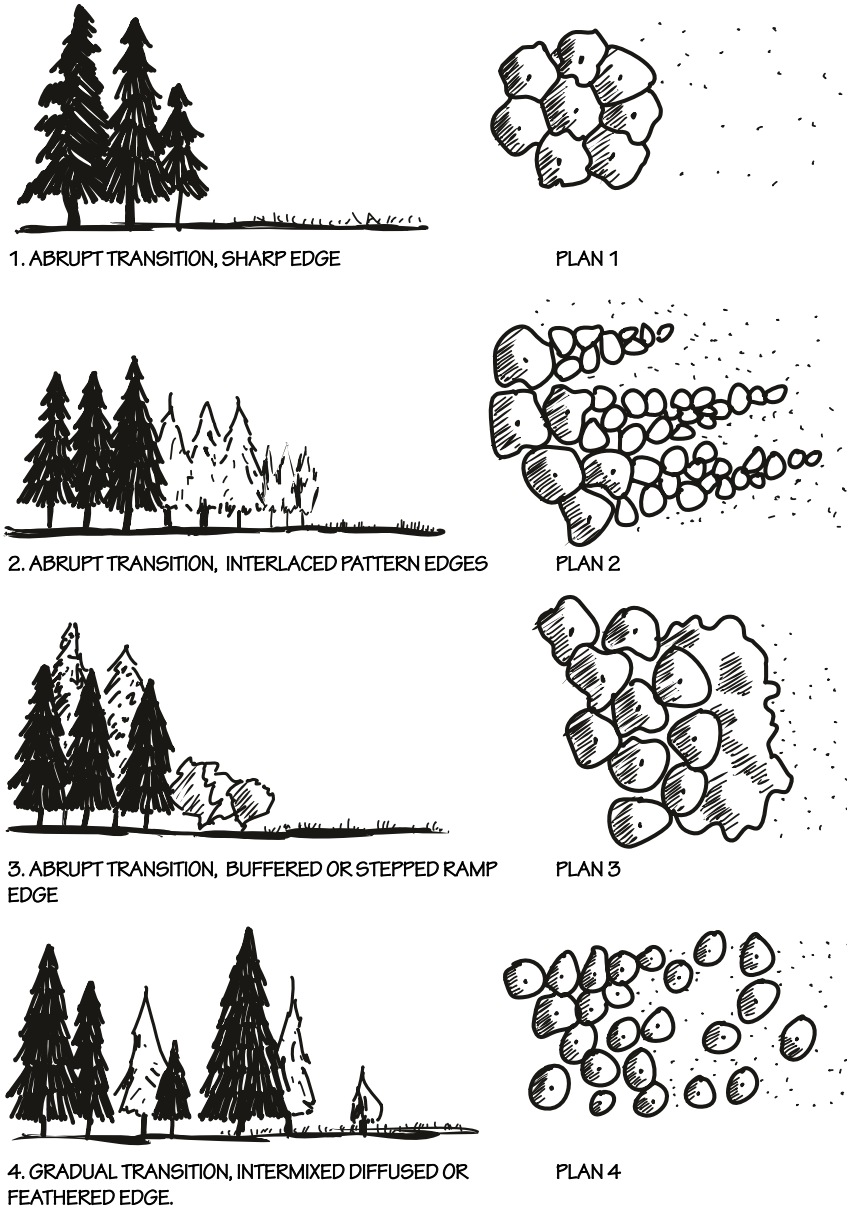


Figure 3–019—Four examples of visual edge treatment, in order of diminishing distinction. This illustration is from the "Visual Vulnerability of the Landscape: Control of Visual Quality."

- Construct the shape of a paved area to respond as closely as possible to the land's contour and to the natural shapes of the site, paying particular attention to the outside edges of the paved areas where they meet the natural surroundings (figures 3–020 and 3–021).
- Provide interpretation of valued historic and cultural features.

Figure 3–020—Minimize the use of straight lines when constructing paths to better complement scenic character.

Figure 3–021—Retaining walls and steps respond to site topography and help reinforce site character.

Buildings and Other Structures

- Design buildings to complement and be visually subordinate to their surroundings.
- Keep facilities simple and functional and design them to have individual character that expresses purpose while maintaining the character of the setting to which they belong.
- Consult with archeologists to restore and adaptively reuse historic buildings, spaces, and features in an appropriate way. Retain as much historic built heritage as possible. If the site includes historic work from several periods, consider ways to retain the different elements to illustrate and interpret the evolution and history of the site.

- Reference—without mimicking—cultural architectural features and styles onsite and within the surrounding area. Local vernacular buildings (those built with local materials and knowledge and designed for function rather than monument) and historic buildings provide the frame of reference for Forest Service architectural design, consistent with "The Built Environment Image Guide for the National Forests and Grasslands" and its design provinces.

Details

Design building details to reinforce the structure's overall form as it relates to the setting (figures 3–022 through 3–026).

- When possible, place doors and windows to relate to the site and frame views from the inside rather than centering doors and windows on the face of the building.
- Generally, use muted, earth-tone or tree-bark exterior colors representative of the surrounding site and setting, except when preserving a historic cultural feature (figure 3–027). Dark colors recede from a distance, while bright colors stand out against the landscape. Typically, roofs should appear darker than exterior walls.

Building Mass and Form

- The scale and shape of structures should relate to the surrounding landscape. "The Built Environment Image Guide for the National Forests and Grasslands" provides examples from each design province.
- Generally, the design and form of a building should be simple or should include elements that break up a larger form in a way that relates to the setting.
- Vegetation or built features should not screen views or detract from scenic character.

Figure 3–022—Pay careful attention in the design to the way a building meets the ground. Depending on the locality, naturally shaped and weathered stone placed near the base of a structure helps to visually anchor it to the landscape.

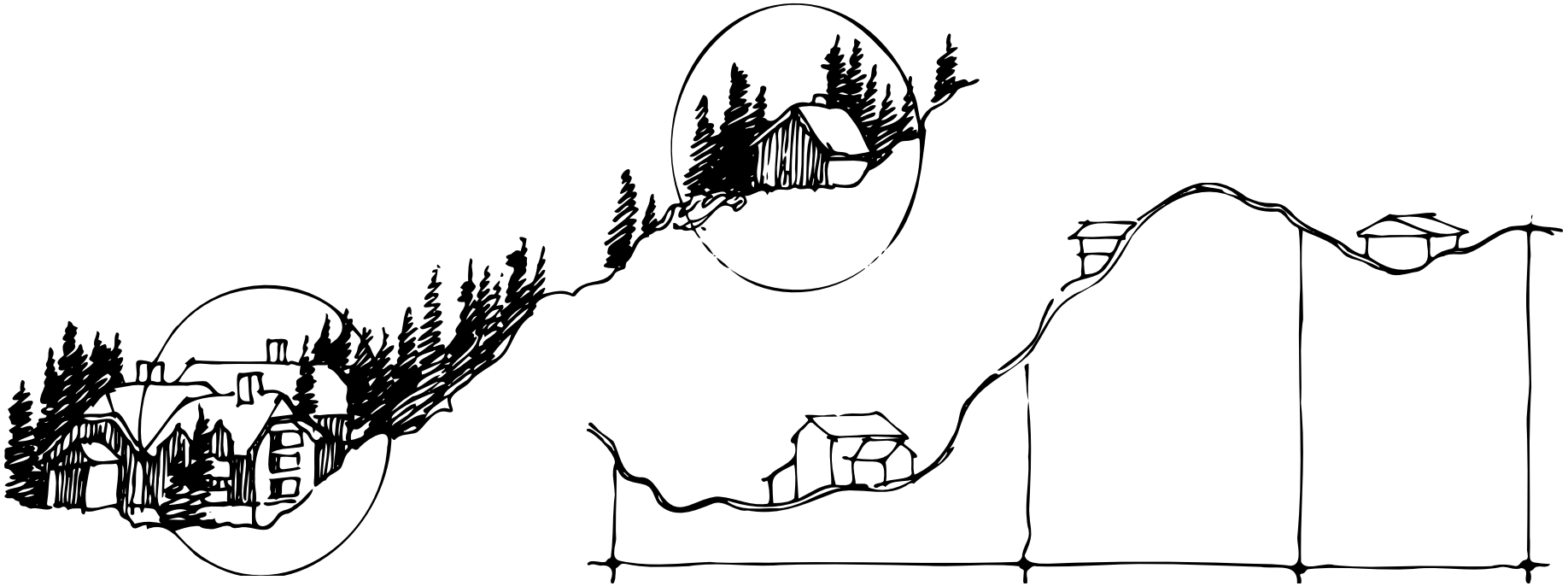


Figure 3–023—Align the scale and complexity of development with the site character and condition. These illustrations are from "The Built Environment Image Guide for the National Forests and Grasslands."

Figure 3–024—Keep focus of a developed recreation site on the landscape setting, not on the constructed features. Here, the structure built into the landscape disguises it from important views elsewhere onsite.

Figure 3–025—The way a building connects to the ground should respond to its environment. These illustrations are from "The Built Environment Image Guide for the National Forests and Grasslands."

Figure 3–026—In this example, prominent features in the original toilet building the Civilian Conservation Corps built (left) are reflected in new building construction completed during 2019 (right).

Figure 3–027—Color and material choices should complement their surroundings.

The Secretary of the Interior's Guidelines on Historic Preservation

"The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings" provides guidance to historic building owners and building managers, preservation consultants, architects, contractors, and project reviewers.

Applying these standards takes into consideration the economic and technical feasibility of each project. Standards apply to historic buildings and a wide variety of historic resource types eligible for listing in the National Register of Historic Places. This includes buildings, sites, structures, objects, and districts. Nominated buildings usually include the site and site features such as fences and support buildings, with consideration for preserving the setting. Cultural landscape nominations can be for a district or a thematic nomination of landscape features (figure 3–028).

The standards are available on the U.S. Department of the Interior, National Park Service Technical Preservation Services website <https://www.nps.gov/tps/standards.htm>.

Figure 3–028—Preservation of historic structures includes work to protect and stabilize the property, such as replacing a wood shake roof.

Roads and Pedestrian Paths

- Generally, keep the character of roads or paths at the lowest development possible to meet the site needs, consistent with the ROS class and development scale (figure 3–029).
- Design the entrance to a site with care to set the tone for the visitor's experience with their first impression of the site.

Site Amenities

- Keep amenities simple and sturdy—functional, economical, and of materials and workmanship representative of the local setting.
- Consider using vegetation, topography, and local boulders (where possible) in place of constructed barriers (figure 3–030).
- Promote national forest identity within sites; for example, include entrance signs that display the Forest Service shield near main access points and at key buildings (figure 3–031).
- Locate amenities to protect and enhance enjoyment of the site's character. For example, orient paths and benches so people can enjoy key views.
- Design and locate sign boards and information kiosks so they do not block key views of the landscape.

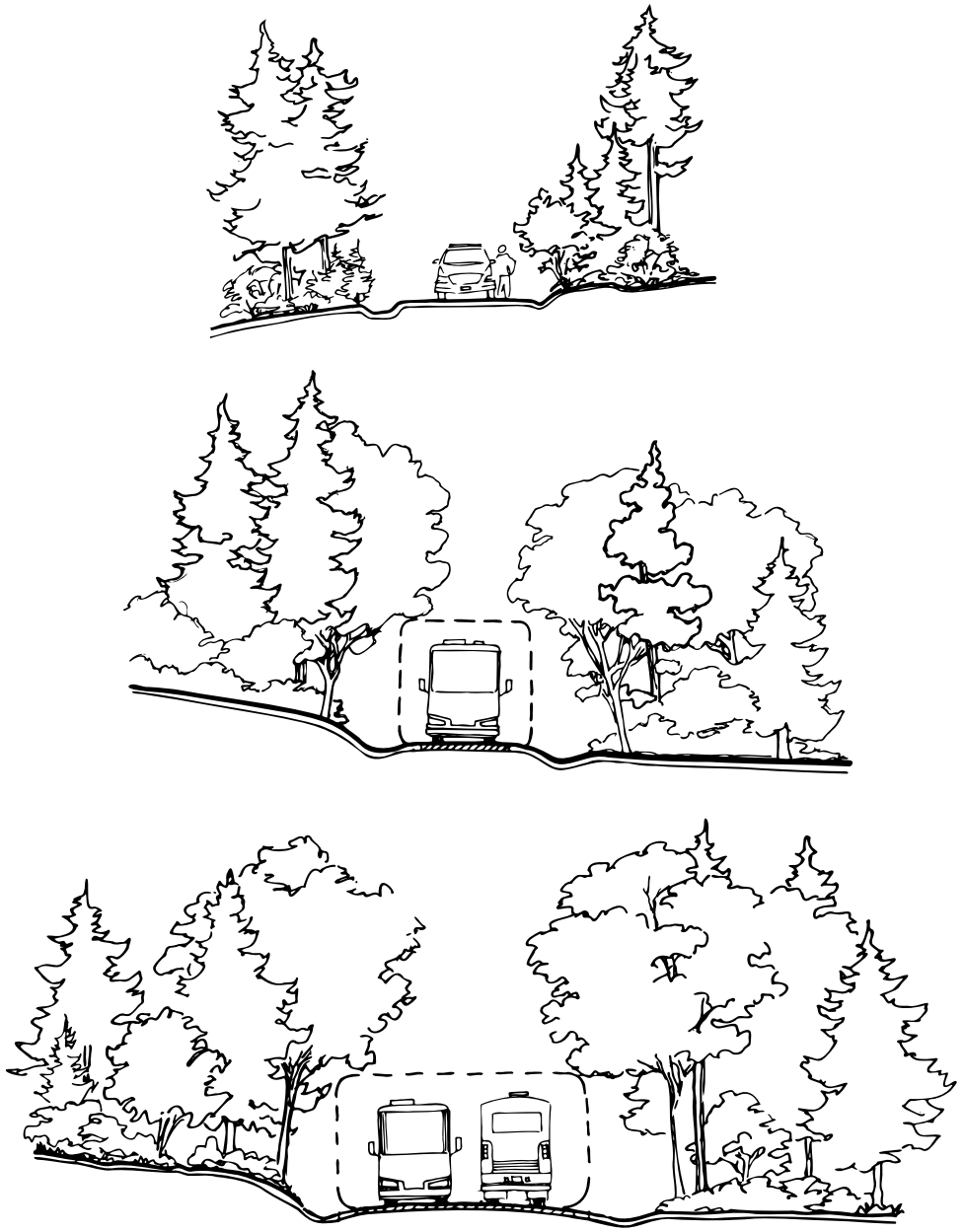


Figure 3–029—Generally, recreation site roads have minimal width and clearing, and trees and vegetation come close to the side of the road to retain the natural character of the site.

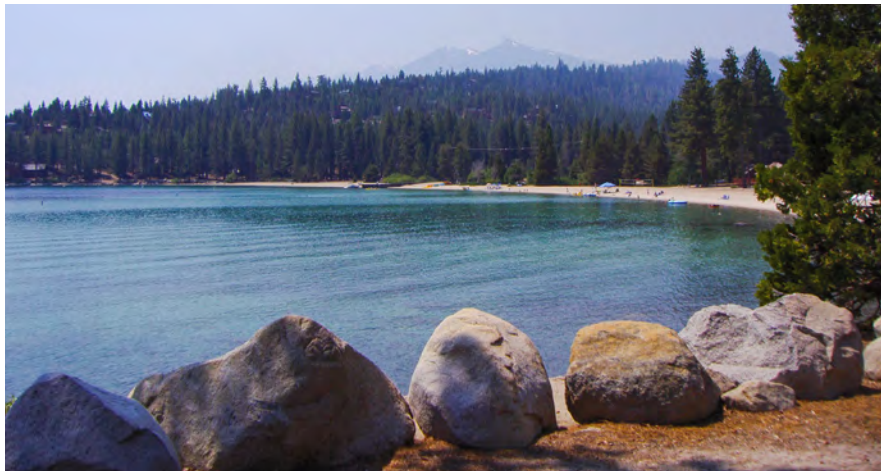


Figure 3–030—Local boulders can serve as vehicle barriers.

Figure 3–031—Use the Forest Service shield prominently within developed recreation sites.

Materials

- Select materials with a rustic appearance that harmonize with the natural setting (figure 3–032). For further information, refer to Forest Service Handbook (FSH) 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities, section 12.8 <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13!..>.

Figure 3–032—This durable, heavy-gauge, split-rail fence material promotes the site's rustic character.

Concrete—When concrete or other surfacing is visible, emphasize its more natural characteristics. Specify a higher rock content in the mix. A coarse texture surface or formed surface with texture can complement the natural setting. Avoid a fine broom finish. Avoid (or use very selectively) integral color or concrete forms that imitate stone walls or stone paving (figure 3–033).

Figure 3–033—Use concrete color and texture to help development fit into its surroundings.

Stone—Use stone with naturally weathered surface and shape. Use native rock for drainage stabilization or other visible applications. When constructing culvert headwalls or armoring areas with native rock, incorporate a variety of rock sizes and minimize the linear character of edges (figure 3–034).

Figure 3–034—Naturally weathered stone visually blends with its natural setting (note that the U.S. Department of the Interior, U.S. Geological Survey, Board on Geographic Names renamed Mount Evans to Mount Blue Sky in 2023.)

Wood—Where appropriate and feasible, use rough-sawn lumber or logs to reinforce scenic character, consistent with the ROS class setting and cultural heritage context (figure 3–035).

Stain rather than paint outdoor wood surfaces.

Figure 3–035—Naturally tapered wood and rough-sawn lumber elements help reinforce local scenic character.

Color—Avoid using bright colors unless the colors are culturally significant to the site. In general, the earth-tone colors usually found in local soil, mulch, bark, rock, and vegetation achieve a more natural appearance. Darker colors tend to blend better with a setting (figure 3–036).

For metal installations, choose self-weathering steel or matte-finish black or dark brown paint (figure 3–037).

Figure 3–036—The colors selected should complement scenic character.

Figure 3–037—Long-lasting, self-weathering steel requires little maintenance and generally complements its surroundings.

- Avoid reflective and light-colored materials that contrast with scenic character. For example, lacking feasible alternatives to galvanized metal, treat surfaces with a weak acid solution to dull the reflective finish. Paint the backs of signs dark brown or another dark color to avoid contrast (figure 3–038).

Figure 3–038—Painting the backs of metal signs reduces impacts of visual contrast and improves the visitor experience.

- Verify that material types and other aesthetic considerations are consistent with the project design narrative. (For further information, see the Materials and Siting & Layout sections, as well as the Phase 2—Planning, Design Narrative subsection in part 2 of this guide).
- Select materials that reference local and vernacular built features (figure 3–039).

Figure 3–039—In the desert Southwest, adobe construction, a traditional building practice in the region for hundreds of years, keeps building interiors cool in the summer and warm in the winter. This material also complements the area's scenic and cultural character.

Siting & Layout

Siting and layout involve design of the entire recreation site. From alignment of roads and paths to location of structures, thoughtful siting and layout provide the foundation for the user experience and sustainability of the site. Layout design considers users, operation and maintenance, and the site's ecological and cultural setting.

Desired Sustainable Recreation Outcome

At all development scales and ROS settings, placement and layout of roads, paths, structures, and amenities will be coherent and clear to the user, highlight site features, and complement the natural setting. Efficient use of space and arrangement of site facilities make site layout understandable, enjoyable, and convenient for visitors, while reducing maintenance and providing for efficient operations.

- Identify clear and logical functional relationships between design program elements. Separate uses, where appropriate, to allow independent use of each site setting while minimizing conflicts between user groups (figure 3–040).

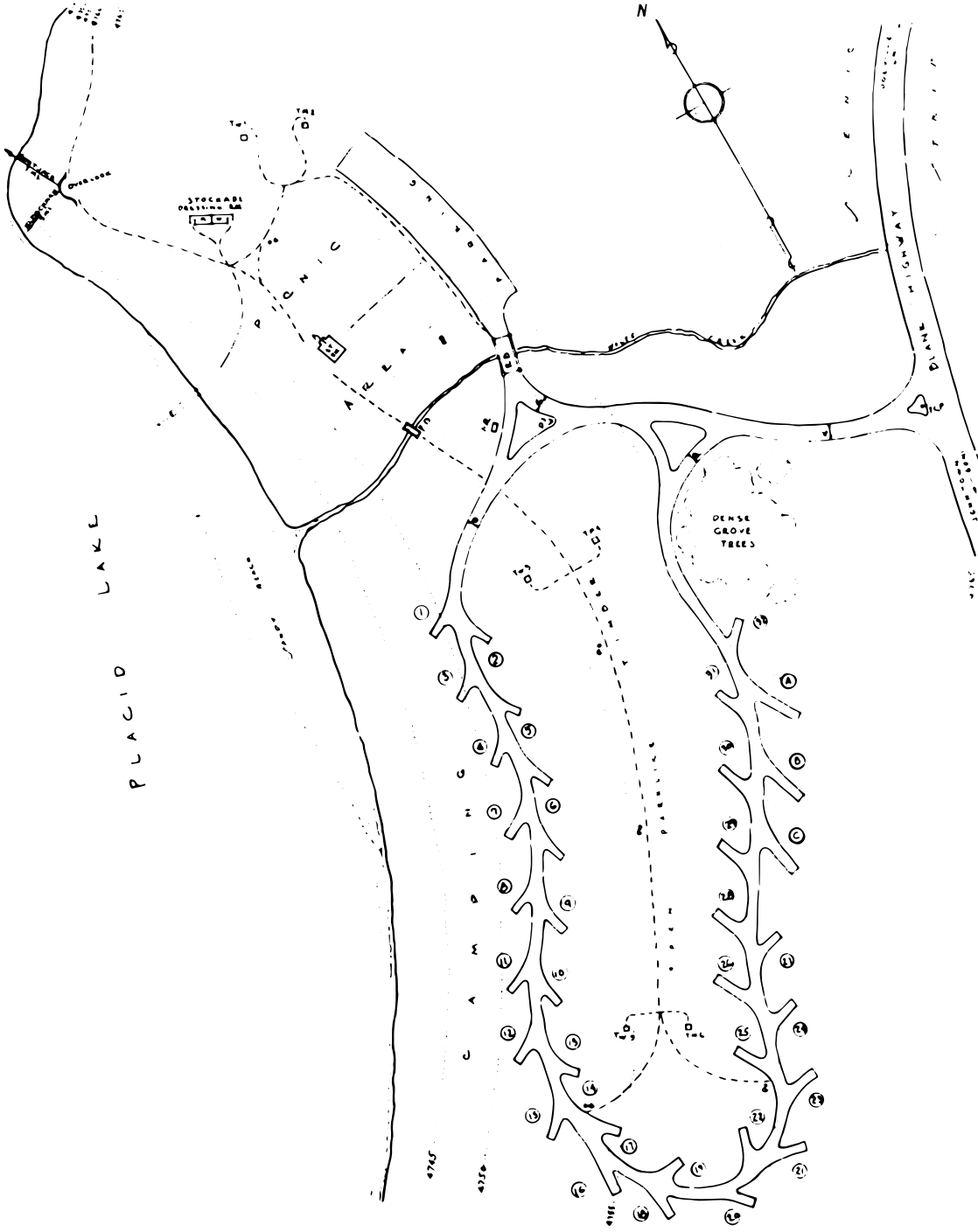


Figure 3–040—This recreation site layout from the 1930s shows that the underlying principles of site layout persist over the decades. Separation of uses and conformance to topography are the same as they would be now, while design features like the size and orientation of sites or the locations of toilet buildings would be in a contemporary design. This illustration is from the "Improvements" section of the 1937 "United States Department of Agriculture-Forest Service Recreation Handbook."

Location of Features

- Identify any visible or obscured cultural or heritage sites and avoid disturbing these areas.
- Concentrate building locations in resilient portions of the site to protect sensitive areas. Locate proposed site amenities and features in previously disturbed areas to minimize additional impacts, if possible and practical.
- Early in a project, evaluate whether the location of existing developments serve site needs effectively and determine the feasibility of making changes. Reuse as much of the existing infrastructure and site configuration as practical to meet the recreation needs. The changes may range from minor adjustments to full site redesign.
- Locate new facilities to complement and maintain connections with the existing site configuration and features. Consider views from the facility, how placement of the facility supports the visitor experience of the setting, and how to minimize impacts to scenic character (figure 3–041).

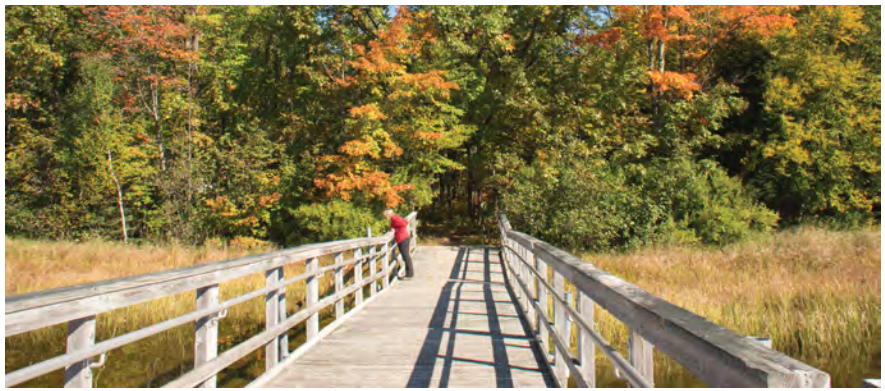


Figure 3–041—Sustainable recreation site design provides needed amenities for visitor enjoyment while protecting critical landscape features and ecological processes.

- Provide managed access to attractive natural site features such as water shorelines, meadows, and vistas, especially when a site purpose depends on these natural features (figures 3–042 and 3–043).
- Limit site development to the toe of a slope and areas below ridgelines. Move visible infrastructure to lower points on hillsides.

Figure 3–042—Providing managed access to water protects riparian resources and improves visitor experience.

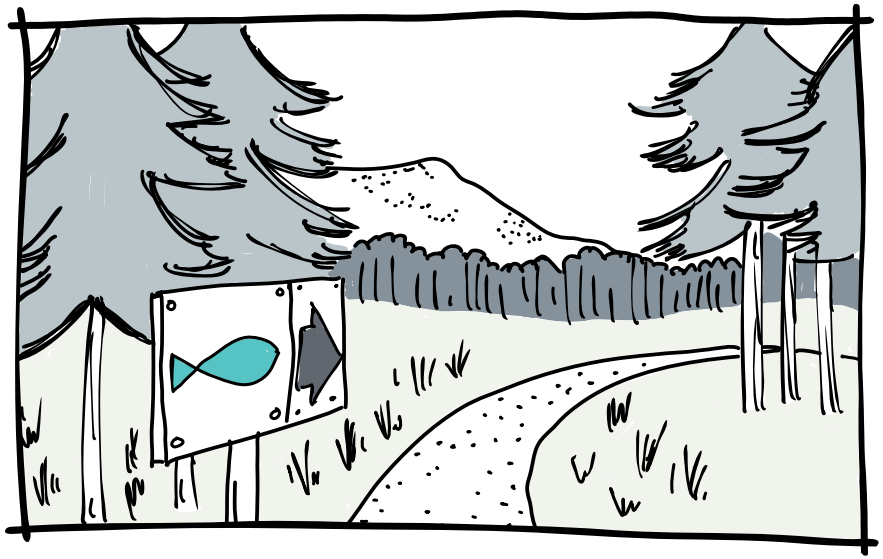


Figure 3–043—Make directional cues leading toward the desired goal easy to spot. Providing a clear path and directions can limit resource damage by concentrating traffic. This illustration is from the "National Forest Landscape Management, Agricultural Handbook 434, Volume I-General Concepts."

Site Resilience

- Use the site analysis to identify areas that require protection, including shorelines, floodplains, wetlands, and other riparian features. Identify and retain the key landscape components and support processes that enable these areas to remain healthy.
- Focus planning and design development in environmentally resilient and stable areas and protect sensitive areas.
- Decide whether (and how) to design the project to mitigate identified risks or natural hazards within the site. If you cannot mitigate risks such as rock fall, hazard trees, flooding, and wildfire, look for alternate locations to provide recreation facilities. Identify wildfire-defensible space surrounding buildings and other important infrastructure based on established guidelines.
- Design site layout and locate buildings to recognize climate-related elements such as prevailing wind, sun angles, or seasonal stormwater runoff. If you want to take advantage of passive solar heating, place buildings on the south side of dense vegetation or mountain slopes, where feasible. For cooler temperatures, consider shaded or north-facing locations (figure 3–044).
- Provide for flexibility in use of the site (figure 3–045). For example, design for potential future expansion in locating roads and utilities and include utility sleeves under pavement for future use.
- Avoid placing buildings or facilities in a way that dominates or disrupts valued views and vistas. Locate buildings at the edges of clearings and at changes in grade.
- Locate utilitarian structures to minimize their visibility. Screen undesired views using topography, rock outcrops, vegetation, or other natural features.
- Locate individual units in campground and picnic areas to optimize level ground, sun, shade, attractive vegetation, proximity to site natural features, and views. Preserve vegetation patterns to provide greater privacy for users.
- Avoid locating fire rings and barbeques beneath low-hanging branches or immediately adjacent to vegetation with a high risk of flammability.
- Locate toilets on edges of roads rather than in center islands to minimize impacts of foot traffic from numerous user-created routes (figure 3–046).

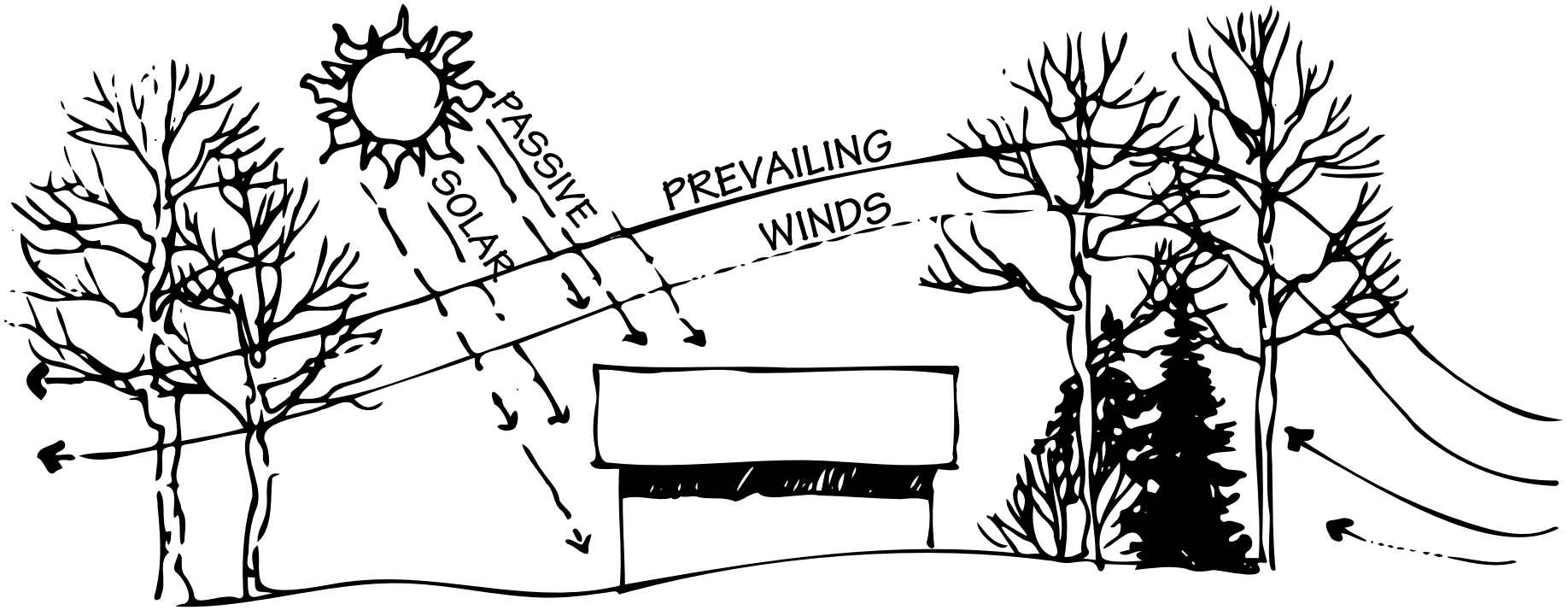


Figure 3–044—Design choices regarding location of features respond to site and environmental conditions such as sun angles and prevailing winds. This illustration is adapted from "The Built Environment Image Guide for the National Forests and Grasslands."

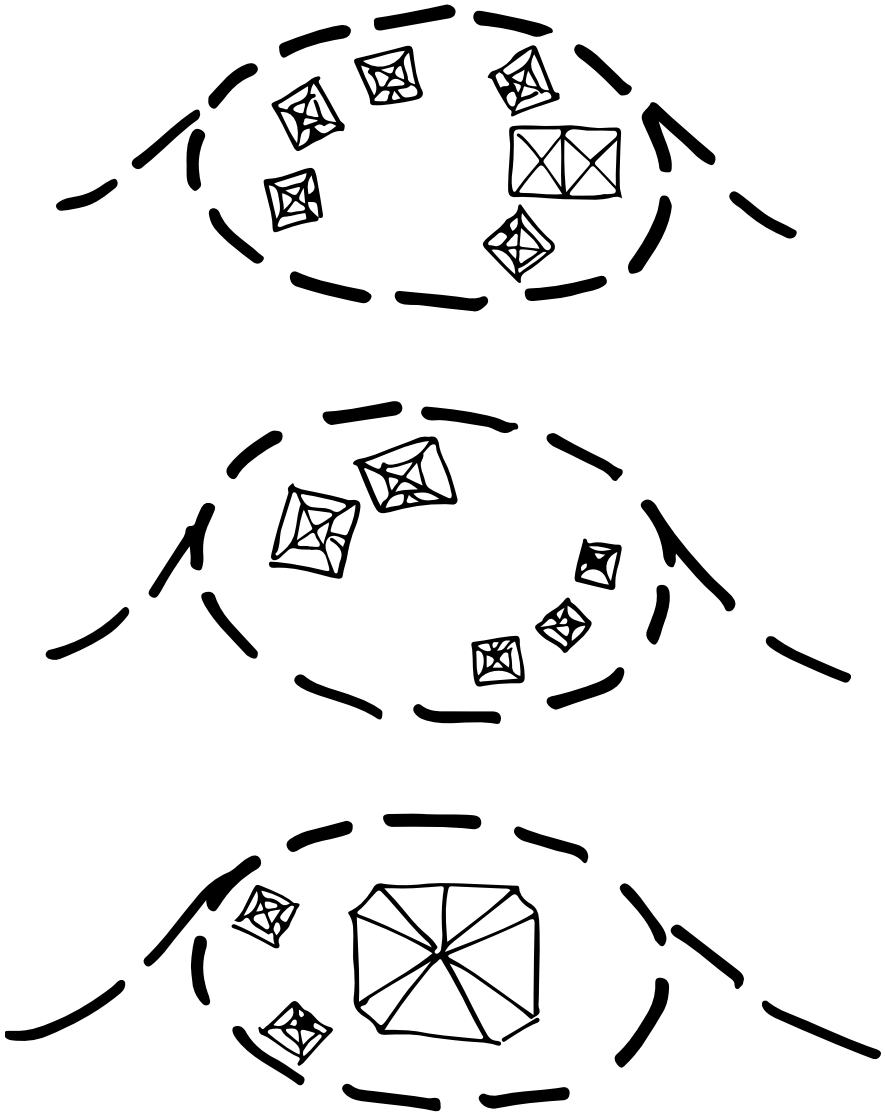


Figure 3–045—Site design can provide opportunities to flexibly use the same area in different ways, minimizing disturbance and increasing use of infrastructure.

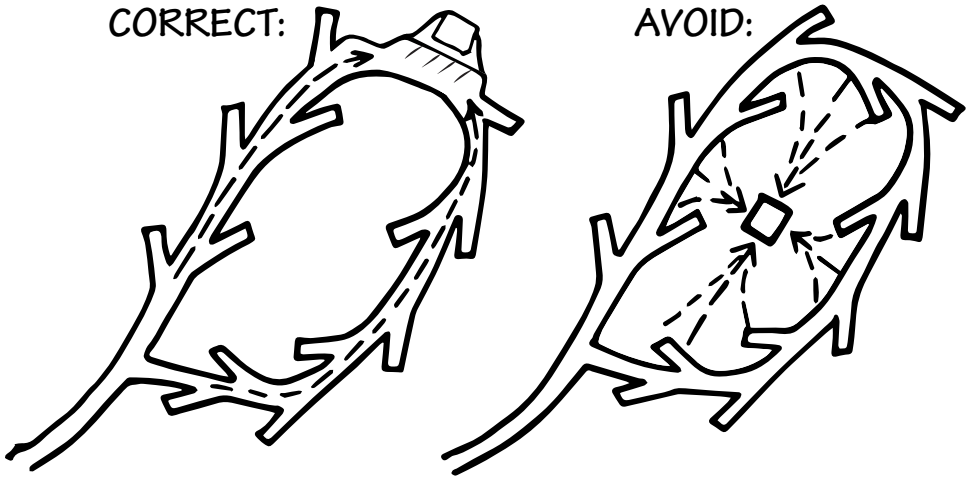


Figure 3–046—Locate features, such as a campground toilet building, to encourage managed pedestrian travel. Dashed lines in the drawings show the direction of pedestrian traffic. Locating toilet buildings at the adjacent edges of loop roads (left) encourages users to follow the established paths. Locating the facility in the center of loop roads (right) encourages users to create trails from each campsite.

Further Reading

- The Built Environment Image Guide for the National Forests and Grasslands, Image and Identity section https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/TheBuiltEnvironmentImageGuide-2001-09.pdf
- Camp Planning and Camp Reconstruction https://foresthistory.org/wp-content/uploads/2017/01/Meinecke_Camp_Planning_1935.pdf
- Guidelines for a Quality Built Environment, Technical Note 446, The Use of Color for Camouflage Concealment of Facilities https://www.blm.gov/sites/default/files/documents/files/Library_BLMTechnicalNote446.pdf

Circulation

From 2017 to 2021, more than 168 million visitors traveled to national forests, with 84 percent of these visits being recreation related (U.S. Department of Agriculture 2022). In 2020 there was an increase in visitation to 168 million people, as more visitors escaped to outdoor destinations during the coronavirus (COVID-19) pandemic. The annual visitation dropped down to a more normal range during 2021. Public recreation access is one of the most important and economically beneficial services the Forest Service provides. Design decisions for vehicle and pedestrian movement affect recreation settings and overall public experience. Sustainable recreation design seeks to improve transportation and pedestrian connection to the landscape, complement the recreation experience, promote active lifestyles, and align with agency financial capabilities.

Desired Sustainable Recreation Outcome

Sustainable recreation design provides defined, efficient, and safe circulation that facilitates connectivity within recreation sites, between recreation destinations, and with local communities. Well-designed alignments minimize conflicts between vehicular and pedestrian use, provide accessible routes, preserve site character and environmental quality, and contribute to a safe and quality recreation experience for visitors. Offering multiple modes of transportation—including non-vehicular—reduces carbon output, energy consumption, and resource impacts while enhancing visitor opportunities.

Roads

In a developed recreation site, the road system provides and directs vehicle access to features within the site and the activities the site offers. Other design considerations include parking and the typical size of user vehicles, emergency vehicles, and operations vehicles such as trash pickup or toilet-pumping trucks. Requirements for snow removal influence the layout. The road system must also interface with pedestrian paths and trails (table 3–1).

- Identify the characteristics of the design vehicle—what typical users of the site drive. Factors include weight, typical length, height clearance, and turning radius. Estimate road-use volumes.
- Identify requirements for maintenance and emergency vehicle access, such as front-loader refuse collection trucks or toilet-pumping trucks, that might need higher and wider clearances when maneuvering. Identify whether snow removal will be necessary.
- Identify any required permits, including U.S. Department of Transportation encroachment permits.
- Determine whether pedestrians will reach site features and amenities using the roads as a primary access route. When pedestrian traffic does not use internal site roads, separate vehicles and pedestrians as often as possible.
- Prioritize user experience and the quality of the setting over strict efficiency of the road system within a site. Design a road system to relate to the setting and desired experience, rather than simply meeting the minimum requirements (figure 3—047).
- Design facility entrances and use areas to create a positive impression for visitors.
- Design space in high-use sites for current or future shuttle buses or other transit alternatives, if feasible and appropriate.
- Minimize the amount of road infrastructure provided while accomplishing design goals.

Table 3–1—Design criteria for recreation site roads (assumes emergency vehicle access and standard 15-mile-per-hour vehicle speeds)

Design feature	One lane	Two lane
Width—roadbed shoulder to shoulder	14 to 16 feet	24 to 26 feet
Width—travel way	10 to 12 feet	20 to 22 feet
Width—parking spaces	10 to 14 feet	Not applicable
Minimum turning radius	50 feet at centerline	50 feet at centerline
Gradient road ideal	Under 5 percent	Under 5 percent
Gradient road maximum	8 percent	8 percent
Gradient road exception	12 percent on pitches less than 100 feet long, provided adequate erosion control measures are incorporated into the plans	12 percent on pitches less than 100 feet long, provided adequate erosion control measures are incorporated into the plans
Gradient parking spaces	Up to 5 percent running and cross slope; 2 percent running and cross slope for accessible parking spaces	Up to 5 percent running and cross slope; 2 percent running and cross slope for accessible parking spaces

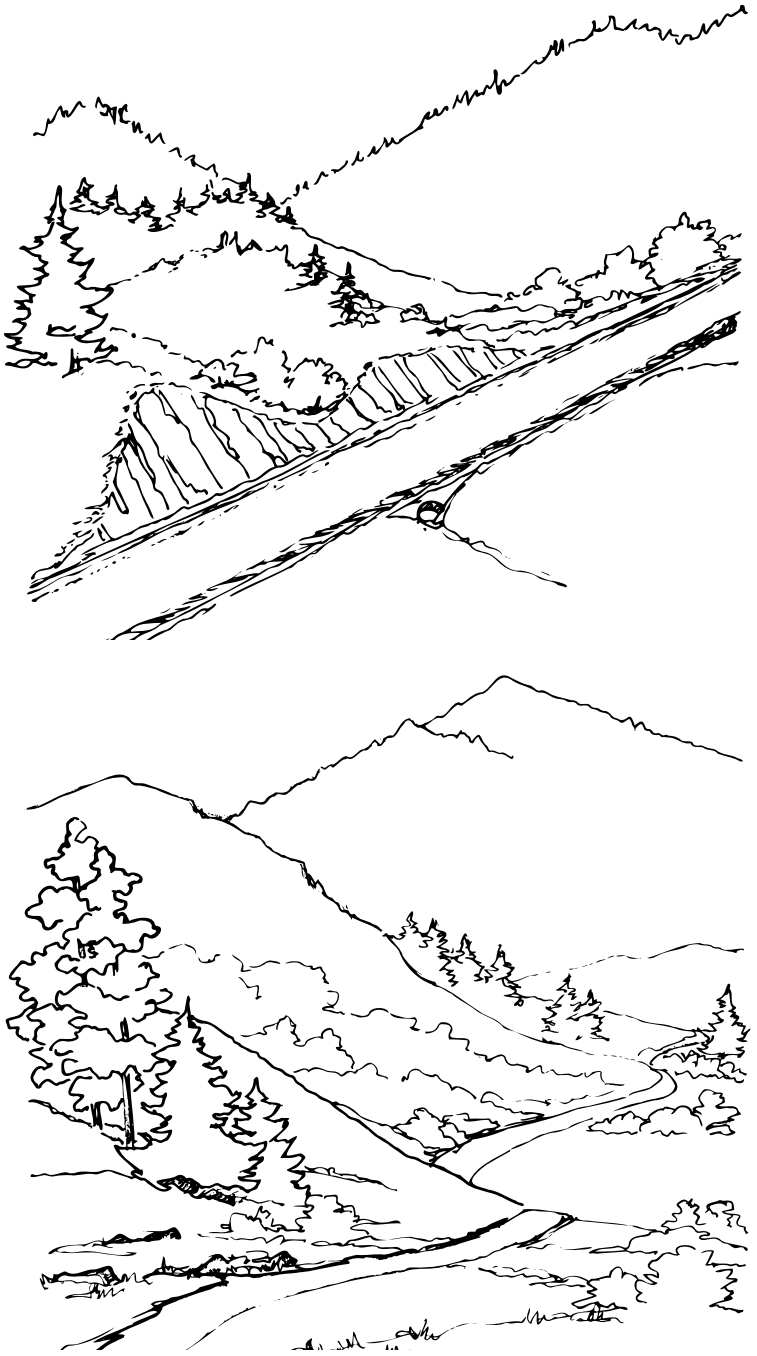


Figure 3–047—Minimize heavy-handed approaches to road construction that require extensive grading and drainage control (top). Design roads that respond to natural conditions, minimizing disturbance and enhancing scenic character (bottom). These illustrations are adapted from the "Low-Volume Roads Engineering Best Management Practices Field Guide."

Road Layout and Alignment

- Locate routes to minimize impacts to natural site drainage and conditions. Determine if existing roads negatively impact water quality, riparian areas, or other areas of sensitivity. If so, consider opportunities for and implications of rerouting or reconstructing existing roads. Design road alignments to preserve valued site characteristics—such as character trees, utilities, or known archeological features—and minimize grading requirements.
- Use traffic islands, curvilinear alignments, and one-way routes to slow vehicle speeds, improve safety, and enhance the recreation experience. Design one-way road systems to simplify circulation and wayfinding for visitors (where feasible). The reduced width of one-way road systems may require less grading and site alteration compared to two-way roads (figure 3–048).
- Include pulloff spaces at regular intervals to facilitate vehicle passing for single-lane roads with anticipated occasional two-way traffic in low development scale settings.
- Provide a clear and visible site entrance, along with adequate sight distances at intersections. Allow adequate queuing length at campground or fee site entrances to avoid vehicles stopping along access roads or highways. See FSH 7709.56—Road Preconstruction Handbook <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?7709.56> and AASHTO's 2023 "Guidelines for Geometric Design of Low-Volume Roads, 2nd Edition" <https://store.transportation.org/Item/CollectionDetail?ID=195> for further information.

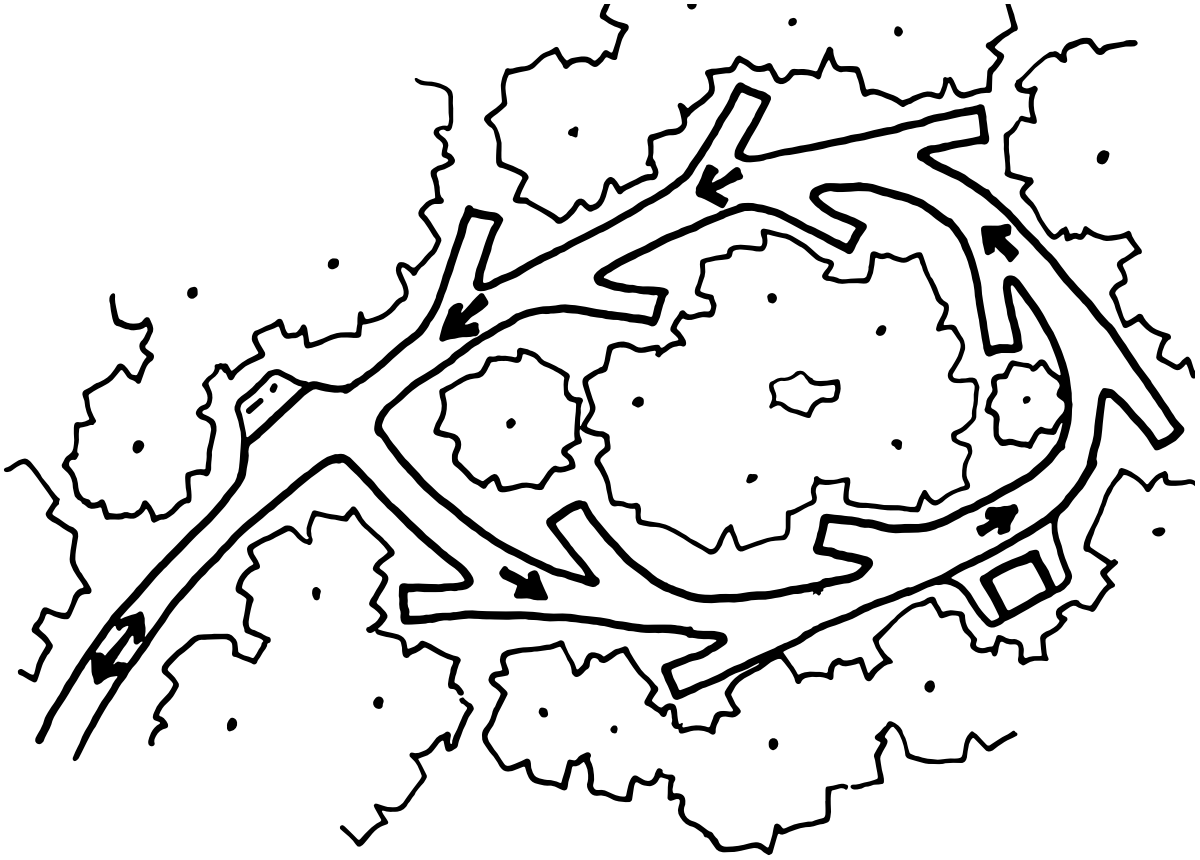


Figure 3–048—One-way vehicle loop roads, often used in campgrounds, can reduce vehicle conflicts and improve visitor experience.

- Consider providing an alternate vehicular ingress/egress route if a main route becomes blocked or to enable rapid evacuation (figure 3–049). Gate alternate routes for use only during emergencies.
- Provide distinct intersections and minimize the number of intersections. For every intersection, install stop signs and ensure clear visibility for oncoming drivers.
- Provide gate locations that enable closure of the entire site (or portions of the site) to vehicle access during "shoulder seasons" or in response to changes in conditions or use (figure 3–050)
- Always provide a method for securing gates open.
- Prioritize vehicle routes with right-turn traffic flow to minimize vehicle crossing points.

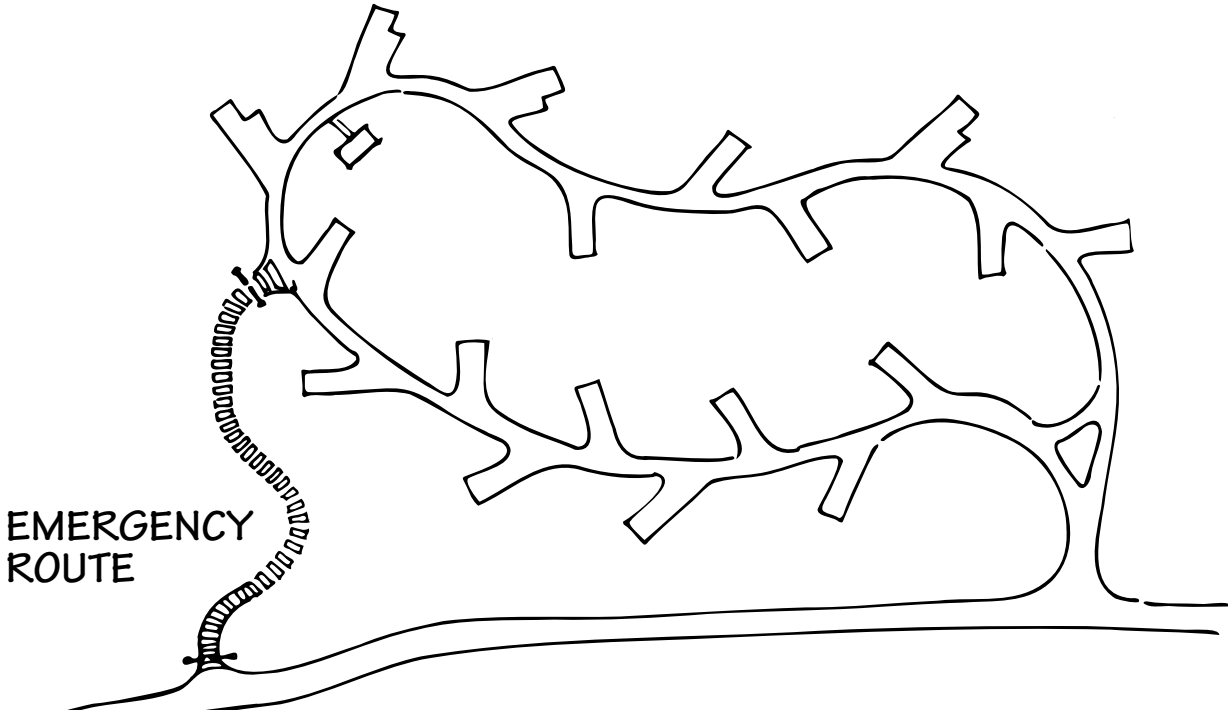
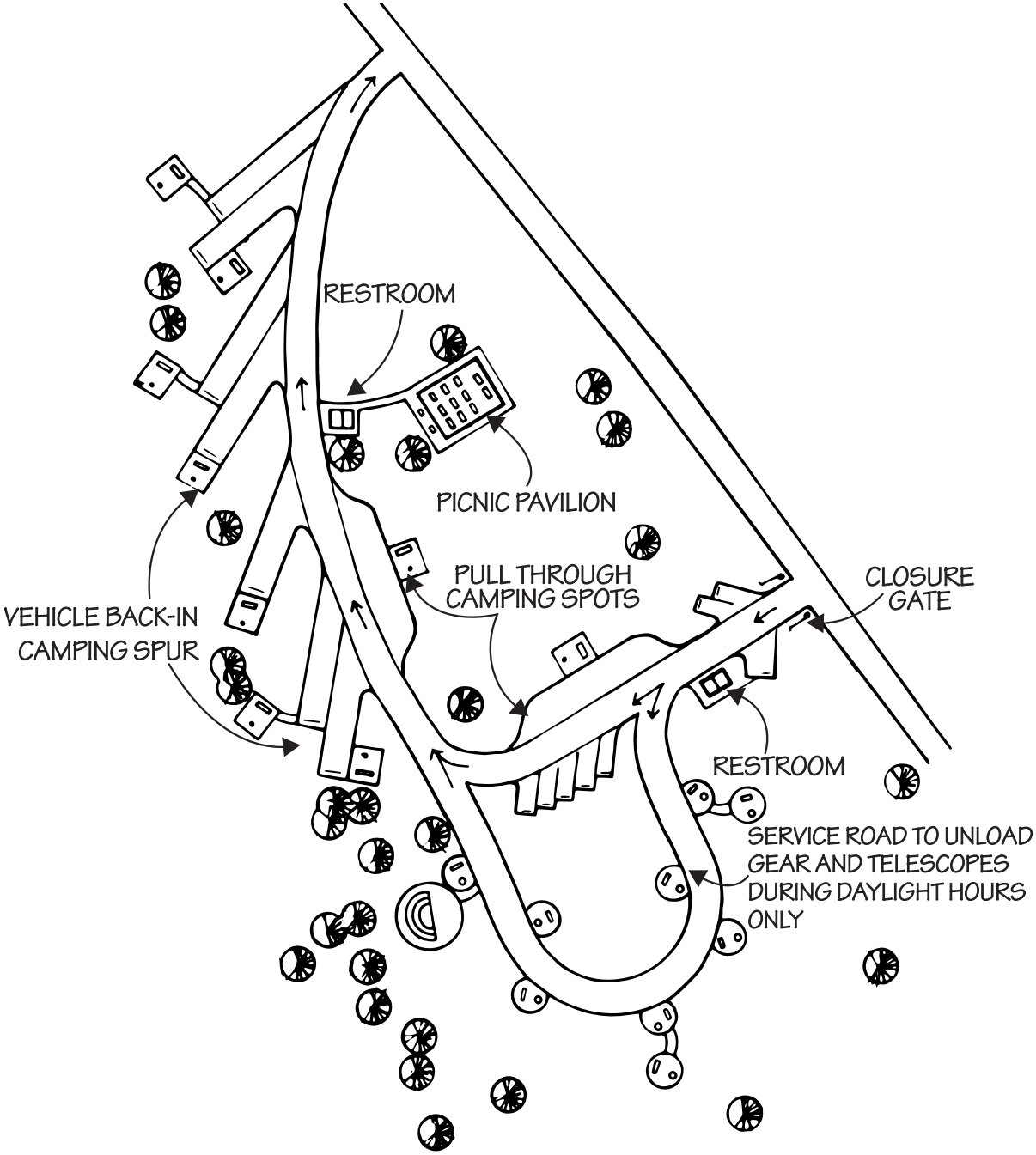


Figure 3–049—Consider providing an alternate emergency ingress/egress route for vehicles in case the single entry is blocked, or to facilitate an orderly evacuation.

Figure 3–050—Provide gates to enable closure of the site or portions of the site to public access.



- Always consider the direction and angle of vehicle headlights and their potential impact on visitor experience, especially at campgrounds and sites popular for astronomical viewing or enjoyment of night skies (figure 3–051).
- Always have a road design that allows a sufficient turning radius for the design vehicle, as well as for emergency and operations vehicles such as pumper trucks (figure 3–052).
- Always consider the ROS setting and development scale in designing barriers that limit vehicle access. An irregular placement of native boulders and limited use of large-dimensioned, rough-sawn posts may serve the purpose while preserving the site's scenic character. More developed settings could employ rustic fencing. Natural slopes or features can often serve the purpose of keeping vehicles on driving surfaces, eliminating the need for constructed barriers.

Figure 3–051—Consider potential impacts to campers from vehicle headlights entering the campground. The lower loop of this campground is designed specifically for astronomy enthusiasts. This illustration depicts the Dark Skies Campground, Gila National Forest.

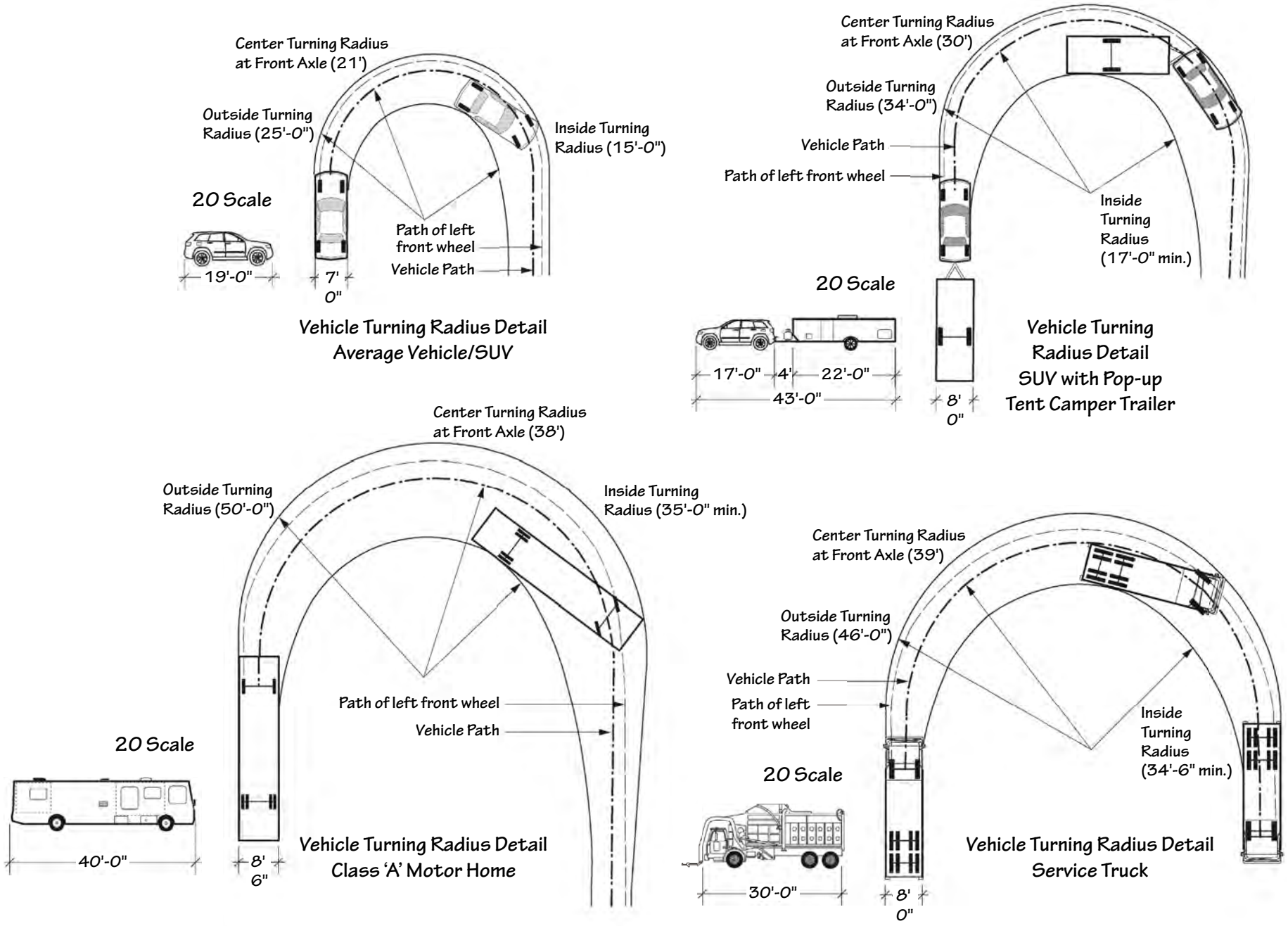


Figure 3–052—Identify the design vehicle the site is intended to serve and ensure road radii and other geometry meet that need.

Road Geometry

- Generally, design road grades at less than 8 percent, with a maximum of 5 percent preferable for road surfaces used as pedestrian routes. Short pitches can be up to 12 percent, depending on anticipated vehicle types and road-use volumes.

Road Surfacing

- Consider initial costs, lifecycle and maintenance costs, ROS setting, site development scale, and environmental impacts when choosing road surfaces. Document the rationale for proposed road surface choices (table 3–2).
- Limit the use of impervious surfaces. Roads and paths of asphalt pavement and concrete can help reduce erosion and annual maintenance needs, but involve considerable upfront and long-term maintenance costs. Use permeable surfaces or compacted aggregate where feasible.
- Remove all vegetation and organic material from the road profile to the extent possible in order to reduce future surface settling and maintenance requirements.
- Apply universal design principles when selecting road surface materials in locations that will serve as primary pedestrian routes, such as within a campground (figure 3–053).

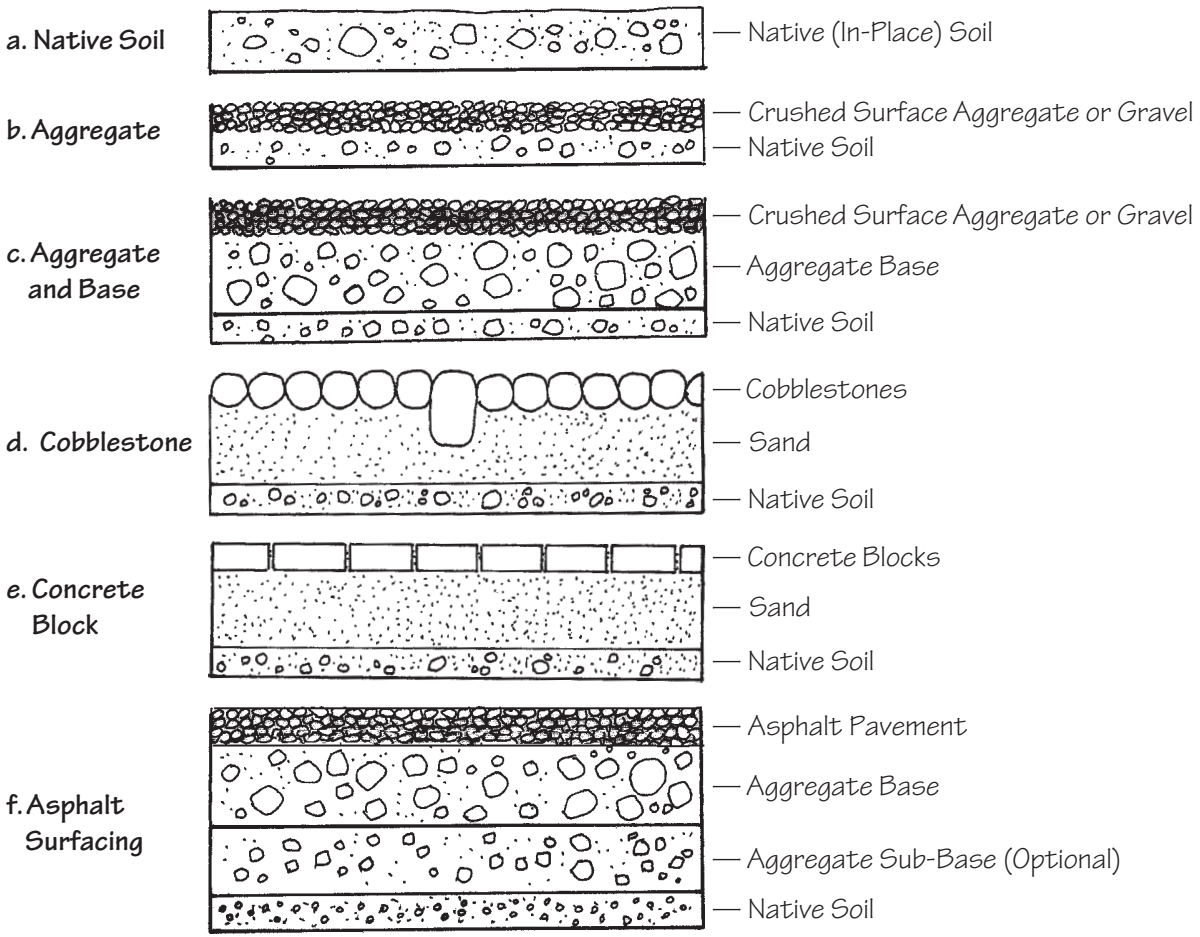


Figure 3–053—Different types of road surfaces require different subgrades and road profiles. Well-constructed subgrades greatly improve the sustainability of constructed roads. This illustration is from the "Low-Volume Roads Engineering Best Management Field Guide."

Table 3–2—Pros and cons of road surface types

Road surface material	Pros	Cons
Native soil	• Low initial cost • Complements scenic character of site	• Difficult to drain water from road • Can become rutted and a source of erosion • Can be difficult to restrict vehicle travel to designated route • Can generate dust • Local native soil may not meet geotechnical requirements for vehicle travel
Aggregate base	• Relatively low cost • Elevated and graded road profile can improve drainage • Complements scenic character • Compacted material is generally considered accessible • Can include recycled asphalt content	• Requires routine maintenance • Can generate dust
Chip seal	• Less expensive than asphalt or concrete • Elevated and graded road profile can improve drainage	• Bituminous adhesive can remain soft for extended period and can track on tires and feet • Typically not very thick and does not provide much structure or longevity • Stone chips can become dislodged from surface and require cleanup
Asphalt	• Relatively long-lived material if properly maintained • Elevated and graded road profile can control drainage • Reduces erosion and sedimentation • Material can be recycled for use as aggregate • Provides user comfort • Accessible surface • No dust	• Hot-mix asphalt plant proximity to jobsite will affect asphalt temperatures at install • Petroleum product has the potential to create environmental impacts, especially around riparian areas • Relatively expensive • Dark color can absorb and radiate summertime heat • Expensive long-term maintenance and replacement costs
Concrete	• Readily available material • Relatively long-lived material • Elevated and graded road profile can control drainage • Material can be colored and textured to complement scenic character • Reduces erosion and sedimentation • Material can be recycled for use as aggregate • User comfort • Accessible surface • No dust	• Expensive long-term maintenance and replacement costs • Expensive to remove

Table 3–2—Pros and cons of road surface types, continued

Road surface material	Pros	Cons
Porous asphalt and concrete	• Elevated and graded road profile can control drainage • Material can be colored to complement scenic character • Rough surface texture complements scenic character • Reduces volume of stormwater runoff	• Expensive material • Requires greater investment in subbase structure • Contractors may be unfamiliar with material • Difficult to repair • Porous material can fill with sediment, reducing drainage effectiveness; requires routine maintenance to maintain porosity

Road Drainage (also see section on Grading & Drainage)

- Design road drainage to be as unobtrusive as possible while carrying off stormwater to avoid damage to the site, the road, and other facilities.
- Maintain continuous natural contour and drainage patterns (as often as possible) from one side of the road to the other.
- Maintain road surface finished elevations above the surrounding finished surface to provide drainage from the road surface and to reduce excavation associated with the road profile.
- Design drainage structures and patterns to continue natural water flow patterns across the site (figure 3–054).
- Disperse, rather than concentrate, stormwater from road and parking areas (figure 3–055). Avoid using curbs unless you construct them with curb cuts to disperse stormwater flows.
- Minimize road crossings through natural water courses (figure 3–056). When unavoidable, consider wet and dry fords (low-water crossings) designed to carry full stream flow where practical. When using culverts, generally size them as large as feasible to handle larger flows and avoid blockages, which can cause extensive infrastructure damage.

Figure 3–054—This stream crossing accommodates the 100-year flood level and provides aquatic organism passage.

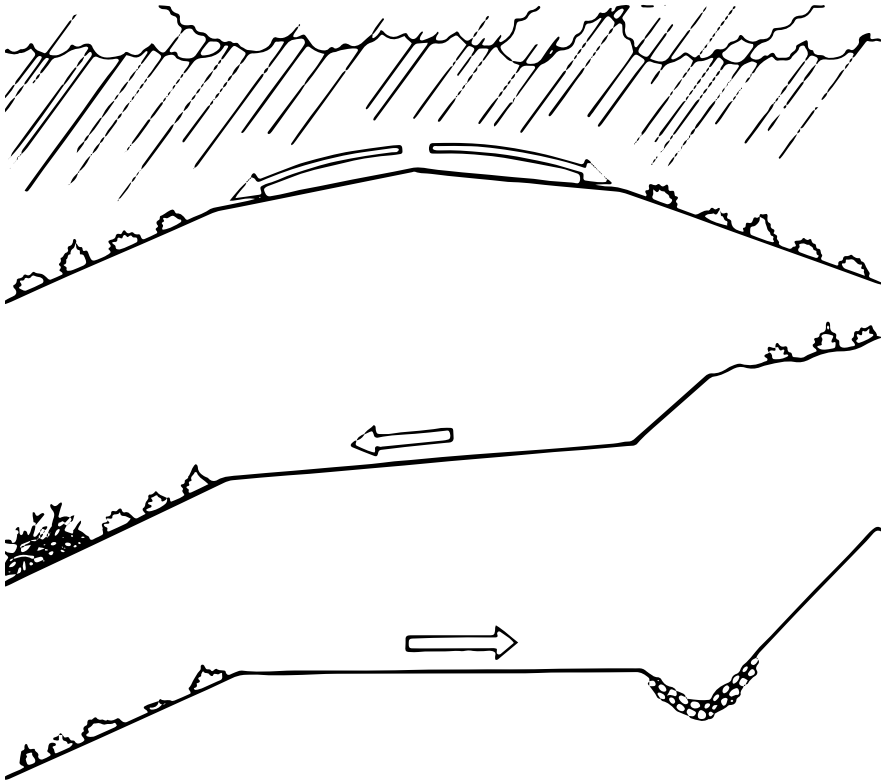


Figure 3–055—Intentionally design the way in which water will drain off a road surface. The crowned road (top) sheds water from a high point to both sides, the outsloped road (middle) drains across the road to the downslope, and the backsloped road (bottom) sheds to a drainage swale to be collected, infiltrated, and transported. This illustration is adapted from the "Low-Volume Roads Engineering Best Management Field Guide."

Parking

- Locate parking within 300 feet of the destination (generally).
- Provide a well-designed pedestrian path system from the parked vehicle toward the destination, with minimal need for wayfinding.
- Provide a safe and convenient dropoff spot for pedestrians in large or consistently busy parking areas.
- Avoid "hammerhead" or "deadend" parking where vehicles must navigate a U-turn. Providing a loop improves traffic flow, especially for larger parking areas (figure 3–057).
- Design parking areas with a single two-way entrance, where possible.
- Clearly mark parking spaces that are designated for trailers, large RVs, or buses.
- Locate parking areas to take advantage of microclimate conditions (e.g., summertime shade to cool asphalt or springtime sun to melt late snowfall).
- Design limited overflow parking areas for short-term or occasional use.
- Consider adding electric vehicle charging stations in higher development scale sites.

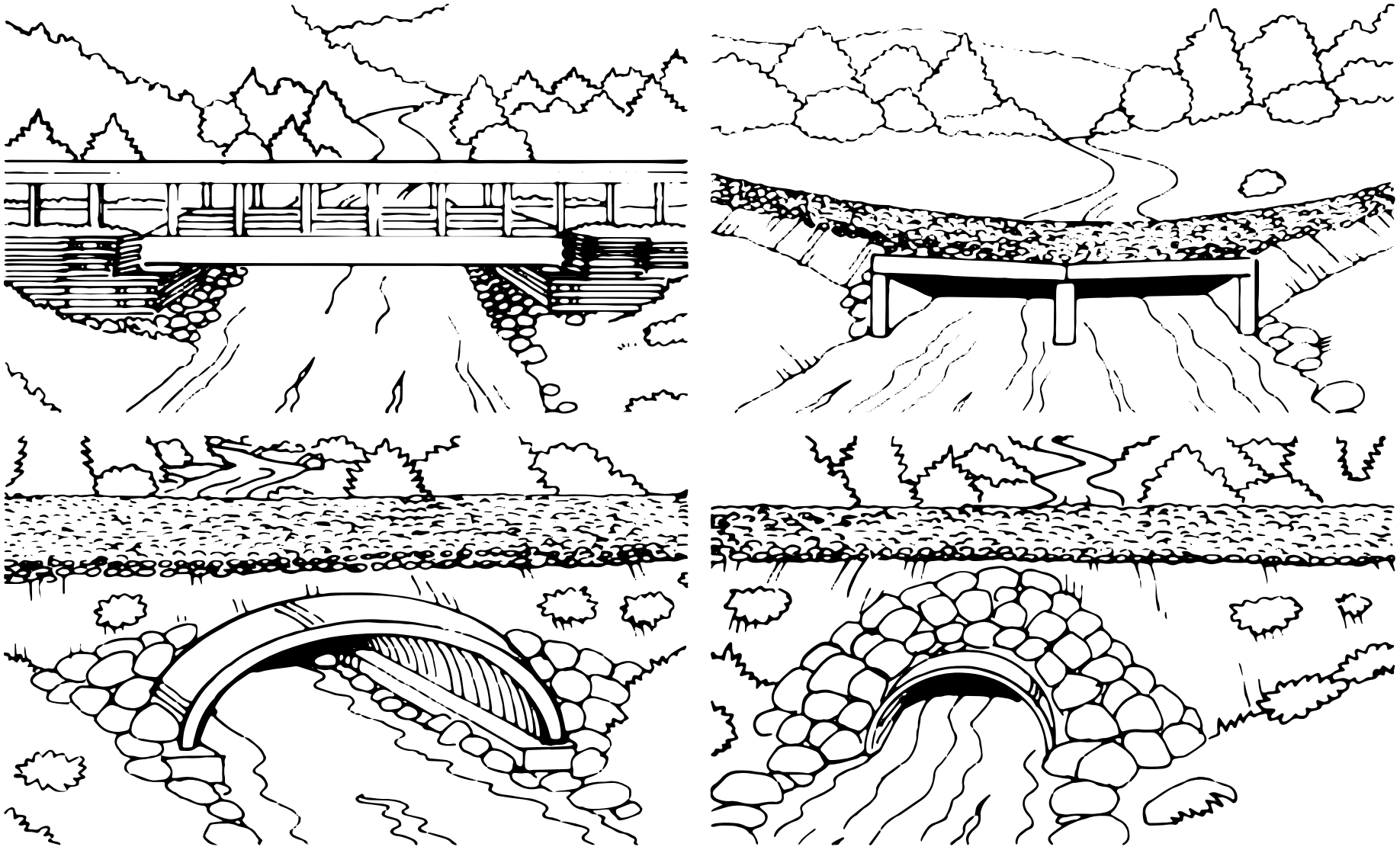


Figure 3–056—Four examples of road crossings: bridge (upper left); box culvert (upper right); bottomless arch (lower left); culvert (bottom right). Design crossing elevations to prevent downstream scouring and to prevent barriers to aquatic organism passage. These illustrations are adapted from the "Low-Volume Roads Engineering Best Management Field Guide."

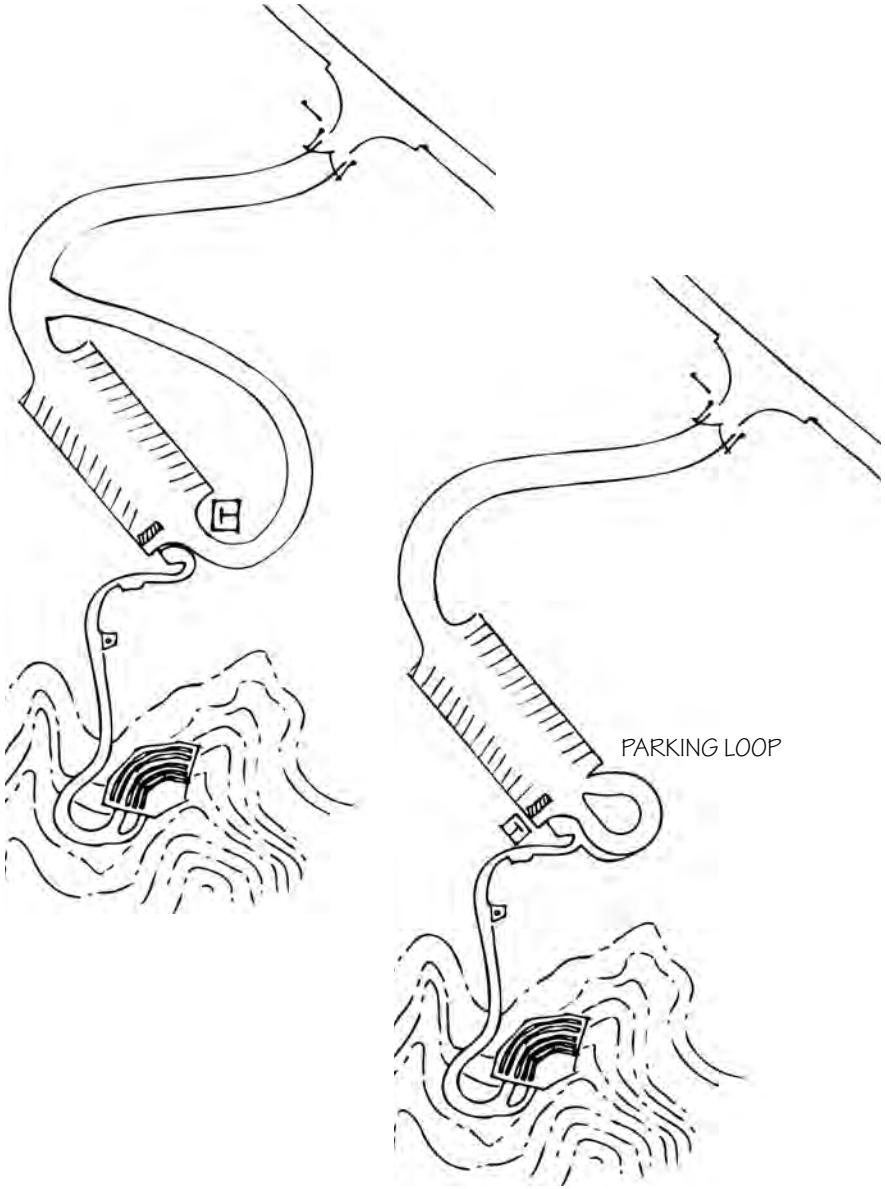


Figure 3–057—Providing a loop at the end of a parking lot improves circulation. Especially important in amphitheaters or other locations where many people will leave at the same time.

Parking Stall Configurations

Consider efficient use of paving materials and evaluate tradeoffs when making sustainable recreation design decisions. Angled parking stalls that result in a zigzag edge may cost more to install and have higher maintenance associated with more linear feet of pavement edge. Designing "excess pavement" with a straighter edge may offer a more sustainable solution.

- Design parking stalls to be typically 10 feet wide by 20 feet long.
- Allow a 25-foot aisle width for perpendicular parking to facilitate vehicle maneuvering.
- Design parking for boat- or trailer-towing vehicles and buses beginning at dimensions of 12 feet by 50 feet and provide for pullthrough parking whenever practical. Avoid perpendicular parking for these vehicles. For longer stays, angled parking may offer a reasonable solution (figure 3–058).
- Delineate parking spaces in sites with higher development scales to encourage efficient use of the parking area. In unpaved areas, use wheel stops or other measures to designate intended parking patterns (figure 3–059).
- Designate required accessible parking spaces in parking lots with surface marking and signage (figures 3–060 and 3–061).
- Use the blue international symbol of accessibility signs and painting (as required) where local law enforcement will enforce violations. Alternate designations, such as brown and yellow signs, may be appropriate for the setting in Forest Service-managed sites.
- Always include the required number of accessible parking spaces for vans and vehicles in developed parking areas (table 3–3). Refer to the Architectural Barriers Act Accessibility Standards and Forest Service Outdoor Recreation Accessibility Guidelines for regulatory requirements.

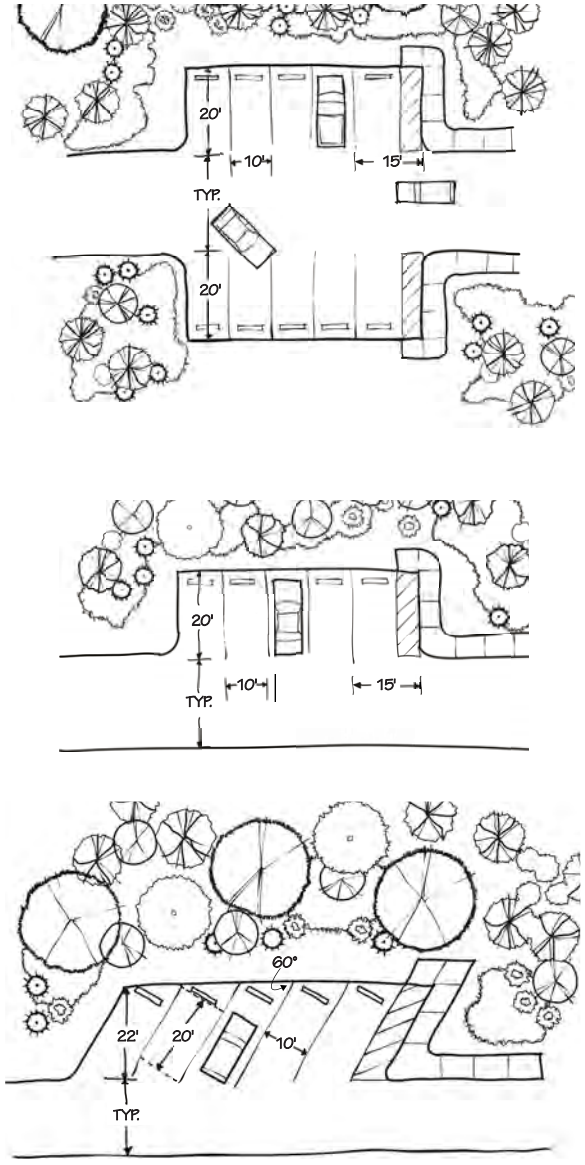


Figure 3–058—Design parking configurations to meet the use demands and character of a particular location.

Figure 3–059—Delineate parking stalls by using finish grading stakes, "marking whiskers" (left), staked reflector domes, or wheel stops (right) to replace paint striping in aggregate or native surface parking areas. Staked materials require routine maintenance.

Figure 3–060—Identify accessible parking spaces using the international symbol of accessibility. Refer to the Architectural Barriers Act and the Forest Service Outdoor Recreation Accessibility Guide for requirements on painting asphalt.

Figure 3–061—There is no legal requirement for the international symbol of accessibility (ISA) to be posted in blue and white on federally managed lands. However, the ISA must be posted in high contrast colors. Yellow on brown or cream on brown blend well into the forest setting, while providing the required contrast.

Table 3–3—Number of accessible spaces required based on number of total parking spaces

Total parking spaces	Required accessible parking spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6

Forest Service employees can access vehicle barrier details on the National Recreation Facilities Drawing Library website. See Further Reading on page 110.

Road Barriers

- Use barriers only when necessary to protect resources or safety. Do not use constructed barriers where natural barriers such as shrubs, trees, boulders, or sloped edges exist (figure 3–062). In limited situations, use soil mounding or earth berms as a vehicle barrier, blending with the natural topography as appropriate. In some cases, carefully located paths and roads do not require barriers.
- Locate barriers 3 to 5 feet from the road edge to prevent vehicle damage and inadvertent damage to the barriers. Combine types of barriers such as logs and boulders with vegetation to meet traffic control needs.
- Maintain 36 inches of minimum clearance between barriers.

Rock and Boulder Barriers

- When possible, use native boulders from a local source (figure 3–063). Designers commonly use boulders in recreation sites, especially if the natural terrain includes boulder outcroppings.

Use of Vegetation as a Barrier

Vegetation as a barrier usually fits best with the surrounding environment. Creating that barrier follows a three-step process:

- **Step 1**—Install a temporary artificial barrier to stop existing vehicle access and to provide appropriate growing conditions for the vegetation.
- **Step 2**—Establish plantings that will grow into an effective barrier.
- **Step 3**—Remove the barrier from step 1 after the vegetation is established and conceals most evidence of the previous access.

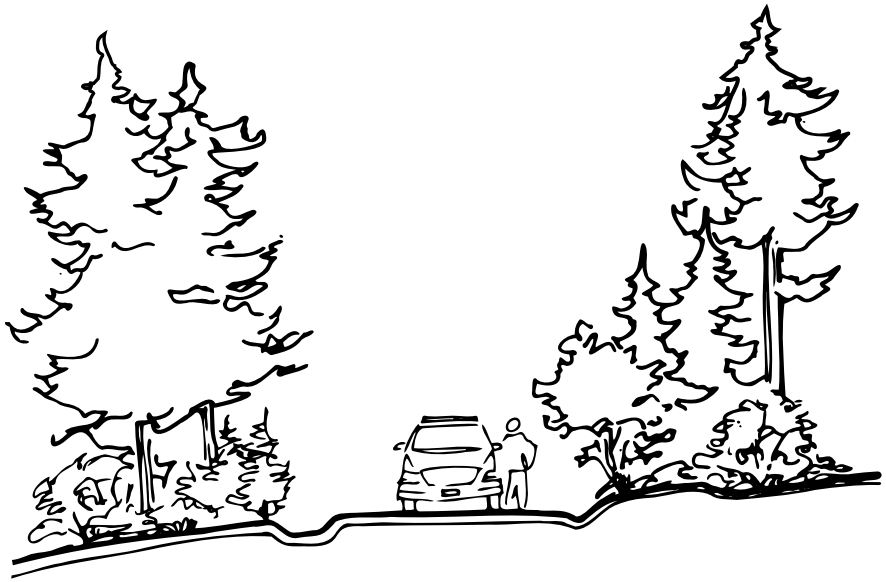


Figure 3–062—Recreation site roads maintain naturally vegetated edges beyond the travel way and allow water to move across the site with minimal disruption.

Figure 3–063—A mixture of boulders and vegetation serve as barriers to vehicle travel off roads.

- Bury boulders in the ground (from 30 to 50 percent of the height of the boulder) to create a natural appearance. Place boulders with the desired face of the boulder exposed, with the natural lie of the stone, and with the longest side parallel with the grade. Locate boulders in groups of odd numbers—one, three, five, etc. (figure 3–064).
- Avoid placing boulders in straight lines and at regular intervals. Vary the spacing between boulders from 36 to 60 inches.

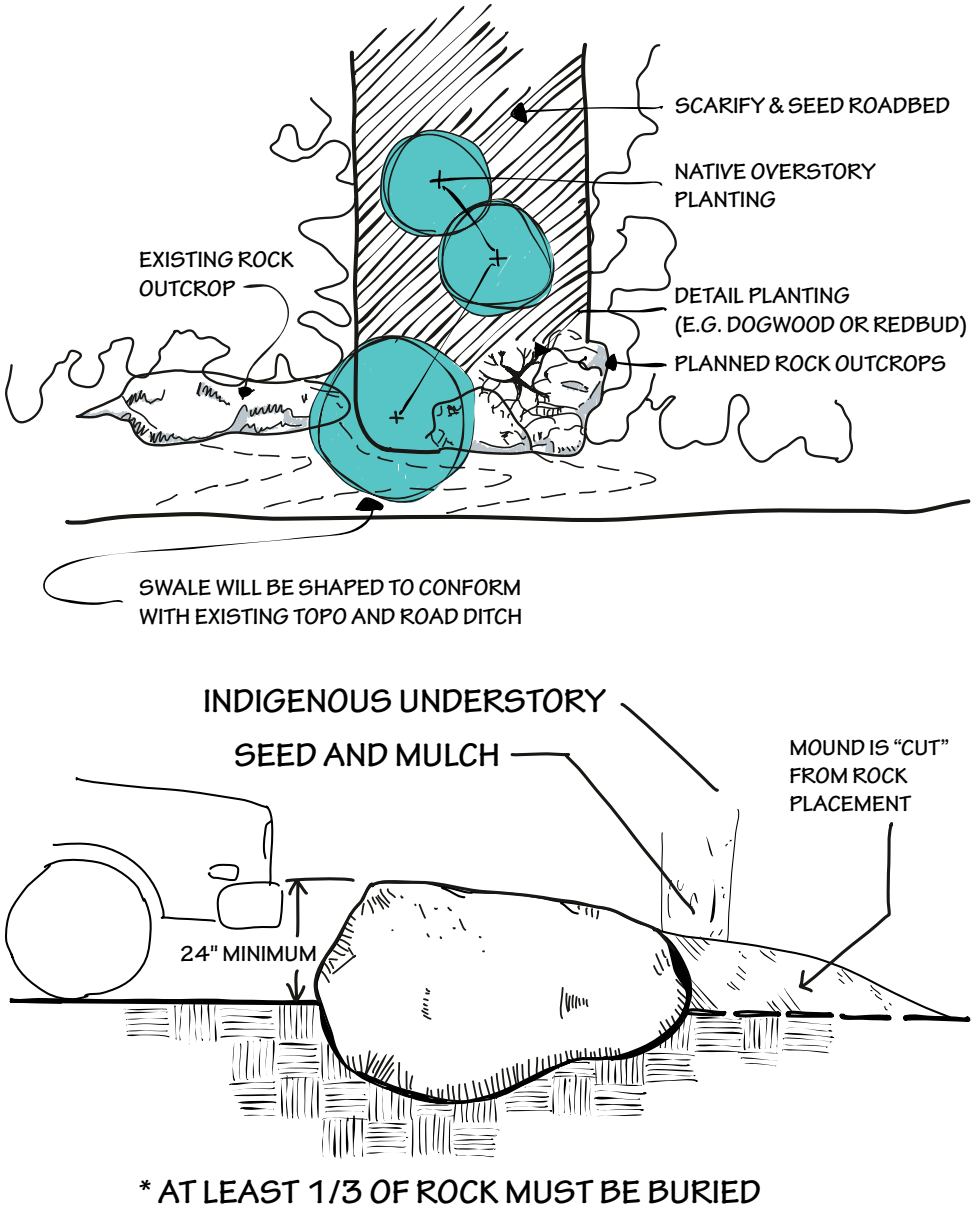


Figure 3–064—Use boulders and vegetation to protect areas from vehicle impacts. These illustrations are from the "Visual Aspects of Road Closure."

Log Barriers

- Create log barriers by placing straight logs directly on the ground, connected to an anchor chain or steel cable (if necessary). These logs, generally 12 inches or more in diameter, may be treated with chemicals to resist insect and wood rot damage; allow untreated log barriers to weather naturally. Logs barriers can survive numerous seasons. Readily available logs can provide barriers along roads and parking lot edges and can also provide traffic control in open fields. The size and weight of the logs typically dissuade people from moving them. Limit log barriers in campground settings where they can pose a pedestrian tripping hazard, especially at night.
- Position log barriers on supports at vehicle bumper height. Maintain 36 inches of separation between barriers to allow pedestrian traffic while preventing vehicles from entering protected areas.

Post Barriers

- Design wood post barriers with large posts, 8 to 10 inches wide and up to 6 feet long. Bury the posts in compacted soil, with 18 to 24 inches exposed above grade. Cut the tops of posts at a slight angle away from primary view to provide a more natural appearance and to shed water.
- Use rot-resistant wood or chemically treat posts to reduce damage from insects and wood rot.
- Stain posts to improve visual compatibility with the landscape character. Consider using rough-sawn lumber.

- Place post barriers with irregular spacing and group in odd numbers. Place posts as close as 4 feet apart. Avoid long, extended lines of log posts; break up the line patterns with soil mounding, native shrub planting, boulders, or other barrier types to create a more natural appearance.
- To permit administrative access behind road barriers, consider installing removable bollards locked in place but light enough for one or two people to move. Removable bollards can range in material and design.

Fences

- Rustic fence designs most suited for recreation settings include post and rail, log worm, post and pole, and buck and pole, using rough-hewn or rough-sawn wood (figures 3–065 and 3–066).

Figure 3–065—Use rustic fences to discourage access to sensitive areas while complementing local scenic character.

Pedestrian Paths

Developed sites can feature a variety of pedestrian paths, as appropriate for different accessibility requirements. Outdoor recreation access routes (ORARs) connect the outdoor constructed features within each recreation unit and connect to common-use features such as toilets, showers, water hydrants, trash or recycling receptacles, parking spaces, and beach access routes. Following the requirements in the "Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG)", ORARs are a minimum of 36 inches wide with a grade of less than 5 percent (the FSORAG defines some exceptions). Some developed recreation sites also include trails. Trails may provide access to a river, lake, a similar natural feature, or other attraction. Trails must comply with the guidelines in the "Forest Service Trails Accessibility Guidelines (FSTAG)."

Path Function

- Design the site to encourage walking between features (figure 3–067). Separate vehicles and pedestrians as often as possible.
- Determine who uses the paths—individuals, couples, groups, or any of these sharing a path with bicycles.
- Retain and enhance access points to surrounding trails.
- Design routes for everyone to use and enjoy, including people with disabilities. Avoid creating separate paths for visitors with disabilities—design for integrated experiences to comply with accessibility requirements.

Path Layout and Alignment

- Provide clearly defined and direct routes to site facilities—including toilets, water hydrants, and refuse containers—to avoid user-created "social trails." Pedestrian routes must comply with FSORAG requirements for ORARs (figure 3–068).

Figure 3–066—Fences can take many forms, depending on the requirements of the site.

Figure 3–067—In this campground, a pedestrian trail network links the multiple amenities and camping loops in the recreation complex.

- Design with and complement the natural features and topography of the site. Curved paths that respond to the topography can harmonize with the setting.
- Design for the visitor's experience at the site—including the path of travel, spatial relationships of the constructed features, and the site's appearance—while applying accessibility standards.
- Document environmental conditions, settings, or cultural features that prevent achievement of accessibility standards for accessible routes. The responsible official should review and sign this documentation and the rationale for the departure conditions and include it in the project file and facility records. The document should also be available for reference in the database of record.
- Recognize that required accessibility standards only address minimum requirements. Exceeding these minimum requirements (such as providing additional clear area) may be appropriate to provide a high-quality experience, satisfy recreation goals, or aesthetically fit into a setting (figure 3–069).
- Avoid sign pollution but provide easy-to-understand wayfinding signage where necessary (figure 3–070).

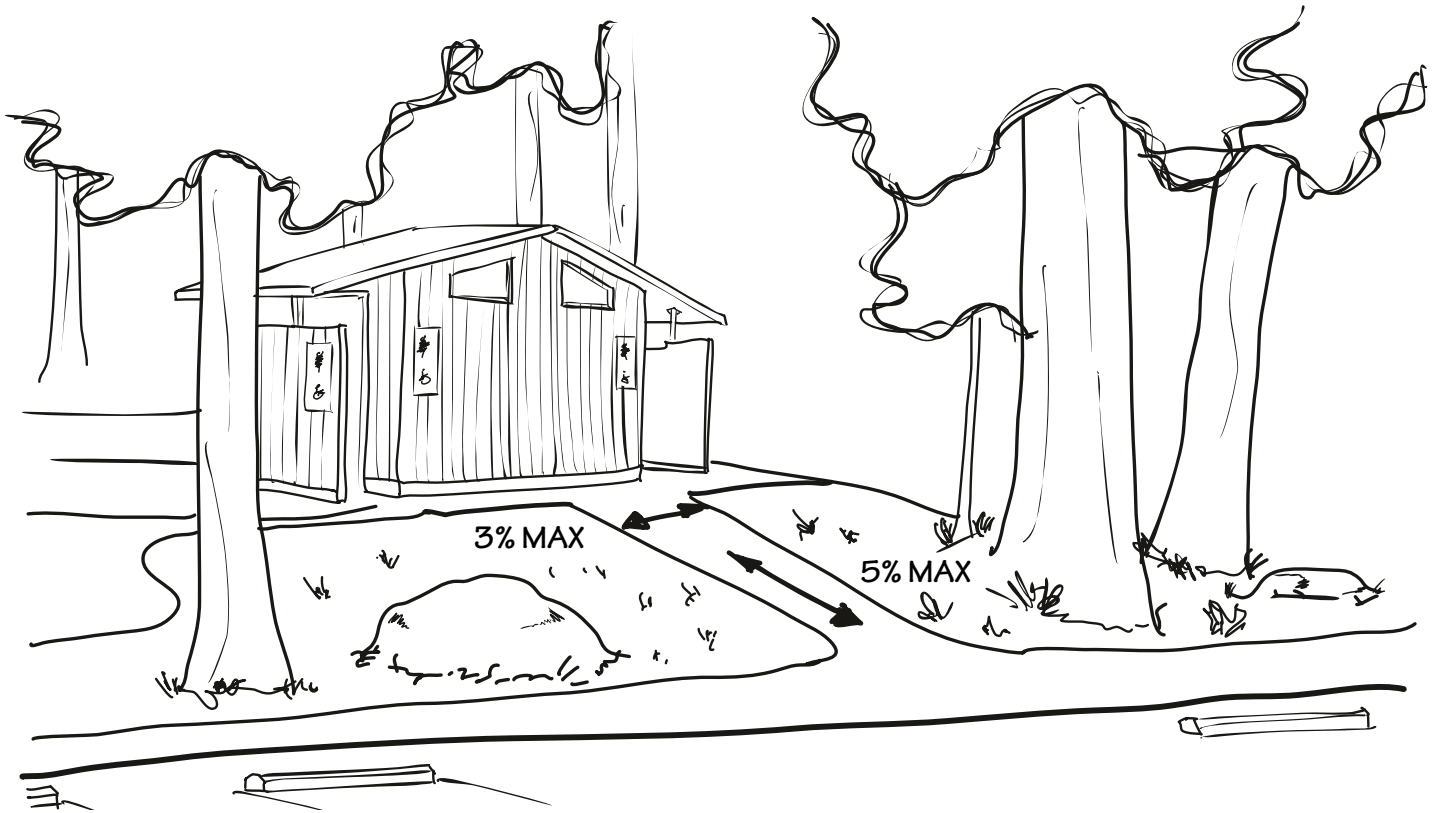


Figure 3–068—Design paths that all visitors can use, including those with disabilities. This illustration is from the "Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) Pocket Version."

Figure 3–069—Outdoor recreation access routes provide universal access for all visitors.

Figure 3–070—Provide easy-to-understand wayfinding signage.

Universal Design

Universal design—a fundamental condition of sustainable design—creates an environment that is accessible, understood, and used to the greatest extent possible by all people, regardless of their ability or disability, age, or size. All individuals benefit when a design makes an environment accessible, convenient, and a pleasure to use.

Path Geometry

- The Architectural Barriers Act (ABA) prescribes grade requirements for path of travel within and around buildings:
  - Up to 5 percent running slope
  - Up to 2 percent cross slope
- The FSORAG outlines grade requirements for path of travel within developed recreation sites. Specifications for ORARs that connect recreation features and amenities include:
  - **Width**–Paths should be a minimum of 36 inches wide.
  - **Passing spaces**–Paths less than 60 inches wide shall provide passing spaces at intervals of 200 feet or less.
  - **Running slope**–Paths with less than 5 percent slope are fully accessible and require less maintenance. Slopes up to 8.33 percent are permitted for up to 50 feet of path before requiring a resting interval. Paths with up to 10 percent slope are permitted for up to 30 feet of path.
  - **Cross slope**–Where the path surface is paved or elevated above the natural ground, cross slopes shall not exceed 2 percent slope. Where the path surface is flush with the surrounding natural ground, cross slopes shall not exceed 3 percent slope.

Path Profile and Surface

- Construct the path surface to be firm and stable to comply with accessibility requirements. This requirement applies to average conditions during periods of use. If rainstorms infrequently saturate the site, materials such as native soil or compacted, decomposed granite can meet accessibility requirements (figure 3–071).
- Ensure that tread obstacles (obstacles in a native surface or aggregate path) do not exceed 1 inch in height. Obstacles in paved or elevated paths shall not exceed ½ inch in height.

Figure 3–071—Various firm and stable surfaces that comply with accessibility requirements.

- Consider factors that may impact accessibility in the years after project completion, such as erosion, settling of grades, tree root growth or decay, capacity to provide regular maintenance, and potential deferred maintenance. Anticipate how design choices may remain compliant with accessibility standards under these conditions.
- Discuss and document the rationale for the proposed path surface. Consider initial costs, lifecycle and maintenance costs, ROS setting, and site development scale.
- Avoid loose and unconsolidated path surface materials, including sand; sawdust; volcanic cinders; mulch or wood chips; loose, crushed rock; pebbles; or pea gravel.
- Design for appropriate surface stability, including subgrade (figure 3–072, table 3–4).
- Consider using header boards to help sustain surface materials other than concrete. Redwood and cedar, boards composed of recycled plastic, and steel edging all have different degrees of flexibility and durability.

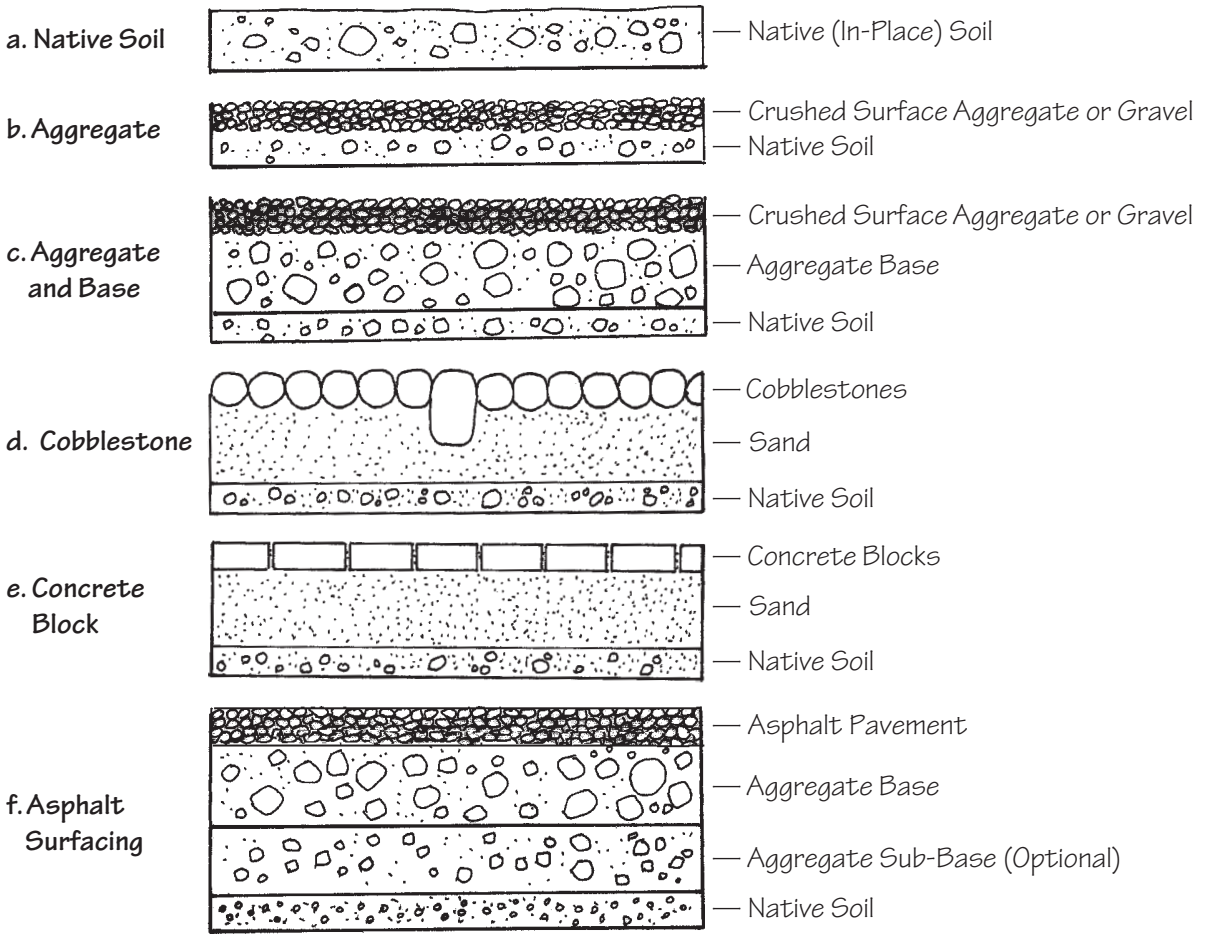


Figure 3–072—Different path surface materials require different subgrade preparation. Well-constructed subgrades greatly improve the sustainability of constructed paths. This illustration is from the "Low-Volume Roads Engineering Best Management Field Guide."

Table 3–4—Surface materials for paths

Material type	Pros	Cons
Manufactured pavers	• Readily available material • Depending on color, shape, and texture, may complement scenic character	• Relatively expensive • May require embedding in concrete or constraining with header board • Less suitable in lower development scale settings
Stone	• Readily available material • Can complement scenic character	• Difficult to install and maintain in a manner consistent with accessibility requirements • Relatively expensive • May require embedding in concrete
Concrete	• Readily available material • Relatively long-lived material • Elevated and graded path profile can control drainage • Reduces erosion and sedimentation • Material can be colored and textured to complement scenic character • Compacted material is firm and stable for accessibility compliance • Material can be recycled for use as aggregate	• Expensive material • Difficult to repair • Less suitable in lower development scale settings
Permeable pavements (including asphalt and concrete)	• Elevated and graded path profile can control drainage • Material can be colored to complement scenic character • Rough surface texture complements scenic character • Compacted material is firm and stable for accessibility compliance, as long as surface variations are less than ½ inch high • Reduces volume of stormwater runoff	• Expensive material • Requires greater investment in subbase structure • Difficult to repair • Contractors may be unfamiliar with material • Porous material can fill with sediment, reducing drainage effectiveness; requires routine maintenance to retain porosity • Less suitable in lower development scale settings
Asphalt	• Readily available material • Relatively long-lived material • Elevated and graded path profile can control drainage • Relatively easy to repair • Reduces erosion and sedimentation • Firm and stable for accessibility compliance • Material can be recycled for use as aggregate	• Relatively expensive • Hot-mix asphalt plant proximity to jobsite will affect asphalt temperatures at installation • Petroleum product has potential environmental impacts, especially around riparian areas • Dark color can absorb and radiate summertime heat • Without use of header boards, pavement edges can crumble • Less suitable in lower development scale settings

Table 3–4—Surface materials for paths, continued

Material type	Pros	Cons
Aggregate base	• Relatively low cost • Elevated and graded path profile can improve drainage • Complements scenic character • Suitable in most development scale settings • Compacted material is generally considered firm and stable for accessibility compliance • Can include recycled asphalt content	• Requires routine maintenance • Can generate dust • Requires use of header boards to maintain compaction on edges
Decomposed granite/ crusher fines	• Stable if compacted and maintained • Can complement scenic character • Stability can be increased with binder additives • Easy to install • Easy to maintain • Compacted material is generally considered firm and stable for accessibility compliance • Suitable in most development scale settings	• Requires use of header boards to maintain compaction on edges • Requires routine maintenance • May temporarily lose stability when wet
Wood decking	• Can complement scenic character • Commonly available material • Relatively easy to construct and maintain • Considered firm and stable for accessibility compliance	• Requires regular maintenance • Pressure-treated wood can have negative environmental effects • Unmaintained wood can become safety hazard
Compacted native soil	• Low initial cost • Complements scenic character of the site • Suitable in most development scale settings	• Can be difficult to drain water from path • Can become rutted and a source of erosion • Can generate dust • Depending on compaction capacity, may not be firm and stable and may not meet accessibility requirements
Turf grass	• In some settings, can complement scenic character • Minimizes erosion and sedimentation • High degree of stormwater infiltration	• Can be difficult to negotiate if wet, unmowed, or unmaintained • Requires irrigation and routine maintenance in most settings • Depending on native soil compaction capacity, may not be firm and stable and may not meet accessibility requirements

Considering Firm and Stable Surfaces

Does a surface have to be firm and stable in all conditions? No. The surface must be firm and stable in average conditions. A firm and stable, accessible path may become saturated and unstable during rain events but should dry relatively quickly and return to its firm and stable condition.

Providing firm and stable surfaces that are accessible requires maintenance of the path surfaces. Remove leaf and pine needle accumulations before they become deep enough to create a barrier to accessible use.

Further Reading

- Accessibility Guidebook for Outdoor Recreation and Trails (AGORT) https://www.fs.usda.gov/sites/default/files/Accessibility-Guide-Book.pdf
- Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) Pocket Version https://www.fs.usda.gov/t-d/library-card.php?p_num=1523%202811
- Forest Service Trails Accessibility Guidelines (FSTAG) Pocket Version https://www.fs.usda.gov/t-d/library-card.php?p_num=1523%202812
- The Built Environment Image Guide for the National Forests and Grasslands https://www.fs.usda.gov/recreation/programs/beig
- Geosynthetics for Trails in Wet Areas: 2008 Edition https://www.fs.usda.gov/t-d/pubs/pdfpubs/pdf08232813/pdf08232813dpi72.pdf
- National Recreation Facilities Drawing Library https://fsweb.sdtdc.wo.fs.fed.us/programs/rec/recdrawing/landscape_elements.html
- Vehicle Barriers: Their Use and Planning Considerations https://www.fs.usda.gov/t-d/pubs/pdf/06231201.pdf
- Low Volume Roads Engineering: Best Management Practices Field Guide https://www.fs.usda.gov/t-d/programs/forest_mgmt/projects/lowvolroads/

Grading & Drainage

Natural topography and water patterns form the basis of a sustainable recreation site and are a central component of valued scenic character. Modifications, through design choices needed to sustain facility investments and facilitate desired use and accessibility, consciously manipulate site contours and shape the site's long-term structure for sustainable recreation outcomes.

Sustainable recreation design values and respects the central role water plays in shaping and supporting a landscape and its sense of place. Design uses the natural landscape as a model, considering upstream and downstream conditions to influence decisions that alter landforms and how water moves within a recreation site.

Desired Sustainable Recreation Outcome

Grading and drainage solutions minimize impacts to natural topography, naturally occurring hydrologic patterns, site vegetation, and site character, while also providing stable slopes that serve desired uses. Minimally alter site slopes as needed to consciously direct and disperse stormwater runoff, avoid undesired concentrations or collections, and protect and increase the longevity of constructed features. Stormwater runoff from precipitation and snowmelt continues to sustain the ecological integrity of developed recreation settings.

Grading

Grading to modify the landscape has lasting effects and must be accomplished with care.

Topography and Setting

- Maintain natural topography, soil profiles, drainage patterns, and native vegetation as often as possible. Return to natural grade, with natural variation in surface, as often as possible.
- Determine if the existing grades are appropriate for developing a recreation site. Existing grades of more than 15 percent are considered unsuitable without extensive grading. Areas with slopes of 8 to 15 percent require significant investment and site alteration to establish sustainable recreation settings.
- Identify constraints that will affect potential grading design, such as:
  - Subsurface bedrock or large boulders
  - High groundwater
  - Tree roots and base elevations of valued character trees
  - Underground utilities
  - Archaeological or heritage resources
  - Feasibility of importing or exporting material
- Mimic the natural site characteristics and variations of ground surface, slope, and landform, and meet surrounding natural grade when blending manipulated topography with the natural surroundings. This may increase the footprint of disturbance but result in better long-term integration of the site within the landscape.

Cut and Fill

- Investigate alternative onsite locations and layouts of facilities or elements of facilities to minimize grading and avoid the need for cut and fill, while also accomplishing design goals (figure 3–073).

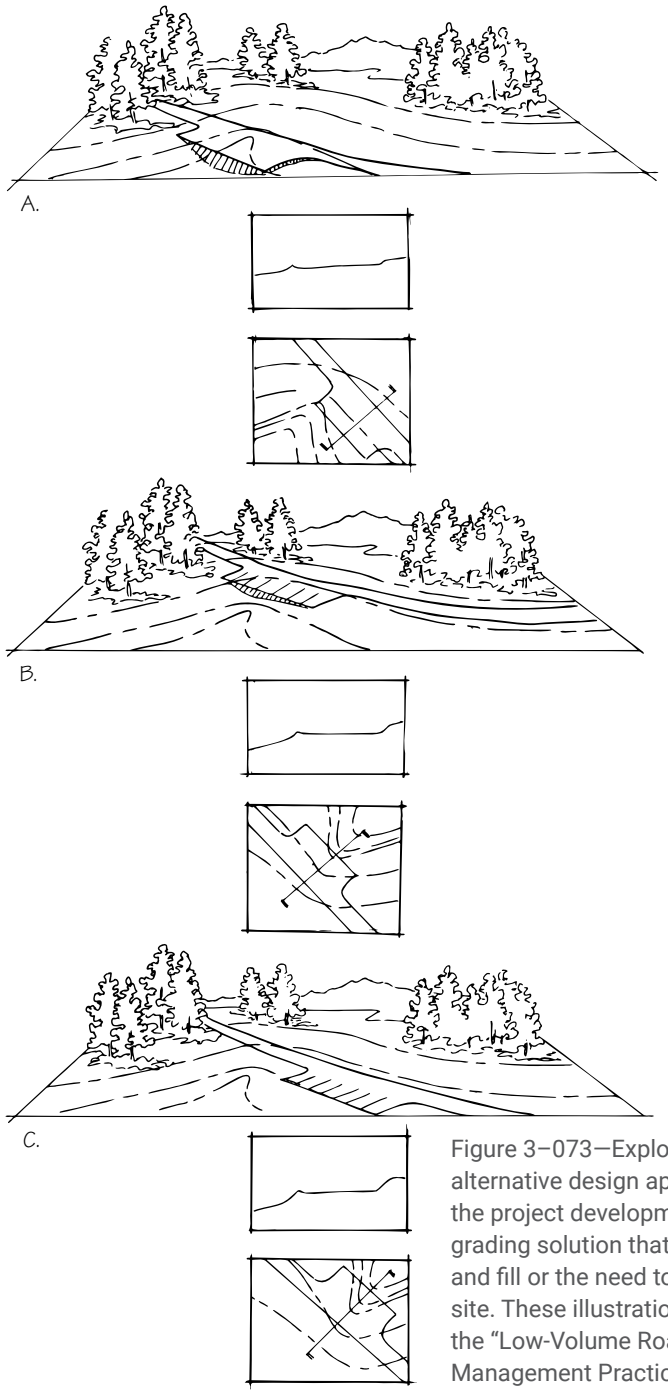


Figure 3–073—Explore and evaluate alternative design approaches early in the project development process to find a grading solution that reduces necessary cut and fill or the need to borrow from another site. These illustrations are adapted from the "Low-Volume Roads Engineering Best Management Practices Field Guide."

- Balance grading cut/fill volumes to reduce the import and export of materials. Include grading quantities, with total import or export of material, in contract documents.
- Verify that imported material is weed free.

Slopes

- Minimize steep slopes on roads, pathways, use areas, and cut/fill slopes. Investigate alternative locations and site facility solutions to avoid steep slopes and retain natural topography as often as possible.
- Aim for running slopes of less than 5 percent when planning a road for a pedestrian circulation route.
- Design pedestrian travel routes consistent with ORARs described in the FSORAG, unless doing so would fundamentally alter the site character or recreation opportunity offered at that site.
- Limit the slope of pedestrian/visitor use areas to 3 percent. Limit use area slope to 2 percent around buildings.
- Reduce the size of larger graded areas, such as parking lots, and provide multiple smaller areas to minimize the need for grading and retaining walls.
- Design the sloped surface of all cuts and fills for long-term stability. Where possible, avoid cut and fill slopes with more than a 3-to-1 ratio. Incorporate terraces, stone armoring, or other measures to hold the soil in place.
- Taper any cut banks to have a contour that appears natural (to the extent possible) and to blend with the surrounding natural topography. Incorporate small depressions in the soil slope surfaces around existing or planted vegetation to collect water and help establish desired plants.

- Limit the use of retaining walls. Assess changes in the siting of facilities or parking areas to avoid or minimize wall construction. When constructing retaining walls, consider creating terraces to reduce the size and structural complexity of required walls. Consider installing local boulders to retain slopes where required and to minimize the use of wood, which deteriorates over time.

Elevations and Profiles

- Include required road and path shoulders in the grading design.
- Establish road, path, and structure finished surface elevations slightly higher than surrounding surfaces. Grade road and path surfaces to drain consistent with accessibility standards.
- Specify the removal of organic material in structure or pavement locations to prevent future decomposition and decrease long-term maintenance. If native soils do not provide the structural stability required, excavate and replace them with appropriate base material.
- Stockpile graded topsoil and use it to replace top profiles of newly graded areas beyond the structure and pavement locations.

Grading Around Buildings

- Grade slope adjacent to buildings away from the buildings to ensure positive drainage and eliminate erosive effects, standing water, and potential flooding.
- Consider tapering the pavement edge below grade (Van Horn roll) to maintain accessibility and reduce long-term maintenance related to future changes in surface condition where paved building access paths meet native soil (figure 3–074).

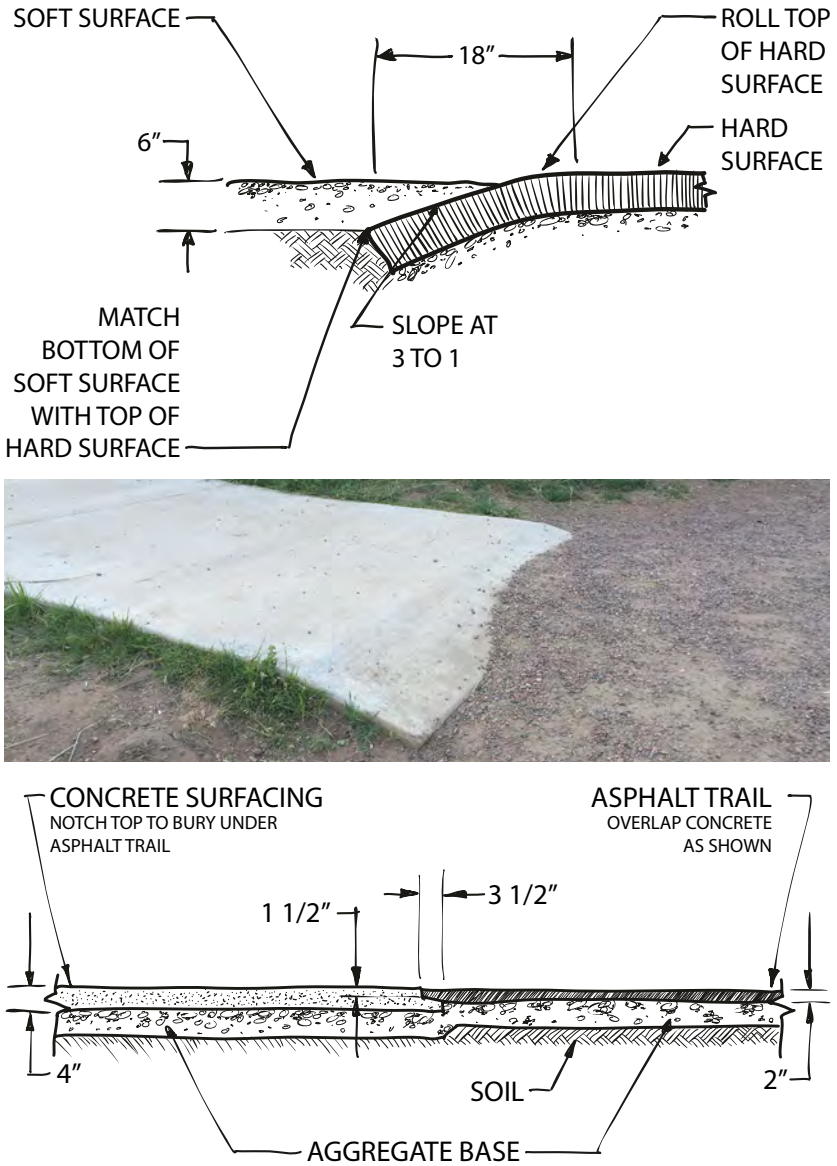


Figure 3–074—Constructing a Van Horn roll where pavement meets a native or aggregate surface anticipates the future shifting of the looser material and maintains accessibility between maintenance cycles. The illustrations of the Van Horn roll are from the "Forest Service Outdoor Recreation Accessibility Guide (FSORAG) Pocket Version."

Grading Around Existing Trees

- Minimize impacts to existing trees and vegetation to the extent feasible. Avoid grading within the drip line of existing trees to minimize root disturbance or soil compaction around roots. Consult with a professional arborist or qualified professional to assess potential impacts before grading around existing trees.
- Cut with a clean saw to minimize the exposed surface area of the root and to help prevent vulnerability to disease if severing roots larger than 3 inches in diameter.
- Cover exposed roots as soon as possible with soil or wet burlap.
- Retain and monitor the health of impacted trees that do not pose hazards.
- Delineate limits for construction operations to protect existing soil and vegetation. Provide enough access, circulation, and storage area for efficient construction operations.

Construction

- Review planned construction grading limits with the contracting officer's representative (COR) and contractor to communicate the rationale for the limits and ensure that the limits comport with project implementation (figure 3–075).
- Identify all storm drainage structures in the contract documents, indicating with a label or symbol the kind of structure intended.

Drainage and Stormwater Management

Sustainable recreation site design demands careful attention to the ways in which water moves across and through a landscape.

Flows

- Grade to direct stormwater flow away from use areas such as campground tent pads, picnic tables, and utility hookups. Grade roads, parking areas, and walkways to preserve the natural flow of stormwater, to the extent possible.
  - Disperse, rather than collect, surface water.
  - Minimize the concentration of surface flow.
  - Design constructed features so that water flows minimize the deposit of sediment and the contamination of streams, lakes, and ponds (figure 3–076).
  - Dissipate the velocity of surface runoff using naturally occurring areas of vegetation, or vegetation with structures such as boulders, rip-rap, reverse grades, and shallow infiltration basins.
  - Disperse infiltration and any collection areas within the site (figure 3–077).
  - Minimize the need for inlet-and-pipe-based subsurface drainage structures.

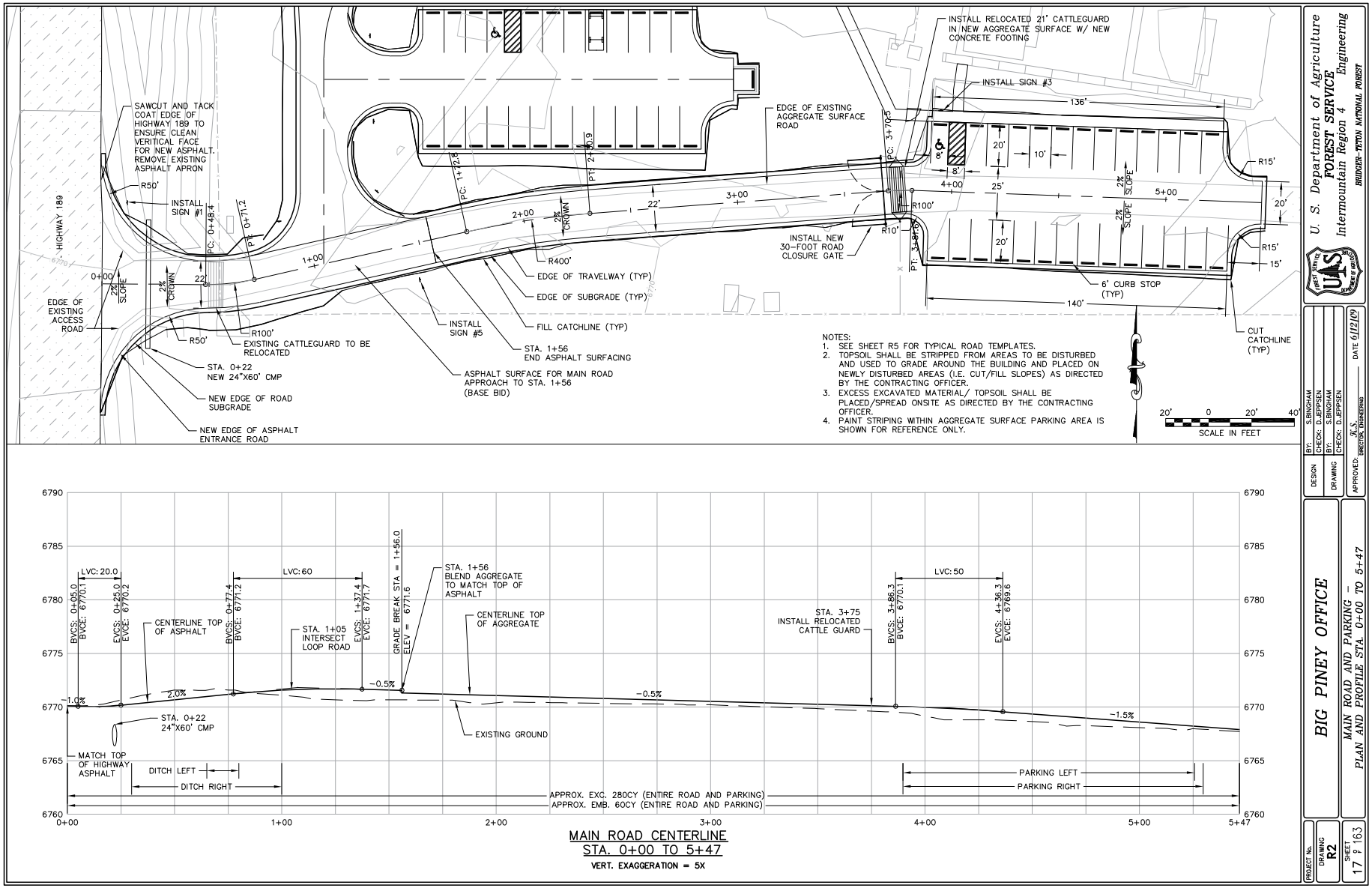


Figure 3–075—Example of a final grading plan showing the plan view and finish-grade elevations. The plan is of the Big Piney Office on the Bridger-Teton National Forest.

Figure 3–076—This confluence of two rivers illustrates the difference that runoff and sedimentation can make in the quality of water.

Figure 3–077—Vegetated swales and unmown areas can collect, infiltrate, and transport stormwater while complementing local scenic character.

Aesthetic

- Retain and restore drainage, grade, and ground condition as continuously as possible with surrounding natural grade and drainage patterns.
- Consider aesthetic treatment of culvert headwalls visible within developed recreation sites.

Hydrology

- Determine the naturally occurring drainage patterns of the site and how these patterns may have been altered in the past. Identify opportunities to restore or improve site hydrology (figure 3–078). Where feasible, remove culverts and underground drainage to restore natural drainage patterns and conditions.
- Consider how precipitation and runoff patterns may change in the future (figure 3–079). Runoff rates from snowmelt and historic timing of peak flows may change. Design for additional storm volume, if appropriate.

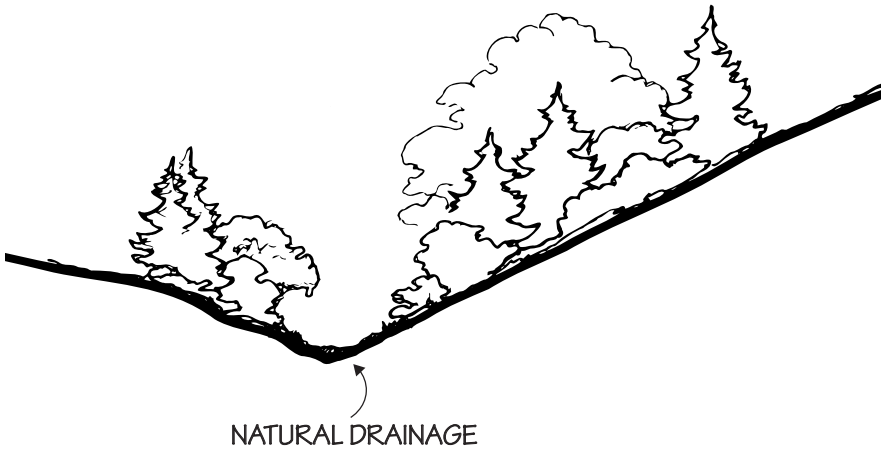


Figure 3–078—Using vegetation to buffer natural drainage areas helps protect water quality and maintains scenic character values.

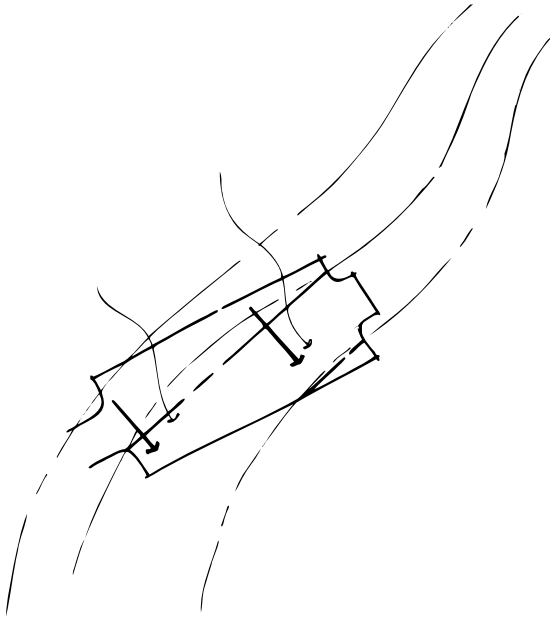


Figure 3–079—Anticipate how stormwater runoff will move across a developed site and adjust grading to achieve desired goals.

Infiltration

- Determine the site's soil infiltration capability. Requirements for areas with low-infiltration capacity differ significantly from areas with sandy soils, which allow for rapid infiltration.
- Infiltrate stormwater onsite, to the extent feasible. Disperse infiltration using low-gradient vegetated swales or microbasins. Limit unnecessary use of impervious surfaces.
- Identify areas that changes in surface stormwater flows—either reductions or increases—could negatively impact.
- Weigh the environmental, financial, and maintenance implications for various paving choices. Install porous pavements to allow infiltration, reduce runoff, and minimize erosion in areas where siltation does not present a problem.

Runoff

- Design the site to sustainably manage the local storm characteristics and volumes (i.e., 95th-percentile design storm). Define the storm's intensity, duration, and time of year. Identify potential risks to the built environment and public use resulting from storms larger than the design storm.
- Minimize potential concentration of stormwater flows. Grade travel routes to sheet-flow water to the edges of the route, where feasible. Consider grade reversals or rolling dips to divert water flow from road or trail alignments. Minimize curb and gutter conveyances, unless they present the only feasible options. When you need to use curbs, disperse runoff with curb cuts at intervals.
- Design stream crossings, such as culverts, to facilitate aquatic organism passage where needed.
- Identify potential pollutants, such as oils from parking areas, that stormwater runoff may transport. Use natural areas of vegetation to filter runoff, where possible, or use vegetation and/or rock-lined infiltration swales or areas (figure 3–080). Consider further bioremediation solutions effective for the identified pollutants. Avoid collecting and filtering water in centralized drain inlets: this requires capital investment, long-term maintenance, and elevation differences to direct water to and away from collection points, and also has greater downstream impacts.

The construction process inherently puts a site at greater risk of negative effects from stormwater runoff when compared with the completed site. Important construction-related design considerations include:

- Avoid construction during periods of heavy precipitation.

- Use performance-based water quality protection best management practices (BMPs) that are consistent with the Forest Service publication "National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide."
- Implement permanent BMPs in the early stages of construction to provide both short-term and long-term benefits (figure 3–081).

Figure 3–080—Stormwater runoff can be directed to areas for infiltration and support of vegetation.

Figure 3–081—Permanent best management practices for water quality protection developed early in the construction process reduce the need for temporary strategies to handle runoff and pollution. This water-retention basin can be used both during construction and after.

Storage

Decide whether to collect stormwater as a resource in your project setting. Divert water to storage cisterns, reservoirs, or rain gardens for delayed release. When possible in arid environments, store runoff from roofs in rain barrels to use for future maintenance or irrigation. Determine the legal requirements associated with capturing stormwater in the local jurisdiction.

Further Reading

- Catching the Rain: A Great Lakes Resource Guide for Natural Stormwater Management
  https://www3.uwsp.edu/cnr-ap/UWEXLakes/Documents/programs/LakeShoreTraining/20.1_low_impact_development_techniques/catching_the_rain_great_lakes_guide_american_rivers.pdf
- Low-Impact Development Design Strategies: An Integrated Design Approach
  https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20004JX4.TXT

- National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide https://www.fs.usda.gov/sites/default/files/FS_National_Core_BMPs_April2012_sb.pdf
- Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act https://www.epa.gov/sites/default/files/2015-08/documents/epa_swm_guidance.pdf

Low-Impact Development

The term "low-impact development" (LID) refers to systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration, or use of stormwater to protect water quality and associated aquatic habitat. At both the site and regional scale, LID practices aim to preserve, restore, and create green space using soils, vegetation, and rainwater harvest techniques.

The LID approach to land development (or redevelopment) works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treats stormwater as a resource rather than as a waste product.

A design to control the 95th-percentile rainfall event (an event with a precipitation total that is greater than or equal to 95 percent of all 24-hour storms on an annual basis) can address this challenge with bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. Designing a site based on LID principles and practices can manage water in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed.

Campground Microbasins

The Nevada Beach Campground on the Lake Tahoe Basin Management Unit addressed stormwater retention and runoff concerns in a campground rehabilitation project by installing shallow microbasins throughout the campground. This relatively low-cost, low-maintenance project didn't require a lot of labor to install and addressed problems of erosion, loss of topsoil, and flooding in the campground (figure 3–082).

Figure 3–082—Direct and distribute stormwater to areas where it can infiltrate, as shown in this example of campground microbasins.

Soils

Soil is the foundation of a site. Soils have different characteristics that are affected by location, topography, geology, vegetation, site hydrology, and use. Soil characteristics affect the suitability and capacity of a place for different levels of modification and types of construction. Impacts to the setting may include:

- Compacting or disturbing soil
- Reducing the site's ability to infiltrate precipitation and recharge groundwater
- Affecting vegetation health and viability
- Degrading ecological integrity

Desired Sustainable Recreation Outcome

Soil characteristics inform the design of recreation sites and facilities. The design protects and restores areas with sensitive soils and minimizes soil disturbance and erosion.

Soil Protection

- Identify areas with sensitive or degraded soil conditions, including any soil hazards such as lead, asbestos, hydrocarbons, or mine tailings.
- Identify soil protection zones on site plans. Soil areas that merit specific protection may include wetlands, riparian areas, floodplains and river or stream banks, or areas with highly erodible or unstable soils (figure 3–083).
- Identify design strategies to protect and restore the natural condition and attributes of a site's soils.

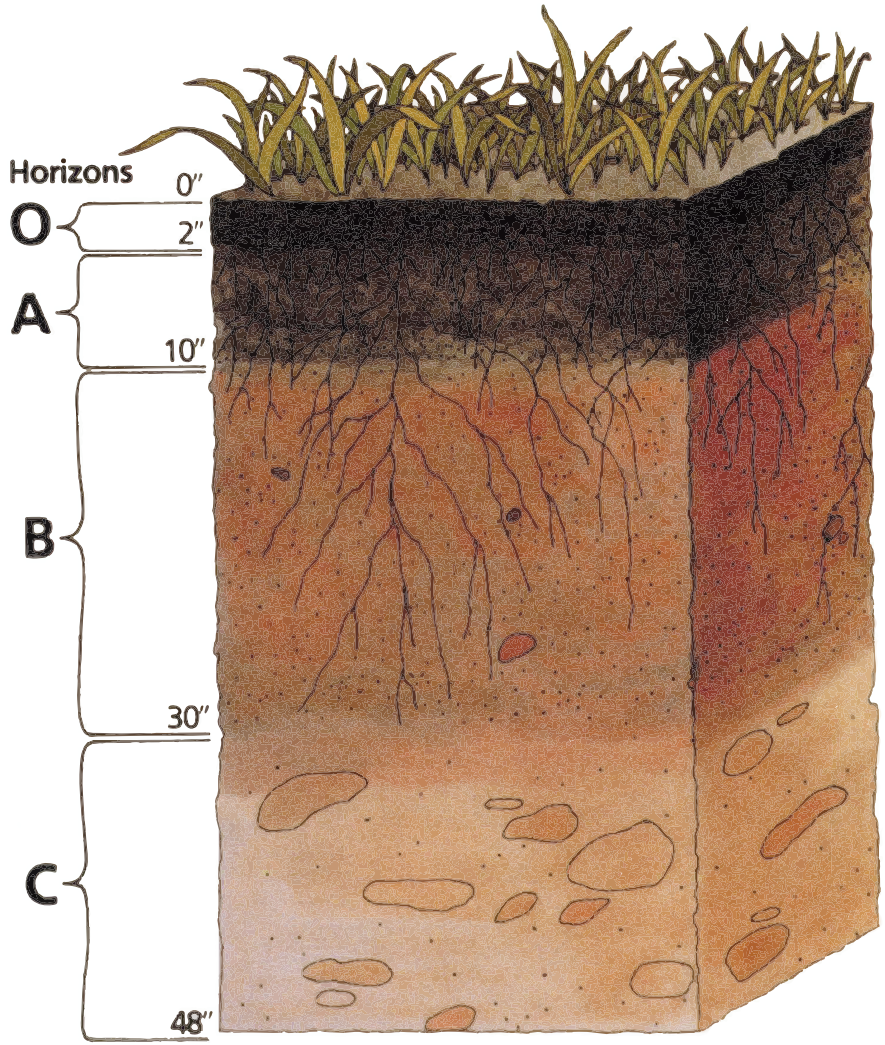


Figure 3–083—Sustainable recreation site design protects soil health. The topsoil horizons are particularly sensitive to compaction impacts. This illustration is from the U.S. Department of Agriculture, Natural Resources Conservation Soil Education and Training website.

- Define vehicle and nonmotorized routes and parking locations. Avoid steep slopes and sensitive soils. When needed, design access routes and site features to protect sensitive soils (figures 3–084 and 3–085).

Figure 3–084—Fencing at the construction limits helps protect soils and other resources from unintended impacts from heavy equipment or other disturbances.

Figure 3–085—Elevated boardwalks can protect sensitive soil and riparian areas while providing sustainable visitor access. These features are relatively expensive to construct and require routine maintenance.

- Maintain permeable soils and topsoils. When grading, stockpile topsoil to reuse in the top profiles of the finished grade surface.
- Decompact, scarify, incorporate organic material, and meet the natural grade to restore previously compacted areas. Restore the natural soil profile and restore maximum natural infiltration.
- Specify weed-free materials if importing fill, soil, or other material.
- Plant or stabilize exposed soil as soon as possible after disturbance.
- Incorporate plants to assist with increasing soil production (e.g., nitrogen-fixing plants or mycorrhizal amendments) or to break up compacted soils and increase soil permeability.
- When removing a building or other structure, remove the foundation but leave abandoned underground pipes and conduit in place, unless they pose a hazard. Cut and cap abandoned underground utilities at least 12 inches below the ground surface.

Further Reading

- A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization
  https://www.fs.usda.gov/t-d/php/library_card.php?p_num=FS-683P

Vegetation

Native vegetation and its characteristics—including individual plant character and native vegetation patterns—are dominant features of the recreation setting and contribute to a sense of place. Naturally occurring soil, sun, and precipitation sustain the vegetation. The condition of natural vegetation directly affects the quality of the setting and recreation experience.

Desired Sustainable Recreation Outcome

The site design conserves, maintains, restores, and enhances native vegetation patterns to have as natural an appearance and condition as possible. The vegetation within recreation sites appears continuous with surrounding natural vegetation patterns and maintains the character of the setting.

Vegetation Protection and Planting

- Before conducting the site survey, locate trees and vegetation that benefit the area's character and screening and mark these to include on the survey. While developing the design, add an aerial photograph to the background to facilitate accounting for the trees and other vegetation.
- Minimize disturbance to existing native plants.
- Complete a vegetation management plan to protect specific characteristic vegetation areas. Examples of characteristic vegetation include:
  - Meadows and pasture/lawn with meadow character
  - Tree groves
  - Individual character trees
  - Riparian corridors, bogs, marshes, and wetland areas
  - Vegetation that contributes to the cultural or historic setting
- Maintain riparian vegetation to separate use areas from the water's edge.
- Consult a Tribal liaison about the presence of plants important to local Tribes.
- Identify the compatibility of existing vegetation with the planned recreation use.
- Provide for short- and long-term tree health by developing strategies for avoiding impacts and enhancing tree health and regeneration.
- Provide methods to eliminate or minimize the spread of invasive plants on the site.
- Use vegetation in the design to create microclimates, providing shade, cover, and temperature variances onsite. For example, place picnic tables under mature trees to maximize shade cover and cooler temperatures in summer months.
- Consider opportunities to interpret native plant communities to connect visitors to the place (figure 3–086).

Figure 3–086—Visitors can enjoy learning about the native plants and how they contribute to an area's sense of place. Photo credit: Friends of the Donnelly Library, Donnelly, ID.

Revegetation and Plantings

- Plant or stabilize exposed soil as soon as possible after disturbance. Restore stream banks and riparian vegetation where eroded and impacted by human use. Restore native vegetation cover and pattern, including in areas disturbed by construction or use.
- Manage access to protect sensitive areas. For example, use vegetation, boulder barriers, or fencing to direct visitors to access locations and minimize pedestrian impacts to areas of revegetation or vegetation protection (figure 3–087).
- Promote natural regeneration and recruitment. Use barriers as necessary to protect young plants from pedestrian impacts and wildlife.

Figure 3–087—Redesigning recreation sites often entails moving or eliminating some elements. Here, barriers protect the revegetation of a decommissioned road.

- Consult the forest botanist or silviculturist for suggested plants appropriate for the project design. Select species based on the elevation and aspect of the site and current and future climate scenarios (figure 3–088).
- Limit mown lawn and planted landscape areas to the most developed sites in ROS class settings. Consider whether existing sod or turf is appropriate at the site. Consider functional benefits and maintenance methods for turf areas.
- Consider, if planning revegetation, first taking natural transplants from portions of the site undisturbed by construction or from nearby forests. See the forest botanist or silviculturist for plant materials. If using nursery stock, locate suitable supply sources and give advance notice for local suppliers to stock needed plants.

Figure 3–088—The success of any revegetation plan depends on choosing the right native plant for the site. This plan used river oats because it was already naturally established elsewhere at the site.

- Plant replacement trees at the time of disturbance. Plant at a replacement ratio that considers survival rate and in a manner that enhances aesthetics consistent with the desired scenic character.
- Grow nursery plants in smaller containers; they have a better chance of becoming established and outpacing the growth of plants grown in larger containers.
- Determine and specify best planting methods and preferred time periods—typically fall or early spring. Plant shortly before the rainy season to allow plants to establish naturally. Use temporary irrigation to establish new plantings in arid locations, where feasible.
- Mulch planted areas to a depth of 2 to 4 inches to help retain soil moisture and support plant establishment. Only lightly mulch seeded areas.
- Avoid manicured flowerbeds, painted or whitewashed rocks or trees, and other types of landscaping not compatible with the natural and cultural environment.

Irrigation

- Design plantings to be self-sustaining with natural precipitation. Avoid using permanent landscape irrigation whenever possible and limit it to sites with the highest development scale in rural or urban ROS settings.
- Determine whether the design can appropriately incorporate rainwater or snowmelt collection from structures for use in irrigation (figure 3–089). Design swales and retention ponds to direct water to vegetation.

Form, Cover, and Structure

- Locate plants so that vegetation has a natural appearance that blends with the surrounding landscape. Plant single plants or, for a "clumpy" appearance, in groups of three, five, seven, or in a mass planting. Avoid linear configurations (figure 3–090).
- Use plants from the group of species represented on or adjacent to the site. Plant revegetation areas with a mix of several species, in a ratio representative of the area (figure 3–091). Some revegetation areas can have just one species, if this reflects how a plant tends to naturally occur.
- Locate trees and shrubs to form an overstory for groundcover plants, where possible. Replicate overstory, midstory, and understory plant communities typical to the surrounding environment.

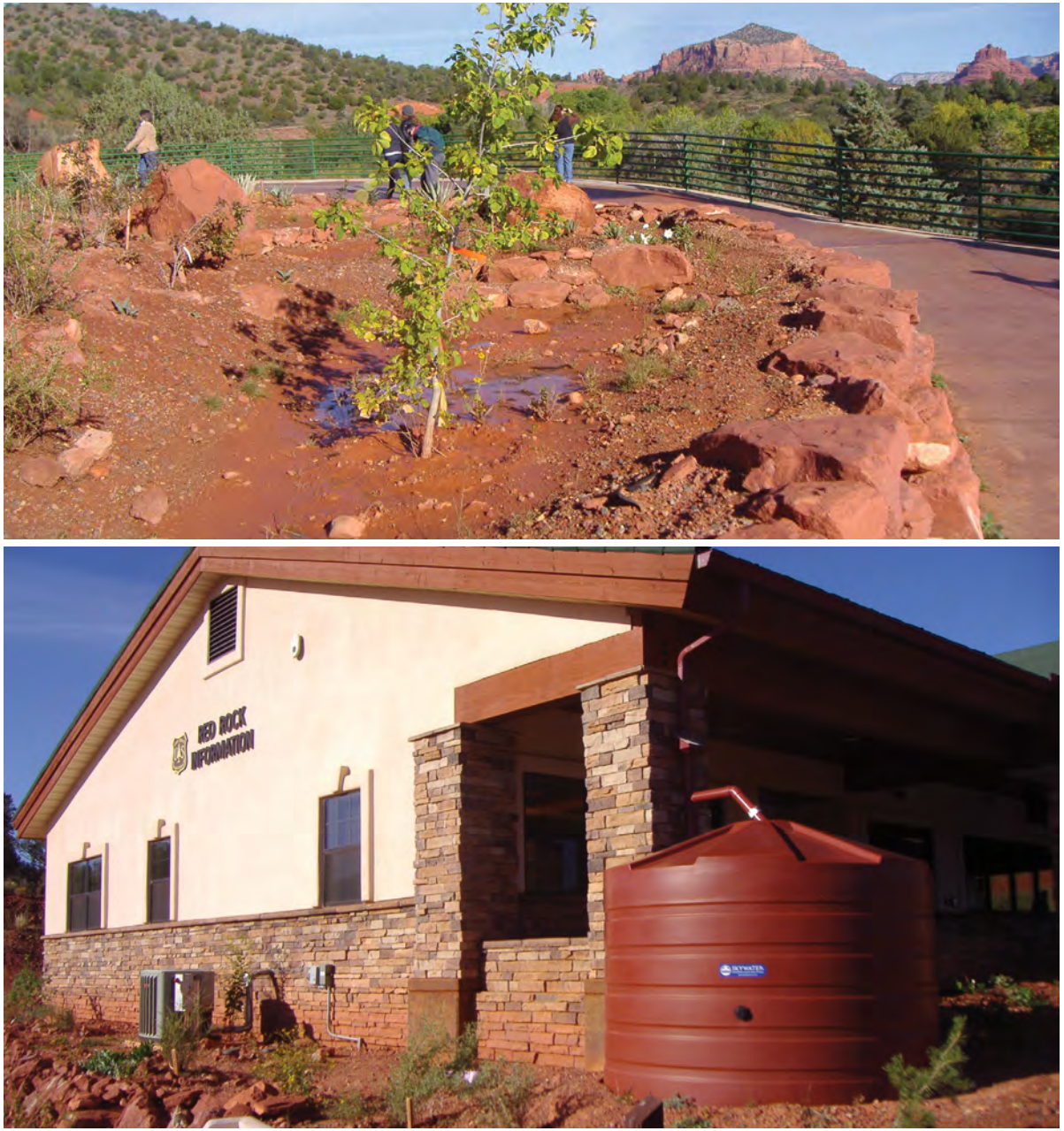


Figure 3–089—A rain garden (top) and cistern (bottom) in the arid Southwest.

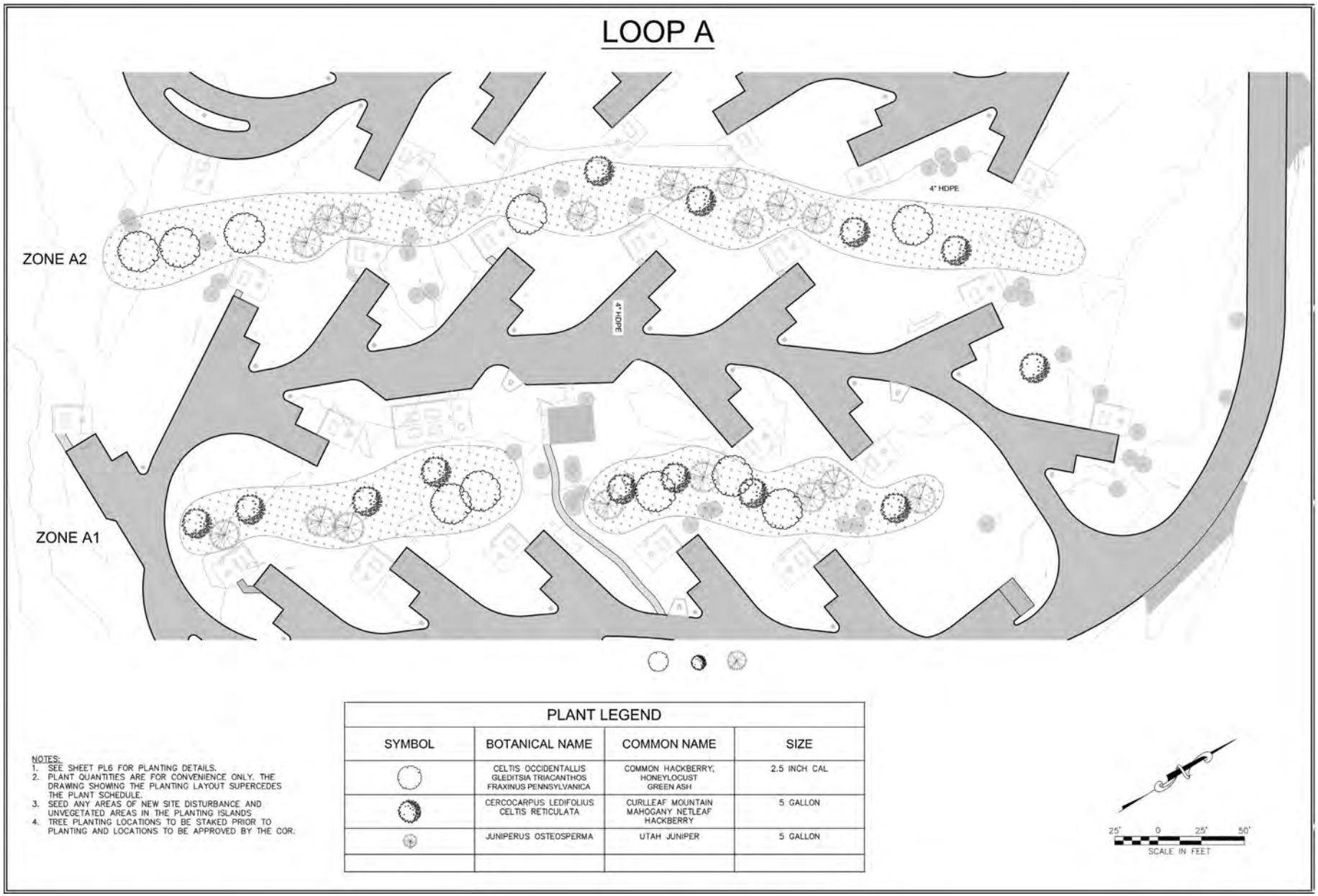


Figure 3–090—Example of a planting plan. Locate plants so that vegetation has a natural appearance. Generally, plant in groups of three, five, seven, or in a mass planting. Avoid linear configurations. This plan is from the Lucerne Campground Reconstruction, Ashley National Forest.

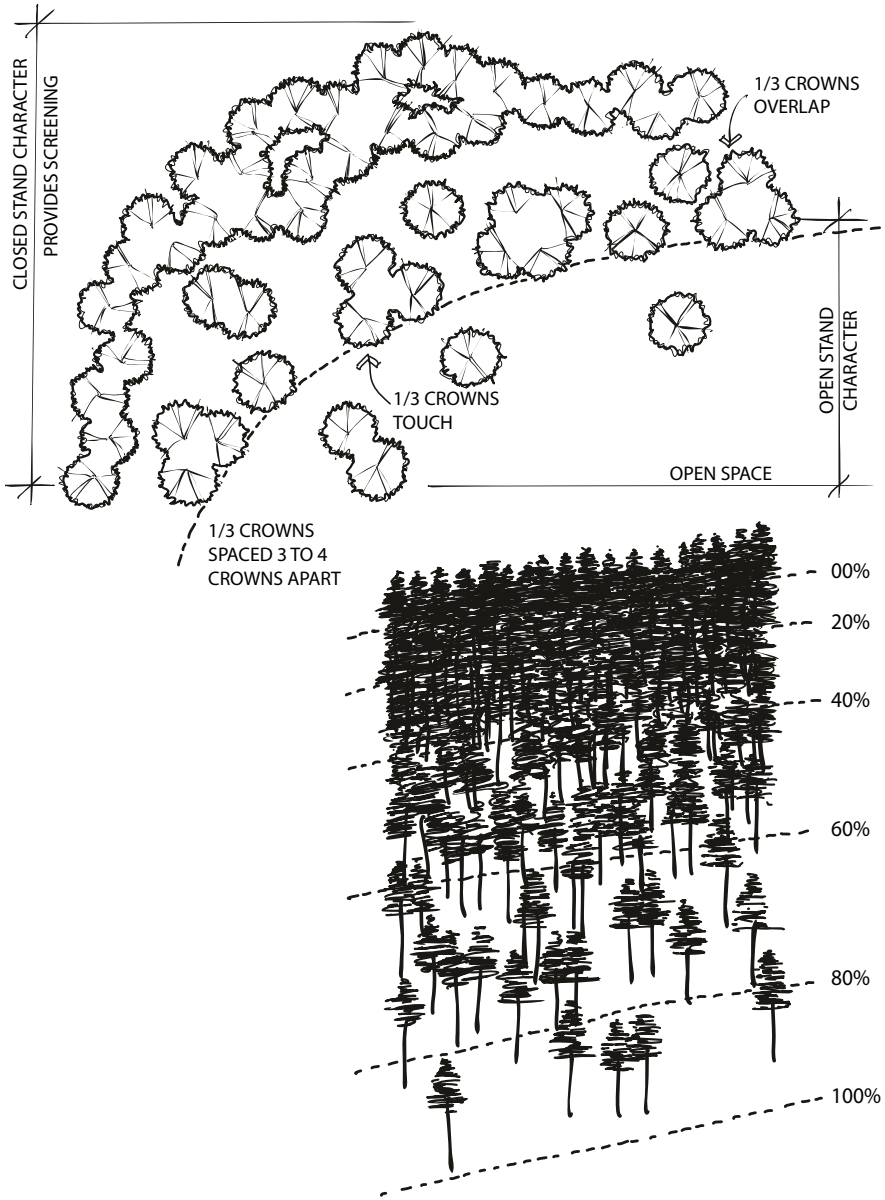


Figure 3–091—Design recreation sites and their surroundings to accomplish desired vegetation densities and character. These images are from "National Forest Landscape Management, Volume. 1."

- Incorporate vegetation treatments at edges and within recreation sites to visually blend with the surrounding landscape character.
- Maintain natural vegetation between individual use areas, if possible.
- Manage vegetation around recreation facilities and buildings to allow visibility of the immediate surroundings.
- Protect visual settings by screening administrative buildings or toilets with vegetation.

Further Reading

- Description of the Ecoregions of the United States https://www.mvs.usace.army.mil/Portals/54/docs/fusrap/Admin_Records/NORCO/NCountySites_01.06_0016_a.pdf
- Long-Range Planning for Developed Sites in the Pacific Northwest: The Context of Hazard Tree Management https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev2_026108.pdf
- Riparian Restoration https://www.fs.usda.gov/t-d/pubs/html/04231201/toc.htm
- Wilderness and Backcountry Site Restoration Guide https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%202C02
- Sustainable Sites Initiative http://www.sustainablesites.org

Lighting & Dark Skies

Dark night skies are a natural, cultural, and economic resource of the NFS. Light pollution and excessive outdoor lighting reduce the brightness of stars and can disrupt behavior in wildlife. Stewardship of night skies requires the Forest Service to take special care during facility planning and design (figure 3–092).

As of this publication, the the International Dark Sky Association has designated the following NFS sites **Dark Sky Places**:

- Gila National Forest Cosmic Campground—International Dark Sky Sanctuary
- Superior National Forest Boundary Waters Canoe Area Wilderness—International Dark Sky Sanctuary
- Sawtooth National Recreation Area Central Idaho Dark Sky Reserve—"Gold tier" International Dark Sky Reserve (figure 3–093)

Figure 3–092—Stunning night sky views are an important part of the outdoor experience, and sustainable recreation design protects this resource.

Figure 3–093—A sign promoting the Dark Sky Reserve designation at the Sawtooth National Recreation Area.

Figure 3–094—Use vegetation, built features, or existing terrain to reduce light trespass across a site and preserve dark sky values.

Desired Sustainable Recreation Outcome

National forest recreation sites exhibit care in lighting choices, minimizing impacts to the valued qualities of dark night skies and enhancing visitors' connection to the outdoors (figure 3–094). Lighting choices relate to the development scale of the site and the ROS setting.

Dark Sky Conservation

- Document requirements for lighting based on the operation of the site. Align lighting choices consistent with the development scale and ROS setting of the site: minimal to no lighting at lower development scales, lighting for visitor convenience and comfort only at higher development scales (figure 3–095).
- Light only where and when needed, with the least amount of light appropriate to the situation. Mount light fixtures as low as possible. Fully shield light fixture bulbs and lenses. Direct light fixtures downward. Redirect or retrofit existing lights with shrouds (figures 3–096 and 3–097).
- Use motion sensors and timers to turn lights on and off in response to use.
- Select fixtures and bulbs that use longer wavelengths of light. For applications that require accurate color rendering (information boards, for example), limit light temperature to 3,000 Kelvin (K).
- Use amber-colored lights for situations that do not require accurate color rendering. For situations that only require a minimal amount of nighttime illumination, use red-colored lights. Avoid the blue/white spectrum for nighttime lighting.

Figure 3–095—Carefully consider the need for artificial lighting in recreation site design.

Figure 3–096—Shield lights in and around buildings from shining up into the sky. This photo is of the Mendenhall Glacier Visitor Center, Tongass National Forest.

- Consider the direction and angle of vehicle headlights and impacts on visitors when designing road alignments. This plays a particularly important role at campgrounds and sites popular for astronomical viewing.
- Use a consistent lighting style throughout a site. Consider lighting fixtures and bulbs that are "Wildlife Lighting Certified" and/or "Dark Sky Approved" by the International Dark Sky Association.
- See FSH 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities, sections 12.11a to 12.11f <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13!..> for additional best practices to preserve night sky quality and prevent light trespass in sensitive NFS areas.

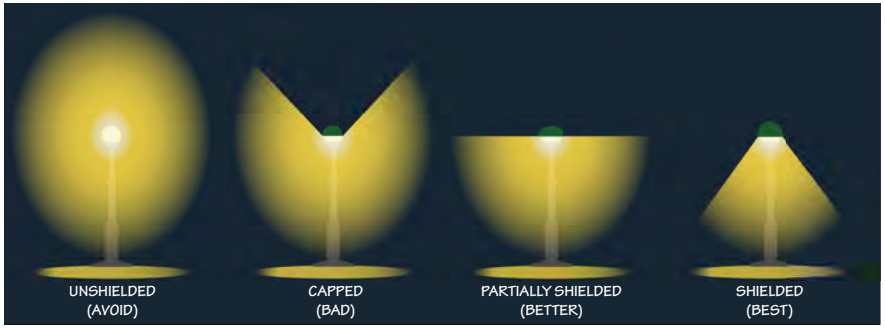


Figure 3–097—Choose light fixtures that focus the light where it is needed for safety purposes and shield light distribution from the sky.

Further Reading

- Wildlife Lighting Certification
  http://myfwc.com/conservation/you-conserve/lighting/certified
- International Dark Sky Association
  http://darksky.org
- National Park Service Natural Sounds and Night Skies Division
  https://www.nps.gov/orgs/1050/index.htm

Energy Use

Design choices related to energy systems can result in landscape impacts associated with development, resource consumption, and pollution, as well as financial impacts associated with infrastructure and maintenance. The term "energy footprint" collectively refers to these impacts. Sustainable recreation design seeks to conserve resources through decisions related to facility location, size, and services, along with choices related to materials, equipment selection, energy use, and renewable energy generation. Design choices can also help make visitors more aware of their environment and understand the value of conserving resources.

Desired Sustainable Recreation Outcome

The planning and design process aims to minimize energy use throughout developed recreation sites while providing a level of visitor comfort aligned with the development scale of the site. Designers pilot innovative technologies, monitor the results, and share the results across the agency. Thoughtfully implemented techniques and technologies do not detract from the natural setting and character of the site. The site interprets energy-conserving elements for its visitors.

Energy Conservation

- In sites with existing utilities infrastructure, identify and document historic energy and water consumption. Identify inefficiencies.
- Connect to existing infrastructure where possible.
- Consider updating or removing underused energy-use components to promote conservation and reduce impacts associated with energy use.

DECK Monitoring System

The DECK Monitoring system is a software platform that links to installed solar panels to display a building's solar generation on the web. The World of Wonder Museum in Lafayette, CO, displays up-to-the-minute information on the performance of the museum's solar panels. It features kilowatt-hour graphs and explains how much atmospheric carbon dioxide (CO_2) the solar generation prevents and the number of trees this equates to. These equivalencies provide the public with a perspective on solar generation in relatable terms and units, connecting the visitor to the solar generation and sustainability of the building, as well as inspiring citizen stewardship and sustainable personal choices.

Lighting and Electrical Use

- Design buildings to maximize the use of natural daylight (figure 3–098).
- Determine if electricity will be available onsite. Investigate and evaluate potential energy sources for the site, considering efficiency, greenhouse gas emissions, and other environmental costs (figure 3–099).
- Minimize lighting onsite using low-energy and dark-sky-friendly fixtures.
- Use efficient lighting to reduce energy consumption, including solar and/or low-color-temperature or narrow-spectrum light-emitting diode (LED) bulbs or other energy-efficient bulbs.
- Run utility wires underground where feasible.

Figure 3–098—Incorporating skylights (top), including those that direct sunlight to ceiling-mounted lenses (bottom), can increase building functionality while reducing electricity consumption.

Heating and Cooling

- Locate and design buildings to use passive solar energy and to optimize heating and cooling efficiency (figure 3–100).
- Use shade to cool southern and western building exposures (figure 3–101).

Figure 3–099—Photovoltaic panels and solar power reduce energy consumption and can provide power without installing electrical service.

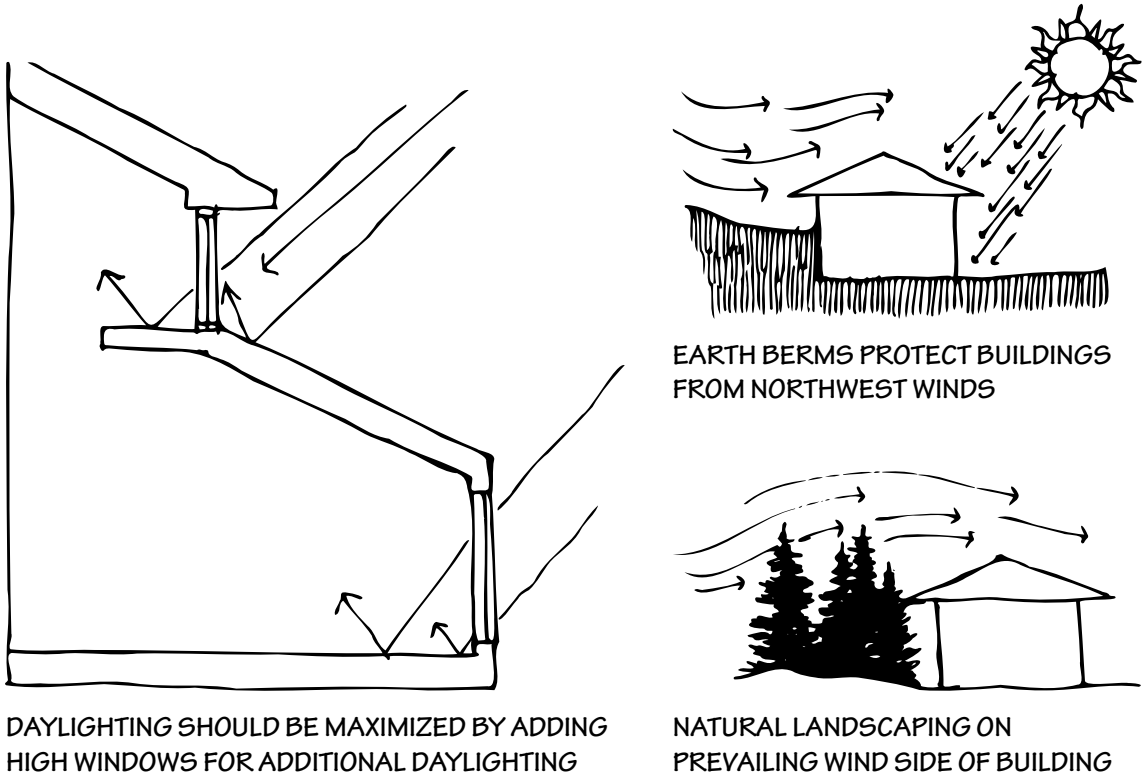


Figure 3–100—Building orientation, topography, and vegetation can improve energy efficiency by shading and deflecting winds or exposing areas for desired solar gain. These illustrations are from "The Built Environment Image Guide for the National Forests and Grasslands."

Figure 3–101—Trees can shade a building in the summer. After leaf fall, solar gain can help heat a building in the winter. Conifers and dense canopies can help to shelter buildings from sun and wind.

Further Reading

- Built Environment Image Guide Sustainable Design Principles
  https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%201805P
- Landscape Planning for Energy Conservation
  https://www.osti.gov/biblio/6739750

Drinking Water

Higher development scale recreation sites have traditionally offered drinking water sources for the recreation user. Although not required, this level of comfort has become expected at high-use campgrounds and picnic areas. Sustainable recreation design first considers whether to provide water at all and, if so, how to provide it in a responsible manner sensitive to environmental and fiscal constraints.

Desired Sustainable Recreation Outcome

Analysis of the economic, social, and environmental effects and benefits determine water provision at national forest sites. The setting and recreation opportunity dictate the availability of drinking water. Water use onsite is environmentally sustainable and fiscally responsible.

Water Systems

- Identify nearby springs or the ability to import water. For a viable drinking water system, it is necessary to analyze groundwater depth. Analyze nearby surface water for potential contamination or infiltration. Identify alternatives to providing a drinking water system.
- Account for the ongoing costs of maintenance, including the need for a licensed water system operator.
- Document any local monitoring, testing, and certification requirements with which a water system might have to comply.
- Identify potential opportunities and the cost-benefit of connecting to nearby municipal infrastructure. Where feasible, approach utility providers about the possibility of sharing installation costs.
- Identify use constraints and maintenance requirements related to seasonal water system startup and shutdown.
- Identify season of use, expected demand, and desired water uses at the site (e.g., hydrants, flush restrooms, showers, trailer hookups, etc.).
- Take advantage of gravity when designing water systems and minimize the need for pumps whenever possible.
- Assess the locations of existing infrastructure when renovating a site and take the opportunity to replace or move fixtures to more efficient and accessible locations.
- Assess the age and condition of water systems (and other utilities) serving the site. Determine if existing infrastructure can safely serve its intended use into the future.
- Determine if existing water infrastructure has leaks—often this represents the biggest source of water consumption—and repair or replace the infrastructure if necessary and feasible.
- Locate water spigots where users need water most, such as near restrooms or transition areas between parking lots and activities. Include drinking water fountains only in high-development scale sites.
- Locate drinking water hydrants so each can serve several use areas or camping units. Maximum distance from day-use sites or camping units depends on the ROS class:
  - Semi-primitive motorized: 300 feet
  - Roaded natural: 150 feet
  - Rural/urban: 100 feet

- Select water-efficient features like low-flow plumbing fixtures, automatic valves, and spring-loaded faucets that shut off automatically.
- Include indoor showers only at development level 4 or 5 campgrounds within the rural or urban ROS setting; these must have tempered water. Outdoor showers (rinsing stations), a desirable amenity at swimming and boating sites, do not require hot water. Use metered faucets or token timers to limit water consumption (figure 3–103).

Figure 3–103—Consider using metered or token-timed shower facilities to limit water consumption.

Zion National Park Water Bottle Filling Stations

Zion National Park constructed its visitor center in 2000 to be a sustainable building that addresses the concerns of millions of visitors coming to a desert national park. In this hot, dry environment, drinking water is critical to the health and safety of visitors. Zion encourages people to hydrate. In the past, asking 2.7 million annual visitors to stay hydrated often resulted in the use of bottled water, generating excessive plastic bottle waste at the park. Recycling this plastic waste consumed financial, labor, and transportation resources, so Zion installed water bottle filling stations in the park (figure 3–102). They teamed with the Zion Natural History Association (the organization that manages their bookstores) to sell reusable water bottles as both souvenirs and as a sustainable option to stay hydrated. They further promote the filling stations as "Zion Spring Water" to market the water. Interpretation at the filling stations highlights the impact of disposable bottles and the consumptive energy needed to produce, use, and recycle the plastic bottles. Zion estimates that they have reduced the sale of bottled water by 60,000 bottles annually, which is about 5,000 pounds of plastic reduction annually—a huge consumptive-energy reduction—without increasing any safety or health concerns.

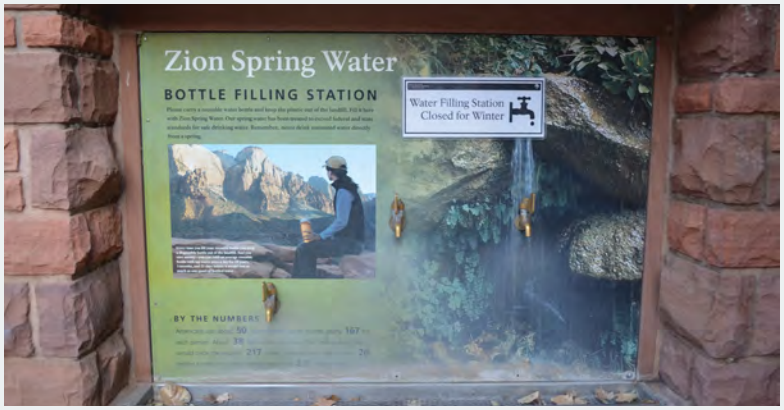


Figure 3–102—Bottle filling stations at Zion National Park help reduce plastic waste.

- Identify the intended operating season and whether you need to account for sub-freezing temperatures when determining the burial depth of water pipes and when choosing hydrant types.
- Include traceable detection wire when installing underground pipes.
- Amend as-built plans to accurately reflect final underground utility locations. Mark Global Positioning System (GPS) coordinates for major features such as valves or access covers. Avoid placing utility marking posts at recreation sites.
- Incorporate a drain sump with water spigots to catch spilled water from faucet use and to improve percolation while maintaining accessibility compliance, where soils allow (figure 3–104).
  - A **sump** is an evacuated hole backfilled with gravel in which water can filter through the gravel and eventually percolate into the ground or evaporate. Construct a simple sump out of concrete, plastic, or corrugated steel pipe about 3 feet in diameter, buried 2 to 3 feet, and flush with the surrounding grade. The pipe can have perforations laterally and vertically so water can flow out through the holes and the bottom, or the pipe can be solid, and the water will flow to the bottom of the sump and percolate into the soil. Fill the pipe with gravel or coarse drain rock.

Further Reading

- FSH 7409.11—Sanitary Engineering and Public Health Handbook, Chapter 40—Drinking Water System Design and Construction https://www.fs.usda.gov/im/directives/fsh/7409.11/7409.11_40.doc

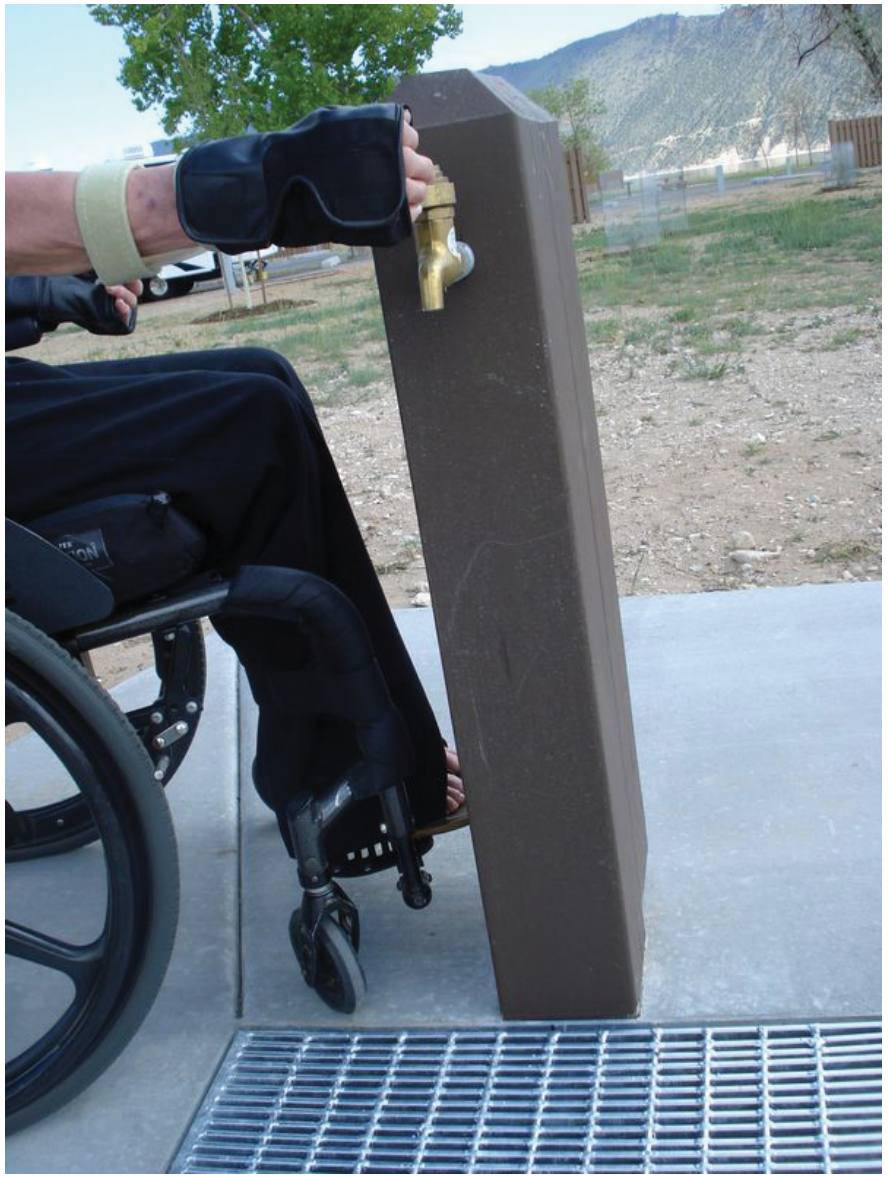


Figure 3–104—Select water spigots with universal design principles. The water spigot lever handle should be operable with a closed fist. The surface should be firm and stable, with enough space so that a person using a wheelchair can maneuver behind the faucet to avoid splash from the hydrant.

Toilets & Waste

Unmanaged waste and pollution from recreation facilities degrade a visitor's experience of the recreation setting and increase Forest Service management requirements. Thoughtful design of waste systems reduces unnecessary duplication of site amenities while aligning the level of service to the ROS setting and development scale of the recreation site. Litter and other unmanaged waste disrupt the experience at a recreation site. Toilet facilities provide basic sanitation, visitor comfort, and resource protection, consistent with the ROS setting.

Desired Sustainable Recreation Outcome

Waste system plans and designs meet site needs, regulations, and national quality standards as efficiently and simply as possible. The placement of trash and toilet facilities, when necessary, meet social needs for waste collection and recycling while minimizing the impact on the natural setting and the burden on operations.

Toilets

- As a general rule, provide one toilet riser for 35 people at one time, including camping units intended for recreational vehicle (RV) use.
- Ensure that any newly installed toilet—without exception—meets the requirements in the Architectural Barriers Act (ABA), including access from the road or ORAR path.
- Consider initial cost, future operation and maintenance costs, accessibility, and the ROS setting of the site when determining the type of toilet facility to install (figure 3–105).
- Consider using prefabricated concrete buildings, which may survive fire events, in areas with high wildfire frequency.
- Identify the availability of vault toilet pumping services as well as any challenges related to access for routine pumping.
- Size the toilet vaults and septic tanks relative to the size of the pump trucks.
- Identify the locations of the nearest toilets when toilets are not available onsite.
- Assess the locations of existing toilets when renovating a site. If locations do not support proposed layout improvements, consider moving or replacing facilities to more efficient and accessible locations (e.g., relocating a facility currently on a grade or in the center of a loop where pumping can prove difficult).
- Always locate toilet facilities along pedestrian routes and provide access for maintenance vehicles like pumping trucks. Place toilet facilities for convenient access from parking and gathering areas, but away from views, feature points, riparian areas, and other visually or environmentally sensitive areas.
- Locate toilet buildings in sunny locations with good air circulation, where feasible (figure 3–106). Locate them away from riparian areas at a distance that complies with local ordinances.
- Locate vault toilets to minimize downwind impacts that may distribute odor. Consider installing vent-mounted exhaust fans in areas without consistent air movement.
- Establish the toilet building finish floor elevation above the surrounding grade for drainage. The access route to the toilet must meet all accessibility standards. Consider installing a Van Horn roll (see figure 3–074) where concrete or asphalt paths or aprons from the toilet building meet native or aggregate surfaces. This helps reduce impacts from compaction or erosion and maintains accessibility with reduced maintenance.

Figure 3–105—Toilet buildings, often the only building at Forest Service recreation sites, represent an important opportunity to express how the built environment should relate to its setting.

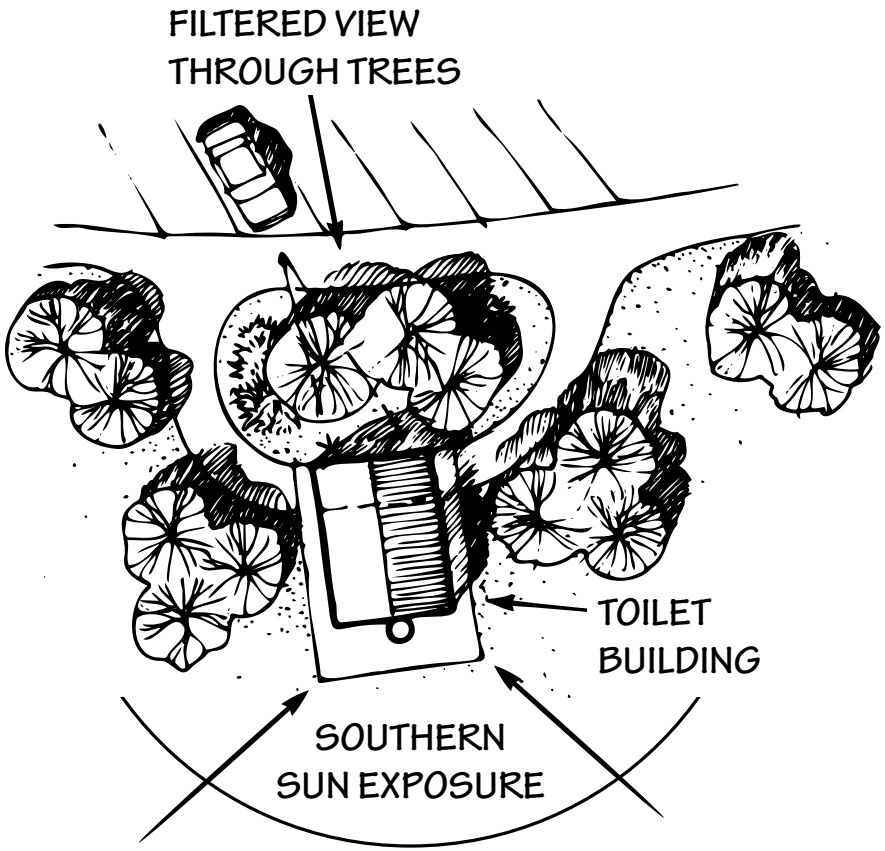


Figure 3–106—Consider tradeoffs when making design decisions about toilet facilities. This illustration demonstrates how to provide visual screening while ensuring sun on the vent stacks to maintain air flow away from the vaults. However, setting the toilet back from the road may increase costs to pump the toilet vault. This illustration is from "The Built Environment Image Guide for the National Forests and Grasslands."

- Locate drinking water hydrants and accessible refuse containers, when provided, near restrooms.
- Offer efficient lighting for restroom facilities or lighting inside the restroom for sites using electricity after sundown.
- Provide hooks inside individual toilet units for visitors to hang coats or bags.
- Consider unisex, gender-neutral signing to maximize use by all visitors for single-user toilets, potentially reducing the footprint and promoting an inclusive environment.
- Design understandable instructional signs so the public will know how to use nontraditional toilets.
- Do not mount informational or interpretive signs on toilet buildings.
- Consider providing trash containers near the entrance to toilet buildings to help reduce the tendency for visitors to deposit trash in toilet vaults.
- Ensure the siting and setting are appropriate to the ROS setting (tables 3–5 and 3–6).

Table 3–5—Common type of toilet facility based on Recreation Opportunity Spectrum setting

Recreation opportunity spectrum class	Facility
Primitive	No toilet facilities
Semi-primitive nonmotorized	No toilet facilities
Semi-primitive motorized	Vault toilets in areas of concentrated use
Roaded natural	Vault, microflush, or composting toilets
Rural	Flush

Table 3–6—Minimum and maximum distances of toilet facilities from a camp unit or picnic table

Recreation opportunity spectrum class	Minimum	Maximum
Semi-primitive motorized	75 feet	750 feet
Roaded natural	50 feet	500 feet
Rural	35 feet	350 feet

Wastewater Systems

- Consider opportunities to use existing municipal sewer systems.
- Document any State and local regulations that affect the location of wastewater infrastructure in relation to other utilities and surrounding wetlands and riparian areas. Identify any specialized certifications required to operate wastewater systems.
- Locate site wastewater treatment away from desirable areas for congregation or visitor use but prioritize accessibility for operations and maintenance.
- Take advantage of gravity and avoid using pumps and lift stations when designing sewer and septic systems (whenever possible). Minimum slope for sewer pipe laterals is 2 percent, maximum slope is 4 percent.
- Design sewer and septic systems to take advantage of gravity and avoid using pumps and lift stations (whenever possible). Minimum slope for sewer pipe laterals is 2 percent, maximum slope is 4 percent.
- Avoid locating access covers and cleanouts in areas of high visitor use, such as campsite living areas.
- Identify existing sewer pipe elevations. Where possible, minimize the distance from a new flush toilet to the sewer line.
- Recognize the spatial requirements of a wastewater septic system.
- Include wildlife mitigations in the design, such as vent screens to prevent animals from entering vault toilet stacks (figure 3–107).

Figure 3–107—To reduce risks to birds and bats, install vent screens over vault toilet stacks.

Waste Management

- Consider a site design's lifecycle and rehabilitation, deconstruction, or disposal needs. Determine what materials might be reused when the site outlives its usefulness or maintenance becomes impossible (figure 3–108).

Figure 3–108—The wood paneling in this visitor center came from recycled redwood picnic table planks salvaged during reconstruction of nearby recreation sites.

- Include contract clauses that address the salvage and reuse of suitable materials, as well as waste diversion.
- Develop partnerships to use waste and excess materials from the site—for example, deliver reusable materials to an organization such as Habitat for Humanity.
- Work with local communities, agencies, and businesses to identify waste reduction options, including ideas for recycling, composting, or reusing materials.

Toilet Types

The options for toilet configurations include pits, vaults, septic systems, sewer systems, waterless, microflush (flush vault), evaporative, and composting.

- **Flush toilets**—Use flush toilets in higher development scale sites with an available water and sewer system.
- **Vault**—Specify concrete for prefabricated vault toilet buildings with opaque windows of vandal-resistant materials, such as polycarbonate resins. All access paths must comply with accessibility guidelines and drain away from the building. Orient buildings for unobstructed solar heat gain to the vent pipes to produce the necessary positive upward draw through the vents. Locate the vent(s) on the south side of the building, where feasible. For buildings in a hot climate, insulate the roof to ensure proper flow of air currents and functioning of the vault ventilation. For complete, detailed information about how to correctly site a "sweet smelling toilet" (SST), see the "SST Installation Guide." Ensure full accessibility to the building and its interior and sign all toilets as unisex unless you provide a multistall facility.
- **Low-volume flush alternatives**—Consider microflush toilets (flush vaults) for sites that have water but lack available or practical sewer or septic infrastructure. These low-volume flush fixtures connect to a vault that requires regular pumping.
- **Prefabricated**—Consider purchasing prefabricated buildings (complete with flush toilets and wash basins) delivered to the site. Select accessible toilet buildings consistent with the development scale and the recreation opportunity spectrum (ROS) setting for the project, factoring in ease of maintenance, operation, and quality of materials and finishes.
- **Site-built**—In special cases that call for a higher level of development, design a custom-built toilet building to meet the needs of the site. Consider custom-built facilities where a prefabricated building does not meet the site's design objective or for remote sites where delivery of a prefabricated building may prove impossible.

Garbage Collection

- Install garbage cans along circulation routes, particularly near toilets or in areas of transition from one activity to another (e.g., from parking to trail use).
- Assess the locations of existing garbage-related amenities when renovating a site and take the opportunity to alter site layout and amenity location to improve efficiency.
- Provide visitor information to encourage "Pack It In, Pack It Out" and "Leave No Trace" principles.
- Include amenities to support and encourage dog owners to collect and manage pet waste at sites with high concentrations of visitors with pets. Consider the effect that providing plastic bags may have on litter levels at the site.
- Plan garbage collection routes and install large garbage bins in places that will maximize operational and maintenance efficiency (depending on site size and development scale), including allowing easy access to the site for large garbage trucks. Visually screen large bins from visitors when possible (figure 3–109).

Figure 3–109—Visually screen large bins from visitors whenever possible, using materials appropriate to the setting.

- Design to minimize unnecessary staff travel for site operation and maintenance. For example, bigger trash receptacles in addition to other smaller receptacles may minimize the number of required pickups. Consider local conditions that may lead to the larger receptacles being used for illegal dumping or nonrecreational use. Locking mechanisms can help prevent this issue.
- Design recreation facilities on forests with populations of black bears (*Ursus americanus*), grizzly bears (*Ursus horribilis*), and Alaska brown bear (*Ursus arctos*) with bear-proof garbage containers or dumpsters (figure 3–110).

Figure 3–110—In settings where animals cause issues with waste, specify use of animal-proof garbage containers to prevent the spread of waste materials and litter and to protect wildlife.

Recycling

- Determine the feasibility and merits of collecting and managing recyclable waste materials onsite. Before providing recycling collection amenities, identify a mechanism or partnership to collect, transport, and process collected materials (figure 3–111).

Figure 3–111—Remember, give a hoot, don't pollute!

Further Reading

- Remote Waste Management
  https://www.fs.usda.gov/t-d/pubs/pdfimage/95231202.pdf
- FSH 7409.11—Sanitary Engineering and Public Health Handbook, Chapter 40—Drinking Water System Design and Construction
  https://www.fs.usda.gov/im/directives/fsh/7409.11/7409.11_40.doc
- SST Installation Guide
  https://www.fs.usda.gov/t-d/library-card.php?p_num=0323%201303P
- Water Conservation Plumbing Fixture: A Waterless Urinal
  https://www.fs.usda.gov/t-d/pubs/pdf/96711309.pdf
- Two-Cubic Yard Bear Proof Dumpster
  https://www.fs.usda.gov/t-d/library-card.php?p_num=0323%201302P
- Composting Toilet Systems, Planning, Design, & Maintenance
  https://www.fs.usda.gov/t-d/pubs/pdfimage/95231803.pdf

Materials

Material choices in site design influence public perception, quality of experience, sense of place, and visitor enjoyment. High-quality materials communicate national forest identity and stewardship values while representing long-term investments in recreation sites. They also help determine the level of future maintenance required to protect the agency's investment.

Desired Sustainable Recreation Outcome

Material choices reflect a site's scenic and cultural character and minimize long-term maintenance. They represent the site and locality, contribute to visitors' connection to the outdoors, and complement the ROS setting and the design province identified in "The Built Image Environment Guide for the National Forests and Grasslands." Materials selection aims to balance environmental cost against the long-term performance and benefit provided.

Materials Selection

- Emphasize native materials representative of the local area, where possible.
- Determine the availability of local materials and skills.
- Identify onsite natural and cultural materials and how they are used in local buildings and constructed features. Consider how trees and stone, earth color, fences, walls, and cultural influences can inform design and material choices and establish a strong relationship with the landscape (figure 3–112).
- Conserve and use existing materials. Repair existing construction, if possible, before constructing new. Minimize waste in use of materials. Carefully consider materials and avoid last-minute substitutions. Reuse and recycle materials where feasible.
- Choose materials that are not hazardous to the site or the environment. Consider weather and vandalism when selecting materials.

Connecting Materials to Cultural Settings

- Local Tribes can contribute skills and examples of handiwork to the design and construction of a site. They can also contribute to the interpretation of the site's natural features and material selection.
- The handmade look of fashioned natural materials avoids overly straight lines and finishing and highlights rustic character. Other examples include raked mortar joints that replicate the appearance of dry-set stone, a wall built with batter and buttress, and stone laid with the natural lie of the stone.
- Legacies of the Civilian Conservation Corps (CCC), still highly valued and cherished at many national forest sites, represent a unique rustic style, obvious handmade structures and features, and use of native, onsite materials (figure 3–113).
- Hand-built workmanship represents a treasured hallmark of featured construction at national forest recreation sites, particularly in fences, walls, information boards, and buildings. The timeless quality of "hand-built of natural materials" represents visitors' ties to the land and direct experience with nature and celebrates the pride of local artisanship.
- National forest sites honor the work of craftspeople skilled with natural materials—stone masons, fence builders, and other skilled workers. Sites place a high value on hand-built construction using time-honored techniques, finely-honed skills, and artistry associated with the use of native materials (figures 3–114 and 3–115). Examples include stonework, adobe wall construction, log peeling, rail splitting, hewing, and wood joinery.

Figure 3–112—Materials and construction techniques reflect the area's environment and cultural influences.

Hand Built, the People and the Land

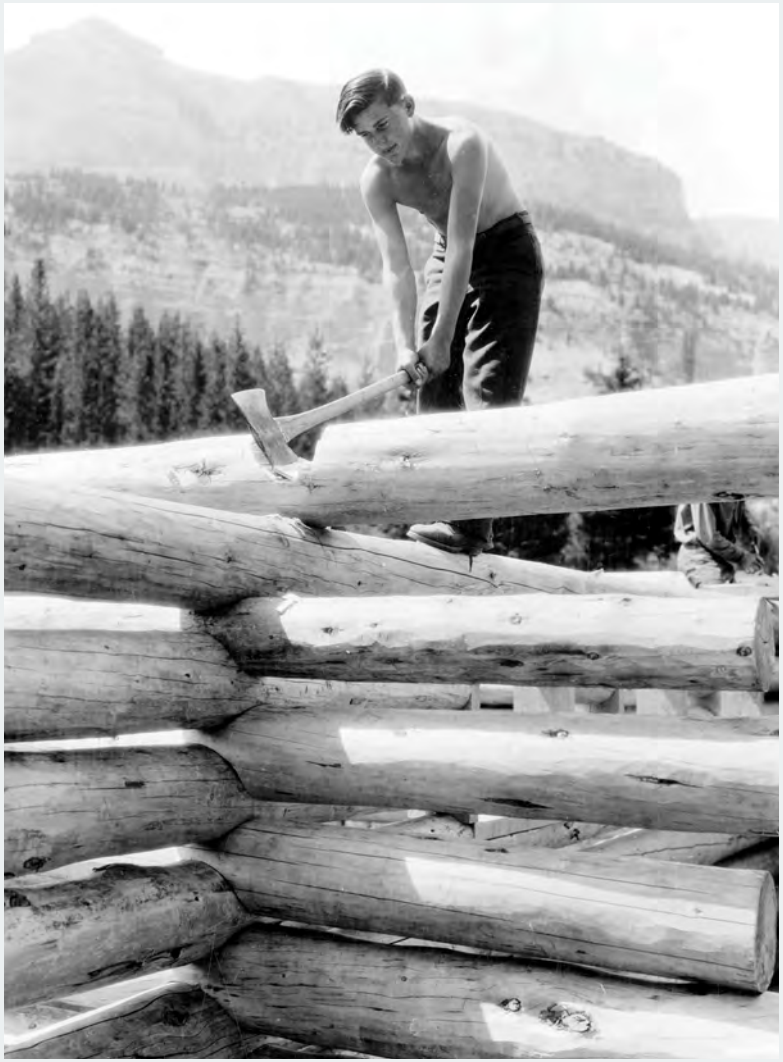


Figure 3–113—A member of the Civilian Conservation Corps hand-hews logs for a structure built during the 1930s.

- National forest sites exhibit traditional skills associated with using native materials developed from people "living off the land." Examples include the stone mason who builds a stone wall by selecting, hand-shaping, and fitting stone.

Figure 3–114—Historic restoration or new construction designed to complement a historic setting may require skilled workers with knowledge of historic construction techniques.

Figure 3–115—A group of workers employ traditional carpentry skills to restore a historic structure (top). New sill logs stabilize the base of a historic building (bottom).

Color and Texture

- Identify and use suitable colors and surface finishes that relate to local or onsite natural and cultural features (table 3–7).

Table 3–7—Colors the Forest Service commonly uses

FED-STD-595C	EM7100-15 color name	PANTONE color
20059	Brown	7596
23695	Yellow-cream	1345
14260	Green	16-5924 TPG
15187	Light blue	2183
17038	Black	433 or black 3
20109	Seminole brown (used as a stain)	7594
20260	Tan (used as a stain)	7508
27875	White	12-5201 TPG

- Avoid light and bright colors, unless culturally significant to the site. In general, achieve a natural appearance by using earth-tone colors usually found in local soil, mulch, bark, rock, and vegetation (figure 3–116).
- Select color shades for large surfaces that are slightly darker than the surrounding natural colors. Darker colors tend to blend better with a setting.
- Stain rather than paint exposed wood.
- Paint backs of signs dark brown or another color to avoid contrast with scenic character values (figure 3–117).
- Specify integrally colored concrete where appropriate to reduce visual contrast with surrounding landscape character. Use higher stone content and a coarse surface for exposed concrete.

Figure 3–116—Material choices should harmonize with the local scenic character.

Figure 3–117—Paint or treat the backs of signs to reduce contrast and improve the visual quality of sites.

Figure 3–118—The scale of the logs used in this structure reflect the size of the surrounding trees.

- Avoid imposing non-site-based patterns on materials or in the use of materials. Limit the variety of exposed materials.
- Use Forest Service shields in key locations to reinforce national forest identity.

Scale

- Generally, for the outdoor setting, select heavy-duty materials with low maintenance requirements (figure 3–118). Consult the "The Built Environment Image Guide for the National Forests and Grasslands" for direction based on local design province characteristics.

Form

- Place materials so lines emphasize the natural characteristics of the material (figure 3–119).
- Consider standard-dimension materials in design to avoid cuts and waste, especially for materials that are heavily used or routinely replaced.

Type

Emphasize natural materials and characteristics over machine-produced materials.

Figure 3–119—The form of constructed features should harmonize with the setting.

- Minimize use of synthetic materials. If used, keep synthetic materials visually subordinate to naturally appearing materials and components. Select synthetic materials with chemically benign and nontoxic properties.
- Choose materials with recycled or biodegradable content when possible. For example, during road construction, specify recycled asphalt for the aggregate base course, if available.
- Evaluate life-cycle costs associated with material choices—sometimes the most durable materials are the most sustainable.
- Standardize basic materials to make them easy to replace.
- Specify larger, rough-sawn lumber rather than smooth-milled lumber when using visible dimensioned lumber (figure 3–120).

Figure 3–120—Large-dimension, rough-sawn wood provides character to this fence and complements the site's rustic setting.

- For many settings, specify self-weathering steel, matte-finished black or dark brown paint, or powder coating for metal construction (figure 3–121). Treat galvanized metal surfaces with a weak acid solution to dull the reflective finish.

Figure 3–121—Self-weathering steel reduces contrast by oxidizing into colors found in the environment. While initial costs may be higher than other materials, self-weathering steel lasts a long time and has low maintenance requirements.

Site Furnishings

- Ensure that every element of site furnishings is compatible with the ROS setting and complies with accessibility standards.
- Consider the level of maintenance required to provide quality experiences, the level of supervision required to combat vandalism, and the rate of required replacement for all site furnishings.

Tables

- Specify heavy-duty construction for tables, generally 8-feet long and compliant with accessibility standards. Select picnic tables for longest life, least maintenance, and compatibility with the ROS setting.
- Ensure accessibility at both table ends with appropriate knee and toe clearances.
- Determine whether to install permanent or freestanding tables, based on site use—typically permanent at day-use sites but freestanding at campgrounds.

Fire rings

- Fire rings made of metal, firebrick, or natural stone can work independently as a fire ring or have an integrated cooking grill that users can flip out of the way when not in use. Install compacted aggregate (never concrete) for the ground surface under the fire ring and for 2 inches beyond the edge of the fire ring.
- Fire rings should have an open area at least 9 inches above the ground for building a fire and should have a cooking surface at least 15 inches above the ground.

Pedestal grills

- Provide pedestal grills at picnic sites and campsites where campfires are prohibited. Pedestal grills, set on a standpipe, should have adjustable grate height settings, the ability to rotate, and a hinged or removable grate for easy cleaning.
- Consider the area's predominant wind direction and typically locate the grill downwind from the table.
- Install the grill cooking surface less than 15 inches or more than 34 inches above the ground surface, with a clear space of 48 inches on all usable sides.
- Discuss pedestal grills with maintenance personnel and determine a consistent policy. Some forests have determined that pedestal grills present maintenance or fire hazard concerns, especially at campgrounds.

Benches

- Provide benches, as appropriate to enhance the recreational experience, along paths and at sites such as picnic areas, campgrounds, overlooks, vistas, and rest stops (figure 3–122). As a rule, benches should be comfortable, durable, attractive, and designed to blend with the surrounding setting. Allow enough space to one side of the bench for a wheelchair user to pull off the trail and alongside the bench.
- Provide arm rests only on one end of the bench or in the middle to allow use by groups that include visitors with a disability.

Figure 3–122—Locate benches where they can provide a welcome respite from a walk and at a place to enjoy the scenery.

Further Reading

- Picnic Table Selection Guide for Heavy Snow Locations https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%201804P
- Standard Colors for Forest Service Developed Recreation Sites https://static1.squarespace.com/static/5504d100e4b08eb858c4e8fc/t/5de5919dcceb6a637f1a16a8/1575326125658/Standard+Colors+for+Forest+Service+Developed+Recreation+Sites.pdf
- Accessible Recreation Facilities—Picnic Tables https://www.fs.usda.gov/sites/default/files/Accessible-Picnic-Tables.pdf

Signs & Interpretation

Signs, especially in recreation areas, display an ever-present "face" of the Forest Service. Second only to clean restrooms, clear, helpful, well-maintained signage represents the amenity many of the recreating public value most. Signs help people use and enjoy recreation sites; they guide, educate, and inform visitors about forest rules, regulations, activities, and safety information. Interpretation can enhance visitor experience as well as foster stewardship and respect for the natural setting. Designed interpretive amenities include trails that explore the site and other special features. Interpretive signs engage the visitor, appeal to different learning styles, and serve the public.

Too many signs create clutter and visual confusion. Site planning and design can reduce the number of signs needed by creating an intuitive, easy-to-understand site layout and by identifying effective locations for sign structures.

Desired Sustainable Recreation Outcome

Recreation site signage complies with the "Sign and Poster Guidelines for the Forest Service" (EM 7100-15). Signs and their supporting bases align with the site's ROS setting and the correct design province in "The Built Environment Image Guide for the National Forests and Grasslands." Complementary materials and locations integrate the signs into the setting to support interpretive goals.

A minimum number of signs convey necessary visitor, management, and interpretive information through a design that reduces visual clutter. Signage from the nearest highway clearly directs visitors to Forest Service recreation sites.

Sign Location

- Develop a sign plan for all recreation sites by consulting with the forest sign coordinator or appropriate personnel. Each phase of project planning and design should include elements of sign planning (figure 3–123).
- Provide alternative opportunities at locations that cannot meet accessibility requirements. For example, provide interpretive material showing and explaining an inaccessible historic feature. Document all departures from accessibility requirements.
- Use the assigned ROS setting of the site to influence the number, type, and character of signs at a site (figures 3–124 and 3–125).

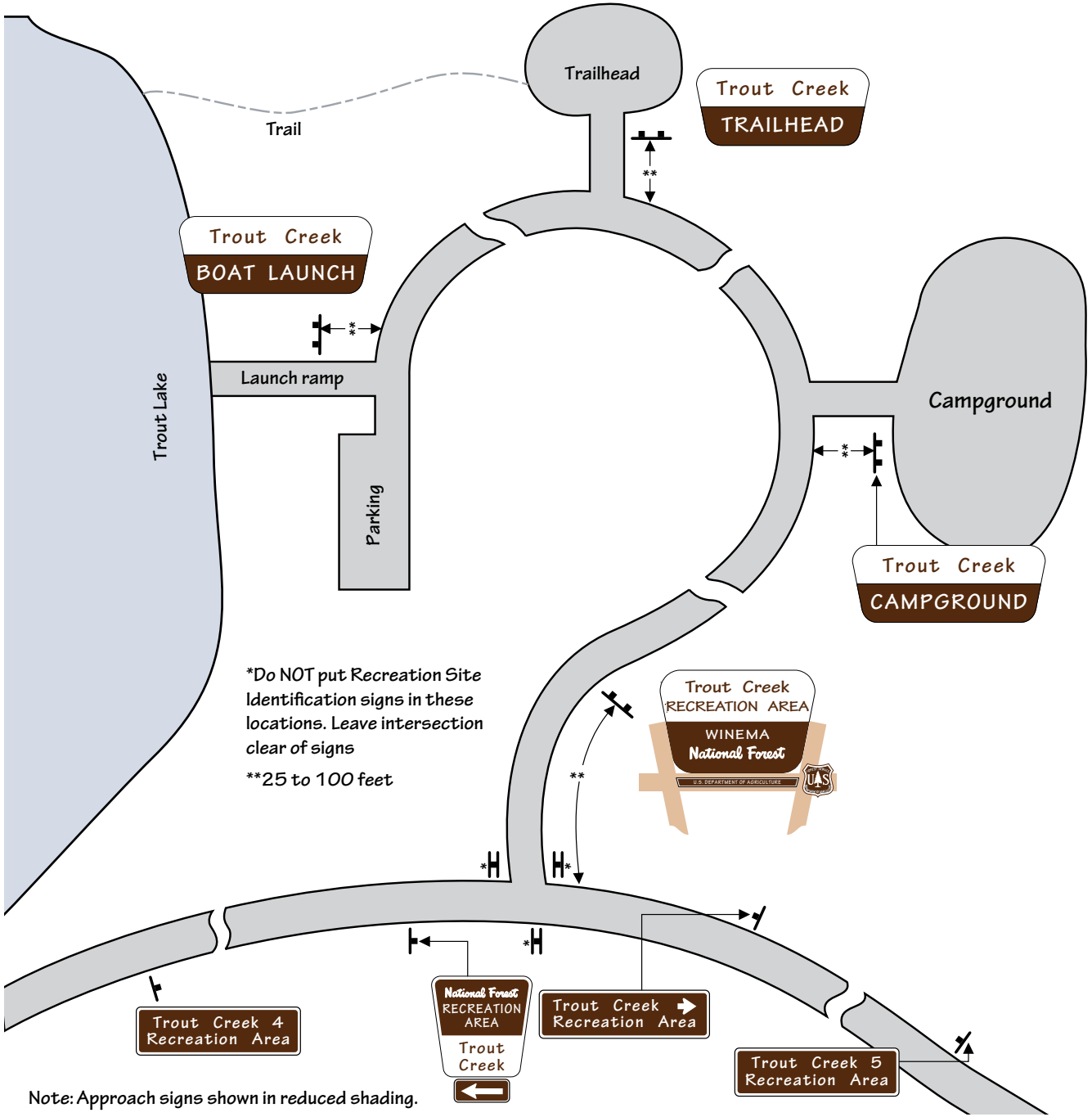


Figure 3–123—A sign plan identifies the locations, purpose, and sign types throughout a site. This image is based on a computer-aided drawing found in the "Sign and Poster Guidelines for the Forest Service."

Figure 3–124—The design of entrance signs reflects the natural and cultural setting.

Figure 3–125—The site's recreation opportunity spectrum setting class, as well as the facility's development scale, guide the level of investment in signage.

Sign Design

- Design vehicle and pedestrian routes with clear signage to make it easy for visitors to find their way.
- Locate signs to be visible without dominating natural settings and views. Avoid obstructions that could impede the view of the sign, such as vegetation, objects, or snowbanks.
- Locate interpretive signs to support the appreciation of site features, rather than as the attraction.
- Locate signs for visitor convenience (e.g., adjacent to pedestrian paths). In parking areas, allow clearance space for opening vehicle doors.
- Implement a consistent signage design theme with sign shapes, fonts, colors, and sizes. Always display agency logos and typefaces in true proportion, never altered to fit a space.
- Construct signs with durable materials (figure 3–126 and table 3–8).

Figure 3–126—Durable, self-weathering steel sign frames often require far less maintenance than wood but cost more for materials, manufacturing, and installation.

Table 3–8—Sign materials and durability

Type	Advantages	Disadvantages
High-pressure laminate (digital output encapsulated in clear plastic resin)	• Resistant to shattering, weathering, fading, and graffiti • Excellent colors and resolution • Warrantied for 10 to 20 years • Panels ½-inch thick can be mounted without frames	• Can be scratched or damaged but takes a lot of effort
Fiberglass embedment (digital output encapsulated in clear fiberglass)	• Resistant to shattering and graffiti • Excellent colors and resolution • Generally warrantied for 10 years	• Fibers begin to weather out of material with exposure to high-elevation sunlight • Fiberglass yellows with age, obscures image • May need to occasionally buff with sandpaper or car polish
Fused polycarbonate	• Takes high humidity well, routine maintenance is easy • Maximum size of 42 inches by 90 inches • Durable • Thicker panels can be mounted without backing or frame	• Can be scratched
Anodized aluminum (full color available)	• Very durable, low maintenance, impervious to harsh weather • Attractive for designs with line drawings • Often has a lifetime warranty	• Can be scratched • Color spectrum is not as vibrant as other materials • More costly
Printed aluminum (Image-LOC)	• Resistant to shattering, weathering, fading, and graffiti • Excellent colors and resolution • Warrantied for 10 years • Panels can be mounted without frames • Lower cost than some other methods	• Can be scratched
Porcelain enamel (ceramic coating on metal)	• Outstanding color and resolution • Often warrantied for 25 years • Extremely weather- and vandal-resistant • Requires very little maintenance	• Can be chipped or shattered by bullets, tire irons, or other heavy objects • Blowing sand can mar the surface
Engraved stone	• Very durable and impervious to harsh weather, enabling a long life • Can incorporate inlayed metal or photos; often used for monuments	• Can be broken with heavy objects • Smallest font is ½ inch • Needs to be resealed about every 5 years • Engraved details can collect dirt and debris; requires periodic washing • Expensive shipping
Routed wood	• Rustic look for primitive signs	• High maintenance; requires paint every 5 or 6 years • Difficult to manage

Table 3–8—Sign materials and durability, continued

Type	Advantages	Disadvantages
Routed plastic	• Two colors are composited together, color layer is permanent and no need to paint	• Can fade over time
Laminated paper	• Lowest cost • Easy to update and replace • Longevity and aesthetics can be improved by designing plastic sleeves into the sign base for laminated signs (can be helpful for map locations and other visitor information that requires frequent updating)	• Fades quickly • Vulnerable to weather damage • Can look shoddy if not maintained

- Integrate sign elements into the setting by using complementary materials such as local stone or timbers, if possible.
- Paint the back side of signs a dark color to make them nonreflective.
- Consider positioning signage to minimize weathering. For example, try to angle interpretive signs away from long-term direct sun to prevent rapid fading.
- Decide whether to provide interpretation based on the ROS settings and the level of development. Semiprimitive settings seldom include interpretation, but rural or urban ROS settings often do (figure 3–127).
- Design bulletin boards and other information stations to follow a theme consistent with the setting and allow easy additions and changes to the information.
- Include an information board with registration requirements and instructions as an integral component of a fee station. Post fee requirements at all entrances to the site (figures 3–128). Strategically locate the visitor information sign for visitor convenience.
- Place signs on the right-hand side of the road when entering the site for safety and to facilitate traffic flow. Locate registration/payment stations in turnouts or parking areas so stopped vehicles will not obstruct the flow of traffic.
- Provide information about nearby recreation opportunities and community offerings/events. If drinking water is not available at a developed recreation site, consider posting the location of the nearest drinking water source.
- Make interpretive signs concise, relevant to the immediate site and setting, and thematic to the site (figures 3–129 through 3–131). Effective interpretation inspires visitors to:
  - Feel a connection to the immediate site and setting
  - Understand and enjoy local cultural and natural characteristics
  - Learn about resource issues and become informed citizen stewards of public lands
  - Reduce their environmental footprint and implement sustainable operations at home and in their communities
  - Respect other forest visitors and the natural landscape

Figure 3–127—Design choices for signs and information displays should reflect the site's scenic character, recreation opportunity spectrum setting class, and facility development scale.

Figure 3–128—The infrastructure used to collect fees should reflect the site's development scale.

Figure 3–129—Interpretive signs should complement the setting and the level of development. They can range from simple, low-profile structures to larger structures that attract visitors.

Figure 3–130—Creative interpretive design can engage visitors' senses and curiosity in many ways. Photo credit: "Scenic Byways: A Design Guide for Roadside Improvements."

Figure 3–131—Historic interpretation can help visitors imagine life in another time.

- Design information and interpretation for differing ages and interest levels (figure 3–132). Consider using multiple languages or universally understood symbols. Respond to national and local community needs and determine the need for signage in languages other than English.

Figure 3–132—Interpretive signs should inspire curiosity and understanding about the natural and cultural setting.

Bridging Language Barriers

The Monticello, UT, field office of the U.S. Department of the Interior, Bureau of Land Management (BLM) abuts the Navajo Nation and receives a high volume of fuelwood cutting permit requests from Tribal members. As a way to address language barrier concerns, the BLM developed a rules and regulations video to deliver information in Navajo/Diné, the community's primary language (figure 3–133). This has not only ensured better compliance with the rules and regulations but has also developed a sense of partnership and good will between the Navajo Nation residents and the BLM.

The Manti-La Sal National Forest has since adopted this video presentation in their Monticello office to provide the same information and improve compliance and relationships. The BLM and Manti-La Sal National Forest teamed up to sell permits in the small rural communities on the Navajo Nation at health clinics, homecoming, and other established events where many Tribal members gather, further simplifying the process of receiving a permit while building relationships.

Figure 3–133—Signs and other information presented in languages other than English offer an important way for public lands to be more inclusive.

Interpretation of Sustainability

Interpret sustainable design elements and operations and maintenance actions to showcase how the Forest Service cares for the site and considers it important (figure 3–134). For example:

- Place signs on solar energy components, interpreting how the system works and how much grid energy the solar energy saves.
- Interpret riparian and forest health restoration efforts.
- Consider interpretive opportunities beyond the use of written signs, such as animal tracks imprinted into hardscape surfaces.
- Alternate construction techniques, such as a straw bale building "construction window," to see underlying materials.
- Communicate facility statistics, such as number of annual visitors, gallons of stormwater infiltrated onsite, pounds of carbon dioxide (CO_2) sequestered onsite, pounds of garbage generated by the public, pounds of waste recycled, etc.
- Identify and design an educational interpretation about water conservation, including site-specific historic and recent consumption data.
- Suggest actions that visitors can take right away and at home to help the environment.
- Promote "Leave No Trace" guidelines, including proper waste disposal.
- Develop interpretation to highlight sustainable outcomes of the building or site and the social investments for ensuring its sustainability (e.g., volunteer hours, youth participation, etc.).

Figure 3–134—This sign interprets the sustainable design elements of this visitor center.

Further Reading

- Anchoring Trail Markers and Signs in Rocky Areas
  https://www.fs.usda.gov/t-d/library-card.php?p_num=0523%201202P
- Sign and Poster Guidelines for the Forest Service
  https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3810021.pdf
- Manual on Uniform Traffic Control Devices for Streets and Highways, 11th Edition
  https://mutcd.fhwa.dot.gov/kno_11th_Edition.htm
- Sign Installation Guide
  https://www.fs.usda.gov/t-d/library-card.php?p_num=1071%202812P
- Region 4 Recreation, Heritage and Wilderness Resources, Visual Information Boards
  http://fsweb.r4.fs.fed.us/unit/rhwr/interp_ed/visual_info_boards/index.shtml
- Signs, Trails, and Wayside Exhibits: Connecting People and Places (Interpreter's Handbook Series)
  https://archive.org/details/signstrailswaysi0000trap
- Washington Office, Forest Services Interpretive Services Hub
  https://usdagcc.sharepoint.com/sites/fs-nfs-tti/SitePages/Home.aspx

PART 4

SUSTAINABLE RECREATION DESIGN BY SITE TYPE

Introduction

Specific types of recreation sites have unique design considerations for achieving sustainable recreation outcomes. Part 3 of this guide provided general design information for elements that apply to all developed recreation sites, such as site furnishings, materials, and vehicle circulation. Part 4 provides site design guidance for the fundamental national forest recreation site types—campground, picnic ground, trailhead, viewpoint, fishing site, boat launch, swimming site, and interpretive site.

This part identifies:

- Site type program and function (why people go to these sites)
- Site type features and conceptual layout (the basic anatomy of site type)
- Specific design considerations for each type
- Recommendations for more developed sites, recreation complexes, and recreation corridors, including combinations of site types

Designers can combine the tips in these two chapters to create sustainable designs and outcomes for Forest Service recreation sites.

As with all projects, design must respond to the area's recreation opportunity spectrum (ROS) class, scenery management, the facility development scale, the natural and cultural characteristics of the site and its setting, stakeholder values, management resources, limitations, and other considerations specific to the site (figure 4–001).

Figure 4–001—Different types of recreation require different site designs to facilitate specific uses in a sustainable way.

Campgrounds

Essential Function

Camping on national forests enables families, friends, and individuals to immerse themselves in the natural environment as they gather to socialize, cook and share meals, explore the outdoors, relax, and sleep. The campsite unit functions as an outdoor kitchen, family room, and bedroom, varying in complexity with the degree of campground development. Children have opportunities to explore the natural world while playing near their campsite. Campgrounds also serve as a base of operations for campers (figure 4–002). During the day, campers often leave to participate in activities in other locations and return in the evenings. Gathering around the campfire often figures prominently in the experience.

Figure 4–002—Campgrounds offer a base of operations for visitors, giving them a place to gather and stay overnight while they explore and enjoy the national forest during the day.

Campgrounds have similar characteristics to other temporary lodging. Visitors want opportunities to socialize with their group but desire a sense of privacy from adjacent campers. Especially in higher development sites, users place importance on convenient access to shared amenities, including drinking water, toilets, garbage disposal, and site information.

This section consists of six parts:

- Overall design considerations
- Site layout
- Roads and parking
- Living area units
- Community amenities and services (such as toilet buildings)
- Specialty campgrounds and future trends

Design Considerations

In recent decades, most Forest Service campground projects have involved reconstructing all or part of an existing site. Sites originally constructed by the Civilian Conservation Corps (CCC) in the 1930s have continually evolved, including one or two complete reconstructions and many interim changes (figure 4–003). Redesign poses unique sustainability challenges when compared with new development. The design for many existing sites included accommodations for much smaller vehicles than those often used today. We can anticipate that vehicle types and use will continue to change. Enabling accessibility has fundamentally altered the design of many sites since the 1990s, adding accessible site furnishings and increasing the size of sites to allow for wheelchair use.

Figure 4–003—Many Forest Service campgrounds constructed decades ago (top) require renovation to bring them to current standards (bottom).

Campgrounds often offer such an appeal that people return year after year, decade after decade (figure 4–004). A very popular campground may enjoy near-full occupancy for months. In a campground, people occupy a site for days instead of hours. Long-term use often creates management challenges such as undesired social trails, soil compaction, or degradation of a site's ecological integrity. The intensive use should influence design in various ways, including the need to look for ways to retain and renew the condition and character across the campground site.

Figure 4–004—Camping has long been a common way for visitors to experience the forest. Some Forest Service campgrounds have been in service for more than 100 years.

Program Considerations

Determining what type of camping and the level of development to plan at the site hinges on understanding the character of the setting, the desired experience, and the requirements of the visitor (figure 4–005). Consider a spectrum of camping styles in new design or reconstruction. Some people choose to camp in tents, arriving in a car, on a bicycle, or by foot. Other visitors use large trucks to pull 40-foot-long trailers that feature 4-foot slide-outs on both sides and all the amenities of home. A campground near a major highway will attract visitors with larger vehicles. Consider providing for a variety of camping types adapted to large RVs and trailers, as well as small RVs and small vehicles with tents. A campground accessed by a more primitive, backcountry road with steep grades may best suit a truck-mounted camper and tent-only design. Special situations may call for a campground designed with walk-in, bike-in, or even boat-in sites.

Figure 4–005—Campgrounds can take many different forms and levels of development, but should immerse visitors in a natural setting.

Most individual campsites accommodate single families or small groups of five to eight people. When planning for groups, some units may allow double, triple, or group sites. Understanding use patterns and preferences will help you determine the mix of single versus multifamily or group sites (figure 4–006).

Figure 4–006—The plan for campgrounds and campsites enables accommodation for groups of all sizes. Here, a young adult conservation crew gets ready to rest after a day in the national forest.

The natural features near a campground determine key elements of the design. For example, for a campground located near a lake or a river the design must address the popularity of sites near the water while protecting that desirable natural resource. To protect the lake or river, locate sites 100 feet or more from the high-water edge. Positioning site improvements to maintain a view of the lake or river or providing a few more spaces near water may help manage the demand for these sites (figure 4–007). The design must also provide alternate access to the lake or river for other users in a way that does not intrude on the privacy of campers near the water.

Figure 4–007—An example of a campsite related to a water feature, using elevation and existing vegetation to provide views while protecting the bank or shore.

Because people sleep in campgrounds and cannot be constantly aware of their surroundings, these sites present added safety concerns compared to other types of developed sites. These factors include hazard trees, flood risk, and bears and other wildlife. Part 3 includes sections that provide design recommendations for managing these risks: please refer to "Grading & Drainage," "Toilets & Waste," and "Siting & Layout."

Campgrounds include shared amenities such as toilet buildings, water hydrants, and trash receptacles. They may also feature social areas within or adjacent to the campground where visitors can congregate, such as a day-use site, an amphitheater, a lakeshore, or trailhead. The campground design must consider the full program of activities.

Campground Layout

Managing parking and vehicle traffic present significant challenges when designing campgrounds. Many users travel to campgrounds in large RVs and truck and trailer combinations, and some drivers have limited experience maneuvering these large vehicles. The site design, including spurs and pullthroughs, must facilitate moving and parking safely and conveniently.

The campground loop road, a basic design feature, provides an effective means for accessing the site, especially for larger vehicles. One-way loops and two-way loops have different functional considerations. For larger sites, the multiple loop design can provide options for closing parts of the campground during low-use periods while keeping some sections open.

Arrival, Departure, and Information

Campground visitors need certain features when arriving and departing. Large sites may have a booth at the gate for hosts, smaller sites may provide a pullout for an information board and a fee station (figures 4–008 and 4–009). Position these entrance features in visible, easily accessible locations with sufficient temporary parking out of the main roadway. Plan also for departures by locating trash receptacles or dumpsters where visitors can deposit trash when exiting, assuming the site provides trash service.

Figure 4–008—Keep the level of development consistent across a recreation site. At smaller campgrounds, a simple fee station and information board are sufficient.

Figure 4–009—The entrance to a campground helps form the visitor's initial impression of the site and sets expectations for their experience.

Entry Stations

- In popular sites, especially those with check-in structures or information boards, provide short-term vehicle parking at registration to prevent stopped vehicles from interfering with travel along the access road.
- With staffed entry stations, provide a turnaround space for vehicles if visitors decide not to enter the campground.

Road and Parking Design

Ideally, a campground road design uses one-way loops to offer safe and efficient traffic management that provides for a quality experience. One-way loops reduce traffic and improve efficiency for backing into spurs.

- Larger campground developments call for a system of single-lane loop roads for one-way traffic. Construct collector roads that access campground loops to a two-lane width. Design loops to accommodate counterclockwise vehicle travel to minimize vehicle crossing conflicts and to fit the normal driving convention of keeping to the right (figure 4–010).

Basic Campground Anatomy

- Design camp loop roads with a series of smaller loops, each with a single gate that can close off a section in times of reduced demand, thereby improving operational sustainability (figures 4–011 and 4–012).
- For sites that provide for recreational vehicle (RV) and trailer use, design campground roads to meet engineering standards for class A motorhomes and other large and heavy service vehicles. Include minimum vertical and horizontal clearances for vegetation and other physical obstructions, such as rock outcroppings.
- Consider limited designated areas for parking extra vehicles or trailers.
- In higher development campgrounds, select road surfaces that minimize dust generation.

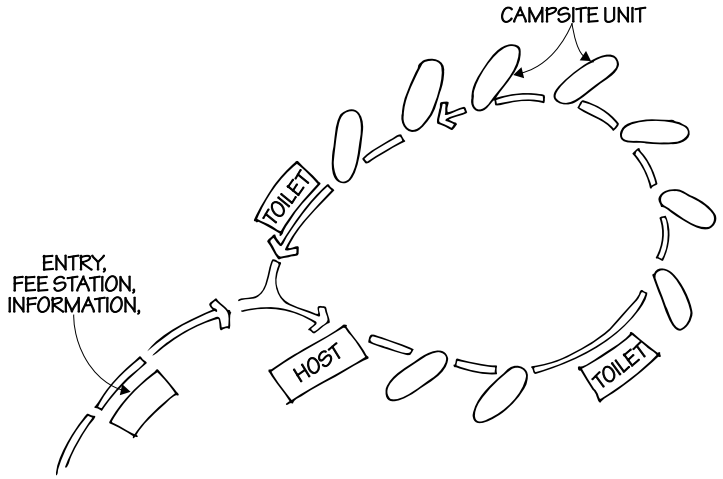


Figure 4–010—Basic campground sites include an access road, entry portal, internal road, campsites, and basic visitor amenities.

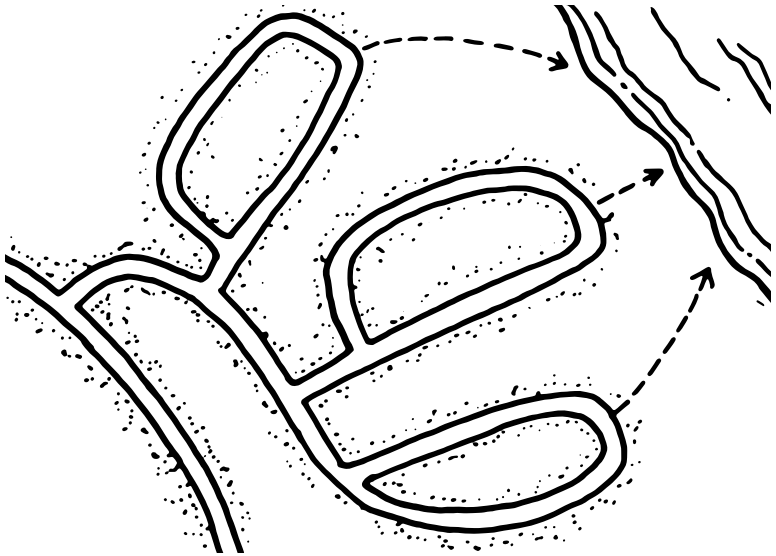


Figure 4–011—A proven campground road configuration provides campsites off individual loop roads linked by a central access road. Loop roads can also provide managed access to natural destinations, such as shoreline.

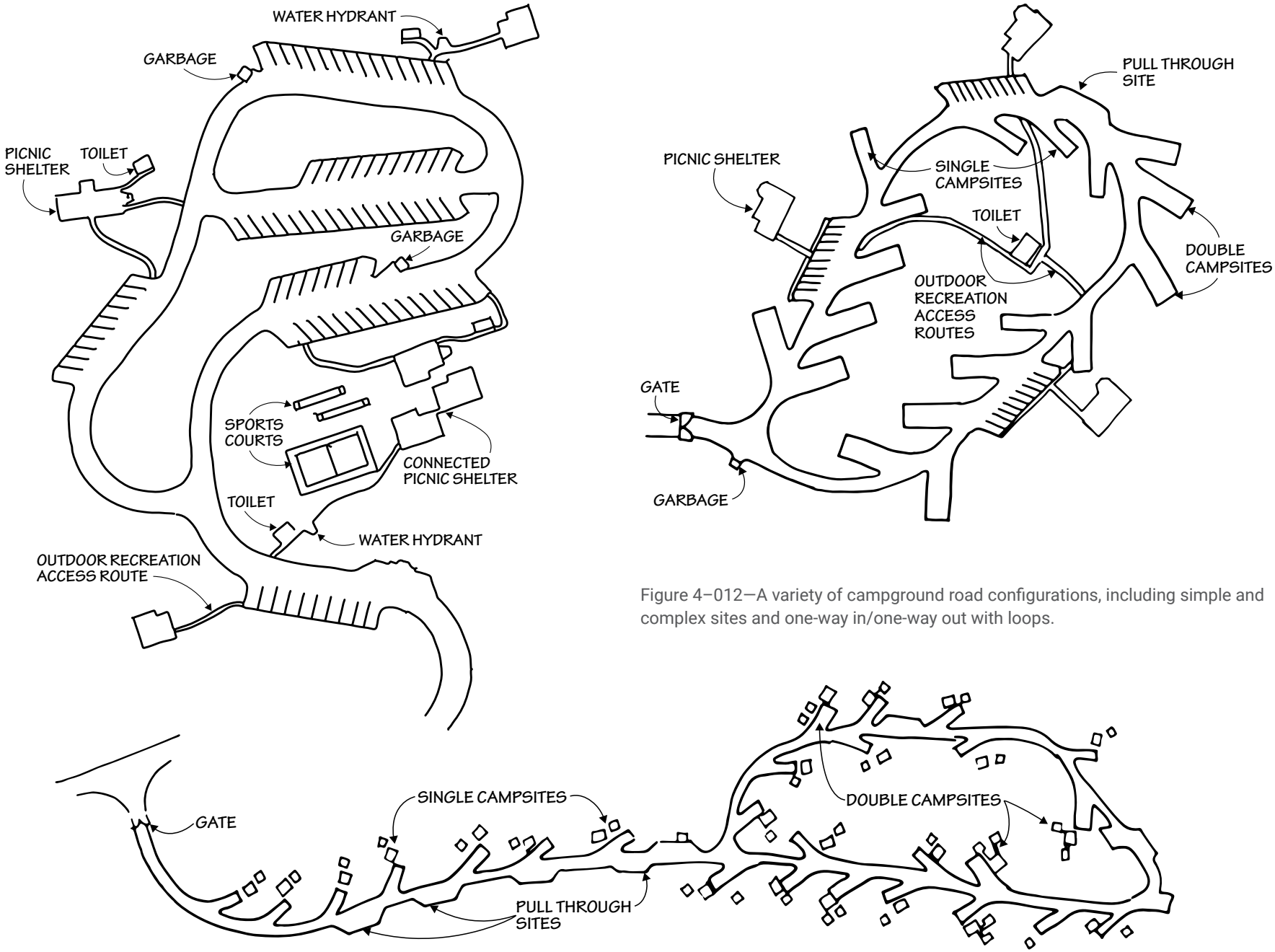


Figure 4–012—A variety of campground road configurations, including simple and complex sites and one-way in/one-way out with loops.

Basic Campsite Unit Anatomy

Campsite Units

The campsite unit is the foundation of a quality design in a campground. The types and locations of campsite units dictate the overall function of the campground. Develop the design based on the experiences that users desire and the range of equipment they may use (i.e., tents versus RVs). When planning to reconstruct an existing site, talk to field personnel, camp hosts, concessionaires, and others who have observed the mix of tent camping to RV camping. These individuals can also provide insight about how individuals and groups use the site, which helps to inform the design. Walk through the campground site with those who know it well and identify areas where people like to camp. Identify areas that have natural characteristics and the appeal of a quality campsite. When constructing a new site, visit other campgrounds in the area to observe the design and layout and to see what campers bring with them and how they use the site. Check online reviews, travel websites, and social media for public views on types of use, concerns, and preferences. Ensure your design supports current trends in camping and typical use patterns for the site (figure 4–013). Avoid a sentimental attachment to the days when everyone camped in tents—a site can sustain damage when people adapt the site on their own to accommodate a large trailer.

The makeup of the visitor population also affects the design. Does a site receive more individual families or groups? Provide a variety of campsite sizes to accommodate single families and small groups. Consider configuring some single sites for members of a larger group to occupy to enable extended families or groups to camp near each other.

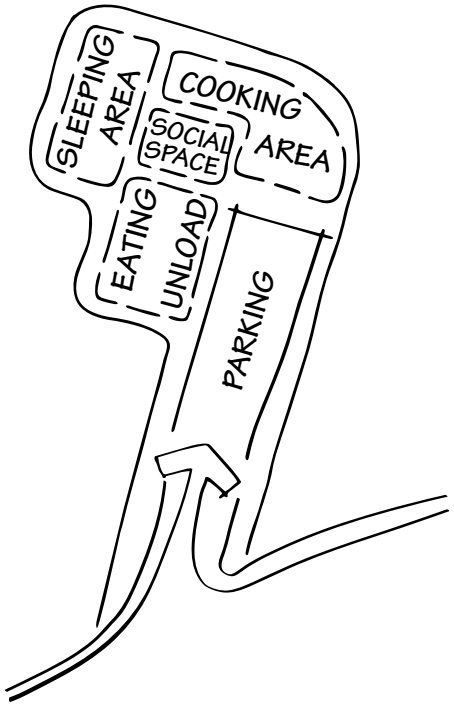


Figure 4–013—A basic campsite unit includes a driveway, parking spur, living area, and sleeping area.

A sustainable campsite unit can accommodate the planned type and amount of use over time without markedly expanding in area, degrading the setting, causing unreasonable maintenance requirements, or creating crowding or social conflicts.

Pullthroughs or Back-in Spurs?

The decision of whether to design for pullthroughs or back-in spurs fundamentally influences the overall design and circulation of a site. Parking spurs, the most efficient footprint in terms of space used, typically call for back-in parking. The doors for trailers and RVs are always on the passenger side of the vehicle. When spurs

are designed to back to the right from the road, the door is on the long side of the spur. This functions better because the living space will be a greater distance from the road with handy access to the trailer door. When the design calls for backing to the left, the door opens on the short side of the spur, which is close to the road. This creates a situation with less privacy for the campers and more exposure to road noise and dust.

People with trailers and RVs generally prefer pullthroughs because they make maneuvering the vehicle easier. However, pullthroughs require a large, level surface, so the design must allocate more space and longer parking areas than designs for spurs. Pullthroughs give campers an increased sense of privacy, with the living area separated from the roadway by the pullthrough and by other parked vehicles. This configuration also results in less damage to surrounding trees because users do not need to back the trailer or RV. A thoughtful mix of spurs and pullthroughs provide for a variety of experiences and sensitivity to the topography.

Campsite Parking Spur or Pullthrough Design

- Design parking spurs to a width of 16 feet or more, as required in the Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG). If conditions for departure from standards exist and are documented, spurs may be as little as 13 feet wide.
- FSORAG requires a certain number of 20-foot-wide campsite spurs in campgrounds with RV camping, based on the total number of camping units. Include the minimum number of these sites, as outlined in table 4–1.

Table 4–1—Ratio of accessible camping units to total camping units

Number of camping units	Minimum number of 20-foot (6-meter)-wide vehicle parking areas required in campgrounds with units designed for accessibility
1	1
2 to 25	2
26 to 50	3
51 to 75	4
76 to 100	5
101 to 150	7
151 to 200	8
201 or more	8, plus 2 percent of the number above 200

- Design typical spur lengths to accommodate two vehicles or one vehicle with a trailer, typically about 65 feet from the edge of the access road. Design spurs 75 to 100 feet long from the centerline to accommodate all RVs.
- Provide a pedestrian route from the spur to the living area that complies with the outdoor recreation access route (ORAR) section of the FSORAG.
- Orient campsite spurs parallel to topographic contours (where possible) to minimize grading. Campsite spurs do not need to be adjacent to the campsite living area, particularly in locations of challenging topography.
- Install campsite markers with reflective site numbers clearly visible to arriving vehicles and protected from potential vehicle damage.

- To meet FSORAG requirements, design the last 35 feet of each parking spur with a slope of 2 percent or less and as close to the natural grade as possible. To enable drainage, grade up to 2 percent maximum running slope and 3 percent maximum cross slope. The driveway portion of a campsite spur should not exceed 8.33-percent running slope. Taking advantage of the driveway portion of a spur can help with locating a spur in challenging topography.
- Construct parking spurs using compacted aggregate base, asphalt, or concrete.
- Design spurs to support the weight of a class A motorhome, unless designing exclusively for smaller vehicles with tent camping only.
- Locate and design spurs to minimize grading requirements, thus reducing construction costs.
- When designing campsite spurs for RVs, consider that many of today's RVs have slide-outs that extend up to 4 feet on either side of the vehicle.
- Optimize the design of the campsite living area by placing it on the passenger side of the vehicle. This improves convenient access from the interior of the trailer to the picnic table and other living-area amenities (figure 4–014).
- Avoid back-in spurs that require a substantial change in grade from the main road.
- Design for the preferred spur-to-road angle for a back-in of 30 to 45 degrees, as measured from the road. The angle of back-in spurs should not exceed 60 degrees.
- Locate pullthrough spurs only on the right side of the road.
- Do not physically identify or sign individual campsites that comply with FSORAG accessibility standards. If less than 100 percent of sites comply with standards, indicate those that are in compliance on a campground map or through the online reservation system.
- Try to keep the cut and fill slopes adjacent to the parking area less than 2 feet high to enable campers to maneuver around the trailer and access the rest of the site.
- Vary the slope angle to save selected trees, shrubs, and rock outcroppings, and to blend with the terrain.

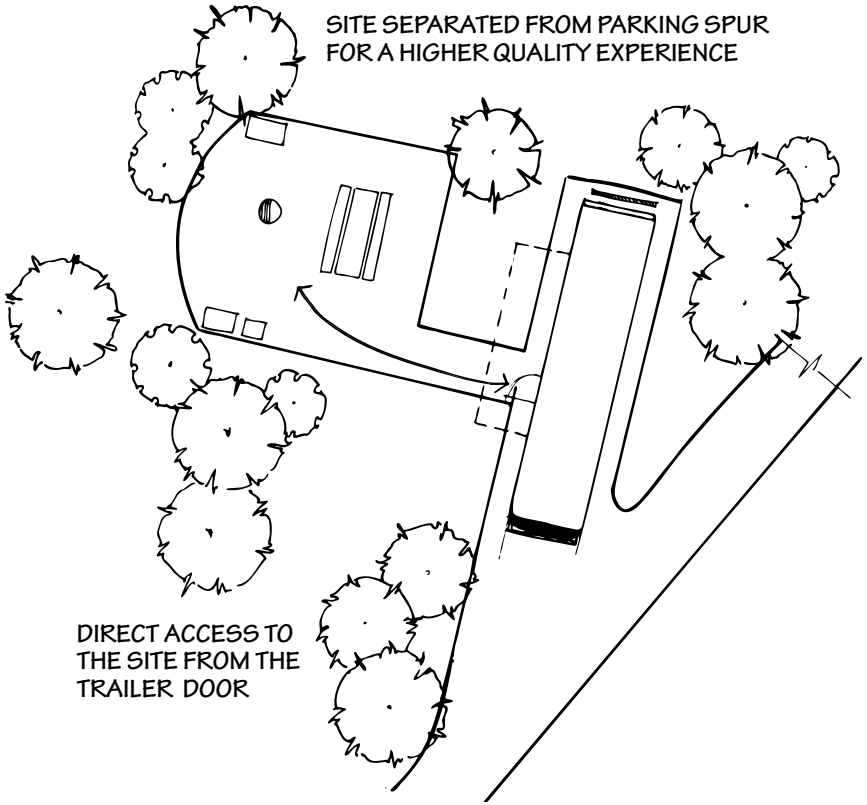


Figure 4–014—A campsite spur consists of a driveway portion, where the spur meets the road, and a parking area. An ideal spur layout positions the campsite unit on the long side of the spur with direct access to the recreational vehicle or trailer access door.

The function of the campsite unit—Consider how people use the site. Some elements equate to functions in a home, others to functions in a hotel:

- People arrive, select their site, and park the vehicle.
- They unload food and cooking supplies and place them on the table.
- If they have a tent, they identify their sleeping area.
- They set up their social space; usually, a circle around the fire ring.

Does the design facilitate efficient access to the table? Is the table oriented so that the bench can provide seating during a social gathering around the fire ring? Considering the position of a grill or utility table in relation to the table, is it convenient for cooking and preparing food (figures 4–015 and 4–016)?

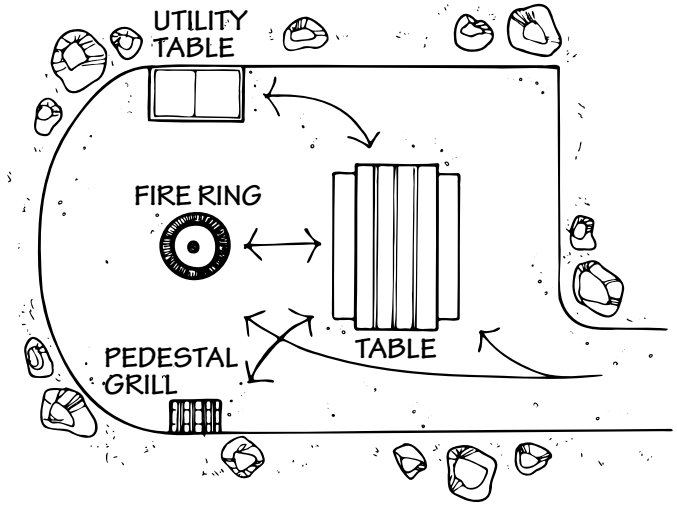


Figure 4–015—A basic campsite living area includes a table and fire ring. Consider how the individual amenities relate to each other. In more developed settings, living areas may include food storage containers, pedestal grills, and other amenities.

Figure 4–016—The minimum site furnishings for a campsite living area consist of a table and fire ring.

A quality campground design considers how neighboring sites relate to each other and to the access road. People want privacy and most want quiet; spacing units 75 to 100 feet apart supports this. Vegetation can help with privacy.

The fire ring supports the social experience of the campground and provides heat and a place to cook (figure 4–017). Provide space around a fire ring for circling camp chairs. Design the open space based on the number of people the unit accommodates.

Figure 4–017—The fire ring serves many functions, including heat and cooking. In modern campgrounds, perhaps the most important function is the iconic experience of sitting around the campfire at night, sharing stories, and enjoying the company of family and friends.

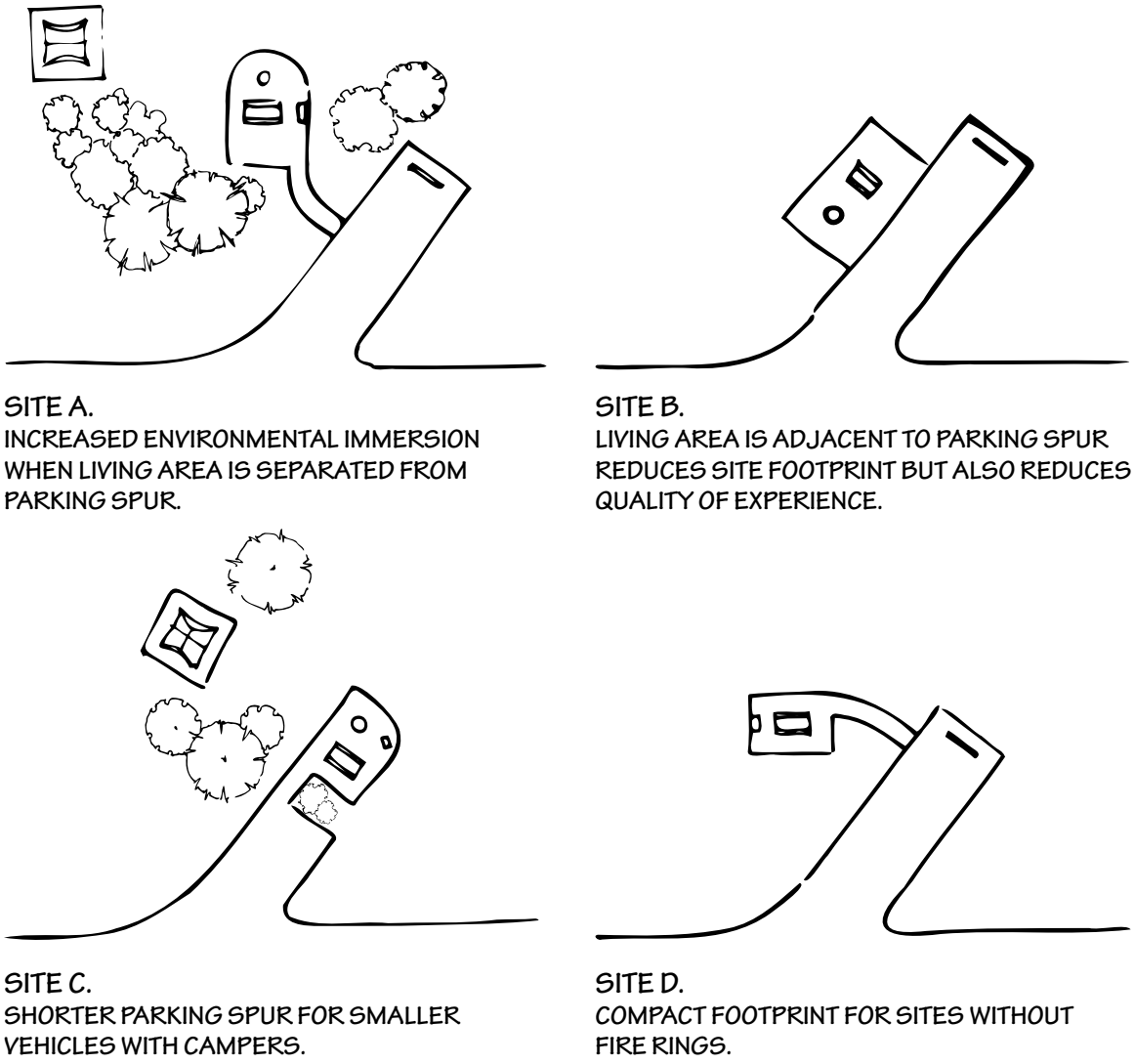
Figure 4–018—A utility table can provide an area for food preparation, a place for camp stoves, or a surface for Dutch-oven cooking.

The level of planned development and local preferences determine the number and types of amenities. For example, where many campers cook with a Dutch oven, a utility table helps with this activity and also provides a food preparation surface (figure 4–018). For a site with few trees, or to prevent damage to standing trees at a site, providing a lantern hanger makes it easier to illuminate the site. In areas that experience a high level of tree damage from hammock ropes, installing hammock posts may offer a solution to the problem and provide an amenity that campers may value. Base a determination of this feature on local need, risk management, and inspection requirements for safety.

Design for Living Areas

- Where topography allows, orient the living area to the trailer or RV passenger side with the vehicle pulled through or backed into the spur.
- Grade living areas and tent pads on a slight slope—not more than 3 percent—to drain away from the living spaces while retaining accessibility.
- Avoid locating campsite living areas or tent areas in low spots where stormwater runoff may collect.

- Design sites based on how the topography influences the separation of the campsite living areas from campsite parking spurs. Placing the campsite adjacent to the parking spur reduces the footprint of the development and increases the convenience of moving between the living space and the interior of the trailer. Separating the living area from the parking spur can improve the sense of experiencing nature and better accommodate a site in challenging terrain (figure 4–019).
- Take advantage of topographic constraints, such as sloped areas adjacent to campsite living areas, to contain use to the designed area and discourage user expansion of the area.
- Locate fire rings away from surrounding and overhead vegetation to reduce the chance of vegetation burning.
- To meet FSORAG accessibility requirements, maintain a minimum clearance of 48 inches between all site amenities and natural features that restrict pedestrian movement.
- To meet FSORAG requirements, where topography allows within campsites, provide accessible routes between campsite living areas, tent areas, and parking spurs.



SITE A.
INCREASED ENVIRONMENTAL IMMERSION WHEN LIVING AREA IS SEPARATED FROM PARKING SPUR.

SITE B.
LIVING AREA IS ADJACENT TO PARKING SPUR REDUCES SITE FOOTPRINT BUT ALSO REDUCES QUALITY OF EXPERIENCE.

SITE C.
SHORTER PARKING SPUR FOR SMALLER VEHICLES WITH CAMPERS.

SITE D.
COMPACT FOOTPRINT FOR SITES WITHOUT FIRE RINGS.

Figure 4–019—Campsites can be configured in many ways to fit their environment, address constraints, and take advantage of opportunities.

- As required by FSORAG, do not sign individual camping units with the international accessibility symbol. This implies that the site is reserved for individuals with disabilities. If all campground sites do not meet full accessibility standards, indicate which ones do comply on internet platforms such as recreation.gov and on campground maps at the entrance.
- If placing boulders in living areas, position them with the flattest boulder side face up to allow use as natural seating.
- Depending on local concerns, anchor tables to prevent relocation or theft.
- Where bears are a concern, food storage lockers may be recommended or required. Anchor these into a concrete slab or secure post.
- Locate campsite living areas to retain a natural character, to preserve existing vegetation, and to give the user privacy.
- Where feasible, locate the campsite living areas to take advantage of views.
- Use vegetation or constructed features to take advantage of or provide protection from sunlight. Most campers enjoy the full morning sun in the campsite living area, and where possible, protection from the hot sun later in the day (figure 4–020).
- Where possible, locate fire rings and pedestal grills downwind from tables.
- Design double and triple units with the assumption that a single group will occupy the site, not two unrelated groups. Provide one fire ring and two or three tables. When designing for three tables, consider providing two grills or a group grill. The fire ring constitutes an important social element, just as with a single-family unit, where the group can gather in the evenings.

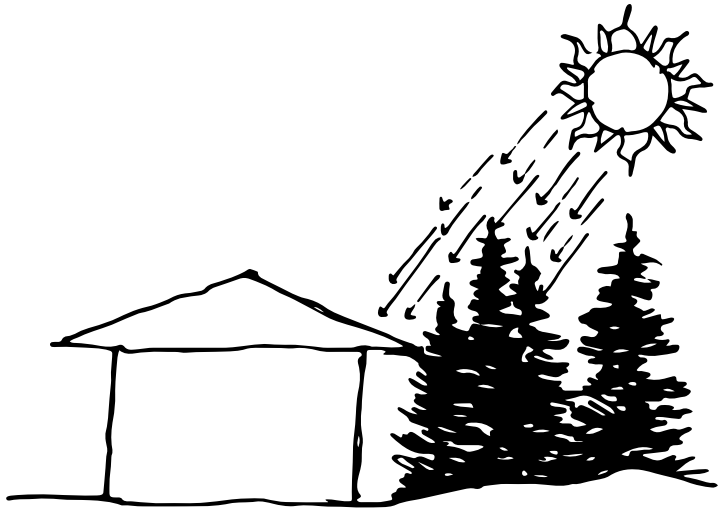


Figure 4–020—Use existing vegetation or pavilions to provide shade from the afternoon sun. This illustration is adapted from "The Built Environment Image Guide for the National Forests and Grasslands."

Tent Area/Sleeping Area

FSORAG accessibility standards require a 4-foot level surface around most tents. A minimum 16-by-16-foot level area accommodates a square 8-foot tent. Construct living areas and tent pads of compacted material or native soil to provide a firm and stable FSORAG-compliant accessible surface. When designing for tent pads, talk to area hosts and others familiar with camping styles in the area to learn about common sizes of tents used in the area:

- Design double or triple sites to accommodate two or more tent sites per campsite.
- Locate tent areas away from the road, in an area with good drainage.
- Provide a minimum separation of 20 feet between the tent area and fire ring.

Individual Campsite Layout

- We recommend separation between adjacent campsite living areas to provide privacy. The ROS setting class serves as a guide for desired spacing distances between sites. As a guideline, separate center points of campsite living areas by the following distances:
  - Rural/urban—75 feet
  - Roaded natural—100 feet
  - Semi-primitive motorized—125 feet
- Maintain and encourage vegetation screening for privacy between campsites (figure 4–021).

Figure 4–021—Visitors often value screening and privacy between campsites.

- Consider shade and openings when locating campsites. Open sites without shade may not appeal to visitors during the hot summer months but may be attractive during the cooler spring and fall.
- While visitors with RVs and camping trailers prefer pullthough driveways over back-in spurs, back-in spurs require less area. Design for a combination of pullthrough and back-in spurs that will allow for space efficiencies while providing improved visitor comfort.

Outdoor Recreation Access Routes

- Provide ORARs (that comply with the ORAR section of the FSORAG) between campsites and campground amenities, unless the design indicates use of the campground road for pedestrian circulation within the site.

RV Utility Connections

- Refer to the Forest Service Handbook (FSH) 2309.13—Recreation Site Handbook, Chapter 10—Planning and Design of Developed Recreation Sites and Facilities, section 13.2 <https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsh?2309.13!..> before planning utility hookups to ensure that all criteria are met and documented.
- Locate utility connections in the rear third of the campsite parking area, adjacent to the driver's side of the vehicle.
- Install 30-amp service to meet basic RV needs for most settings. While many modern RV users want 50-amp electrical service to operate air conditioners and other high-draw appliances, the construction costs are substantially more.
- Physically separate connectors and utility trenches for drinking water and wastewater, as building codes require.
- Specify drinking water connections with anti-siphon valves to protect the water supply from cross contamination.

- Install barriers to protect the utility connection from accidental vehicle damage (figure 4–022).

Figure 4–022—Utility services (hookups) for recreational vehicle camping can include water, sewer, and/or electricity. Install barriers, such as a bollard, to protect utility connections from accidental vehicle damage.

Double and Triple Units

Providing double and triple unit sites builds flexibility into a design. These units can accommodate larger families or groups, without the expansion necessary for a group site. Determine the demand in an area for larger sites when planning a design. When including these sites, provide more space from adjacent spurs (figure 4–023).

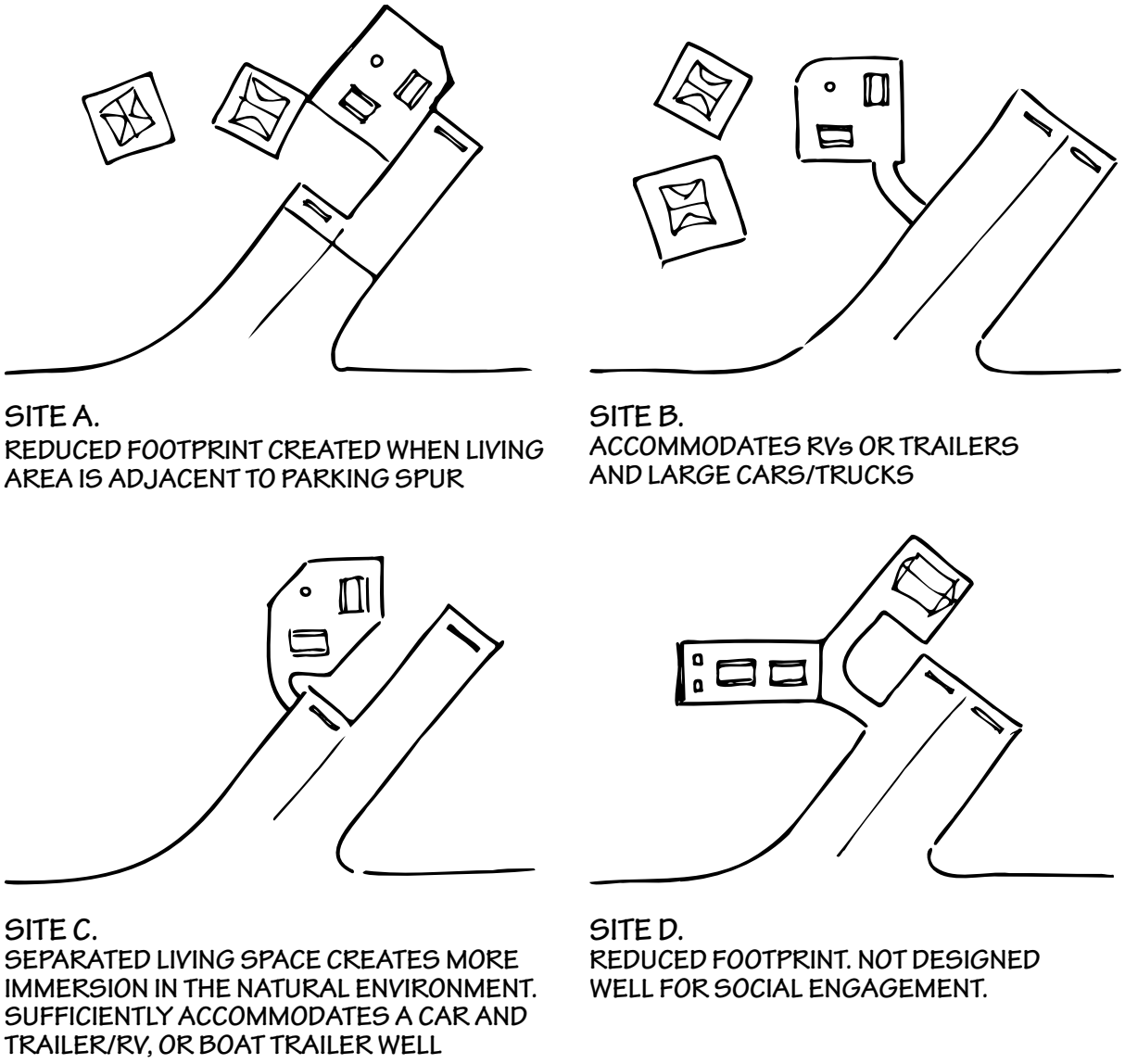


Figure 4–023—Examples of different double-unit campsite configurations. A double site has a wider spur for parking two vehicles. Orient tables so that benches provide seating space for enjoying the campfire after meals.

Group Campground Units

The characteristics of group campgrounds differ from those of typical individual-family campgrounds. The group site values collective social areas, including a larger eating area where the group can gather. Arrange the tables to facilitate socializing. Consider the arrangement for food preparation and service and how to make it convenient to the cooking grill. Provide a large fire ring with a large, clear surface for placing camp chairs for evening social activities, such as singalongs and telling ghost stories (figure 4–024).

Figure 4–024—A group eating area within a campground can either support day use or provide a gathering place for campers. Design this type of site with some degree of privacy or separation from other site users.

Design the sleeping area to meet the needs of the expected users. Youth groups will need multiple tent sites positioned fairly close to each other (figure 4–025). For groups with individual families, design the loop similar to an individual-family site, with the group eating and social area in a central location (figure 4–026).

Figure 4–025—Where youth groups and other groups typically camp with tents, consider incorporating amenities such as small sites with multiple tent locations.

For a group campground or day-use area connected to an individual-family campground, provide distance and a separate loop to avoid conflict between the two uses.

Cooking and Campfire Amenities

- If providing grills, install one or two large open-fire grills instead of multiple small grills.
- Provide serving tables that visitors can use for food preparation and food service.
- Provide multiple bear-resistant food storage containers where necessary to match planned site-use capacity.
- Provide a large group-use fire ring with enough space for campers to arrange camp chairs around the ring.

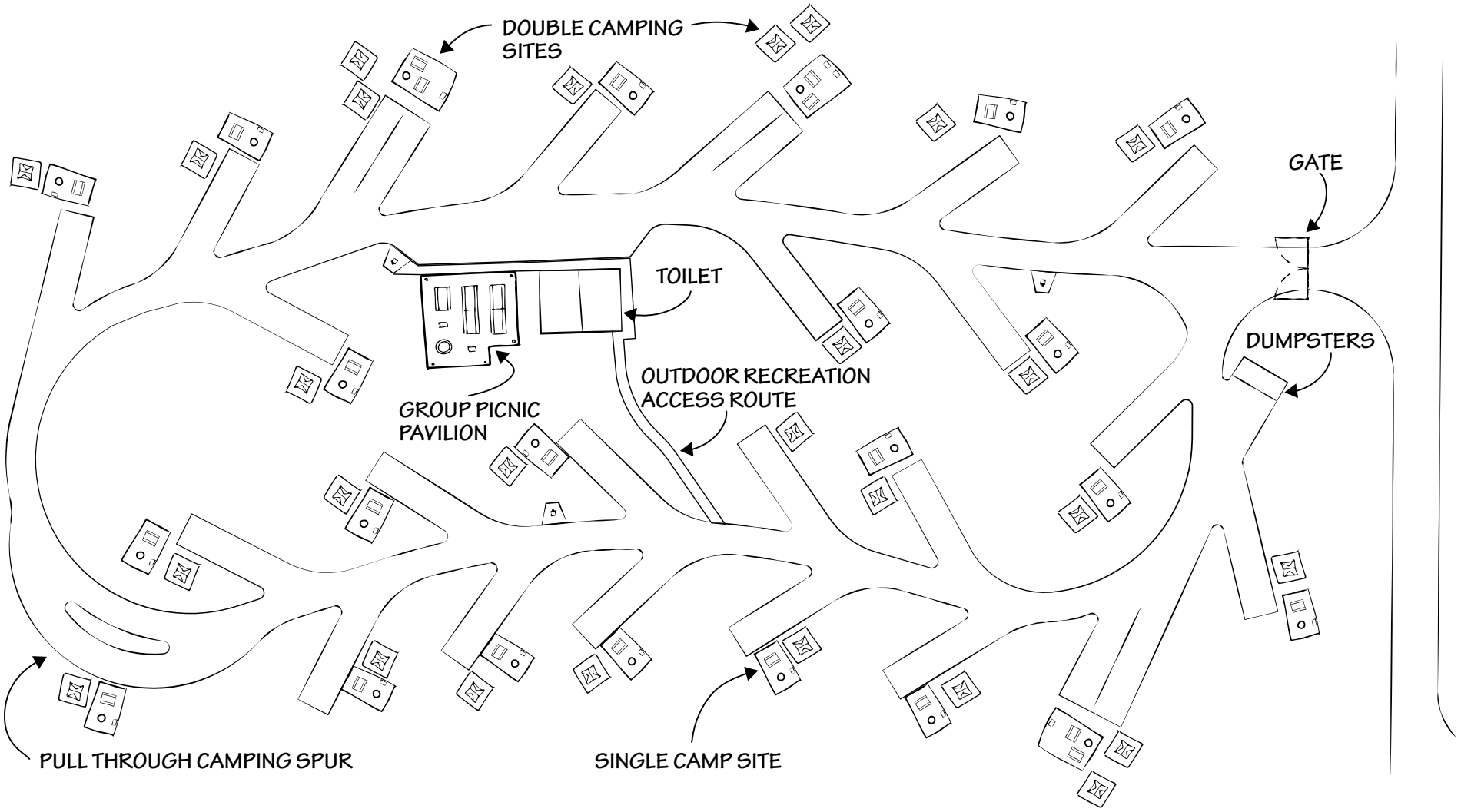


Figure 4–026—Consider providing a variety of camping types in group sites, such as single and double sites.

Water and Sanitation Facilities

- Locate restrooms at least 100 feet from the food preparation area to minimize toilet odors from drifting into food service and eating areas. Verify the prevailing wind direction and locate toilets to minimize negative effects.
- Locate any drinking water hydrant for convenient access from the food preparation area.

Roads, Parking Areas, and Gates

- Provide entrance gates to enable management to close the area and allow access on a reservation basis.
- Plan parking area capacity to correlate with the designed visitor capacity of the site.

Other Improvements

- Consider including overhead shelters at group sites. This will enable groups to reserve the site in advance with less concern for weather conditions. Shelters add to initial costs and maintenance costs over the life of the structure.
- Consider including open areas for informal play to offer a popular amenity without the need to provide facilities or equipment.

Campground Host Site

Campground hosts can play an important role in the successful operation and maintenance of a campground. Hosts, who may be volunteers for the Forest Service or employees of the concessionaire, provide information and help campers feel more welcome and secure. Consider adding at least one host site to a campground, if appropriate for the location. Position sites where the hosts can monitor entrances and interact with the campers.

For a site managed by a concessionaire, work with the area manager to determine the need and location. The design and location of a campground host site can serve as an important factor in attracting and retaining quality hosts. Offer hosts a larger site than others and separated from adjacent units. Consider providing electricity, water hookups, and holding tanks for waste. Recognize that hosts will occupy the space continuously for 3 months or longer. Sometimes long-term occupation of a site can give it a lived-in or messy appearance that could reduce the scenic attraction at the entrance of a campground. Finding a suitable location for a host site with all these considerations can present a challenge.

Campground Host Campsite

- Consider including a septic tank or vault or providing a direct hookup to nearby sewer utilities. This offers a significant benefit for a host site because it relieves the host from having to regularly move a camper just to empty onboard tanks.
- Locate host sites in attractive and comfortable areas, yet not the “most desirable” for visitors. Host sites should be visible, identifiable, and in a good location to monitor activities, while providing some privacy.
- Consider providing additional parking space for a maintenance vehicle or temporary parking space for guests.

Campground Amenities

Toilets, Trash, and Other Community Services

As they say in real estate, “location, location, location.” Locate toilets, trash, and other community amenities such as water hydrants or pumps where everyone can access them, including people with disabilities, but also situate them so that the entire campground

system functions well (figure 4–027). Users want the convenience of nearby toilets and trash receptacles, but not so close that odors or other visitors intrude on their space. Also, consider the requirements for cleaning and maintenance.

Toilet Building

- Locate toilets at the beginning or ends of loop roads to encourage campers to walk along roads to the building. Avoid locating toilets in the interior center of loops, which makes the facility more difficult to pump and clean.
- Consider providing utility sinks for visitor use. This reduces plumbing costs when compared with installing sinks separate from other structures.
- If a high-development scale campground has electricity, consider keeping external lighting to the minimum necessary for visitors to locate the building.
- In highest development scale settings, provide timer-controlled or motion-activated interior lighting.

Figure 4–027—Clustering visitor amenities such as a kiosk and restroom can aid in providing accessible facilities.

Showers/Laundry (at some high-development scale campgrounds)

- When showers are available, control hot water flow with coin- or token-operated or metered timers.
- Consider designing floor drain pans with integral baseboard coping to reduce long-term maintenance.
- Manage the layout of single-occupant shower units to permit use by all genders.

Utility Sinks (at some high-development scale campgrounds)

- Locate utility sinks within or on the outside of a shower building, restroom, or group pavilion with water to reduce plumbing costs. Utility sinks designed to eliminate food waste provide a useful amenity for washing dishes, pots, and pans, and can improve safety where bears are a concern. This reduces the incidence of dumping food debris in camp units and rinsing it into drain areas below hydrants.

Water Hydrants

- Locate water spigots/hydrants along circulation routes or near restrooms. Avoid locations in the middle of a loop.
- Install fixtures with smooth-nose faucets to ensure visitors do not connect hoses to the hydrant.
- When managing for user convenience, position drinking water locations according to the suggested maximum distance to a campsite unit based on the ROS setting (table 4–2).

Table 4–2—Recommended maximum distance of campsite units to a drinking water source

Recreation opportunity spectrum setting	Distance
Roaded natural	150 feet
Rural/urban	100 feet

Garbage

- Locate trash receptacles near common-use areas such as toilet facilities and water hydrants, or provide large dumpsters near exits to loops. Avoid individual trash receptacles because of their operation and maintenance costs.
- Position bear-resistant dumpsters in locations 150 to 200 feet away from campsites. In areas where bears represent a particular concern, keep dumpsters a minimum of 300 feet from any campsites where people will sleep.

Information Signage

- At smaller sites, post information about fee stations on the bulletin boards. At larger sites, improve information-sharing by creating multiple information areas.
- Provide a campground message board near the campground entrance.

Resource Protection

- Locate individual campsite units away from streams or lakes to protect riparian areas and to facilitate access to the water for wildlife and for campground visitors. The required distance from water sources depends on the specific site location. Complying with this requirement may involve moving existing campsites out of a riparian area and providing one or several defined and protected access points to the water's edge.

Recreational Vehicle Dump Station

- Determine if commercial full-service RV dump stations are available within a reasonable driving distance of the campground. If so, provide information about the commercial location and avoid constructing a dump station at the campground.
- Consider the potential demand for a dump station by both campsite and offsite users. Size the station to accommodate more users than just those in the campground.
- If the dump station will service offsite users, locate it in a readily accessible location where campers will not be impacted by congestion and use. To provide service for campers only, locate the dump station within the gates of the campground.
- Locate dump stations to serve vehicles as they leave the campground. Provide adequate vehicle circulation space, which could include back-in access. However, pullthrough access is far more efficient. Avoid back-in access if possible.
- Design dump station areas with lanes a minimum of 45 feet long and at least 16 feet wide to accommodate trailers and RVs.
- Screen the dump station with vegetation or solid fencing to reduce its visual impact.

- Locate dump stations downwind of camping areas.
- Provide a source of water to wash down and flush out the RV holding tanks. Locate the disposal tank inlet on the driver's side of the vehicle. Mark this water source as "non-drinking water" to protect against possible contamination.
- Provide fresh drinking water with a hydrant to refill RV tanks. Position this hydrant in the vicinity of the dump station but separate it from the sewage-dumping inlet and "wash out," per local sanitary codes. Clearly sign all components of the dump station to prevent any cross-contamination.

Interpretive Program Areas

- Larger campgrounds provide an excellent opportunity for interpretive programs. Consider including signs, exhibits, nature trails, children's learning areas, and amphitheaters or small-group gathering areas to facilitate traditional campfire programs. Amphitheaters can be small and simple or more complex, with permanent seating built into a hillside and a stage. Amphitheaters can also offer a performance space for community activities (figure 4–028).
- Small-group gathering areas with simple seating or rustic features (such as large rocks or logs for sitting) provide a location for interpretive talks or other opportunities for campers to gather.
- Consider including nature trails in a campground to encourage visitor appreciation and understanding of an area.
- For larger development sites or sites adjacent to an outstanding natural or cultural heritage feature, consider developing an interpretive plan before or concurrent with the campground design. This plan can be the basis for integrating interpretive opportunities in the campground design.

Figure 4–028—Larger campgrounds may include additional amenities, such as an amphitheater for evening programs and group events.

Play Areas

- Natural play areas that are designed into the site provide a safe place for children to play and explore the natural world. These may serve as a complement to interpretive programs (figure 4–029).
- Provide open, level areas for unstructured and creative play that does not require permanent amenities or fixtures.
- Do not place or authorize placement of playground equipment or similar amenities, such as swings and slides.

Figure 4–029—Design of natural play areas can complement interpretive programs and encourage children to explore the forest environment.

Concession Sales/Firewood Sales

- Locate an area or structure to meet visitor needs to purchase local firewood or other amenities. In areas where rain is common during use seasons, consider a simple shelter to keep wood dry.
- Where desired, locate concession stores near the campground entrance and check-in facilities.

Lighting and Dark Skies

- In high-development-scale campgrounds where toilet buildings have electricity, control interior toilet room lighting with motion sensors or timers.
- Limit exterior lighting on toilet buildings using timers to turn off after many campers typically are asleep.
- Install shielded lights to reduce light pollution (figure 4–030). Refer to the "Lighting & Dark Skies" section in part 3 of this guide for more information on types of light shields.

Overflow Parking

- Overflow areas should not include amenities beyond providing sanitation and gating to manage the site when not in use.

Figure 4–030—For many visitors, overnight camping provides awe-inspiring dark sky experiences. Design choices should preserve dark sky values.

Developing Trends in Campground Use

Designers should maintain awareness of new technology and user trends in campgrounds. Examples of new technologies and uses currently emerging include:

- Electric vehicle and electric bike (ebike) charging infrastructure (figure 4–031)
- Solar showers, which require a location to hang in the sunlight that is sturdy enough to support about 40 pounds

Figure 4–031—The availability of charging stations at recreation sites will be an important amenity as electric vehicle use increases.

- Hanging tents, which are designed to suspend between trees
- Websites that provide business opportunities for people to rent their trailers and set the trailers up in campsites

Internet Wi-Fi and Cell Phone Service

As the use of cell phones and internet connectivity has grown, diverse perspectives are emerging on the role of these services in Forest Service developed recreation settings. In many locations, commercial cell phone coverage helps visitors navigate, communicate, and enjoy some of the comforts of home while enjoying the outdoors. Cell phone coverage can also improve safety through easy communication with emergency services, if the need arises. Internet coverage while in national forest settings can improve the experience of some, helping them connect to the outdoors in ways that were inconceivable a generation ago.

When considering campground development and promotion of sustainable recreation goals, engage a diverse group of stakeholders and encourage robust conversation about the appropriateness of cell phone and internet connectivity at the site. For some, the fact that a Forest Service campground may not be connected is an important value that supports a unique experience connecting to the outdoors. For others, a lack of connectivity may be a barrier to participation and enjoyment of Forest Service recreation opportunities.

Specialized Campgrounds

There are a variety of campgrounds that are responsive to specialized types of camping. These include sites designed to provide for off-highway vehicle (OHV) recreation, sites that accommodate equestrian use, walk-in and bike-in campgrounds, and sites with lodging accommodations such as yurts, tent cabins, and tiny houses. These specialized sites require designers to consider specific elements for each.

Off-Highway Vehicle Camping Areas

Campgrounds that accommodate OHVs have unique considerations. Often associated with trailheads to an OHV-designated trail system or area (figures 4–032 and 4–033), they principally require space to accommodate the OHVs and the on-road vehicles that transport them. For campgrounds that support OHV use:

- Provide staging areas for loading and unloading the OHVs (many users travel with their own unloading ramps)
- Provide additional space at individual campsites for parking the extra vehicles

Figure 4–032—Specialty parking designated for off-highway vehicle (OHV) use in the Oregon Dunes National Recreation Area that facilitates staging for OHVs and the trailers that haul them.

Figure 4–033—Design specialty campgrounds in areas that accommodate off-highway vehicle use.

Equestrian Camping Areas

Equestrian camping areas have special design considerations (corrals or hitching rails) for accommodating horse trailers and horses (figure 4–034). Generally, equestrian sites are associated with a trailhead and trail system that is suitable for equestrian use.

- Refer to the "Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds" <https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%202816> for additional details about designing campgrounds for equestrian users.

Figure 4–034—Campsites for equestrian users have unique design considerations.

Bike-In/Walk-In Camping Areas

Bike-in and walk-in camping can provide a unique experience away from motorized vehicles. Before designing these camping areas, analyze whether sufficient demand exists. These sites are most successful when located near landscape features attractive to campers that have no vehicle parking opportunities, such as a shoreline or a unique vista.

- Locate walk-in campsites in desirable areas that cannot sustainably accommodate a parking spur (figure 4–035).
- Provide ORARs that serve multiple campsites and the parking area.
- Cluster the campsites.
- Situate campsite living areas at least 50 feet from the centralized parking area.

Figure 4–035—Walk-in campsites typically have basic amenities but are not connected to a campsite parking spur.

Boat-In Camping Areas

In addition to the features of standard campgrounds, boat-in campgrounds need a docking area for the boats (figure 4–036). In areas with substantial boating use, additional parking for boat trailers offers a valued amenity.

Figure 4–036—Boat-in camping provides a unique visitor experience.

Tent Cabins, Yurts, or Other Lodging

Providing tent cabins, yurts, or even tiny houses at campgrounds may encourage use from people who are new to camping and have not invested in camping equipment. Consider opportunities to partner with concessionaires or outfitters to provide this type of opportunity.

- Design tent cabins or yurts to comply with the basic principles described in the "The Built Environment Image Guide for the National Forests and Grasslands" for the design province. Tent cabins can be clustered or dispersed within a campground.
- Provide an accessible path of travel to an elevated tent cabin.

Further Reading

- Design for Outdoor Recreation https://www.taylorfrancis.com/books/mono/10.4324/9780203928110/design-outdoor-recreation-simon-bell
- Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%202816
- Great Trails: Providing Quality OHV Opportunities Through Sound Management, Conservation, & Design https://nohvcc.org/education/manager-education/great-trails-guidebook/
- Sign and Poster Guidelines for the Forest Service https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3810021.pdf
- Accessibility Guidebook for Outdoor Recreation and Trails https://www.fs.usda.gov/t-d/library-card.php?p_num=1223%202806P

Picnic Areas

Essential Function

Picnic areas offer users a place to share outdoor meals and conversation and to enjoy the setting. Like campsite units, picnic sites are social areas that offer a sense of unity to small and large groups who gather there. Picnic areas are designed for short-term day-use visits of less than an hour to all day. They can be located near an attraction, offering a place to sit down and have a meal before or after visiting local sites such as a trailhead, viewpoint, water access area, or interpretive site (figures 4–037 and 4–038). Sites close to communities enable people to visit the national forest with friends and family for a midday lunch or evening meal (figure 4–039).

Figure 4–037—Picnic areas are often located to enjoy a viewpoint or support trailhead activity in the day-use portion of a larger recreation complex.

Figure 4–038—Picnic sites offer a place to sit down and have a meal before or after visiting an attraction. Providing accessible routes to picnic sites is essential but does not always require pavement.

Program Considerations

Different design goals apply to picnic areas when compared with campgrounds, similar to the differences between a restaurant and a hotel. For lodging, key factors include privacy and quiet during sleeping hours, but for a restaurant the social setting and proximity to other tables and diners comprises part of the experience. In the forest environment, while people still want quiet in the outdoor experience, they expect less space between picnic areas or tables than the space between campsites. For many, the convenience of being close to their vehicle outweighs their interest in privacy and seclusion. As a result, the combination of central parking areas and higher density units reduces the development footprint and increases sustainability (figures 4–040 and 4–041).

The picnic unit may consist of only a table or may provide cooking amenities. Some sites may include a pedestal grill or a fire ring (figure 4–042). Even with a site designed for day use, fire rings can form an important part of the outdoor experience. More developed picnic sites may also include food storage or shelter from the sun and rain (figure 4-043). Refer to the "Campsite Units" section on designing living areas—many of the same principles apply to picnic areas (please see figures 4–020 and 4–024 in the "Campgrounds" section for examples).

Group Picnic Sites

Group picnic sites have similar facility considerations to less developed picnic sites, but on a larger scale. They are designed for larger groups—large family groups or a variety of organizations—to congregate and socialize. These gatherings may last a few hours or a full day or evening (figure 4–044).

A central purpose of a group picnic area is to offer a situation for cooking and serving food and eating together. Amenities useful for group picnic sites include a serving table and large group grills. Consider the flow from parking to the serving table and from the grills to the serving table. The serving table functions as both a place to prepare food and to serve the group. When arranging tables, consider access to the serving table (figure 4–045). Separating tables instead of placing them end-to-end assists with accessibility. People with mobility challenges can more easily slide in from the ends rather than swinging their legs over the seats.

Having a dedicated toilet facility and trash collection for the group site will improve efficiency and help reduce conflicts with any nearby single sites.

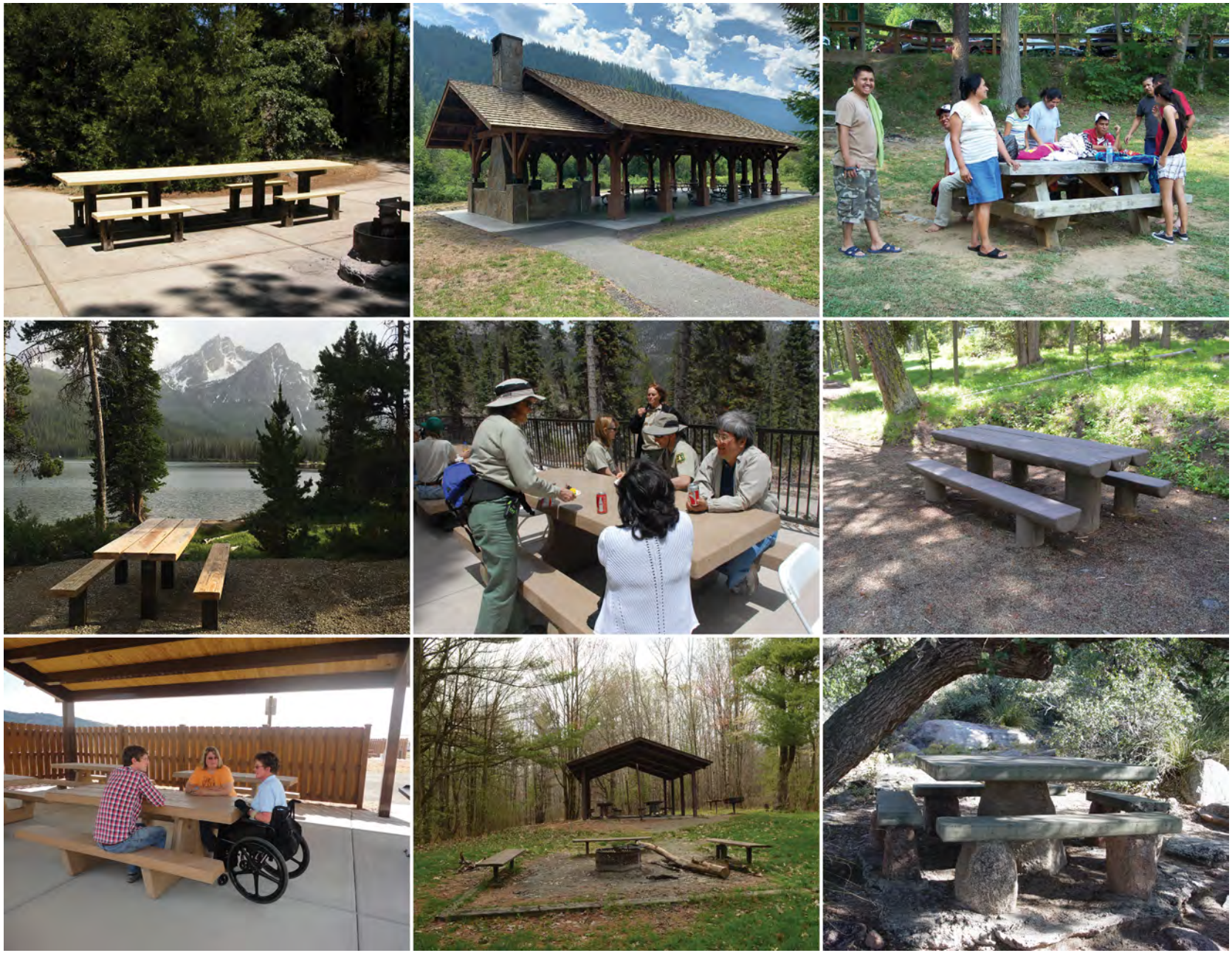


Figure 4–039—Picnic areas provide a range of places and settings to enjoy a meal or spend time with friends during a day visit.

Figure 4–040—A reconstructed picnic site, before (top) and after (bottom). This project reduced the footprint of the site and decreased environmental impacts by clustering parking and individual picnic sites.

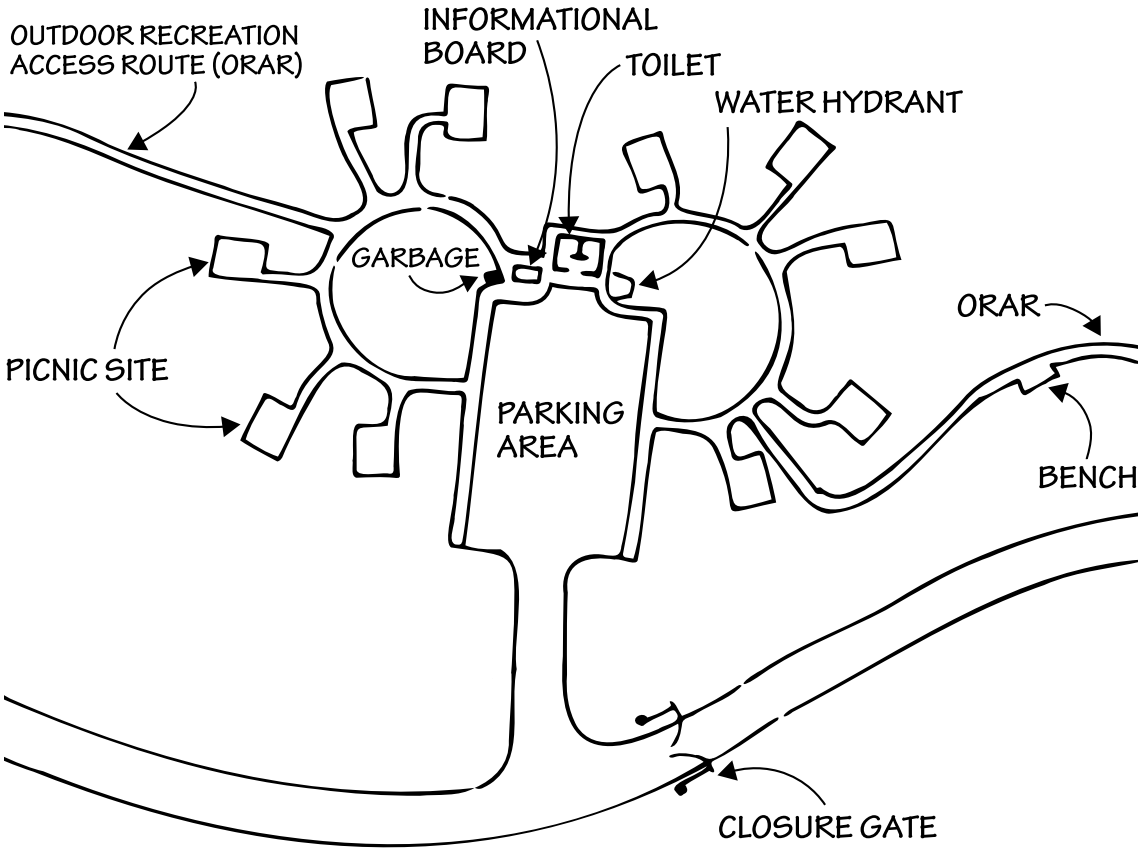


Figure 4–041—Picnic areas often consist of multiple day-use picnic sites centered around a common parking lot and shared visitor conveniences.

Figure 4–042—A basic picnic site, with a table, grill, and access to and around the table. This unit is positioned to showcase a scenic view.

Situate parking as conveniently to the picnic tables as practical and calculate parking requirements based on two stalls for every 8-foot table.

Adding a shelter to the site allows visitors to use the site in all types of weather, providing shade in the heat of the day and protection from wind and rain (figures 4–046 and 4–047). Availability of a shelter can boost reservations for the site. Other amenities, such as large, flat turf areas for informal gatherings, enable social activity.

Picnic sites are sometimes part of larger complexes, such as a day-use picnic area associated with a campground, marina, or interpretive area. Visitor centers sometimes offer picnic areas (figure 4–048).

Larger sites may have more complex vehicle circulation and parking. Cluster parking and design it in response to the topography. Creating parking clusters along roads reduces the visual impact of providing parking for many cars (figure 4–049).

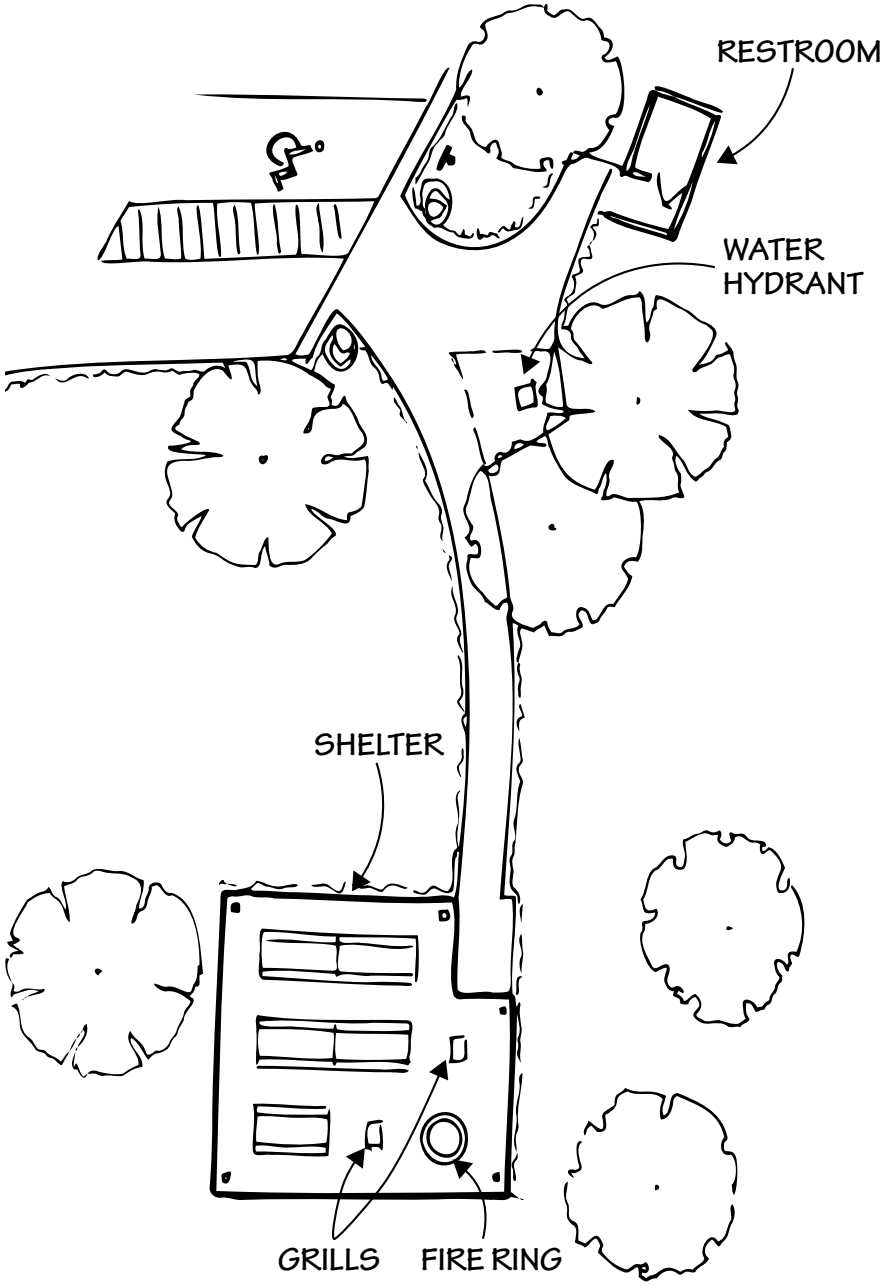


Figure 4–043—A group picnic site may include more amenities of a higher development scale.

Figure 4–044—Picnic areas have an important social role for families and for shared experiences of small and large groups.

Figure 4–045—Consider the configuration of the tables in relation to the serving table. In this example, there is easy access from the serving table to the picnic table.

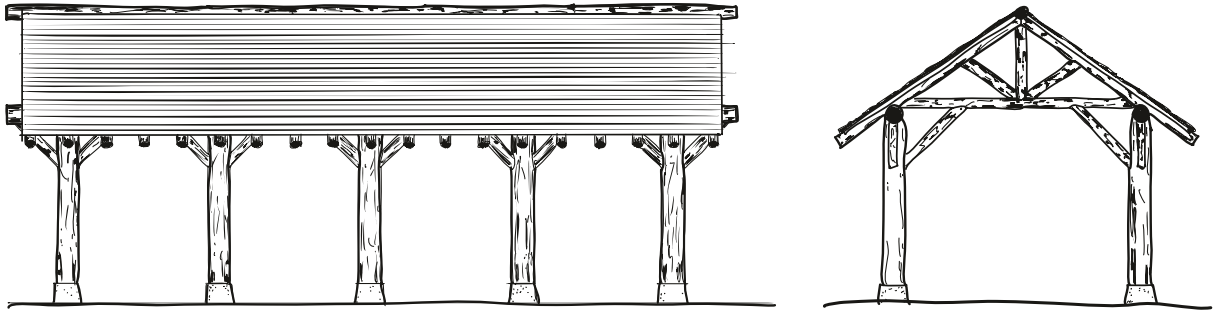


Figure 4–046—An example of a picnic shelter. This illustration is from the "The Built Environment Image Guide for the National Forests and Grasslands."

Figure 4–047—Picnic shelters should be designed to complement the scenic or cultural character of their setting.

Figure 4–048—Picnic tables outside a visitor or interpretive center offer a valued amenity and can expand the time that people stay at the site.

Further Reading

- Picnic Table Selection Guide for Heavy Snow Locations https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%201804P
- Accessible Recreation Facilities—Picnic Tables https://www.fs.usda.gov/sites/default/files/Accessible-Picnic-Tables.pdf

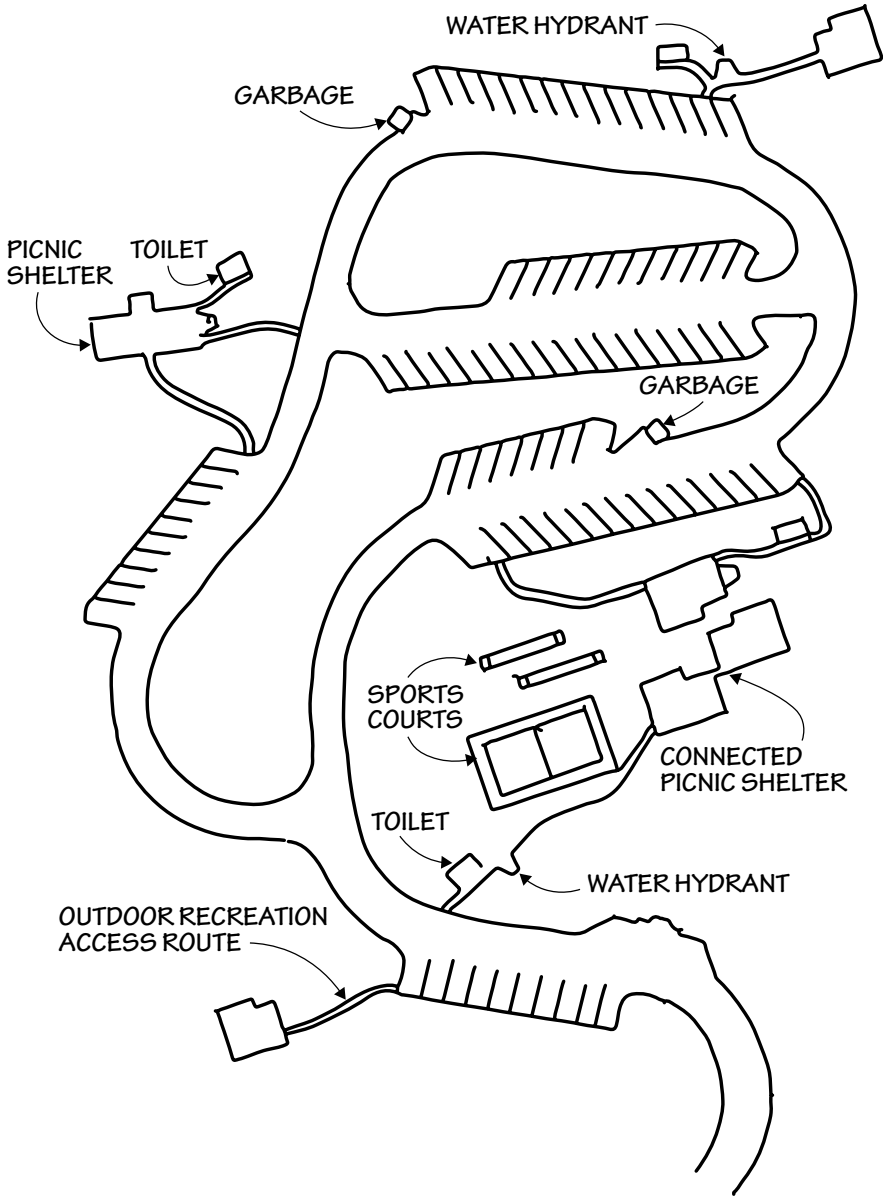


Figure 4–049—Rather than one or two large parking areas, this site has loops with parking pods to reduce visual impacts. This site has four group camping sites and a shared outdoor recreation area with a volleyball court and horseshoe pits.

Scenic Overlooks/Vista Points

Essential Function

Scenic vista points and overlooks provide viewing areas for exceptional or representative cultural and natural features of the landscape (figure 4–050). Vista points are located to provide broad panoramic views or focused views of special features. An overlook may be a roadside pulloff or part of a larger site, such as a day-use area or visitor center. Often, a pathway will connect the parking with the overlook and be an integral part of the experience. Vista points offer the visitor a chance to know an area better through the landscape and interpretation of features such as geology, cultural features, wildlife habitat, historical events, and landscape stewardship challenges (figures 4–051 and 4–052).

Figure 4–050—Scenic overlooks provide managed locations for enjoying expansive views of the landscape.

Figure 4–051—The main focus of a viewing platform is to bring viewers into the scenery. This platform offers a prime view of the landscape while protecting its surroundings from resource damage.

Figure 4–052—Scenic overlooks provide memorable experiences and help visitors appreciate the outdoors. This illustration is from the "The Built Environment Image Guide for the National Forests and Grasslands."

Program Considerations

Often popular destinations for limited-time visits, vistas and overlook sites provide an opportunity to highlight key forest and grassland themes for many visitors. Because of their prominence, scenic vistas can be places to invest in higher quality materials that are consistent with the area's scenic character.

Overlooks and vistas are sometimes associated with designated routes such as National Scenic Byways or National Historic Trails. Consult byway or trail management plans and work with byway partners when designing vistas and overlooks along these routes.

Additional site components at higher development scale sites may include:

- Restrooms
- Garbage collection
- Short trails
- Interpretive exhibits
- Viewing telescopes (figure 4–053)

Figure 4–053—Viewing telescopes provide a unique way to view the landscape.

Design Considerations

- Siting is everything at a vista point facility. Design for the view and for proximity to the road (figure 4–054).

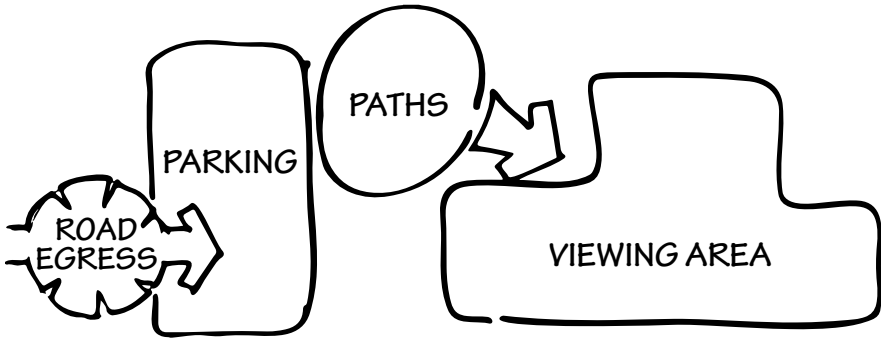


Figure 4–054—The basic anatomy of a scenic overlook site includes the arrival area, parking, viewing area, pathways, and information.

Basic Site Anatomy

- Choose a scenic vista point based on primary considerations that include vegetation, the immediate natural features, their aesthetic qualities, and their effect on framing and enhancing the view (figure 4–055).
- Design a separation between the viewer/view and pedestrians and vehicles (figure 4–056).
- Refer to scenic byways or other recreation corridor plans and goals when designing the site.
- Locate the toilet building (when provided) away from the popular view but with easy access from the parking area.

Figure 4–055—Natural elements such as rock outcrops and vegetation can help frame views.

Figure 4–056—Vista points offer visitors an opportunity to pose for photographs away from vehicle circulation.

Access/Egress from the Road and Parking Areas

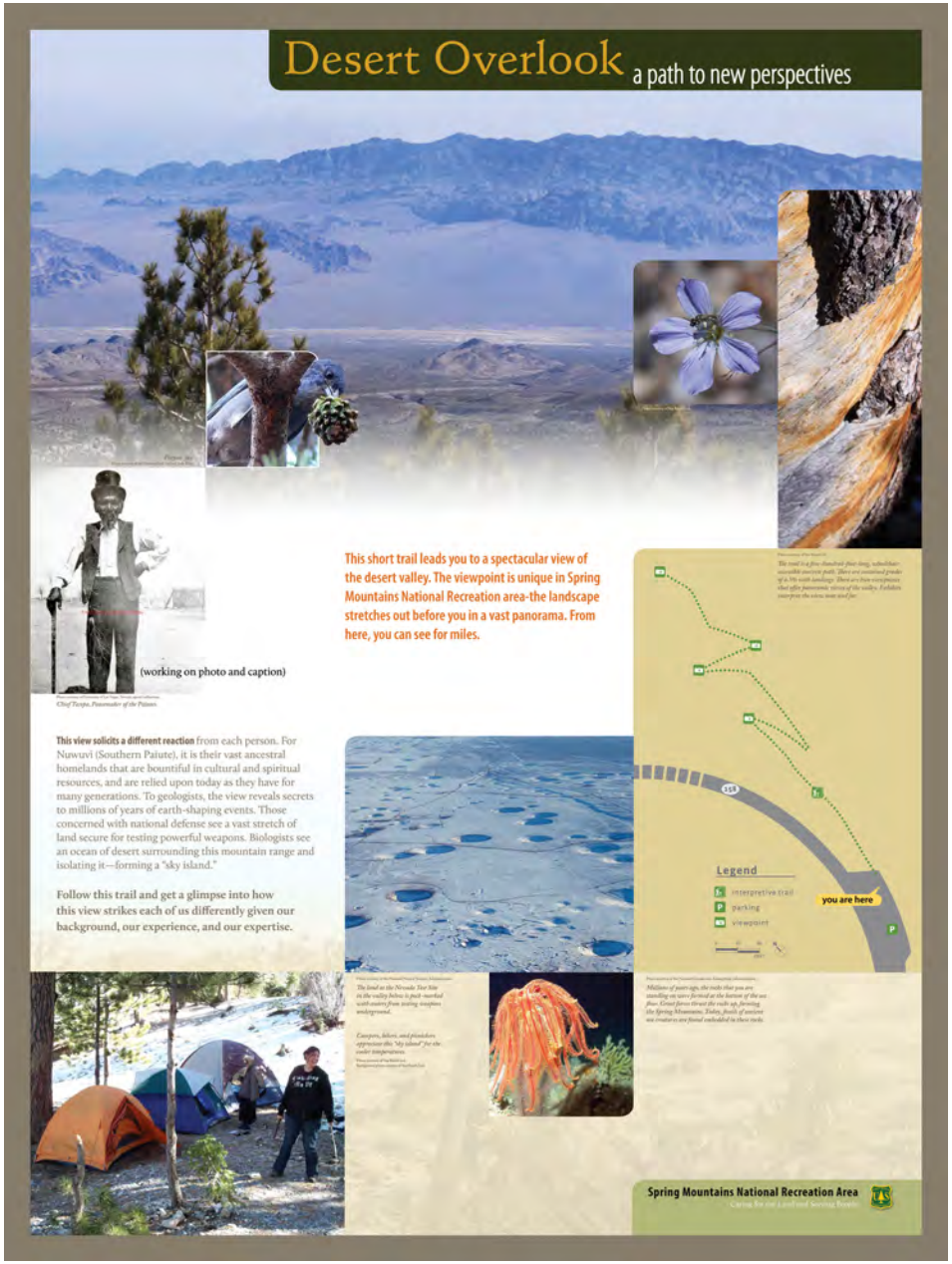
- Designing parking and access to viewpoints can be challenging, with frequent, short-duration traffic into and out of the parking area. Consult with the road managers (forest and/or county, State) to ensure safety in locating access/egress points along a forest road or highway. Where possible, create separation between the parking area and the road; a simple berm or other barrier may be enough to improve safety.
- Design the facility while considering the aesthetic importance of views from the road. This experience shapes the visitor's anticipation and experience of the viewing opportunity (figure 4–057).
- Avoid locating parking areas between the viewers and the view.
- Consider accommodating larger vehicles, including buses.

Figure 4–057—Approach signs provide visitors advance notice of a scenic vista opportunity and help set visitor expectations for their experience.

Pedestrian Pathways

- Allow the view to predominate over any built facility or amenity. The design of the path, guardrails, interpretive exhibits, or any other aspects of the built environment should complement the view and the setting (figure 4–058).
- When the path to the overlook is long, consider installing an introductory panel that includes a map, accessibility information, and the distance to the overlook. This will help visitors decide whether to invest the time to walk to the overlook (figure 4–059). This is also an opportunity to introduce the interpretive story (where applicable) provided by exhibits along the path.
- Design to enhance the dramatic character of the view—conceal and reveal views—when creating the alignment for the path.
- Ideally, design all paths to overlooks to meet the standards in the FSORAG or Forest Service Trails Accessibility Guidelines (FSTAG) (figure 4–060). Retaining walls can help to achieve this goal (figure 4–061). However, you can include stairs in a path if creating an accessible route would negatively impact the character of the setting (figure 4–062). If you construct stairs in an area that is not visible from the parking area, install a sign that notifies visitors that there are stairs along the path.
- Guardrails may be necessary where the dropoff along the path is more than 30 inches. In areas that require guardrails, identify a style that does not impact the view for children, people who use wheelchairs, or anyone below the 42-inch rail height (figure 4–063).

Figure 4–058—The design character of paths complements the setting and leads to a viewing area.



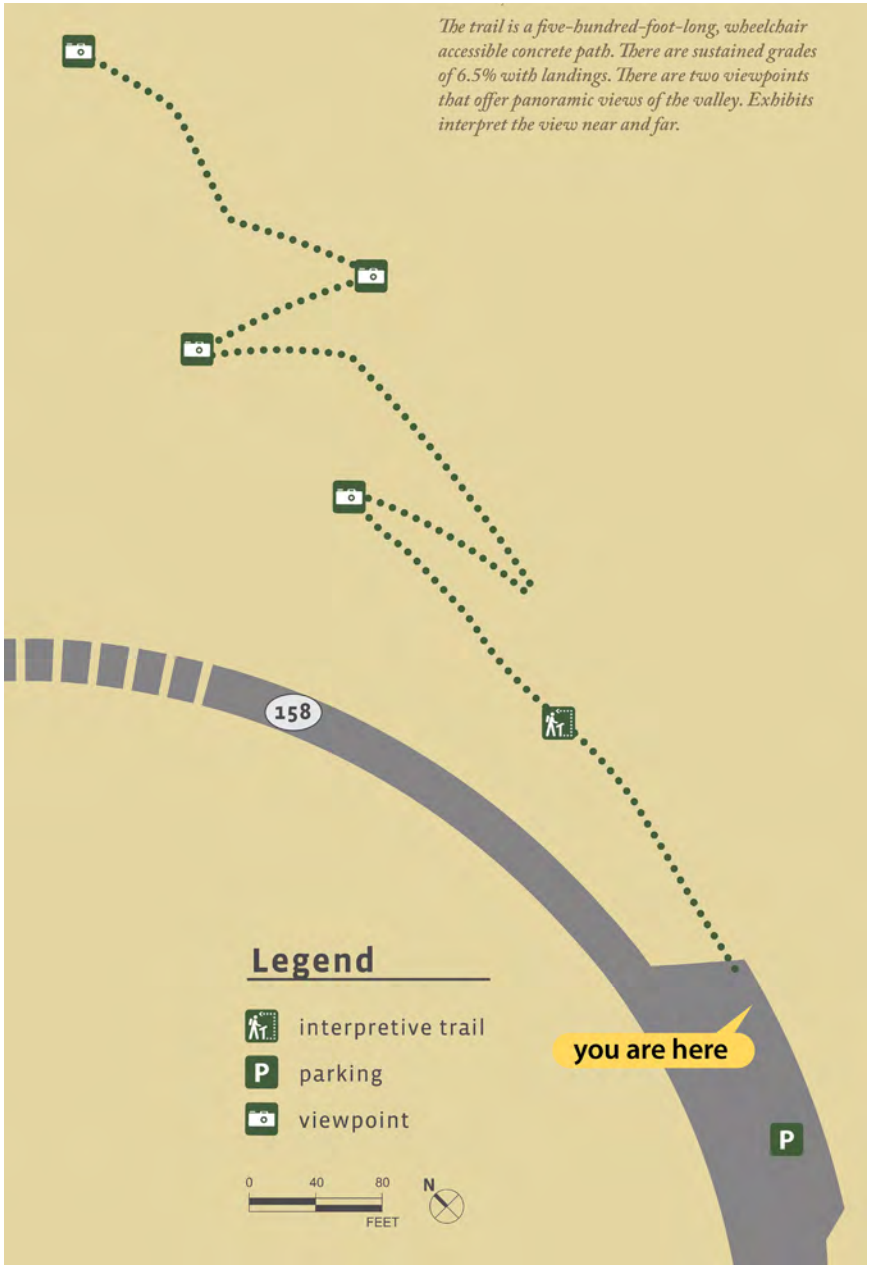


Figure 4–059—An orientation sign displays information about the path from the parking to the viewing area. Include the distance and path conditions so visitors can make an informed choice about whether to attempt the path.

Figure 4–060—Design paths to respond to natural topography and site character. Careful design of the route to a viewing area constitutes part of a high-quality experience for visitors.

Figure 4–061—Creating an accessible route may require construction of retaining walls, but these should not fundamentally alter the character or function of the site.

Figure 4–062—Steps, although not accessible, can allow retention of the natural character of the setting. In this case, the stairs are visible from the parking area. Where stairs have been included in the path but are not visible from the parking area, include a sign with a map to the overlook to help visitors make an informed decision about whether to attempt the path.

Figure 4–063—An elevation difference of 30 inches or more requires installation of 42-inch-high guardrails with openings of no more than 4 inches. The design of this guardrail minimally intrudes on the view, allowing views for visitors who may not be able to see over the top of the rail.

Viewing Area

- Ensure the built environment complements the view and stays subordinate to the setting and site character (figures 4–064 and 4–065).
- Ground the viewing experience with foreground features near the viewer, including built features such as walls or fencing. Frame views to enhance the dramatic experience of a vista. Bring viewers closer to a view with safety railings or guardrails as required (figures 4–066 through 4–068).
- Manage vegetation to preserve and frame views over time and to maintain and enhance scenic character (figure 4–069). This may require selective tree removal. Ensure native vegetation includes young age classes to provide regeneration. When removing trees, cut stumps as low to the ground as practical and slope the cut away from the location where most visitors view.
- Direct stormwater runoff away from the key vista, where feasible.
- Orient visitors to the larger landscape setting (figure 4–070).
- Keep signs low and locate them so they do not block the main viewing area.

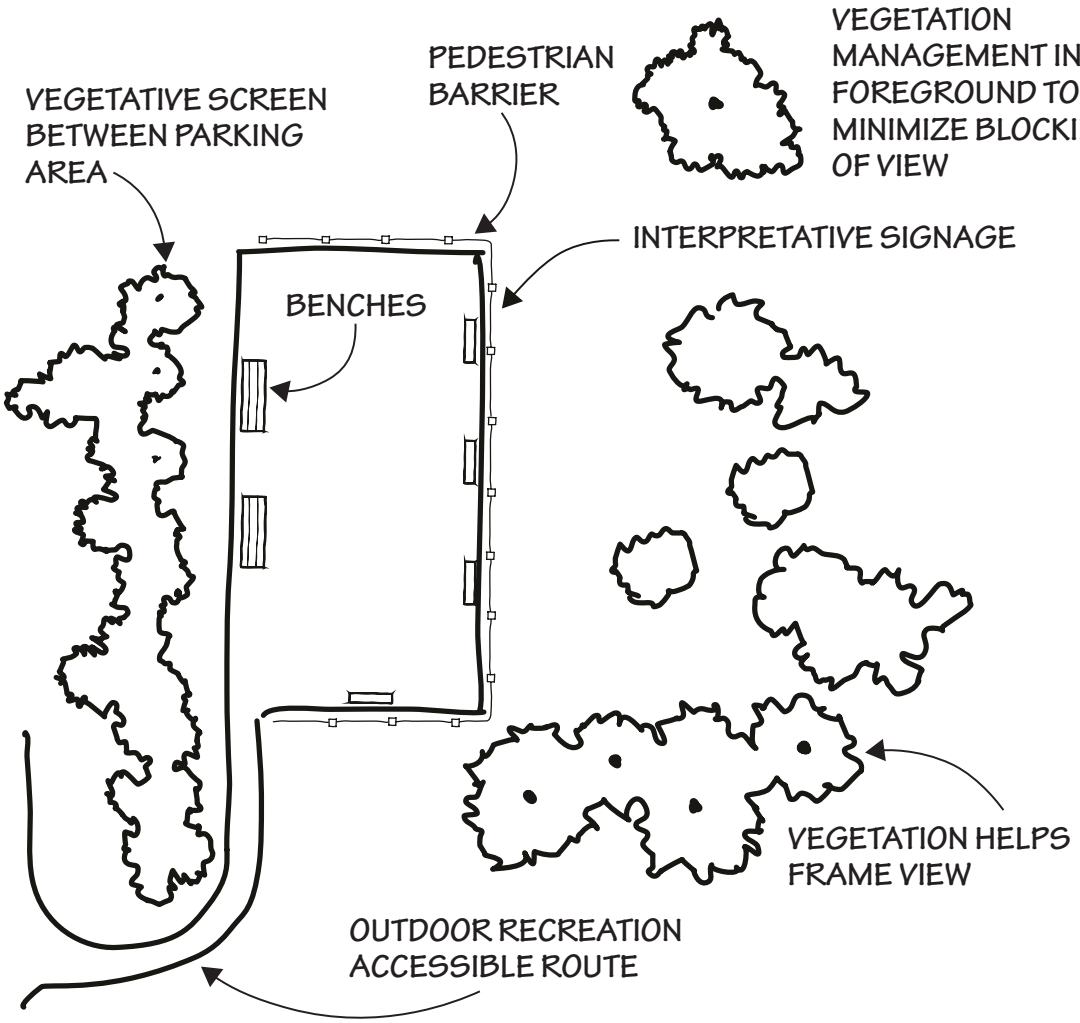


Figure 4–064—Example of an early design process sketch for a viewing area conceptual site plan.

Figure 4–065—Local construction materials complement the natural scenic character. Rock walls have a high initial cost but a low lifecycle cost. Dark-colored railings protect visitors from the edge while reducing visual contrast with the surrounding landscape.

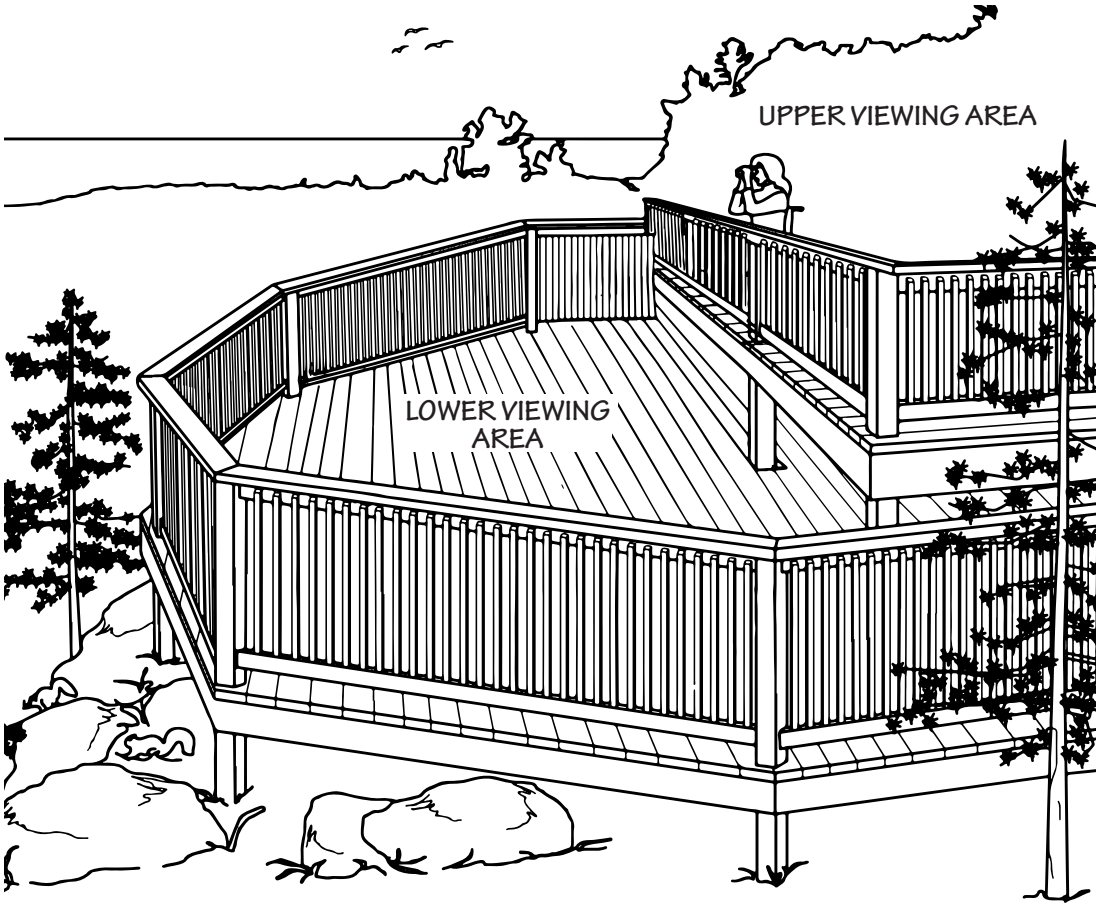


Figure 4–066—The "Forest Service Outdoor Recreation Accessibility Guidelines" (FSORAG) include requirements for unrestricted viewing. This viewing platform provides an upper deck that is less than 30 inches above the lower deck, enabling the use of a lower rail height on the upper deck. For children and people who use a wheelchair, the views are not interrupted by the 48-inch-high guardrail on the lower deck. This illustration is adapted from the FSORAG Pocket Version.

Figure 4–067—Barriers encourage visitors to remain within managed viewing areas and protect surrounding vegetation.

Figure 4–068—A combination of guardrails and benches provide different ways for visitors to get close to and safely enjoy vista points.

Figure 4–069—Maintain foreground vegetation to preserve and frame significant views, including removing some trees if necessary to prevent views from becoming blocked.

Figure 4–070—Scenic overlooks can be effective at a low development scale and provide a wider perspective of the landscape setting.

Signage

- Consider signs that orient visitors to opportunities available in the larger recreation area. If the area is part of a designated scenic byway, design signs for consistency within sites along the scenic corridor.
- Design interpretive trails so they do not interfere with views from the primary viewing area (figure 4–071).
- Refer to the "Signs & Interpretation" section in part 3 for more information.

Further Reading

- Combining Silviculture and Landscape Architecture to Enhance the Roadside View https://www.fs.usda.gov/treesearch/pubs/6928
- Scenic Byways: A Design Guide for Roadside Improvements https://www.fs.usda.gov/t-d/pubs/pdf/hi_res/fhwa02001hi.pdf
- Forest Service Trail Accessibility Guidelines (FSTAG) Pocket Version https://www.fs.usda.gov/t-d/pubs/pdfpubs/pdf15232812/pdf15232812dpi300.pdf

Figure 4–071—Interpretive signs help visitors understand and appreciate their surroundings.

Trailheads

Essential Function

Trailheads are portals to the national forests. A trailhead provides access to the trail, trail system, and general forest lands. It is a place of transition; a gathering and staging area to prepare for trail or dispersed-use experiences (figure 4–072).

Figure 4–072—Trailheads get visitors to the opportunity they wish to experience.

Program Considerations

The amount and character of development varies with the site characteristics, the recreation opportunity setting, the access road, and the type and amount of use. Trailheads vary in size, providing parking for a few vehicles or hundreds of vehicles, depending on the level of use and ROS class setting (figures 4–073 and 4–074). The length of time that people use the trailhead and the season of use vary with the type of trail and type of trail use.

Trailheads play a vital role by orienting visitors to their surroundings and providing information for a safe and positive experience on the trail.

Basic Trailhead Anatomy

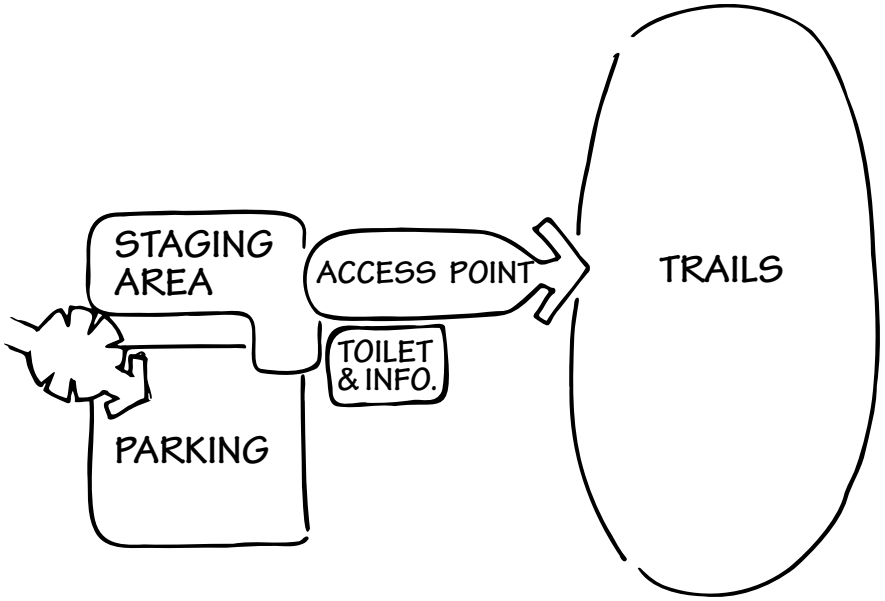


Figure 4–073—Primary trailhead components include vehicle access from a travel route, the parking area, a staging area for trail users, and the trail access point.

Figure 4–074—Trailheads can use a range of development scales, depending on their recreation opportunity spectrum class setting and function.

High-development scale locations may include:

- Interpretive exhibits
- Toilet facilities
- Garbage collection
- Drinking water

Depending on the function and setting, trailheads may also include:

- Picnic areas
- Bike racks
- Vehicle barriers
- Staging area with sufficient space for unloading OHVs or horses
- Warming huts
- Shuttle/transit stop
- Snow storage
- Equipment washing
- Fuel spill mitigation materials pads, drainage control

Program Considerations for Specialized Trailheads

Off-Highway Vehicle Trailheads

OHV trailheads provide staging areas for access to motorized trail systems. The design must accommodate larger vehicles and trailers and provide space to offload and maneuver OHVs. The trail system requires space—parking stalls should accommodate a vehicle and trailer combination at least 60 feet long. Designing parking stalls for pullthrough can help improve efficiency and use of space. Develop the capacity to respond to the anticipated use (figure 4–075).

Figure 4–075—Off-highway vehicle trailheads must provide room for large vehicles and trailers.

Snow Access Trailheads

Snow access trailheads can include access for cross-country skiing, snowmobiling, snowshoeing, and parking for sledding. Many of the design recommendations for trailheads and OHV trailheads apply to these sites, with added consideration for snow removal and storage. Signposts may need to be adjustable to allow for varying snow levels (figure 4–076). Sledding locations may require slope grooming as part of regular maintenance. Warming huts can help keep people safe in inclement weather, but huts must be sited correctly to prevent significant icing issues.

Climate change may play an increasing role in the design and location of snow-access trailheads, given that winters may see less snow, or snow may arrive later or melt earlier. Consider opportunities for adapting trailheads for use in all four seasons. Having options for accessing winter trails at multiple elevations and locations increases adaptability to provide for winter sports.

Figure 4–076—Trailheads providing access to winter activities should have information signs designed to accommodate the anticipated snow depth.

Equestrian Trailheads

Refer to The "Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds" <https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%202816> for additional details about designing and maintaining equestrian trailheads.

Horseback riders experience a natural setting on horseback, often with a group of fellow riders, and the trailhead must meet the needs of both the riders and their mounts (figure 4–077).

Figure 4–077—Design elements uniquely important for equestrian areas include feed bunks and water troughs.

Wilderness Trailheads

Wilderness trailheads provide the interface between the developed world and designated wilderness areas. The approach road and trailhead are not in wilderness, but still offer opportunities to provide the transition to wilderness character through design style and features. The use of the trail system will dictate the size and features of the trailhead. Popular trailheads can be quite large. A trail or system with mostly day use has different trailhead needs than one where users begin a multiday trip. Some trails attract equestrian users and require trailer parking and space for unloading horses. Add an appropriate bulletin board with specialized wilderness information.

Design Considerations

The character of the trail and surrounding recreation program determines the character of the trailhead facilities.

Access/Arrival

- Provide sufficient transition spaces for the visitor between parking areas, amenity areas, and the trail itself (figure 4–078).
- Design the start of the trail so it is easy to locate. The start of the trail establishes the character of the trail and lets visitors understand the kind of conditions they can expect along the trail.
- Provide an area for gathering, putting on packs, and other preparations near the start of the trail. The size of the gathering space depends on the trail use and may include a delineated area for pack animals.

Figure 4–078—Some trailheads provide visitors with an area to sleep before their early-morning departure.

Parking

- When sizing a parking area, plan for the number of vehicles on a typical summer day. It is best not to design for high-use weekends; the size of the parking area will be more sustainable from a maintenance perspective (figure 4–079).
- Where you anticipate trailer use, design for a large-vehicle turning radius and provide options for trailer pullthrough parking spaces.
- Provide space for vehicles to pass on narrow access roads.
- If the parking area will be plowed in winter, consider not installing wheel stops and constructed barriers to avoid impacting snowplowing.
- Consider any circulation requirements for snow-grooming equipment.
- In areas with extreme heat, like the desert Southwest, provide stable concrete areas for motorcycle kickstands (kickstands can sink into hot asphalt).

Figure 4–079—Plan enough parking for the general level of use at the site, not for the biggest crowd of the year. Choose a design capacity for a general level of need across the season of use. Generally, do not design parking for the greatest amount of use a site may experience in a year.

Trail Information and Signage

- Convey information on trailhead signs using icons and symbols, along with clearly written text that provides easily understood instructions that the trailhead user can absorb quickly.

- Provide information about the trail and the trailhead:
  - Trailhead and trail name
  - Conditions of the trail, including slope, width, length, and surface
  - Location of the trail and trailhead on a topographical and/or contextual map, as part of a trail system
  - Designated uses of the trail (e.g., nonmotorized pedestrian, equestrian versus motorized ebikes, OHV—particularly important at trailheads leading into wilderness areas that prohibit bike use)
  - Relevant regulations (bear aware, closure order details, etc.)
  - Opportunities to promote citizen stewardship and volunteerism
  - "Leave No Trace" principles, including fire awareness and measures to avoid the spread of invasive species
- Consider placing trail information signs parallel to the trail and just a bit down the trail to avoid potential vandalism.

Start of a Trail

- Provide a trail identification sign at the start of a trail (figure 4–080).

Figure 4–080—Always identify the trail as it leaves a trailhead. Provide a clearly visible entrance to the trail and define the start of the trail.

Off-Highway Vehicle Trailheads

- Design sufficient parking area space for visitors to unload their OHVs (many travel with ramps to facilitate this).
- Provide clear travel management regulations and route designation information. At a minimum, display a motor-vehicle-use map on a kiosk. Allow space for other regulations and travel opportunities.
- Design social areas within view of vehicles.
- Provide vehicle barriers to control/direct OHV use at internal and external edges within parking areas.
- Include vehicle width limiters near motorized trail access points. For example, if a trail is designated for motorized vehicles 50 inches wide or less, install barriers to prevent a larger vehicle from using the trail. Always retain 36 inches of clear opening to comply with accessibility standards. See the FSORAG for specifics related to standards and certain exceptions that can reduce spacing to 32 inches.

Snow Sport Trailheads

- Use overflow parking areas on a case-by-case basis, depending on individual forest policies for winter parking.
- Consider that winter parking lots often function as snow play areas. Design parking lots in snow country for snowplow maintenance with no formed curbs, rolled curbs, manufactured wheel stops, logs, or dimensional timbers. Provide adequate snow storage areas along the parking lot perimeter.
- Design winter parking areas with multi-season use in mind. Winter parking typically doubles as parking areas for hikers, bicycle riders, etc., during the summer.

Equestrian Trailheads

- Plan gathering spaces for people, with animals in view, and space for people with their horses as they prepare to ride.
- Include route or path connections for moving horses between use areas, such as a corral, pasture, and the beginning of a trail.
- Separate use areas, including areas for horses, away from noise and other potential disturbances.
- Generally, separate horses from riparian areas. Limit and direct locations of access to creeks and water sources.
- Consider including horse water troughs, tie rails (at least 5 inches in diameter, with posts at least 8 inches in diameter), corrals, and loading and mounting ramps.
- Consider creating a staging area for early morning, multiday trail rides that can be used as "bivouac" camping for visitors preparing for early morning departures.
- Design a perimeter trail for horses and riders to connect with the main trail, separated from roads to minimize the need for horses to travel on paved surfaces.
- Design the parking area and road to accommodate 50-foot-long vehicle and trailer combinations. Provide parallel pull-through parking.
- Separate trailhead parking from any nearby camping areas.
- Provide information about hitching locations and water access points and about avoiding impacts to vegetation, creeks, and streams.
- Identify how animal waste will be managed at equestrian sites, with signs to guide appropriate treatment options to avoid a concentration of horse waste.

Wilderness Trails

- Clearly define wilderness regulations, including prohibitions on the use of mechanized and motorized devices.
- Provide safety information and tips for backcountry recreation.
- Display wilderness stewardship information, including the intent of the Wilderness Act.
- Locate any required trail registration at the trailhead.

Further Reading

- Continental Divide National Scenic Trail Trailhead Design Guidelines
  https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/CDT_trailhead_guidelines_0.pdf
- Equestrian Design Guidebook for Trails, Trailheads, and Campgrounds
  https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%202816
- National Ski Areas Association (NSAA) publication on snow play areas
  https://www.nsaa.org

Water Access and Facilities

Water access sites provide people with opportunities to enjoy seashore, lake, river, and stream settings, and to have access to water, waterways, and fishing opportunities (figures 4–081 and 4–082).

Figure 4–081—Water access in national forests can give visitors the opportunity to explore lakes, rivers, creeks, springs, and beaches by foot or watercraft.

Riparian stewardship serves as the basis for the design for water access sites—caring for the resource and setting that people come to enjoy and working with a site's natural characteristics (figure 4–083). Water access sites recognize and provide for the elemental appeal of water and water features through site and facility design based on stewardship of water features.

Important considerations include designing for stormwater drainage and protecting natural hydrology. Water access facilities include fishing facilities, boating sites, and swimming areas.

Figure 4–082—Well-designed boating access is essential for memorable experiences on the water.

Figure 4–083—Sometimes, all a fishing facility needs to do is provide access to the water.

Fishing Facilities

Essential Function

The design of fishing facilities provides visitors with access to opportunities for fishing (figures 4–084 and 4–085). They often combine with other site types such as swimming or boating, but should be separate from these other uses.

Figure 4–084—Fishing sites can be highly developed or of low-development scale, providing valued experiences for many visitors.

Basic Fishing Site Anatomy

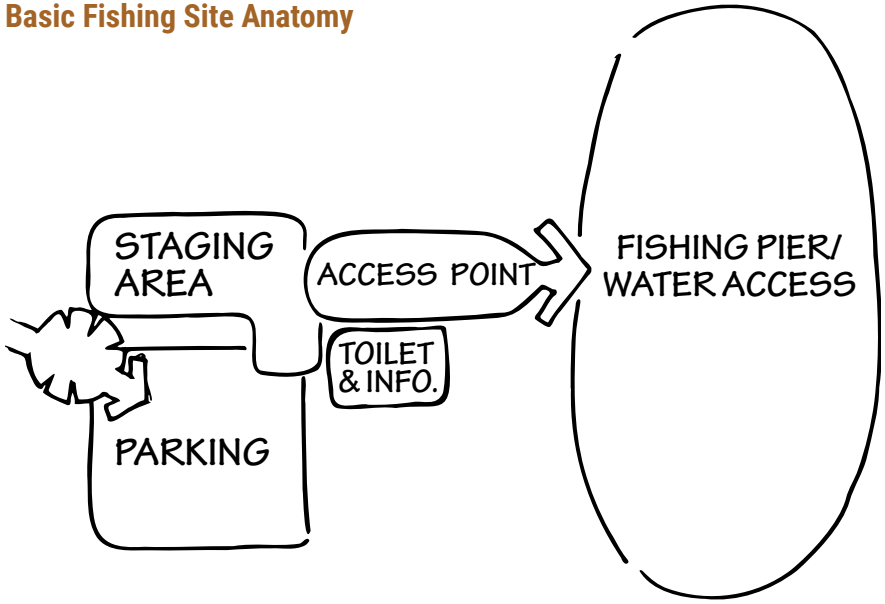


Figure 4–085—Fishing sites provide parking and pathways to fishing access points.

The design should consider stability, resilience of the site and water's edge, and provide for vegetation, soil, and water-quality protection.

- Design parking areas to avoid interference with water access. Consider vehicle turnaround and length of stay.
- Use slip-resistant materials for fishing pier tread surfaces. Assess riparian condition and use vegetation and rustic barriers, such as low fencing, to manage riparian access as needed.
- Locate any fish-cleaning facilities close to parking lots and away from other recreation facilities.
- Provide drinking water for all fish-cleaning stations.

Program Considerations

Location is key to fishing sites. Consider characteristics of the water and water's edge, including shape, water level through the day and year, use by fish, and seasonality of fishing use. Consult local anglers and regulatory agencies when locating and siting a fishing facility. Fishing sites cater to a wide spectrum of demographic users and the design should provide for user choices. Fishing facilities and access routes must allow access for visitors with disabilities.

Boating Sites

Essential Function and Basic Boating Site Anatomy

Design boating sites to enable visitors to transfer their watercraft from their vehicle to the water. Boating sites may range in size from simple hand launches for canoes and kayaks to large, multi-lane boat ramps (figures 4–086 and 4–087).

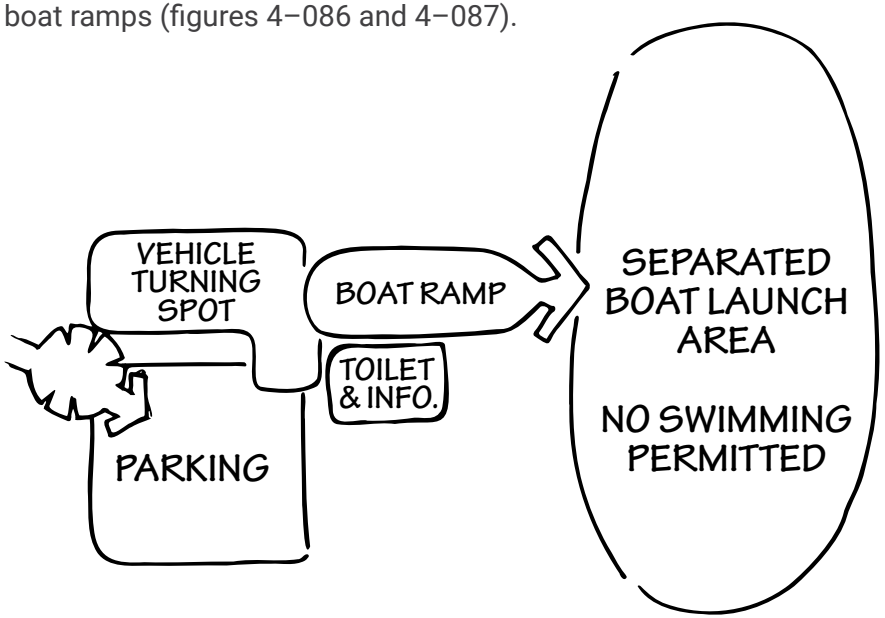


Figure 4–086—Boating sites provide parking, a vehicle turning spot, and boat ramp or launch sites. Often the site also has a restroom and information kiosk.

Figure 4–087—Boating sites provide managed and safe launching of watercraft.

Figure 4–088—High-use boating facilities may require multiple launch lanes to accommodate the use levels.

Program Considerations

Have multiple launching lanes in high-use areas. Base the number of lanes on average daily use (figure 4–088).

Clearly separate areas for swimming, fishing, and launching watercraft. Separate boating sites from swimming areas by a minimum of 300 feet. Designated swimming areas adjacent to boat-launching facilities must have a barrier and warning device between the two areas that functions at all water levels.

Ensure that design choices take account of fluctuations in weather and water conditions.

Higher development scales may include (figure 4–089):

- Aquatic invasive species inspection and screening infrastructure
- Boat wash station for removing invasive species (boat launch and swim area site types)
- Fish-cleaning station
- Foot/shoe wash stations
- Drinking water
- Toilets

Figure 4–089—A higher development site such as this one will often have paved parking for larger vehicles and trailers, a courtesy dock, a restroom, and well-thought-out circulation.

- Boating Facilities
  - Orient boat-launching ramps at an angle to the main approach road so vehicles on the road must make a turn to use the boat ramp. This will reduce the likelihood of a driver unwittingly driving down the boat-launching ramp.
  - Establish a smooth transition with enough clearance for trailers to clear the top of the ramp without dragging.
  - Separate the boat launch ramp from the access route and parking based on the ROS setting (table 4–3).

Table 4–3—Recommended recreation opportunity spectrum maximum distance from a parking area to a boat launch ramp

Semi-primitive motorized	Roaded natural	Roaded
Not Applicable	750 feet	500 feet

Restrict vehicles to designated surfaces and proactively protect riparian vegetation and water quality.

Boat Launch Ramps

- Locate boat launch ramps in areas free of wave action and cross currents (where the maximum wave action is about 6 inches, if possible).
- Locate boat launch ramps away from cut-bank/scour locations.
- Design boat launches so that swimming and wading are prevented in these areas.
- Situate overhead structures, such as utility lines, so sailboat masts will not hit them.
- Orient ramps perpendicular to the shoreline or angled downstream if there are currents.
  - Design single lanes a minimum of 15 feet wide.
  - Design boat launch ramps with a longitudinal slope of 12 to 15 percent (13 percent is optimum).
  - Extend ramps from 2 feet above the highest water level to 3 feet below the edge of the water at the lowest seasonal-use water surface elevation.
  - Ensure the ramp surface treatment provides good vehicle traction, drains sand and water, and can withstand currents and fluctuations in water level.

- Employ a vegetative buffer to filter runoff and pollutants.
- Consider placing upstream armoring to prevent streambank erosion.
- Design parking areas based on the typical and maximum length of boat trailers of the anticipated users. Provide pullthrough parking opportunities.
- Post information on aquatic invasive species concerns, prevention requirements, and stewardship responsibilities.
- Promote water safety requirements in the information display.

Docks/Piers (at some high-development scale sites)

Docks and piers serve distinct purposes—docks provide mooring access points for boats and piers provide pedestrian access to the water (figure 4–090). Each has different accessibility requirements. Refer to "Further Reading" in this section for information about designs for these types of structures.

Figure 4–090—Docks serve as important site elements for any boat ramp, but especially at high-use sites.

Swimming Areas

Essential Function and Basic Anatomy of a Designated Swimming Area

Swimming areas provide access to water play and areas adjacent to the water to observe those swimming (figure 4–091). The Forest Service does not construct manufactured swimming pools, so installing diving boards and swimming rafts is discouraged. Components of a swimming area can include an access point to the site, shore, beach, or picnic area with a view of the water and access to the water/swimming area (figure 4–092).

Figure 4–091—Swimming areas can range from high-development scale, including separation of swimmers and watercraft (top), to low-development scale that provides visitor access to the water's edge (bottom).

Program Considerations

Develop swimming sites only where it is possible to mitigate hazardous conditions. Hazardous conditions include:

- Frequent breakers more than 4 feet high
- Rough, rocky bottom
- Submerged stumps, snags, rocks, and other entanglements
- Unpredictable water level fluctuation of more than 1 foot per hour
- Current velocity of more than 5 miles per hour
- Dangerous undertows and riptides
- Sharp metal, glass, and other dangerous debris
- Underwater gradient of more than 10 feet in the first 100 feet from shore

Higher development levels may have associated:

- Picnic areas
- Toilet facility
- Shower building
- Foot wash
- Garbage collection

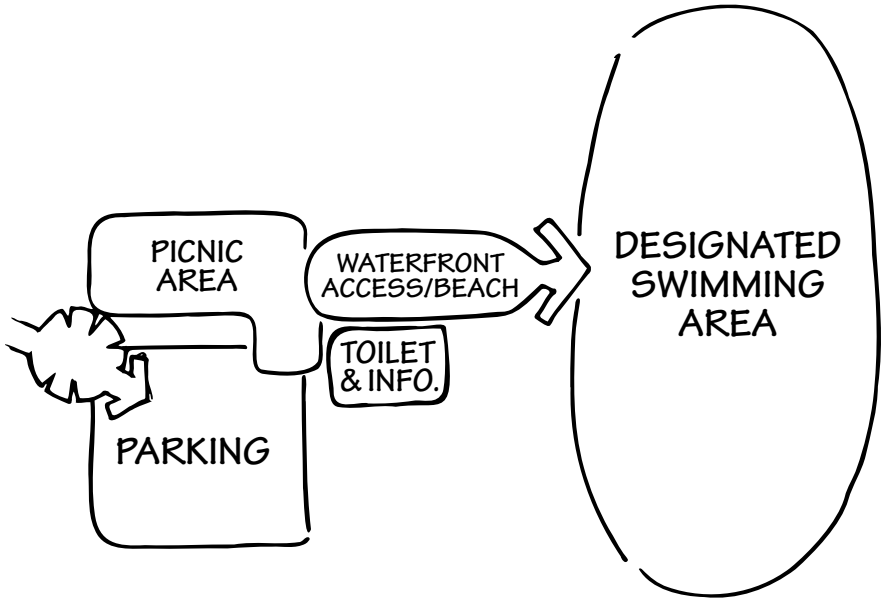


Figure 4–092—An example of a basic swimming site that includes a picnic area, parking, waterfront access, toilet, and site information. This illustration is adapted from the British Columbia "1998 Park Design Guidelines."

Parking

Establish parking in a location that promotes accessible entry to the swimming area and size it to meet use on a typical summer weekend. The ROS setting should influence the proximity of the parking to the swim area. In a high-development rural setting, the parking area should be closer to the swim area and have easier access (table 4–4).

Table 4–4—Maximum recommended recreation opportunity spectrum distance of a parking area from a beach

Semi-primitive motorized	Roaded natural	Roaded
1000 feet	750 feet	500 feet

- Construct paved or compacted surfaces to drain away from surface water.

Swimming Site Access

- Use surface mats or at-grade deck surfaces to provide an accessible travel route to the high-water zone (figure 4–093).
- Consider armoring water access points with native boulders to stabilize stream banks.
- Design so visitors remaining on land can see those in the water.

Figure 4–093—Providing accessible travel routes to swimming areas can present a design challenge. In this example, recycled plastic lumber is cabled together and lays directly on the sand to form a firm, stable surface.

Grading and Drainage

When determining suitability for developing a swimming area, consider the slope of land both above and below the water level (table 4–5).

Table 4–5—Grades for swimming areas

Swimming area	Minimum percent or slope	Maximum percent or slope	Preferred percent
Beach (underwater)	1 percent or 100:1	8 percent or 12.5:1	2 to 5
Beach (above water)	1 percent or 33.3:1	6 percent or 10:1	2 to 4

Information

- Provide visitor information that describes conditions, such as "no lifeguard on duty." Install depth markers and swim buoys to keep boaters and swimmers separate (figure 4–094).
- Consider whether the site requires life preserver ring towers.

Figure 4–094—Swim buoys keep boaters and swimmers separated. Place waterway regulatory buoys to designate a no-boating zone where waters serve both swimmers and boaters.

Toilet/Bathhouse (at some high-development sites)

- Locate toilets, dressing rooms, or bathhouses near the water but beyond floodplain elevations and within reasonable walking distance of the central parking area.
- Provide exterior showers instead of bathhouses whenever possible.
- Dressing rooms or bathhouses are usually unnecessary at swimming sites adjacent to campgrounds.

Further Reading

- River Access Planning Guide: A Decision-Making Framework for Enhancing River Access https://rms.memberclicks.net/assets/RiverAccessGuide/03012020%20Layout_RAPG_FINAL__Tags_v22.pdf
- Facilities, Methods, and Equipment for Fish Cleaning and Disposal of Fish Viscera https://www.fs.usda.gov/t-d/php/library_card.php?p_num=9423%201208
- Design Guidelines for Recreational Boating Facilities https://digital.osl.state.or.us/islandora/object/osl:6836
- Natural Resources Management Gateway to the Future, Good Enough to Share https://corpslakes.erdc.dren.mil/employees/gets.cfm?Id=facilities
- Accessible Recreational Boating Facilities and Fishing Piers and Platforms https://www.access-board.gov/webinars/2022/08/04/accessible-recreational-boating-facilities-and-fishing-piers-and-platforms
- Accessible Loading Platform for Boaters https://www.fs.usda.gov/t-d/pubs/htmlpubs/htm00232837/index.htm
- Floating Trail Bridges and Docks https://www.fs.usda.gov/t-d/library-card.php?p_num=0223%202812P
- Prepare to Launch! Guidelines for Assessing, Designing, & Building Access Sites for Carry-In Watercraft https://www.river-management.org/assets/PreparetoLaunch/introduction%201.15.14.pdf

Interpretive Sites

Essential Function

Interpretive sites communicate the special character of the national forest site or area and provide an opportunity to connect the visitor to the place and to share a greater understanding. Interpretive sites serve a variety of visitors—some local, some traveling from other parts of the world—representing all ages and abilities. The ROS setting influences whether interpretation is needed and the extent and type of interpretation (figure 4–095).

Program Considerations

An interpretive site puts the focus on the essential character of the setting to recognize, preserve, and facilitate participation in the activities provided at the site.

Figure 4–095—In this example of an interpretive site showcasing a rustic ranger station compound, the sign design complements the site.

Interpretation is a specialized skill. Begin collaborating with interpreters early in the process when designing an interpretive site and continue at each stage of design to achieve an effective and integrated project.

A complete interpretive plan can inform the site design. This plan highlights features for interpretation and helps define the project program, including identifying the types of spaces required (4–096).

Basic Interpretive Site Anatomy

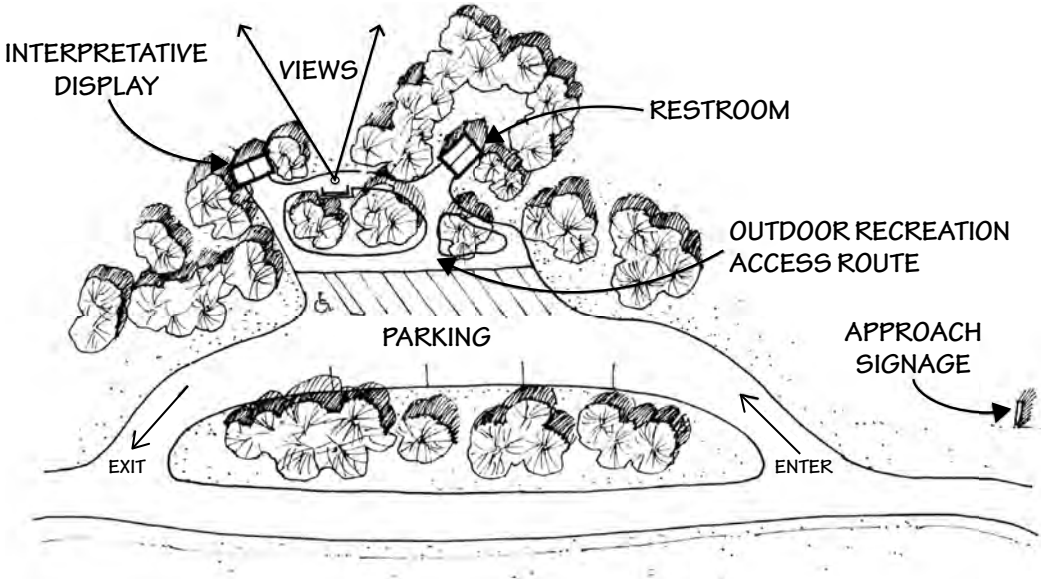


Figure 4–096—Interpretive sites provide informative displays, visitor parking, paths, and often visitor conveniences such as toilets. This illustration is from the "The Built Environment Image Guide for the National Forests and Grasslands."

Specific Design Tips for Interpretive Sites

Interpretive Sites Circulation and Parking

- Provide a clear pedestrian access point to the interpretive display area and other amenities.
- Design larger or high-interest sites to accommodate tour bus parking and dropoff areas.

Entrance Gathering Area

- Provide orientation to the site and the larger forest context.
- Direct visitors to opportunities within and near the site.
- Retain site and setting character while providing conveniences according to the site development level.
- Where a building houses the principal interpretative program, include outside interpretation, such as sign panels, to support the use of the site when the building is closed.

Visitor Center Building

- Direct the visitors' focus from inside the building to the site and the immediate outdoor setting.
- Design interpretive sites and buildings to complement their surroundings. Use built features such as paths, displays, and architecture to frame views of the surrounding landscape and immerse the visitor in the natural setting.

Interpretive Site Signs

- Provide clear wayfinding and signage to help visitors enjoy the interpretive site.
- Design of individual features should include common elements to support a unified theme and site identity. High-development scale interpretive sites may have special features such as an amphitheater, or they may have a complex of features such as viewpoints, trails, and trailheads with associated picnic sites.
- Consider including informal interpretive features such as boulders grouped for informal gathering, small-scale interpretive signs throughout the area, and trails. These types of features can promote user-directed discovery at low-development scale interpretive sites.
- Use common design themes for a series of interpretive interest points or areas, such as along a scenic byway road corridor.
- When providing wildlife viewing opportunities, minimize disturbance to wildlife and ensure visitors' safety with viewing blinds (figure 4–097).

Figure 4–097—Seeing wildlife in its natural national forest habitat can be thrilling, but it's better for everyone if it's done at a distance.

Further Reading

- Scenic Byways: A Design Guide for Roadside Improvements https://www.fs.usda.gov/t-d/library-card.php?p_num=FHWA-FLH-02-001

Recreation Site Complexes

Essential Function

A national forest recreation destination may have several recreation opportunities with related facilities and areas. This is known as a "recreation site complex" (figure 4–098). Recreation site complexes often have day-use and overnight-use areas; include associated trails, viewpoints, picnicking, and camping areas; and focus around a natural or cultural attraction such as a lake, valley, or historic area.

Recreation sites are also often part of a recreation corridor, as in an area given special recognition, like along a Wild and Scenic River or a Scenic Byway. These areas tend to have specific character and common design needs that guide site design for individual facilities.

Figure 4–098—Recreation site complexes can link many opportunities in a single destination.

Program Considerations

- Generally, separate distinct areas through the design of circulation routes and the site configuration (figure 4–099). Provide pedestrian paths that connect individual facilities and lead the visitor to a major natural or cultural feature.
- Develop a design theme with common elements and materials that are employed throughout the complex.
- Design to retain and enhance the identifying features and natural character of distinct-use areas.

High-development scale complexes may include interpretation areas and special features such as an amphitheater.

Specific Design Tips for Recreation Complexes

Circulation and Parking

- Generally, minimize vehicle circulation with loop and return roads.
- Account for differences in the duration of stay for the various use types within the complex using the circulation design to reduce use impacts on different areas.
- Consider the need for bicycle paths and bicycle racks in larger recreation complexes.
- Design an alternate exit route and provide service and emergency vehicle access. Some service routes can use wide pathways during periods of low public use.

Buildings and Recreation Areas

- Maintain distinction in development levels where a variety of development levels are present at a site.

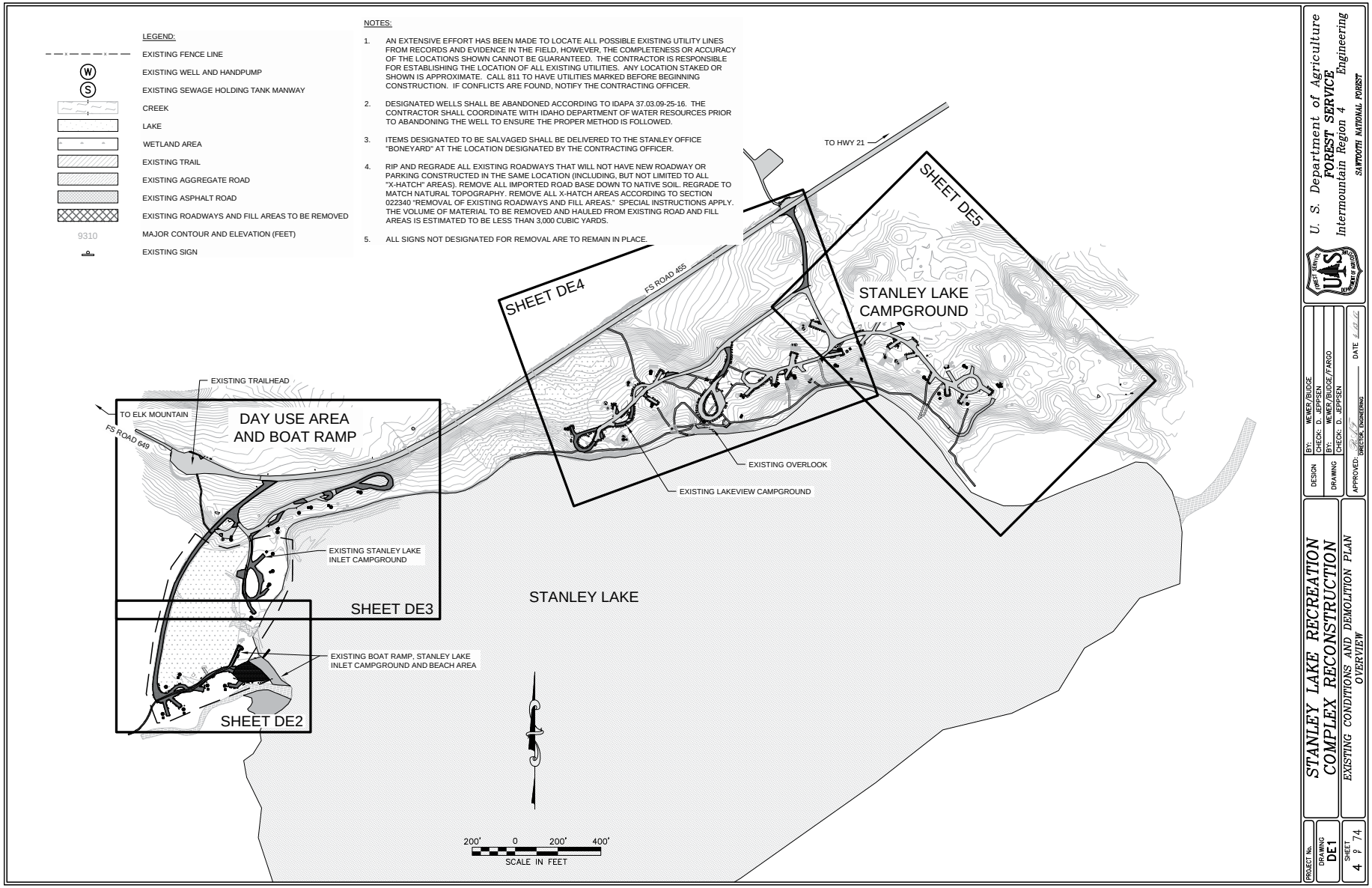


Figure 4–099—Example of the spatial relationship of numerous facilities within a developed recreation complex. This drawing is from the Stanley Lake Recreation Complex Reconstruction, Sawtooth National Forest.

- Locate different use areas in distinct settings and consider how each may affect the others.
- Consider how sun and shade and different site characteristics relate to different uses.
- Consider the individual recreation experience in designing the complex. Create grouped clusters of individually located facilities.
- Look for ways to improve efficiency and reduce impacts by clustering construction and sharing infrastructure where possible.
- Design so individual facilities or groups of facilities can be closed or gated while the rest of the complex remains open.

Recreational Sport Shooting Ranges

Essential Function and Basic Anatomy

Recreational sport shooting ranges provide a dedicated space for target shooting, usually for firearms or archery. Well-designed sport shooting ranges prevent user conflict, keep participants safe, and concentrate harmful lead and other contaminants for easier cleanup and environmental controls.

Program Considerations

While national forests are typically open to target shooting (except within 150 yards of any structure, development, otherwise-occupied area, and areas under closure order), increasing user conflicts are prompting public pressure to curb dispersed recreational sport shooting in some areas. Commonly in the more urban forests of the Southeast, the idea of developing shooting ranges is moving west as population pressures reduce the amount of land available to safely allow dispersed shooting. Shooting ranges can run from a simple setup with shooting tables and a backstop to a fully developed facility with pistol and rifle ranges, movable targets, and a full-time rangemaster (figures 4–100 through 4–102). Developed shooting ranges often partner with State wildlife agencies or local gun clubs.

Figure 4–100—Example of facilities that provide a recreation sport shooting opportunity.

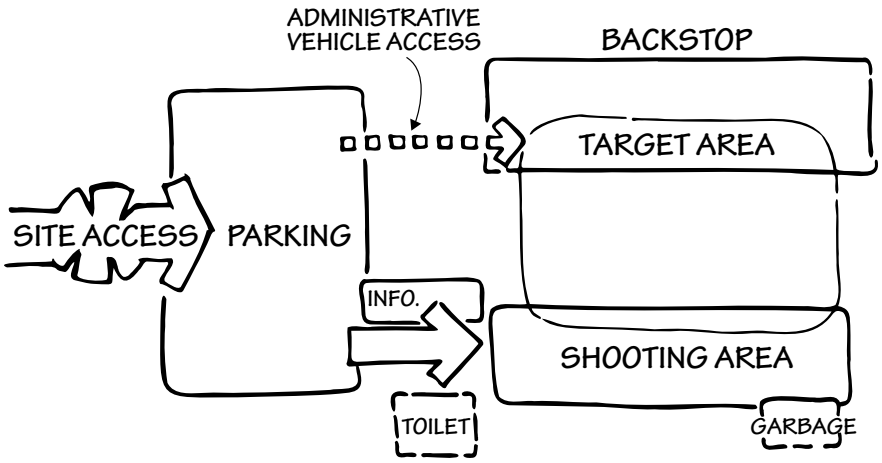


Figure 4–101—Managed shooting areas provide parking, shooting locations, and a shooting backstop. Depending on the development scale, additional amenities could include toilets and interpretive displays.

Figure 4–102—Example of a managed shooting area.

Further Reading

Consult the references below for guidance reviewing the design and operation of target ranges, environmental stewardship plans, and safety plans for target ranges.

- Environmental Management at Operating Outdoor Small Arms Firing Ranges
  https://www.itrcweb.org/Guidance/GetDocument?documentID=94
- Best Management Practices for Lead at Outdoor Shooting Ranges
  https://www.epa.gov/lead/best-management-practices-lead-outdoor-shooting-ranges-epa-902-b-01-001-revised-june-2005
- Do You Use Best Management Practices for Lead at Your Outdoor Shooting Range?
  https://www.epa.gov/sites/production/files/documents/bmp_lead_at_outdoor_shooting_ranges.pdf
- National Rifle Association of America Range Technical Team Program
  https://rangeservices.nra.org/technical-team
- NRA Range Source Book
  https://materials.nrahq.org/index.php?route=product/product&path=91_113&product_id=404
- Environmental Aspects of Construction and Management of Outdoor Shooting Ranges
  http://www.shooting-academy.com/media/NSSF%20-%20Managing%20Outdoor%20Shooting%20Range%20Pollution%20-%20EAofCMofOSR.pdf
- Proceedings of the Third National Shooting Range Symposium (or latest edition)
  https://books.google.com/books/about/Third_National_Shooting_Range_Symposium.html?id=qjOLHAAACAAJ
- Lead Mobility at Shooting Ranges
  https://saami.org/wp-content/uploads/2018/05/Lead-Mobility.pdf

The following references provide information on archery ranges:

- National Field Archery Association (NFAA) Archery and Bowhunter Range Guidelines
  https://www.dshs.texas.gov/sites/default/files/youthcamp/pdf/Archery-Range-Guidelines.pdf
- World Archery Foundation Rule Book, Book 3: Target Archery
  https://www.worldarchery.sport/rulebook/article/3

APPENDIX A
DIRECTIVES

In addition to the directives highlighted in part 1, this appendix contains additional Forest Service Manual (FSM) and Forest Service Handbook (FSH) directives that often apply to agency-developed recreation site construction projects.

1000 Series—Organization and Management

FSM 1349—Value Management: applies to all projects with a total cost of more than $1 million (planning, design, construction, salary, etc.).

2300 Series—Recreation, Wilderness, and Related Resource Management

FSM 2300—Zero Code: the authorities, objectives, policies and responsibilities for recreation management.

FSM 2310—Sustainable Recreation Planning: direction for integrating sustainable recreation principles, land management plan components, recreation opportunity spectrum assignments, scenery management system inventories, and other agency analysis processes to manage recreation.

FSM 2330—Publicly Managed Recreation Opportunities: policy and direction for developed recreation site and facility planning and design. This includes accessibility principles, and direction for campgrounds, picnic grounds, boating sites, swimming sites, and target ranges.

FSM 2340—Privately Provided Recreation Opportunities: focuses on private sector uses on Forest Service lands, but does include direction for planning and designing recreation facilities.

FSM 2360—Heritage Program Management: direction for protection and stewardship of historic and cultural landscapes, structures and features. This is applicable to sites with historic and cultural features in and near developed recreation sites. Many recreation sites were built early in the 20th Century and still have elements of the original construction.

FSM 2380—Landscape Management: defines the principles of scenery management and provides direction for special designations such as National Recreation Areas, Scenic Byways, and Wild and Scenic Rivers.

FSM 2390—Interpretive Services: direction for planning and integration of an interpretive services program.

FSH 2309.13—Recreation Site Handbook

Chapter 10—Planning and Design of Developed Recreation Sites and Facilities: principles for developed recreation site planning and design. Focus is on development scale 3, 4, and 5 recreation sites.

Chapter 50—Operation and Maintenance of Recreation Sites: focuses on the operations and maintenance of developed recreation sites, including national quality standards. Familiarity with this chapter informs planning and design requirements.

6000 Series—Management Services

FSM 6440—Real Property Management: recreation sites are real property and must follow certain rules for capitalization, tracking, and disposal.

FSM 6460—Waste Prevention, Recycling, Acquisition, and Green Purchasing: can affect how we design and construct. Also has operational concerns.

FSH 6509.11g—Service-Wide Appropriation Use Handbook

Chapter 40—Capital Improvement and Maintenance and Land Acquisition: basically, the kinds of appropriated funds that can be used to build, improve, and maintain. Key for project planning.

Note: due to budget reform, there will likely be substantial changes here.

FSH 6509.19—Asset Financial Management Handbook

Chapter 20—Real Property: has key definitions used by the agency. Most of this is derived from the Federal Accounting Standards Advisory Board (FASAB) and Federal Real Property Profile (FRPP) requirements. "Recreation site" is defined here. Also covers capitalization and expensing. This is of more interest to the accountants, but you need to be aware of it in your project planning.

7000 Series—Engineering

7100—National Construction Certification Program (NCCP): the agency is required to have an NCCP-qualified contracting officer's representative (COR) on all construction contracts. Many maintenance projects are construction projects.

FSM 7310—Buildings and Related Facilities

These are the authorities for integration. There is some differentiation between authorities; the recreation mission/business planning is a forest-level task, but the asset planning/approval is at the region.

7310.42: Regional Forester Responsibilities (selective redelegation allowed)

- Alter, repair, construct, and purchase buildings and related facilities.
- Review and approve plans and proposals.
- Manage planning, design, construction, safety and health, and maintenance.
- Provide engineering, architectural, and other staff assistance: formulating project proposals, preparing designs, working drawings, etc.
- Provide training.

7310.43: Forest Supervisors

- Provide planning and program information for buildings and related facilities to support the unit's mission consistent with forest plans.
- Conduct preliminary analysis on facilities to be acquired.
- Provide construction engineering, landscape construction, and general facilities engineering.
- Administer all authorized special-use facilities.
- Maintain facility inventories.

FSM 7312—Planning

- Facility Master Plan (FMP): sites and buildings must be included in the **approved** facilities master plan. The regional forester is the approving authority.
  - When recreation planning identifies a need to acquire a new facility, redevelop/repurpose for an alternative use (heritage lease, Granger-Thye, change in use), or dispose of an old facility, that change requires regional forester approval by amending the forest's FMP.
  - The "retain for existing use" designation includes maintenance, repair, alteration, and minor additions. For example, a 200-square-foot addition to a 7,000-square-foot office is minor. A 200-square-foot addition on a 400-square-foot toilet is not.
- Site Development Plan: also requires regional forester approval.
- Budget Plan: how are you going to pay to construct **and** operate and maintain?

FSM 7313—Development

Approval of Design Drawings: regional director of Engineering (7313.04d)

7313.3—Design Standards

7313.4—Construction Methodologies

- Certified inspector required
- Only authorized persons can approve design and spec changes
- Final construction inspection before occupancy
- Record drawings as built go into facilities records

FSM 7314—Management

Operation and maintenance direction in the engineering handbook. There is additional recreation direction in FSM 2330, Chapters 10 and 40.

FSH 7309.11—Buildings and Related Facilities Handbook

Zero Code: general facilities management process and life cycle. Big difference is the "design narrative" replaces the preliminary project analysis (PPA).

Chapter 20—Planning: (**Note:** under revision)

FMP: applies to developed recreation facilities.

PPA: this is accomplished with the design narrative in recreation sites.

Site Development Plan: all administrative sites owned by the Forest Service should have a current, approved site development plan.

Chapter 30—Development (**Note:** revision not yet underway)

Section 33—Forest Service Constructed Facilities

- Reference back to agency-adopted codes
- Complete project site plans and seek approval of the site development plan before completing the final design
- Use qualified professionals to design
- Use qualified tradespeople, supervisors, and inspectors for construction

Section 34—Design Standards

Subsection 34.16: Accessibility Standards

Subsection 34.17: Recreation Facilities (refers back to FSM 2330)

Subsection 34.21: Prospectus—the design narrative will include some of the required content. Every site feature, building, and functional requirement must be spelled out and quantified. This is where functional relationships and initial site analysis should be provided. Typical/standard designs can be included for better planning and for informing the designers.

Subsections 34.22 to .24: Design Stages

Subsection 34.25: Drawings and Specifications—everything needs applicable drawings and specs. Use Construction Specifications Institute (CSI)-style specs for buildings, water/wastewater, and sites.

Subsection 34.26: Design, Review, and Approval—design review at each major stage. Final review is not complete until signed by the regional engineer.

Subsection 34.27: Coordination with State and Local Authorities—certain development activities have permit requirements (stormwater, erosion control, water/wastewater) where the States have jurisdiction, even on the Federal Estate. Generally, that means those things have to be designed and sealed by the appropriate professional licensed in the State in which the work occurs, even if the designer is an employee of the United States.

Section 35—Construction

- Office of Management and Budget (OMB) A-76 requirements before using force account
- Contractors must abide by State and local laws
- Forest Service does permit coordination before construction
- Contractor secures specific permits
- No occupation until after the final inspection (i.e., "Substantial Completion")

Chapter 40—Management (**Note:** revision complete—in the Office of Regulatory and Management Services [ORMS] cycle for approval and publication)

Subsection 41.2: Security

Chapter 42—Maintenance and Repair

Chapter 43—Facility Management Documents

Subsection 43.1: Operation and Maintenance Plan

Subsection 43.2: Emergency and Security Plan

Subsection 43.3: Accessibility Transition Plan

Chapter 44—Inspections

Chapter 50—Special Use Facilities (**Note:** revision not started)

Chapter 60—Records and Reports

Chapter 70—Sustainable Buildings (**Note:** needs revision. Moving to more reliance on Federal Guiding Principles, International Green Construction Code)

APPENDIX B

DESIGN NARRATIVE TEMPLATE

Southwestern Region Design Narrative Template

Design Narrative

Site Name

Ranger District
County
National Forest
Southwestern Region
U.S. Department of Agriculture, Forest Service

Prepared by:

_____ _____
Landscape Architect/Engineer/Recreation Staff Date

Recommended by:

_____ _____
District Ranger Date

_____ _____
Staff Officer Date

_____ _____
Forest Supervisor Date

Reviewed by:

_____ _____
District Recreation Staff Date

_____ _____
Recreation Program Manager Date

_____ _____
Forest Engineer Date

Approved by:

_____ _____
Director of Engineering Date

_____ _____
Deputy Director of Recreation Date

CONTENTS

How to Use this Template

A design narrative is a prospectus that documents design decisions related to site and facility development. This document assembles basic information, including site characteristics, recreation opportunities, operation and maintenance strategies, and management objectives. The design narrative documents the level of development and architectural themes and the design scope. It is intended for use as a foundation for design development and preparation of construction drawings and specifications.

The level of effort focused on preparing a design narrative should relate to the level of complexity and controversy associated with the project.

This design narrative is **required** for projects of more than $100,000 due to the level of complexity. It is helpful for all projects, regardless of cost.

The design narrative template provides headings for required and additional content to help set parameters for the design process. The bullet points/checklist items under each heading are examples of suggested content but are not all-inclusive. If an item in the template does not apply, delete it from the final document.

Prework: Complete a Site Analysis

A site analysis provides an understanding of a site in its entirety, as needed to inform the design of the proposed project, and shapes sustainable design choices. This will help determine information in the design narrative and set a meaningful course for design direction.

A site analysis identifies site attributes and problem areas, relationships of various site elements, and how the proposed project and use could fit the site. Site analysis is a synthesis of observations about the site.

Document site concerns (e.g., evidence of erosion), condition of vegetation, wildlife corridors, etc.

Basis for development of the concept plan: Use a topographic map at a scale no smaller than 1 inch equaling 100 feet, which includes site boundaries and surrounding areas that may influence site uses or design. Adding a referenced aerial photo beneath the topo map can help with identifying features and concerns.

Walk the site with a map or site plan and record what you observe. Completing a site analysis often provides inspiration for the design. Think of how various aspects of the site interrelate, the characteristics of different areas within the site, how parts of the site might or might not be suited for proposed use of the site, and how adjacent land and land use affects the site.

Engage multiple perspectives and perform numerous on-the-ground visits to observe the site under different conditions.

Incorporate observations and input from diverse stakeholders, as well as staff and design teams, to better understand site function and needs. Where possible, review and refine site analysis onsite.

Purpose

Description of the Project/Purpose and Need

- Include decisions relevant to the project, history of the site, existing conditions, main issues of concern.
- Include a site location/map with key features identified.
- Why is the project being undertaken? What does the project propose to do? What are the major desired outcomes?

Guiding Policy and Direction for the Project

- Existing forest plan direction relevant to the site
- Include context and sideboards
- Recreation facility analysis (RFA)/recreation site analysis (RSA)
- Program of work

Management Objectives

- How does the site contribute to the forest program and sustainability?
- What management outcomes are desired?

Existing Physical Conditions

Location

- Brief physical description of the setting (include key features on the site map):
  - Overall vegetation
  - Hydrologic features

Topography

- Weather patterns
- Prevailing wind directions
- Topographic features

Soils

☐ Sandy ☐ Rocky ☐ Clay ☐ Other ☐ Unknown

Topography

☐ Less than 3 percent ☐ 9 to 15 percent

☐ 3 to 8 percent ☐ More than 15 percent

Vegetation

- Vegetation communities onsite
- Identify key vegetation features (e.g., mature/character trees to retain) and any needed buffers that may protect them

Other Resource Coordination

☐ Soil compaction, leading to substantial loss of vegetation

☐ Soil erosion

☐ Damage to trees (such as vehicles hitting trees with bumpers or mirrors, pounding nails, or exposed roots)

☐ Loss of trees due to insects and/or disease

☐ Shoreline erosion

☐ Riparian or floodplain concerns

Briefly describe primary concerns related to natural resources:

_____

Identified Safety Hazards

- ☐ Flood potential
- ☐ Fire
- ☐ Trees (breakage/falling)
- ☐ Traffic (access to major roads) sight distance
- ☐ Weather: lightning strikes, etc.
- ☐ Falling rocks
- ☐ Other

Describe the hazards and locations:

_____

Social Trends and Use Patterns

- Identify natural character areas such as meadows, grasslands, groves of trees, rock outcrops, shore or beach areas, key views for retention or enhancement, and areas likely to become visitor destinations.
- Identify existing circulation patterns of pedestrians, vehicles, and any known wildlife corridors or habitat areas. Note entry and exit points and how each circulation pattern crosses the site. Note adjacent site use and patterns and how they influence site conditions and design choices.

Recreation Opportunities and Scenery

Primary recreation activities:

- ☐ Fishing
- ☐ Hunting
- ☐ Boating
- ☐ Winter play
- ☐ Camping
- ☐ Day use/picnic
- ☐ Trailhead
- ☐ Interpretive or nature trail
- ☐ Waterplay/swimming
- ☐ OHV/ATV
- ☐ Other _____

Recreation opportunity spectrum class of site location:

☐ SPNM ☐ SPM ☐ RN ☐ R ☐ U

Desired scenic integrity objectives (or visual quality objectives) of site location:

- ☐ High (retention)
- ☐ Moderate (partial retention)
- ☐ Low (modification)

Types of scenic views and recreation opportunities onsite:

_____

Identify visual elements and characteristics that are present onsite that contribute to the sense of place:

_____

Floodplain

- Issues with floodplains/hydrological patterns.
- Identify primary drainage patterns, how drainage crosses the site from adjacent land, any existing drainage or erosion problems, and note areas to avoid.
- Identify flood plains, wetlands, other water features, and any buffers needed to protect them.
- Identify any pollutants that may impact the site in a rain event.

Cultural Resources

- Identify cultural/historic features. Note how the project might enhance long-term preservation of heritage values.

Management Problems that Design May Resolve/Minimize

Why is the site being redesigned or constructed (e.g., absence of universal design and accessible facilities, wastewater issues, soil erosion, compliance with standards, vandalism, safety hazards, etc.)?

Existing Recreation Opportunities and Activities

Type of Facilities—Current

- Infrastructure such as restrooms, picnic shelters, trails, roads, etc., and any design considerations related to them.
- Types of roads and condition.
- Any areas or locations that might be particularly appealing or suited for proposed project features?
- Types of services provided onsite and whether those should continue (e.g., drinking water, flush toilets, etc.).
- Note if any amenities are to be saved, salvaged and/or reinstalled.
- Season of use.

Market Analysis

Customer Profile

- Types of users, demographics, indicated need for bilingual visitor information, etc.

Relationship to Other Private Developments, Public Developments, and Urban Areas

- Any other similar opportunities/areas to connect to or to visually reference? City/county recreation sites, private recreation opportunities, etc.
- Driving distance from local centers, how people will likely arrive to the site and from where, other modes of transportation.

Proposed Recreation Opportunities and Activities

A concept schematic is helpful here.

Desired Use

Type of recreation use:

- ☐ Day use only
- ☐ Campground
- ☐ Group reservation site
- ☐ Trailhead
- ☐ Motorized
- ☐ Equestrian
- ☐ Educational
- ☐ Other _____

Design vehicle by percentage:

- ☐ Passenger car _____
- ☐ Trailer combination _____
- ☐ RV _____
- ☐ Bus _____
- ☐ Other _____

Type of Facilities

- Number and type of facilities/amenities to be provided (e.g., toilets, shelters, picnic sites, tables, cattleguards, etc.).

Roads:

- ☐ Paved
- ☐ Gravel
- ☐ Native surface
- ☐ Combination (describe)

Proposed Managed Season of Use

- Year round? Closures needed?

Proposed and Existing Capacity

- **Current:**
  - What is the current capacity of the site?
  - How many people at one time (PAOT)?
- **Proposed:** Planned PAOT capacity and potential limiting factors.
- Identify how the project will be responsive to use trends.

Type of Construction

- Reconstruction or new construction?
- Will there be expansion of the existing site?

Type of Administration

- Who will operate the site?
- What types of annual maintenance will be needed?

Health and Safety

- Strategies to minimize any potential hazards to public or employee safety.

Vegetation Management

- Are there any needs for invasive species management?
- Plantings needed? Care of plants?

Economics

Fees

- Does the site charge a fee?
- What is the anticipated revenue to support the site?

Maintenance and Operations

Who will manage the site (check all that apply):

- ☐ Concession
- ☐ Contract
- ☐ Force account
- ☐ Volunteer host

- What are the anticipated annual costs of operation?
- What are some maintenance needs?

Design and Construction Costs

- What are the anticipated construction costs (initial) of design and construction by site?

Recommended Design Criteria and Architectural Theme

Recommended design criteria and the architectural theme for the site.

Note: design may determine more sustainable or appropriate design solutions; at this stage, provide recommendations to begin with.

- Define characteristics of the setting and amenities contributing to a high-quality experience.
- Existing cultural features and constructed features influencing design.
- Description of architectural style and materials appropriate to the site, consistent with the local setting and "The Built Environment Image Guide for the National Forests and Grasslands" design province.

Amenity/facility	Material	Finish/details	Color

APPENDIX C

RECREATION DESIGN NARRATIVE

Intermountain Region Design Narrative Template

Recreation Design Narrative

For Recreation Facility

[**Note:** Attach Engineering Report for Water and Sanitation Systems, if applicable]

The following project prospective has been recommended and approved by the following:

Prepared by:

_____ _____
Title Date

Recommended by:

_____ _____
Recreation Staff Officer Date

_____ _____
Forest Engineer Date

Approved by:

_____ _____
District Ranger Date

_____ _____
Forest Supervisor Date

_____ _____
R4, Director of Recreation Date

_____ _____
R4, Director of Engineering Date

Project details:

_____ _____
Forest Date

_____
Project name

_____
Point of contact

_____ _____
Funding source Year

☐ CIP _____ (CMFC) _____ (CMRD)

☐ Grant (type) _____ Total_____

☐ Other _____

Total dollars available for project construction: _____

Project Introduction/Description

(Describe the who, what, where, why, and how of your proposal. Identify the primary objectives of the project. Much of this narrative may be taken from the Capital Investment Program [CIP] submission form.)

- Describe the desired visitor experience.
- What is the managed use (day use, overnight, group use, single family, or a combination)?
- Identify the target audience for this facility. Is it primarily local users, regional users, national or international visitors? Do you anticipate school or other youth groups?
- Describe the sustainable management and operations of the facility once completed.
- What is the level of development planned for this site (refer to recreation opportunity spectrum guidelines from your forest plan or other applicable documents.)
- Is there a design theme planned for this site? For example, is this a site that was constructed by the Civilian Conservation Corps (CCC), and is the desire to maintain that character and level of development?

(If an item below does not apply, delete it from the final document.)

Existing Site Conditions

1. **Season of use**
   Date of opening and closing: _____
2. **Recreation opportunity spectrum class**
   (Forest Service Manual [FSM] 2300.3-3)
   ☐ SPNM ☐ SPM ☐ RN ☐ R ☐ U
3. **Existing people at one time (PAOT)** _____ *(see instructions)*
4. **Identified safety hazards to the public**
   ☐ Flood potential
   ☐ Fire
   ☐ Trees (breakage/falling)
   ☐ Traffic (access to major roads) sight distance
   ☐ Weather: lightning strikes, etc.
   ☐ Falling rocks
   ☐ Other _____

   Describe the hazards and locations:

   _____
5. **Soils**
   ☐ Sandy ☐ Clay ☐ Unknown
   ☐ Rocky ☐ Other
6. **Vegetation management**

   Is there a vegetation management plan?
   (Provide to the design team if the site has a current plan)

   List trees and other major vegetation.

   Are there insect and disease concerns affecting vegetation at this site or in the area?

   Should planting be a component of the final design?

   Are there sufficient water resources at this site to support irrigation for up to 3 years if a planting plan is included with this project?

7. Primary recreation activities

- ☐ Fishing
- ☐ Hunting
- ☐ Boating
- ☐ Winter play
- ☐ Camping
- ☐ Day use/picnic
- ☐ Trailhead
- ☐ Interpretive or nature trail
- ☐ Waterplay/swimming
- ☐ OHV/ATV
- ☐ Other _____

Is there additional information related to recreation activities that would be helpful for the design process? For example, if winter play is a planned activity, what type of winter play (cross-country skiing, sledding, tubing, etc.)?

_____

8. Customer profile

(Used for accommodating equipment and other site design considerations)

Camping:

_____ % tents

_____ % campers and small trailers (such as pop-ups)

_____ % fifth-wheel trailers and large motor homes

Transportation:

_____ % other trailers
(for boats, ATVs, or hauling other equipment—please specify)

_____

_____ % trail bikes

Other:

_____ % horses

_____ % other *(explain)*

_____

Existing Facilities

1. Roads

- ☐ Paved
- ☐ Gravel
- ☐ Native surface
- ☐ Combination *(describe)*

_____

2. Existing water source and system

_____
(Describe water source and system)

3. Existing sewage disposal

- ☐ Vault-pump and haul
- ☐ Septic tank and drain field
- ☐ Holding tank
- ☐ Sewer system
- ☐ Other _____

4. **Demolition**

   a. Items to be salvaged before construction (by number):

   _____ Tables _____ Fire rings

   _____ Grills _____ Hydrants

   _____ Comfort stations

   _____ Barriers (type) _____

   _____ Other _____

   b. Existing facilities to be removed during construction (by number):

   _____ Tables _____ Fire rings

   _____ Grills _____ Hydrants

   _____ Comfort stations

   _____ Barriers (type) _____

   _____ Other _____

   c. Existing facilities to be removed (by number):

   ☐ Forest

   ☐ Contractor

   ☐ Both—if both, itemize

   d. Disposal site location:

   ☐ On forest

   ☐ Commercial landfill

5. **Existing facilities to remain (by number):**

   _____ Tables _____ Fire rings

   _____ Grills _____ Hydrants

   _____ Comfort stations

   _____ Barriers (type) _____

   _____ Other _____

Site Concerns, Challenges, and Expectations

1. **Type of recreation facilities and use desired**

   Day use/picnic

   ☐ Single family _____ % reservation

   ☐ Single family _____ % "drop-in"

   ☐ Group use _____ % reservation

   ☐ Other _____

   Overnight use

   ☐ Single family _____ % reservation

   ☐ Single family _____ % "drop-in"

   ☐ Group use _____ % reservation

   ☐ Other _____

   Recreation facilities

   ☐ Trailhead ☐ Amphitheatre

   ☐ Waterplay/swim area ☐ Educational

   ☐ Visitor information ☐ Other _____

2. Anticipated management operation strategy
(Check all that apply):

- ☐ Concession
- ☐ Contract
- ☐ Force account
- ☐ Volunteer host

If concession or contract, has the concessionaire or contractor been included in project planning?

_____

Are there management or operations concerns that can be improved with design solutions?

_____

3. Is there a vandalism problem at the site?

- ☐ No—mostly routine maintenance issues
- ☐ Occasional vandalism, such as carving in tables or marking walls
- ☐ Frequent vandalism of a minor nature
- ☐ Serious vandalism problems; destruction of site furnishings or serious damage to buildings

Describe:

_____

4. What is the level of use at the existing site (or anticipated use, for new construction):

Site occupancy:

- ☐ Less than 30% weekdays—rarely full on weekends
- ☐ Less than 50% weekdays—full on most weekends and holidays
- ☐ Less than 70% weekdays—full and use overflow on weekends and holidays

Site use:

- ☐ Mostly individual families, less than eight people at a site, seldom more than one or two vehicles
- ☐ Occasional multifamily groups, 8 to 20 people at a site, multiple cars
- ☐ Frequent multifamily groups, 8 to 20 people at a site, multiple cars
- ☐ Occasional large groups, more than 20
- ☐ Frequent large groups, more than 20

Briefly describe the primary concerns related to the level of use:

_____

What are the projected use levels?

_____

5. Are there use impacts to natural resources that should be addressed in the design:

- ☐ Soil compaction—leading to substantial loss of vegetation
- ☐ Soil erosion
- ☐ Damage to trees (such as vehicles hitting trees with bumpers or mirrors, pounding nails, or exposed roots)
- ☐ Loss of trees due to insects and/or disease
- ☐ Shoreline erosion
- ☐ Riparian or floodplain concerns

Briefly describe primary concerns related to natural resources:

_____

6. **Which sites are the most popular? Why?**

_____

Which sites are the least popular? Why?

_____

7. **Visitor satisfaction**

Are visitors satisfied with the existing facilities?
What features contribute to their satisfaction?

_____

Are there features with this site that receive complaints?
Can these be resolved by the design?

_____

Desired Facilities Description

1. **Desired PAOT:** _____
2. **Type of construction:**
   - ☐ Rehab ☐ New construction ☐ Combination
3. **Type of recreation use:**
   - ☐ Day use only
   - ☐ Campground
   - ☐ Group reservation site
   - ☐ Trailhead
   - ☐ Amphitheatre
   - ☐ Educational
   - ☐ Other _____
4. **Desired facilities**
   - **a.** Host unit, including water and sewer facilities
     ☐ Yes ☐ No
   - **b.** Single-family units desired _____ (number or %)
   - **c.** Double-family units desired _____ (number or %)
   - **d.** Group units desired _____ (number)
     PAOTs per unit _____
   - **e.** Family pad surface
     ☐ Concrete paving ☐ Gravel surface
     ☐ Asphalt paving ☐ Other _____

     Group unit pad
     ☐ Concrete paving ☐ Gravel surface
     ☐ Asphalt paving ☐ Other _____
   - **f.** Entrance and/or fee station with bulletin board

     Information plan: What type of visitor information will be provide at the site?
     ☐ Welcome ☐ Trailhead
     ☐ Orientation ☐ Map
     ☐ Unit marking ☐ Fee information

     Will you be installing the Intermountain Region information panels?
     ☐ Yes ☐ No

Bulletin board:

☐ One panel
☐ Two panel
☐ Three panel
☐ Log construction
☐ Wood construction
☐ Metal construction

Fee tube:

☐ Government-furnished
☐ New
☐ Relocated from one onsite

g. Interpretation

Are interpretive exhibits planned for this site?

☐ Yes
☐ No

If yes, will exhibits be installed in conjunction with the construction?

_____

Describe any interpretation planned for this site (e.g., determining exhibit locations near an historic feature or planning interpretive trails):

_____

h. Gates

☐ Yes
☐ No

(For road-controlled access; e.g., closing the road during the winter season)

If yes, include desired locations:

_____

i. Tables

☐ Concrete
☐ Concrete supports and footing
☐ Channel iron supports and concrete footing
☐ Channel iron supports and angle iron footing
☐ 8-foot expanded metal
☐ 8-foot wood plank
☐ Two 8-foot tables for double family units
☐ 8-foot serving table for group units

j. Grills, utility tables, and fire rings

☐ Commercial fire ring with tip-out grill
☐ Concrete with metal insert
☐ Pedestal charcoal grill
☐ Utility tables
☐ Bear-proof food lockers
☐ Large, commercial, charcoal grill for group units
☐ Other _____

k. Garbage

☐ Individual-unit garbage can
☐ Central garbage can area
☐ Recycle center
☐ Pack in/pack out
☐ Garbage bin (commercial) size: _____

l. Water system

☐ Yes ☐ No

(If yes, describe desired water source and system [if known] and complete engineering report)

m. Hydrants

☐ Regional standard with 6-inch by 6-inch wood post

- ☐ With self-closing faucet only
- ☐ With self-closing faucet and drinking fountain
- ☐ With self-closing faucet and lower keyed hose bib (near restrooms)
- ☐ With two hose bibs (for host units)

☐ Frost proof (anti-freeze)

☐ Hand pump well

☐ None

n. Unit markers

☐ Routed number wood post

☐ Other

☐ None

o. Barriers

Rock:

☐ Commercial ☐ Salvaged onsite

☐ Concrete post ☐ Combination

☐ Treated timber post ☐ None

☐ Log

p. Paths

☐ Asphalt ☐ Gravel ☐ Native soil

q. Tent pads

☐ 12 feet by 12 feet with suitable material

☐ 12 feet by 15 feet with suitable material

☐ Other size

☐ With wood border

☐ With concrete border

☐ With metal edging border

r. Horse corral _____ (type construction)

☐ With water trough ☐ Feed bunk

☐ Without water trough ☐ Other _____

s. Unloading ramp

☐ Single ☐ Height 36 inches

☐ Double ☐ Accessible transfer ramp

☐ Height 24 inches

t. Horse tie rack

☐ Steel ☐ 21 feet (steel)

☐ Wood ☐ Other _____

☐ 10½ feet (steel)

5. Vehicle use (by percent)

- ☐ Passenger car _____%
- ☐ Trailer combination _____%
- ☐ RV _____%
- ☐ Bus _____%
- ☐ Other _____% _____

6. Roads, spurs, and parking areas (FSH 7709.56 and AASHTO)

Design vehicle (for roads): _____

Design vehicle (for spurs): _____

Design vehicle (for parking areas): _____

- ☐ Full-size car, truck, and van
- ☐ Car/truck with medium-size trailer or boat
- ☐ Truck with full-size travel trailer
- ☐ Motor home—RV
- ☐ Tour or school bus
- ☐ Garbage truck
- ☐ Tractor with low boy or belly dump
- ☐ Other _____

Additional vehicle design criteria:

For parking areas:

- ☐ Group parking for multi-campers (overnight parking for RVs, etc.)
- ☐ Group parking for picnic (day use only)
- ☐ Group parking for group areas (overnight parking for RVs, etc.)
- ☐ Individual car parking only
- ☐ None

7. Comfort station

a. Vault comfort stations

- ☐ 1-unit, precast concrete vault—design name (if known): _____
- ☐ 2-unit, precast concrete vault—design name (if known): _____
- ☐ 2-unit, precast concrete vault with chase—design name (if known): _____
- ☐ Other: _____

b. Flush comfort stations

- ☐ 1-unit, precast concrete—design name (if known): _____
- ☐ 2-unit, precast concrete—design name (if known): _____
- ☐ Other: _____

c. Comfort station amenities

- ☐ Security lights
- ☐ Fan
- ☐ Lighting controls
- ☐ Hand dryer
- ☐ Heat

(Forest preferences should be considered in the engineering report)

8. Shower building

☐ 2-unit, precast concrete—design name (if known):

_____

☐ 4-unit, precast concrete—design name (if known):

_____

☐ Other: _____

9. Cattleguard

☐ Yes ☐ No ☐ Size

10. Fences

☐ Chain link ☐ Log worm

☐ Post and pole ☐ Wire

☐ Other: _____

☐ None

11. Wastewater sump

☐ Yes ☐ No

12. Trailer dump station

☐ Yes ☐ No

13. Water-related recreation

a. Fish-cleaning station, if electricity is available

☐ Yes ☐ No

b. Boat ramp and parking

Type and size of vehicle: _____

Number of lanes: _____

Number of parking spaces: _____

Surface:

☐ Asphalt ☐ Concrete ☐ Gravel

c. Swimming beach

☐ Yes ☐ No

d. Boat docks

☐ Yes ☐ No

Type of docks:

☐ Floating ☐ Stationary

14. Electricity—new, additional, required changes

☐ Not required or no change

☐ Commercial

☐ Generator

☐ Solar

☐ Existing

☐ Requested

☐ Host unit pedestal

☐ Other unit pedestals

☐ Water and/or sewer, electric

☐ Other options, as shown elsewhere

15. Comments and additional information:

_____

ABOUT THE AUTHORS

Nancy Brunswick

Nancy Brunswick is the regional landscape architect for the Intermountain Region of the U.S. Department of Agriculture, Forest Service, responsible for working with forests and their landscape architects in Utah, Nevada, southern Idaho, and southwestern Wyoming. As the regional landscape architect, she serves on the national Landscape Architecture Leadership Team, which provides direction and guidance for scenic resource and recreation planning and management on the national forests and grasslands.

Brunswick began her career as a student landscape architecture trainee on the Wasatch-Cache National Forest while attending graduate school. Her first career assignment was as the west zone landscape architect on the Dixie National Forest in southern Utah. She transferred into a partnership position in 2000 with the U.S. Department of Transportation, Federal Highways Administration and the America's Byways Resource Center as the first Federal lands byway specialist working with the resource center staff. She was responsible for developing training resources for interpretation, planning, and scenic conservation for State and local byway organizations. Before moving to Ogden, UT, she was the forest landscape architect and recreation program manager on the Cibola National Forests and Grasslands in New Mexico.

Brunswick was a contributing author for "Scenic Byways: A Design Guide for Roadside Improvements," which received an award from the National Association for Interpretation. While working with the America's Byways Resource Center, she was the project manager and a contributing author for "Conserving Our Treasured Places: Managing Visual Quality on Scenic Byways."

She received a bachelor of fine arts degree from the University of Utah and a master of landscape architecture degree from Utah State University.

Daniel Cressy

Daniel Cressy currently serves as the public services staff officer for the Lake Tahoe Basin Management Unit (LTBMU) in the Forest Service's Pacific Southwest Region. He is a licensed landscape architect and previously served as the regional landscape architect and recreation planner for the Rocky Mountain Region, as the forest landscape architect for the LTBMU, and as a landscape architect in private practice. He has particular interest in facilitating connections to and enjoyment of national forest lands in ways that inspire current and future generations to understand, appreciate, and actively steward our shared public land legacy.

Jessica Dole (retired)

Jessica Dole was a forest landscape architect with the Siuslaw National Forest from 1994 until she retired in 2019. She was a district landscape architect before that.

She has a bachelor of science degree in environmental studies, geography from the University of Oregon, and a master of landscape architecture from Cornell University. She received her license as a landscape architect from the State of Oregon.

Dole has particular interest in site analysis and design—in minimizing and reducing developed area in site design; fitting with, protecting, and appreciating the natural site and setting; and in recognizing the everyday, historic, and cultural landscape features that make up large landscape settings.

Jessica Dunn

Jessica Dunn is a landscape architect, recreation planner, and artist who has worked with the Forest Service since 2009. She is the regional recreation planner and landscape architect for the Southwestern Region of the Forest Service, which serves 11 national forests and grasslands in New Mexico, Arizona, and parts of Oklahoma and Texas. She has a bachelor of arts degree from the University of California, Santa Cruz and masters degrees in landscape architecture and fine arts from the University of New Mexico. Growing up within the Humbolt-Toiyabe National Forest in Nevada, Dunn has cultivated a lifetime appreciation of public lands. She chose a career in public service to ensure the recreation and scenery resources of public lands remain intact for the enjoyment of present and future generations. She specializes in the planning, design, and management of recreation, scenery, and designated areas for projects at the national forest, regional, national, and international levels. Her work focuses on the complex relationship between humans and the environment and on creating spaces that encourage connection to place. Based in New Mexico, she continues to pursue adventure in the outdoors at every opportunity—hiking, camping, drawing, traveling, and exploring wild places with her family.

Jesse English

Jesse English is the Recreation, Wilderness & Trails Program manager and forest landscape architect for the Cherokee National Forest in Tennessee, part of the Forest Service's Southern Region. He began his career in public service as a graduate student with the Student Conservation Association and the U.S. Department of the Interior, National Park Service on the Blue Ridge Parkway and in their southeast regional office in Atlanta.

After graduating, English joined the Forest Service as a Presidential Management Fellow in the Washington Office in Recreation, Heritage, and Volunteer Resources. He has also served as the Recreation Program manager and forest landscape architect for the National Forests in Florida, and enjoyed brief stints as the regional landscape architect for the Northern Region in Missoula, MT, and assistant Recreation Program manager on the Gifford Pinchot National Forest in Washington State. His focus is on the management and improvement of settings and opportunities that connect communities to their public lands and cultivate distinct senses of place in east Tennessee and throughout southern Appalachia, whether through campgrounds, restored historic structures, scenic byways, trails, waterways, wilderness, or cultural landscapes. He has a bachelor degree of business administration in construction management and land development, a master of landscape architecture degree from Mississippi State University, and is a Leadership in Energy and Environmental Design (LEED) Accredited Professional.

Ilia Fiene

Ilia Fiene is a regional landscape architect for the Intermountain Region of the Forest Service. Upon graduating with a master of landscape architecture degree, she immediately began her career in the Forest Service as a landscape architect resource assistant for the Columbia River Gorge National Scenic Area in the Pacific Northwest Region. She has a keen interest in progressing the management and potential development of highly impacted, dispersed areas throughout public lands and in preserving scenic resources across the forests.

Susan Jenkins

Susan Jenkins joined the Forest Service National Technology and Development Program (NTDP) in 2019 as a project manager. She graduated from the University of Minnesota-Twin Cities in 1993 with a bachelor's degree in interdisciplinary studies. She also has a bachelor's degree in natural resources from the University of Idaho-Moscow, with an emphasis in wilderness and conservation. Since joining NTDP, Jenkins has primarily led projects for the Recreation, Heritage & Volunteer Resources and Wilderness and Wild & Scenic Rivers Programs.

ACRONYMS

A-E—architectural-engineering

AASHTO—American Association of State Highway and Transportation Officials

ABA—Architectural Barriers Act

ABAAS—Architectural Barriers Act Accessibility Standards

ADA—Americans with Disabilities Act

BMP—best management practices

CCC—Civilian Conservation Corps

CFR—Code of Federal Regulations

CIP—Capital Investment Program

CO—contracting officer

COR—contracting officer's representative

CSI—Construction Specifications Institute

CWA—Clean Water Act

ESA—Endangered Species Act

FAR—Federal Acquisition Regulation

FERC—Federal Energy Regulatory Commission

FSH—Forest Service Handbook

FSM—Forest Service Manual

FSORAG—Forest Service Outdoor Recreation Accessibility Guide

FSTAG—Forest Service Trail Accessibility Guide

GIS—geographic information system

GPS—Global Positioning System

LEED—Leadership in Energy and Environmental Design

LID—low-impact development

lidar—light detection and ranging

MUTCD—Manual on Uniform Traffic Control Devices for Streets and Highways

NEPA—National Environmental Policy Act

NFAA—National Field Archery Association

NFMA—National Forest Management Act

NFRS—National Forest Recreation Survey

NHPA—National Historic Preservation Act

NVUM—national visitor use monitoring

OMB—U.S. Office of Management and Budget

ORAR—outdoor recreation access route

PAOT—people at one time

RFA—recreation facility analysis

ROS—recreation opportunity spectrum

RSA—recreation site analysis

RV—recreational vehicle

SCORP—Statewide Comprehensive Outdoor Recreation Plan

SMS—Scenery Management Systems

SRSDG—Sustainable Recreation Site Design Guide

USDA—U.S. Department of Agriculture

VA—value assessment

REFERENCES

American Association of State Highway and Transportation Officials. 2019. Guidelines for geometric design of low-volume roads, 2nd edition. ISBN: 978–1–56051–726–9. Washington, DC. 100 p. https://store.transportation.org/Item/PublicationDetail?ID=4269&AspxAutoDetectCookieSupport=1

Americans with Disabilities Act of 1990 [ADA]. 42 United States Code (U.S.C.) 12101, Findings and purpose. https://uscode.house.gov/view.xhtml?req=granuleid:USC-1999-title42-section12101&num=0&edition=1999

Architectural Barriers Act of 1968 [ABA]. 42 U.S.C. 4151, Funding. https://www.govinfo.gov/content/pkg/USCODE-2021-title42/pdf/USCODE-2021-title42-chap51-sec4151.pdf

Colorado Office of Archaeology and Historic Preservation. 2008. Architects of Colorado—biographical sketch of Arthur H. Carhart. Denver, CO. 6 p. https://www.historycolorado.org/sites/default/files/media/document/2017/Architects_carhart.pdf

Fehler, D.P. 1985. The visual aspects of road closure. Presentation at the Mark Twain National Forest, Rolla, MO: U.S. Department of Agriculture, Forest Service.

Garst, B.A.; Williams, D.R.; Roggenbuck, J.W. 2010. Exploring early twenty-first century developed camping experiences and meanings. Leisure Sciences. 32: 90–107. https://www.fs.usda.gov/research/treesearch/34710

Hale, J. 2016. U.S. Forest Service celebrates 100 years at Eagle Creek. Oregon Live (online). The Oregonian: Portland, OR. https://www.oregonlive.com/travel/2016/07/us_forest_service_celebrates_1.html

Hancock, J.; Jones Vander Hoek, K.; Bradshaw, S.; Coffman, J.D.; Engelmann, J. 2007. 0723–2816–MTDC. Equestrian design guidebook for trails, trailheads, and campgrounds. Washington, DC: U.S. Department of Agriculture, Forest Service, National Technology and Development Program. 312 p. https://www.fs.usda.gov/t-d/library-card.php?p_num=0723%202816

Keller, G.; Sherar, J. 2003. Low-volume roads engineering: best management practices field guide. Washington, DC: U.S. Agency for International Development and U.S. Department of Agriculture, Forest Service. 182 p. https://pdf.usaid.gov/pdf_docs/PNADB595.pdf

Litton, R.B. 1984. Visual vulnerability of the landscape: control of visual quality. Res. Pap. WO-39. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station. 35 p. https://archive.org/details/visualvulnerabil39litt

Lyle, J.T. 1985. The alternating current of design process. Landscape Journal. 4(1): 7–13. https://www.jstor.org/stable/i40132186

Morrison, J. 2010. Commemorating 100 years of the RV. Smithsonian Magazine (online). Washington, DC. https://www.smithsonianmag.com/history/commemorating-100-years-of-the-rv-56915006

National Forest System Land Management Planning Act of 2012. 36 Code of Federal Regulations (CFR) Part 219, Subpart A—National Forest System Land Management Planning, Federal Register, Vol. 77, No. 68. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5362536.pdf

Outdoor Recreation Resources Review Commission. 1962. Outdoor recreation for America: A report to the President and to the Congress. America's national park system: The critical documents. Washington, DC. https://www.nps.gov/parkhistory/online_books/anps/anps_5d.htm. In: Dilsaver, L.M. (editor). 1994. America's national park system: the critical documents. ISBN 0–8476–8440–7. Lanham, MD: Rowman & Littlefield Publishers. https://www.nps.gov/parkhistory/online_books/anps/index.htm.

Rehabilitation, Comprehensive Services, and Developmental Disabilities Act of 1978. 29 U.S.C., 794, Nondiscrimination under Federal grants and programs. https://www.govinfo.gov/content/pkg/USCODE-2021-title29/pdf/USCODE-2021-title29-chap16-subchapV-sec794.pdf

Specifications and Drawings for Construction. 48 U.S.C., chapter 1, subpart H, part 52, 52.236–21. Specifications and drawings for construction. https://www.ecfr.gov/current/title-48/chapter-1/subchapter-H/part-52/subpart-52.2/section-52.236-21

Tweed, W.C. 1989. A history of outdoor recreation development in national forests, 1891–1942. Washington, DC: U.S. Department of Agriculture, Forest Service. 29 p. https://foresthistory.org/wp-content/uploads/2017/01/USFS_Recreation_1891_1942.pdf

U.S. Department of Agriculture, Forest Service. 1905. 1905 "use book:" the use of the national forest reserves, regulations and instructions. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p. https://foresthistory.org/wp-content/uploads/2017/10/1905_use_book.pdf

U.S. Department of Agriculture, Forest Service. 1907. The use of the national forests. Washington, DC: U.S. Department of Agriculture. 60 p. http://npshistory.com/publications/usfs/use-book-1907/index.htm

U.S. Department of Agriculture, Forest Service. 1937. The United States Department of Agriculture—Forest Service recreation handbook. Washington, DC: U.S. Department of Agriculture, Forest Service.

U.S. Department of Agriculture, Forest Service. 1973. National forest landscape management, volume 1. Agricultural handbook number 434. Washington, DC: U.S. Department of Agriculture, Forest Service. 76 p. https://babel.hathitrust.org/cgi/pt?id=uva.x030492626&view=1up&seq=4

U.S. Department of Agriculture, Forest Service. 2001. The built environment image guide for the national forests and grasslands. FS-710. Washington, DC: U.S. Department of Agriculture, Forest Service. 290 p. https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/TheBuiltEnvironmentImageGuide-2001-09.pdf

U.S. Department of Agriculture, Forest Service. 2002. Scenic byways: A design guide for roadside improvements. FHWA–FLH–02–001. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center. 106 p. https://www.fs.usda.gov/t-d/php/library_card.php?p_num=FHWA-FLH-02-001

U.S. Department of Agriculture, Forest Service. 2010. Connecting people with America's great outdoors: a framework for sustainable recreation. Washington, DC: U.S. Department of Agriculture, Forest Service, Recreation, Heritage and Volunteer Resources. 8 p. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5346549.pdf

U.S. Department of Agriculture, Forest Service. 2012. National best management practices for water quality management on National Forest System lands, volume 1: national core BMP technical guide. FS-990a. Washington, DC: U.S. Department of Agriculture, Forest Service. 165 p. https://www.fs.usda.gov/biology/nsaec/assets/fsnationalcorebmpsapril2012.pdf

U.S. Department of Agriculture, Forest Service. 2013. Forest Service manual 7300—Buildings and other structures. Washington, DC: U.S. Department of Agriculture, Forest Service. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi1icGAjL2EAxVil0QIHXlgCoIQFnoECBIQAQ&url=https%3A%2F%2Fwww.fs.usda.gov%2Fim%2Fdirectives%2Ffsm%2F7300%2F7310.doc&usg=AOvVaw0luO1vMUa1C_BxPSg5UhcW&opi=89978449

U.S. Department of Agriculture, Forest Service. 2013. Sign and poster guidelines for the Forest Service. EM7100–15. Washington, DC: U.S. Department of Agriculture, Forest Service. 681 p. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3810021.pdf

U.S. Department of Agriculture, Forest Service. 2015. Forest Service outdoor recreation accessibility guidelines (FSORAG) pocket version. 1523–2811–MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 46 p. https://www.fs.usda.gov/sites/default/files/FSORAG-Pocket-Guide.pdf

U.S. Department of Agriculture, Forest Service. 2015. Forest Service trail accessibility guidelines (FSTAG) pocket version. 1523–2812–MTDC. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 20 p. https://www.fs.usda.gov/sites/default/files/FSTAG-Pocket-Guide.pdf

U.S. Department of Agriculture, Forest Service. 2015. Forest Service handbook 1909.12—Land management planning handbook. Washington, DC: U.S. Department of Agriculture, Forest Service. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5409939.pdf

U.S. Department of Agriculture, Forest Service. 2018. Forest Service handbook 2309.13—Recreation site handbook, chapter 10—planning and design of developed recreation sites and facilities, amendment no. 2309.13–2018–1. Washington, DC: U.S. Department of Agriculture, Forest Service. https://winapps.umt.edu/winapps/media2/wilderness/toolboxes/documents/vum/wo_2309.13_10_Planning%20and%20Design%20of%20Developed%20Recreation%20Sites%20and%20Facilities.pdf

U.S. Department of Agriculture, Forest Service. 2022. 2021 National Visitor Use Monitoring Program survey results. https://www.fs.usda.gov/about-agency/nvum

U.S. Department of Agriculture, Natural Resources Conservation Service. Education and teaching materials: a soil profile. https://www.nrcs.usda.gov/resources/education-and-teaching-materials/a-soil-profile (Accessed April 2023)

U.S. Department of the Interior, National Park Service. 2023. Natural & Cultural Collections of South Florida website. Mission 66: birth of the modern national park. https://www.nps.gov/subjects/southfloridacollections/introduction-mission-66-exhibit.htm

U.S. Department of the Interior, National Park Service. 2023. Technical Preservation Services website. https://www.nps.gov/orgs/1739/index.htm

U.S. Department of Transportation, Federal Highway Administration. 2014. Standard specifications for construction of roads and bridges on Federal highway projects (FP-14). Washington, DC: U.S. Department of Transportation, Federal Highway Administration. 746 p. https://highways.dot.gov/sites/fhwa.dot.gov/files/docs/federal-lands/specs/12851/fp14.pdf

White House Council on Environmental Quality. 2011. Guidance for sustainable practices for designed landscapes. Executive Order 13693, October 31, 2011 (supplement, October 22, 2014). Washington, DC. 51 p. https://www.fedcenter.gov/Bookmarks/index.cfm?id=29189&pge_prg_id=0&pge_id=3605%20%20%3E

About NTDP

The U.S. Department of Agriculture, Forest Service, National Technology and Development Program, provides Forest Service employees and partners with practical, science-based solutions to resource management challenges. We evaluate, design, and develop new technologies, products, and systems to solve problems and deliver solutions.

Library Card

Brunswick, N.; Cressy, D.; Dole, J.; Dunn, J.; English, J.; Fiene, I.; Jenkins, S. 2023. Sustainable recreation site design guide. 2223–2803–NTDP. Missoula, MT: U.S. Department of Agriculture, Forest Service, National Technology and Development Program. 270 p.

The "Sustainable Recreation Site Design Guide" (SRSDG) is a technical guidebook that describes the best practices and processes for implementing sustainable recreation design into U.S. Department of Agriculture, Forest Service recreation projects at the site scale. The SRSDG helps field staff with planning and designs for new construction and for reconstruction of existing recreation facilities and sites, while also considering the three spheres of sustainability—social, environmental, and economic. It addresses the unique challenges associated with recreation design in national forests and grasslands, translating policy, abstract concepts, and best-available science to guide tangible, project-level actions. The SRSDG offers the tools, examples, and context necessary to guide Forest Service staff in their efforts to develop a sustainable recreation future.

Keywords: accessibility, construction, design plan, facilities, facility, project development, site type, sustainable design

Contact Information

Contact National Technology & Development Program (NTDP) for additional technical information:

USDA Forest Service

National Technology & Development Program

Phone: 406–329–3978 or 909–599–1267

Email: SM.FS.wo_mtdc_pubs@usda.gov

Find electronic copies of NTDP documents on the Internet at:

Search NTDP: <https://www.fs.usda.gov/t-d/products.php>

Forest Service and Bureau of Land Management employees can search NTDP documents, CDs, DVDs, and videos on their internal computer networks at:

Search NTDP: <https://fsweb.wo.fs.fed.us/ntdp/>


Forest Service
U.S. DEPARTMENT OF AGRICULTURE

2223–2803–NTDP | 2300–Recreation | April 2024