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PRESERVING HISTORIC TRAILS

CONFERENCE PROCEEDINGS
OCTOBER 17–19, 2000
ACADIA NATIONAL PARK, MAINE

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Friends of Acadia
Acadia National Park
Olmsted Center for Landscape Preservation

NATIONAL PARK SERVICE

FRIENDS OF ACADIA

Preserving Historic Trails

Conference Proceedings
October 17 - 19, 2000
Acadia National Park, Maine

Sponsored by
Friends of Acadia
Acadia National Park
Olmsted Center for Landscape Preservation
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Cover Photo: Jordan Pond Trail, Acadia National Park

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FOREWORD

The Greenstone Ridge, John Muir, Sargent Mountain, Jordan Pond trails... The personal experiences associated with these and other trails are enduring. They are magical names and places; and, taking care of them is our life's work. We take seriously our responsibilities for management of parks so that future generations may also enjoy and appreciate their magnificent resources. Perhaps those who work on trails have the best jobs; they live and work in this country's most magnificent places; and, they earn personal rewards for doing good work.

Acadia's trails are exceptional; they are historic and very accessible. Rehabilitating and protecting this complex trails system is challenging. Here, we are fortunate that the Friends of Acadia are dedicated to protecting both the park and character of nearby communities. "Acadia Trails Forever" makes future restoration and endowed maintenance of this park's trails possible. We have also benefited from the technical expertise provided by the Olmsted Center for Landscape Preservation. Through their work, we now have a good understanding of the history and significance of Acadia National Park trails. We thank Friends of Acadia for making this conference possible.

- Paul Haertel, Superintendent, Acadia National Park

Acadia National Park is a fitting place to host a conference on preserving historic trails given the incredible system of trails that exist in the park. During the past several years, the Olmsted Center for Landscape Preservation has worked closely with Acadia's staff in planning for the long-term preservation and management of the park's trail system. This collaboration has brought together extensive expertise on trail work and the principles and practices of cultural landscape preservation. As a result, an approach to researching, documenting, and managing these historic trails has been defined and can serve as a model for other historic trail systems. Already, the Acadia trails crew has assisted several other parks in the Northeast, such as Weir Farm National Historic Site, Minute Man National Historical Park, and Delaware Water Gap National Recreation Area.

The idea for a conference on historic trails grew from the questions raised during the planning process for Acadia's trail system. The conference brought together individuals from across the country and covered a broad range of topics from documentation to treatment planning. It provided an excellent opportunity to share information, discuss challenges and solutions, and make connections among individuals interested in historic trail preservation. Through this proceedings, information can be shared with a broader audience and, hopefully, will serve as a valuable reference.

- Robert Page, Director, Olmsted Center for Landscape Preservation

Acadia National Park has 130 miles of extant trails and 110 miles of unmarked or abandoned ones, a world-class network of footpaths nominated for the National Register of Historic Places. Acadia's trails are basic vectors of foot travel, of course, but they are historically significant too. Several styles of path building over many eras make up the system. Most beautiful, functional, and artistic are the "signature" trails, bearing the imprint of a particular builder's genius with rock, iron, soil, and timber, as distinct from another master's hallmark. Friends of Acadia is proud to have sponsored and participated in this conference. Trails experts gathered to contribute knowledge so the park might benefit. Likewise we hoped those professionals might take away ideas and techniques developed here by Acadia's quality team of builders and stewards.

The timing of the conference and proceedings was perfect. With a foundation of detailed trail research and documentation prepared by the NPS Olmsted Center for Landscape Preservation, the park and Friends of Acadia developed a partnership to rehabilitate the trails system to exacting cultural and natural resource standards and maintain it in perpetuity. Called "Acadia Trails Forever," the $13-million program makes Acadia the first national park to have a privately endowed trail system. We extend our gratitude to trail makers and keepers everywhere and commend to you the collective wisdom of these pages.

- W. Kent Olson, President, Friends of Acadia

PRESERVING HISTORIC TRAILS

Acadia National Park
Bar Harbor, Maine

INTRODUCTION

For three colorful fall days in October, trail enthusiasts and historic preservationists from across the country met at Acadia National Park on Mount Desert Island in Maine for a conference on historic hiking trails. The Friends of Acadia, Acadia National Park, and the NPS Olmsted Center for Landscape Preservation sponsored the conference to focus on appropriate rehabilitation and maintenance techniques for preserving the historic character and features of trails. Acadia, with over 100 miles of marked historic hiking trails and many more miles of unmarked trails, offered an ideal setting to discuss the challenges faced in managing trails trodden by millions of feet a year. The conference included five sessions:

(1) an overview of historic hiking trails in the United States and other countries,
(2) a close look at the major trails rehabilitation underway at Acadia,
(3) field sessions on Acadia National Park trails to discuss issues and see work in progress,
(4) case studies on historic trail preservation projects across the country, with an emphasis on documentation, implementation and management, and
(5) poster sessions and information sharing on topics such as new techniques for protecting historic resources, strategies for grants and fund sources, advocacy groups, and implementation of work.

The 100 attendees, a mix of seasoned trails crew supervisors, program managers, landscape architects, planners, and engineers, offered perspectives and strategies for working out solutions both on paper and in the field. After three days of lively discussions, what were some of the solutions for preserving historic trails? Good documentation, ample funding, and dedicated trails crews, supported by a strong volunteer program to provide the much needed labor. Information shared through the sessions demonstrated that a concerted effort is under way to preserve historic trails.

One of the greatest challenges is finding and funding a skilled trails crew. Many trails were built in the late 1800s by volunteers or during the 1930s by the Civilian Conservation Corps, when there was a surplus of labor. Maintaining an extensive network of trails requires creative and diligent fundraising and the organization of volunteer crews. Funds are needed to conduct research and develop guidelines, document the condition of trails, use technology such as GIS, and to support the trail crews and their necessary materials and equipment. Research and documentation typically costs more and takes longer that one would like. In the long run, however, this work builds a valuable constituency, justifys and scopes the physical work needed, and helps preserve the historical character of the trails.

Documentation is critical, both for preserving historic trails and for directing maintenance. The format and approach for documentation may vary depending on the size and type of trail system. The National Historic Trails System Program requires a "Comprehensive Management Plan" whereas a park may complete a "Cultural Landscape Report" with a treatment plan. Regardless of the format, the process needs to be interdisciplinary and comprehensive in data gathering and analysis. Analysis of historical significance is aided by the criteria developed by the National Register of Historic Places and multiple property nominations such as "Historic Park Landscapes in National and State Parks." A thoughtful study of the history and significance of a trail system places it within the broader trends and developments in our country's history and prehistory.

Many decisions are made in the field. No report or guideline can ultimately dictate the placement of stone after stone or the construction of each drainage feature. Skilled trail work, with a respect for the preservation

of historic features and construction methods, grows from within each crew member. This respect begins with the training of volunteers and new trails crew members, thereby justifying the need for such programs. It grows through the sharing of information between crew members, an understanding of the history of trail construction, and the pride of a project successfully completed. New methods for preserving historic trails may be gathered through publications such as this, through training programs, or through cooperative projects between different organizations and different locales. Examining well constructed and well maintained trails and working with those responsible for their care is essential. It is hoped that future conferences and field projects can foster these opportunities.

Heavy use of trails, limited time, staff, and funds for maintenance lead trail crews to find efficient and economical methods and materials to accomplish their work. When preserving historic trails, these methods and materials should not damage or destroy historic features. This consideration may lead to modifications that are slightly less efficient and economical. A respect for the resource and the desire to leave it unimpaired for future generations should be the ultimate goal. To accomplish this goal, one may need to find the support of energetic advocacy groups to raise additional funds, recruit labor, and coordinate labor-intensive routine maintenance projects.

Since their original construction, many historic trails now face new regulations and guidelines. Compliance with the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) may counter natural against cultural resource protection advocates. The Clean Water Act, shoreline zoning, or the protection of threatened or endangered species may bring into question whether a historic trail should be closed seasonally or rerouted. Similarly, the protection of archeological or ceremonial sites may prompt the need to consider alternative routes. Some sections of historic trails may be preserved but no longer actively used. Carefully working through the NEPA and NHPA compliance processes will likely resolve most issues in a manner that is acceptable to all interests.

New guidelines for hiking trail access for those with disabilities are in progress. Although most hiking trails traverse hills, some travel on flatter terrain, such as along rivers, streams, shorelines, abandoned rail lines, or former tow-paths. In addition, the first section of a trail may be easy to travel along to a designated turn-around point. These routes may be made accessible according to the Americans with Disabilities Act Accessibility Guidelines (ADAAG) developed in 1999 by the Regulatory Committee on Accessibility Guidelines for Outdoor Developed Areas. The standards are to be applied to all newly constructed trails, as well as trails undergoing major rehabilitation work. These guidelines allow for grades up to 14% for short sections, and no more that 30% of the slope to exceed 8.33%. These standards for recreational trails allow for greater variability in tread, thus allowing more trails to be considered. The standards also include exemptions if making a trail accessible will cause substantial harm to cultural, historic, or significant natural features, or are not feasible due to terrain or prevailing construction practices. In addition, many trail systems offer information about accessible trails in brochures and at web sites.

These proceedings of twenty presentations were compiled as part of an Albright Wirth Grant for gathering information on preserving historic hiking trails. The conference allowed for comparisons between rehabilitation guidelines developed for Acadia National Park with those developed for other trail systems. Many thanks to the trail professionals whose expertise and enthusiasm contributed tremendously to this endeavor. In addition to the authors, Courtney LaRuffa, Eliot Foulds, David Uschold and Marla Major aided with the compilation of this document. Building upon the information in these proceedings, a "Landscape Line" on preserving historic trails will be printed in 2002. For further information we encourage you contact the sponsoring organizations, the Friends of Acadia, Acadia National Park, and the Olmsted Center for Landscape Preservation.

Margie Coffin Brown
Olmsted Center for Landscape Preservation

NATIONAL PERSPECTIVES:
HISTORIC FOOT TRAILS ACROSS THE COUNTRY

The four essays in this section deal with the history of trail construction in the United States, Nepal, and South America. Landscape architect and National Park Service trail builder Stephen Griswold describes the methods of ancient trail makers in Peru, whose work survives in excellent condition today, 500 to 600 years after construction. Griswold's study of Nepal's high trails is equally informative. He brings lessons home to our national parks, principally: "Quality construction and DRAINAGE, DRAINAGE, DRAINAGE!"

Historian, author and landscape architect Ethan Carr, with the Park Service's Washington Support Office, recounts the history of recreational hiking trails. It's a great story. The concept of footpaths for pleasure had multiple origins, involving great American artists, local volunteer forces, and the creation of public land systems.

Steven Elkinton, also a landscape architect, is program leader of the National Trails System. He describes the evolving complex of national trails. It now includes fourteen great legacy routes, from the Oregon Trail to the Selma to Montgomery Trail. "All of the National Historic Trails are in a state of 'becoming' — none are near completion," Elkinton says, and therein lies a tremendous if uncharted national opportunity.

Bob Proudman, author, master trail builder, and head of trail management for the Appalachian Trail Club, writes of how the Appalachian Trail came about. The AT is the oldest of the national trails, and numerous construction and management questions were first asked and answered there, a process that continues today.

W. Kent Olson, President
Friends of Acadia

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1. Trailwork Solutions in United States National Parks, Peru, and Nepal



Figure 1-1: Rockwork on the Inca trail.

Stephen Griswold
Landscape Architect and Trails Supervisor
Olympic National Park

Impacts to historic trails and trail landscapes worldwide increase as tourism and lack of maintenance combine to jeopardize these most-sensitive cultural and natural resources. Historic trailwork has deteriorated and landscapes that once could sustainably withstand the impacts of use have now become multiply rutted, eroded, braided, and de-vegetated. Land management agencies struggle with appropriate solutions to these impacts.

In protected areas in Perú and Nepal, visitor use problems exist similar to those in the United States. The ancient Incas of Perú constructed magnificent hardened trail surfaces (Cordillera Vilcabamba, Perú), and in Nepal, the local villagers have constructed impressive sections of stone steps on ancient trade routes (Anapurna, Nepal). These solutions have withstood centuries of use with only routine maintenance and minor reconstruction required.

This presentation will describe sustainable maintenance practices observed in other countries, including observations relating to stonework, drainage, steps, walls, and associated features. This work will then be compared with recent trail rehabilitation projects in our National Parks. Methods used for revegetation, reusing tread material, moving rocks, working in fragile alpine areas, and preserving both cultural and natural resources will be described.

Sustainable Trails, The Inca Trail in Perú

In the fall of 1999, I had the privilege of participating in a fact-finding trip to the Cordillera Vilcabamba of Perú to investigate the rockwork of the Incas (Figure 1-1). The Incas constructed a network of rock highways throughout the central Andes that connected the empire to the high-elevation capitals of Quito,

Ecuador and Cusco, Perú (McIntyre, 1975). Many of these routes are still in use, and on the famous Inca trail to Machu Picchu the number of hikers is certainly far greater today than could have been anticipated by the Inca engineers 600 years ago. The Perúvian Park Service, the Instituto Nacional de Cultura (INC), actively maintains this trail and estimates that more than 800 persons will pass from the trail to its terminus at Machu Picchu daily during the peak hiking/tourist season. The Inca trail includes more than 40 kilometers (25 miles) of continuous rock riprap that has survived with little more than routine maintenance for well over 500 years. (Trail riprap is discussed in Griswold, 1996)

The Incas are well recognized as masters of drystone masonry (Protzen, 1997). Their temples at places like Machu Picchu, Sacsayhuaman, and Ollantaytambo are world-renowned (Frost, 1999), and their high elevation trails are also masterfully constructed (Figures 1-2, 1-3). The Inca trail crosses three high elevation passes and provides a sustainable corridor that endures the impacts of use, protects alpine vegetation, and takes hikers where they want to go. The Incas incorporated many trail rockwork structural techniques into their trail, including riprap tread, walls, and drainage structures. Most noteworthy is the extreme attention paid by Inca engineers to drainage. Every section of Inca trail rockwork is protected by a thorough drainage system. Nearly the entire uphill edge of the riprap trail tread is lined by a trail edge-wall that provides a drainage to move water down the inside of the trail and then across or through the trail at one of a number of cross-trail drainage structures. The Incas teach us that a sustainable trail consists of not only quality high-standard work, but also must be protected by a thorough drainage system.

Local guides explained the history, theories, and construction practices. The two basic types of Inca wall work are a tiered style where the rocks are laid in rows similar to bricks, and the polygonal style, thought to be stronger, where the rocks are tightly laid by shape. INC has been actively reconstructing sections of the Inca trail and some of the ruins along this route. As funding permits, the ancient trails are repaired and maintained by the INC in keeping with the original design style. The crews spend weeks on short sections to replicate the high quality work (Figures 1-4, 1-5).



Figure 1-2: Stonework at Tarahuasi.



Figure 1-3: Riprap trailhead on the Inca trail.



Figure 1-4: A wall reconstructed by the INC.

Trailwork Observations in Perú

The most impressive and thoroughly Inca-constructed trail that we observed was on the Inca trail from below the first pass all the way to Machu Picchu – a distance of nearly 40 kilometers (25 miles). This section of trail is certainly worthy of its world-class reputation. It is nearly solid laid rock for the entire distance, negotiating many kinds of difficult terrain and drainage challenges. Our observations regarding Inca trailwork and rock techniques follow.

Drystone Masters: The Incas were masters of high quality drywall/drystone masonry. The quality of their work varied greatly from the most fundamental stone and earth construction on agricultural terraces, to the highest quality in the most sacred temples. The attention to detail and basic drystone principles of footing, contact, size, and shape produced a trail system for the ages – a sustainable trail surface that is an example for all masons who follow drystone techniques. The Incas took construction of their rock "highways" as seriously as modern highway engineers take construction of the Interstate Highway system. The following drystone techniques equal a time-proven sustainable trail.

Riprap: Most of the trail is similar to what we in the United States would refer to as high-quality riprap - a solid laid rock tread that is locked in place by the careful placement of each rock against its neighboring rocks (See Figures 1-1, 1-3). This kind of tread is extremely erosion and impact resistant. It is impermeable to the effects of water as long as the drainage needs of each trail section are provided for. Most noteworthy was the consistent construction of inside walls to form an elevated edge on the uphill side of the riprap trail tread. This facilitates the drainage and protection of these trail sections. In our experience in the United States we would not have laid the rock with as consistent an inside edge, rather we would have tied it more directly into the landscape. This difference reflects the Incas extreme attention to drainage and the potential effects of water movement, and to some extent the local environmental differences in rainfall.

Drainage: In all of their rockwork - walls, buildings, agricultural terraces, and trails - the Incas were extremely conscious of drainage and the movement of water through and off their projects. The most highly constructed Inca trailwork is protected by very



Figure 1-5: An INC crew at work near Intipunku.



Figure 1-6: Inside drain along right side and cross drain.

efficient drainage systems incorporated within the trail. The most effective drainage for any trail system imitates the natural drainage patterns of the landscape. Drainage structures facilitate the flow of water with a system of inside drainage channels and out-sloping drains across the tread (Figure 1-6). The riprap tread surface itself is a nearly impermeable drainage structure, resisting the eroding effects of the moving water, and the inside drainage system allows water to move parallel to the trail edge until encountering a cross-trail drain which facilitates the water to move across and off the trail on the downslope side.

The drainage features so dominate the Inca trail rockwork that we found ourselves wishing that we could visit the trail during the wet season in order to see the drainage structures functioning under the most demanding of conditions. I'm sure that our respect for the Inca engineers would be even greater as we would observe the extensive sections of rockwork protected from the monsoonal flow of water by the well thought-out drainage system (Figures 1-7, 1-8).

Steps: On the more steep sections of trail, the Incas built rock steps by laying the rock on shaped bedrock, or carving the steps directly into the bedrock, or a combination of the two techniques (Figure 1-9, 1-10). The rocks were locked in place over the bedrock without the aid of steel pins or any other external assistance. It is purely drystone masonry of the highest quality (Figures 1-11, 1-12).

Walls: High quality multi-tier retaining walls were necessarily used to support both the outer edge of the trail and to protect the backslope. The outside walls were engineered to support the loads traveling on the trail - herds of livestock and llamas, and the lines of porters carrying goods from one village to another. The walls have withstood these loads as well as the penetrating effects of water and infrequent freeze-thaw in the higher elevations. The walls are carefully laid with particular attention to footing and a consistent batter, and basic drystone principles.

Overlooks: One of the most pleasant features of the Inca trail is the frequent stone overlooks that are placed along the trail at locations to allow for passing, resting, and perhaps to take advantage of the tremendous views. These overlooks are paved stone, or riprap, with drainage structures (Figures 1-13).



Figure 1-7: Cross-trail drainage on the Inca trail.



Figure 1-8: A rock keeping the drain open.



Figure 1-9: The 'Thousand Steps.'



Figure 1-10: Steps carved into the bedrock.

Natural Features: Rather than regard natural features as obstacles, the Incas took advantage of natural rock outcrops both large and small to anchor the footings of their trail segments. Bedrock was meticulously carved to contact closely the rocks that were laid above it, or smaller rock outcrops were used to anchor sections of trail or a drainage feature. In our trailwork here in the United States, we may be tempted to drill and blast such obstacles. The Inca work provides an excellent example of working with natural features that improves the quality of each section and makes each segment unique.

Shaping Rock: Most rock was a type of andesite that was shaped by hand using a mixture of salt and water with harder rocks, such as basalt or meteorite, to grind or hone the rock to a usable shape.

Exact Shapes: It is speculated that exact shapes and near-perfect contact in large wall rocks was attained by creating adobe forms and then shaping the gigantic stones using the template of dried mud prior to final placement. Calipers were used to measure precisely the irregular joint lines that were required to be hewn for the finest standard of work.

Overuse: Present-day overuse of the Inca trail by stock and large numbers of people, combined with minimal maintenance, is creating problems for the trail that was originally meant for messengers and dignitaries, not large tour groups. It is perhaps time for INC management to look closely at reducing the numbers of persons on the trail and in the campsites. Reducing the number of porters may improve the overall experience for everyone. It may be true that a little less luxury for a few will improve the experience for all.

Human Waste: Improved management of human waste as well trash in general is in great need at this time to handle the large numbers of visitors that come to the Inca trail. An introduction to the seven principles of Leave-No-Trace (LNT) would be a very valuable introduction for all users of the trail.

Comparisons with NPS Trails

What did we learn in Perú? We spent several weeks studying and observing the highest quality trailwork and drystone rockwork that we had ever seen and drew several conclusions relating to the work that we

do in the National Park Service. The trailwork that we observed is encouragingly similar to the highest drystone rockwork standards that have been used throughout the National Park Service by historic masons with the Civilian Conservation Corps (CCC) and others and that is emulated by the best trail crews of today in parks such as Big Bend, Rocky Mountain, Yosemite, Kings Canyon, Sequoia, et al.

Sustainable trailwork equals high quality work. Longevity of trail construction is dependent on the engineering and skills with which the trail is constructed and the rock is laid. In the long run, it will be more cost-effective and more protective of park natural resources to construct the highest quality trails possible. Drystone techniques will work to protect park resources and require minimum reconstruction and maintenance, allowing crews to move on to other priority trailwork.

Cyclic maintenance and reconstruction is essential to protect the NPS investment of such labor-intensive work. Routine maintenance of all trails is essential to sustainability.

Funding for NPS trail crews is an essential part of the NPS budget to upgrade and maintain trail standards. The United States National Park Service today sets the standard worldwide for quality hiking and stock trails.

Training and experience of trailworkers is essential to establish and maintain high quality trail programs service-wide. The historic skill of drystone masonry is as important a resource as the product itself and the resource it is protecting. Training courses such as the ones recently taught at Big Bend and Colorado National Monument are very important to communicating the skills of construction and reconstruction of high-quality and historic trailwork to succeeding generations of NPS trailworkers.

The trail crews of the National Park Service are very unique in the entire world. The NPS can be proud of their oral tradition of high quality trailwork and proud of the people who practice the skills involved with trail construction and maintenance. The trail masons of the National Park Service are stewards of a valuable, historic, and



Figure 1-11: Steps on the Inca trail.



Figure 1-12: Steps laid on bedrock.



Figure 1-13: An overlook on the Inca trail.

dying craft that is important for future generations of Americans.

Finally, what is the ultimate key to sustainable trailwork? Quality construction and DRAINAGE, DRAINAGE, DRAINAGE!

Hardened Trail Surfaces in Khumbu and Anapurna, Nepal

In protected areas in Nepal, similar problems of impact exist in high elevation areas. In the Anapurna and Khumbu regions of Nepal, the local villagers have constructed lengthy sections of stone steps to harden the trailtread on ancient trade routes and to protect the landscape from the effects of erosion (Figure 1-14). The ancient trade routes wind their way up and down steep mountain ranges and have been in use for many hundreds, even thousands of years. The routes are still relied upon for trade and are essential to maintaining the lives of the local peoples in the heavily populated foothill regions. With the addition of tourist traffic on popular trekking routes, and the added requirements of supplying the tourist trade, these ancient trails have had to withstand impacts unforeseen in their long histories of use. In very remote areas, erosion and severe impacts may be found, but in many local areas, villagers have protected the trail alignment by hardening the trail tread using rock steps. I observed constructed trails in both the Khumbu and Anapurna regions, and in the Anapurna foothills, the most heavily populated of the two regions, lengthy sections of rock steps have been constructed utilizing rock slabs. These slabs are laid to form gently sloping steps that shed water off the trail onto the downslope side, filling formerly eroding ruts with a sustainable trail surface (Figures 1-15, 1-16).

Rehabilitation Projects in National Parks

In United States National Parks where I have worked, professional trail crews strive to maintain, restore, and rehabilitate historic trails and landscapes while maintaining a connection to the historic work of the Civilian Conservation Corps and others. The objective of this trailwork is to construct long-lasting sustainable solutions to the modern problems of use appropriate to both the cultural and natural context of the trail. Recently I have participated in two National



Figure 1-14: Nepal trade route in Khumbu region.



Figure 1-15: Sloped steps that shed water in Anapurna foothills.



Figure 1-16: Sloped steps with retaining walls in Anapurna foothills.

Register trail reconstruction workshops in Big Bend National Park, TX (the Hot Springs Road) and Colorado National Monument, CO (the Serpent's Trail). These documented examples of historic trail reconstruction taught traditional skills to the trail maintenance, historic preservation, and resource management personnel.

Trailwork solutions to the major impacts associated with trails in high elevation meadow and riparian landscapes have incorporated high-quality CCC-like rockwork standards to solve these common problems of everyday use. Different approaches to solve similar problems were used in Kings Canyon National Park, Yosemite National Park, and Rocky Mountain National Park. In Kings Canyon, the trail alignment in Evolution Basin was rerouted and relocated; in Yosemite, the trail in Rafferty Meadow was reconstructed on old alignments with a hardened trail surface and improved drainage; and in Rocky a combination of the two was undertaken on the Continental Divide at Bighorn Flats.

Big Bend Wall Rehabilitation

On the Hot Springs Road in Big Bend National Park, a long retaining wall originally built by early homesteaders and perhaps the Civilian Conservation Corps was in poor condition due to poor maintenance. The roads crews were bringing in tread material, which first blew out the coping and then damaged the wall. The park developed a rehabilitation plan then mobilized a large work crew to implement the work. Richard Tufnell who heads the Dry Stone Conservancy, based in Scotland and Lexington, Kentucky, led the project. The project team also included an archeologist, who photographed the wall prior to rehabilitation. Most of the wall was dismantled since the key to a strong wall is a good foundation. To rebuild the wall in the historic style, the stonework had to appear rough but also be stable. The result was a face wall where the emphasis was not on tiers or horizontal layering but on varied orientation, whereas the back fill was not rubble but semi-laid stone (Figures 1-17, 1-18). By tightly laying the stone back fill, the wall is much more durable. The wall was again topped with very large coping stones. The load component was transferred down through the semi-laid stones (Figure 1-19).



Figure 1-17: Stones laid in varied orientations at Big Bend.



Figure 1-18: Nearly complete rebuilt wall at Big Bend.



Figure 1-19: Wall at Big Bend with a top layer of large coping stones.



Figure 1-20: Building rock causeway in Rafferty Meadow.



Figure 1-21: Causeway under construction with terraced stone steps in Rafferty Meadow.

Yosemite Alpine Causeway

At Yosemite, riprap stone work that dates to the late 1800s is similar to that found on the Inca Trail in Peru. Similarly CCC stonework done in the 1930s on the Mist Trail is of high quality. In alpine meadows where there was no stonework, such as Rafferty Meadow, hikers had created multiple paths. This braiding was both unattractive and damaging to the resource. After a reroute attempt in the 1970s to circumnavigate the meadow failed because it was not a desirable route, the entire alignment was reconstructed as a rock causeway during three short early-fall seasons in 1983 through 1985. The multi-year project was the culmination of the trailwork season for Yosemite's trail crews, including two 18-person California Conservation Crews. The total number of persons involved with the project each season was approximately 60, including several full-time packers moving supplies in and trash out of the backcountry camp. The project involved establishing a preferred alignment, usually the original one through the meadow. The crew built stone lined causeways, 4 to 5 feet wide, filled with gravel, crushed rock and rock surface (Figures 1-20, 1-21). The materials were compatible yet distinguishable from the surrounding materials. The adjacent aban-

doned ruts were thoroughly revegetated. Fundamental to the success of the project was the re-establishment of an effective natural drainage system to facilitate water movement across the trail alignment. Overall, over 2500 feet of rock causeway was constructed, providing both hikers and stock a high and dry trailtread.

Rock quarries were established and large stones were moved to the project site using stoneboats and teams of pulling mules. Impact to the meadow was minimized by performing the work in the dry early fall of the High Sierra. Tread material was obtained from nearby natural drainages and streambeds and transported to the project sites using strings of mules equipped with hinged dirtboxes. Additional materials were transported by helicopter (Figure 1-22). (Techniques to construct rock causeways are described in Birkby, 1996; and Griswold, 1998).

When I most recently visited the project several years ago, the revegetation efforts have been very successful, and only a few problem areas on the lengthy causeways were observed where stock and hikers have stepped off-trail to avoid close passing. This was a very costly, yet successful project. The budget was approximately $100,000 annually for the three years.



Figure 1-22: Finished causeway with crowned tread material over rock work at Rafferty Meadow in Yosemite National Park.

Rocky Mountain Rehabilitation and Reroute

In Rocky Mountain National Park, both rehabilitation approaches - rehabilitation on the original alignment and rerouting of the trail – are being used beginning in 1998 for a portion of the Continental Divide National Scenic Trail on Bighorn Flats above timberline. The recently designated Continental Divide National Scenic Trail in Rocky Mountain National Park climbs from the deep-forested canyons of the west side of the Continental Divide and crosses between drainages on the high-elevation tundra of Bighorn Flats and Flattop Mountain. The trail, little more than a route, evolved from use with no attention being paid to a proper sustainable alignment or constructed drainage. As use increased, the trail eroded and in many sections the trail was little more than a boggy rut for most of the hiking season. Multiple ruts soon began to evolve. Using both the approaches employed in the California parks, the Rocky Mountain National Park trail crews have both constructed an improved trail and tread on the existing alignment, and rerouted the most problematic wet sections to higher ground within approximately 100 feet of the present route.

A packable steel tripod system was used to transport rocks without damaging the fragile tundra (Figure 1-23). Tread material was quarried whenever possible from the existing trail, and also flown to the site using a high-elevation heavy-lift helicopter in the fall of 1998 (Figure 1-24). Project budget was $60,000 for the crew in 1998 and $100,000 for the helicopter time.

This project is scheduled to conclude in the 2000 trail season. In 1999, a small crew continued with the final phases of the reroute for several weeks in early September, and in 2000 a crew will do the same. The elevated sections of trail have been very successful at providing hikers with a desirable surface upon which to walk, eliminating impacts from the wet, sensitive tundra adjacent. Cost for the crew in 1999 and 2000 is approximately $12,000 per season.

Crews in Rocky Mountain National Park have also reconstructed high elevation portions of the extremely popular Longs Peak trail (up to 1500 persons per day) and the lightly used Stormy Peaks trail by restoring and reconstructing the trails on their original alignments.



Figure 1-23: Tripod system for moving rock on the Continental Divide Trail National Scenic Trail section in Rocky Mountain National Park.



Figure 1-24: Crew spreading tread material on finished section of Continental Divide National Scenic Trail.

The Challenge

The challenge of either rehabilitation approach is to provide a trail surface that can withstand the affects of seasonal water movement, the impacts of recreational hiking and stock use, as well as be the route of choice for hikers and stock. An appropriately constructed trail will consolidate the recreational use within a corridor that can sustain it. The trail will protect the surrounding or nearby vegetation from the potential impacts of that use, if it is an alignment that effectively takes users where they want to go.

As I participated and observed these projects over the last 15 years, I have learned many things. Several of the most significant are discussed below: the importance of aggressive revegetation, a method to obtain trail tread material where it is scarce, and a simple structure to facilitate the easy movement of large rocks.

Revegetation: Aggressive revegetation is an essential part of any high-elevation trail reconstruction project. The process of revegetation attempts to naturalize and restore the landscape to its pre-impact condition and stabilize the area from further deterioration. Less-successful projects in the past have failed in part because of faulty assumptions regarding the capacity of the landscape to restore itself. Abandoned, eroded ruts do not refill themselves, and slow-growing naturally-restoring vegetation alone will not check continued erosion of the old alignment. Soil must be restored to the ruts, and this soil must be secured in place by frequent log or rock checks in order to prevent further erosion. Each section must be consciously protected by a drainage solution, guiding moving water through and across the segment (Griswold, 1998).

Reusing Tread Material: In locations such as Kings Canyon and Rocky Mountain National Parks where soil for trail tread is very difficult to obtain, crews have successfully quarried soil from the existing rutted trail alignment. Soil is stockpiled adjacent to the trail on tarps or plastic (to protect the underlying vegetation) by first digging up and removing as much soil as possible from the damaged trail, essentially making the trail rut deeper. Reconstruction of the trail then follows by laying rock steps, drainage structures etc. over a bed of crushed rock and backfilling the old rut with crushed rock to within approximately 4 to 6

inches of the final tread elevation. The stockpiled soil is then placed on the reconstructed trail bed and crowned or outsloped to facilitate proper drainage. The final step is to compact the soil as much as possible. This soil quarrying method eliminates the impact of borrow pits to the surrounding landscape. The crushed rock fill below the trailtread also facilitates the movement of water through and off the project.

Moving Rocks: In Rocky Mountain National Park, a packable steel tripod system was used to transport rocks to the project site without damaging the fragile tundra. This system was first introduced to the crew by Lester Kenway of Baxter State Park in Maine. The easy-to-construct and easy-to-use system facilitates the movement of large rocks and large quantities of rock quickly across the frequently wet tundra, protecting the vegetation from the impacts of construction, and saving the workers some of the backbreaking labor of rolling and lifting rocks. The tripod consists of 10-foot long adjustable legs made of square steel tubing, and linked together at the top with an all-thread rod. The legs may be cut into several sections and joined together at thc project site to facilitate packing on livestock. Two tripods are used and two large snatch blocks are hung from each of the two all-thread rods. The tripods are separated the necessary distance to move rock from the quarry site to the project and a grip-hoist cable is hung from the two snatch blocks. The separation of the tripods is limited by the length of the cable - a two hundred foot cable is recommended. Rocks are contained in either a chain-basket or large slings made of webbing. The baskets and webbing should be adequately rated to hold the weight of the rocks to be transported. Once the rocks are safely placed in the basket, the basket is hooked to a pulley or snatch block attached to the main overhead line and raised off the ground by taking up the slack in the main cable. This is accomplished by pulling the cable through the grip-hoist, a very strong come-along like device. The basket containing the rocks is then easily pulled or pushed, depending on grade, to the second tripod, nearer the project site. The cable is lowered and the rocks are unloaded. If the source site is far away, additional set-ups may be required. The entire system is easily and rapidly relocated (See Figure 1-20, Kenway, 1997 and Demrow, 1998, illustrated on the cover).

Conclusions

In the United States National Park solutions, both improving the trail on the existing alignment and rerouting the trail to less sensitive habitats have been successfully implemented. As in Perú and Nepal, high quality trailwork is essential to success, particularly after damage has already occurred to the alignment as use and erosive impacts increase. The ancient engineers of Perú and Nepal demonstrated hundreds of years ago that a sustainable trail, one that protects the landscape and vegetation, consists of appropriate high quality trail construction, including a hardened trail tread if required, and meticulous attention to drainage.

All of these trailwork solutions protect historic trails and landscapes by utilizing high-quality craftsmanship to reconstruct historic work and protect natural resources from the erosive effects of moving water and high use. The trailwork carries on the tradition of high-quality dry stone masonry practiced not only by the Civilian Conservation Corps and other figures in the United States, but also the fine craftsmanship of the ancient Incas and more contemporary Nepalese.

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2. Historic Recreational Hiking Trails in the Catskills and Elsewhere

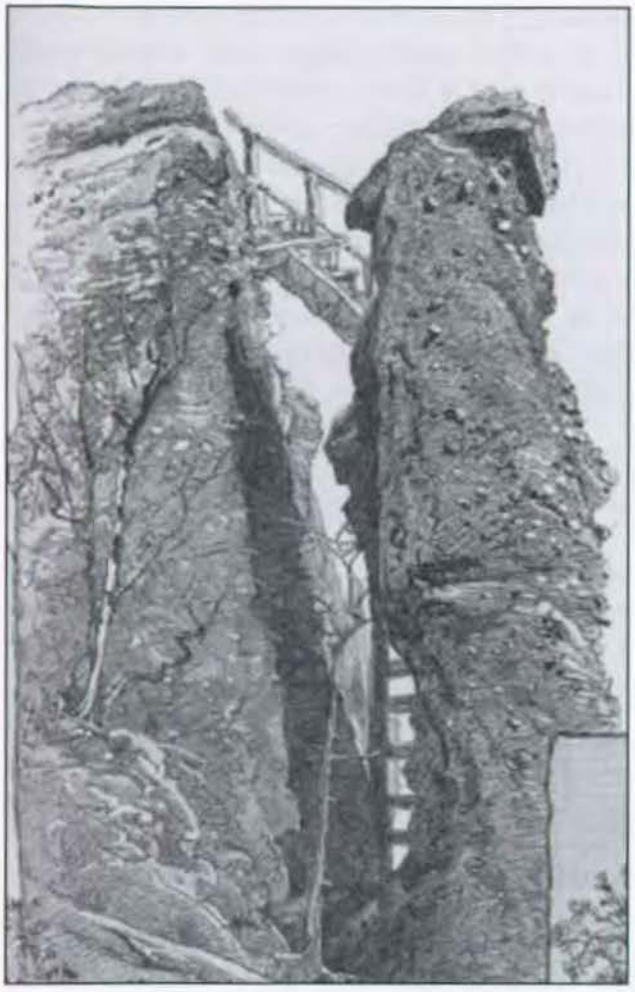


Figure 2-1: Etching of rock formation and climbing ladder from Van Loan's Catskill Mountain Guide *(New York, 1897).*

Ethan Carr
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In their history of hiking trails in the Northeast, Laura and Guy Waterman identify the Crawford Path up Mount Washington, cut in 1819, as the oldest recreational hiking trail in the country still in use. By that time there was enough tourism to the White Mountains for Abel and Ethan Crawford to make a living operating inns, and they cut the trail in order to guide guests to the summit. The Crawford Path was a "hiking trail" in the sense that it was impassable to horses; walking was required. But by the 1850s, the path, and several other trails up the mountain, had been improved into saddle trails, primarily because most tourists at the time preferred ascending on horseback if possible. By 1861 a substantial carriage road reached the top of Mount Washington, and in 1869 a cog railway was built. In 1911 the carriage road was opened to automobiles and it began its transition into today's highway.[1]

The Crawford Path, in other words, remains today as a hiking trail, largely by chance. The history of early trails in northeastern resort areas is very much part of early transportation history. Trails were often simply the earliest means of getting places, and usually they were modernized over the years and became roads or were bypassed and abandoned. Where they have survived long enough to be taken over by people interested in walking for the pleasure of walking, they have become what we now regard as historic hiking trails.

The Catskills and Early Outdoor Recreation

The Catskills received even more early attention from tourists than the White Mountains, and a unique set of trails dating to the early 1820s has survived in the vicinity of the Catskill Mountain House, built in 1823 (Figure 2-1). The Mountain House was one of the

earliest centers of tourism in the United States, and set an influential precedent for future resorts in mountain areas.[2] The location of the Catskills on the western edge of the Hudson River Valley made the area immediately accessible to the largest metropolitan area in the country, New York, to the south. The trip up the Hudson from New York, past the Palisades and through the Hudson Highlands, was itself famous for its dramatic panoramas. The passage was lively and convenient, as well, considering that the river was the nation's principal commercial and transportation artery of the day. During the first half of the 19th century, commercial and industrial activity along the Hudson was intense, and whole new cities and industries were being created. It was no accident that Robert Fulton launched the first practical steamboat on the Hudson in 1808, and that regularly scheduled steam launches plied the river by the 1820s. Such transportation made the Hudson River Valley and the Catskills uniquely accessible (Figure 2-2). No where else in the country was such a scenic area juxtaposed so conveniently with such large urban populations.[3]

A cultural phenomenon was taking place, as well, along with the economic growth along the Hudson. As commerce and industry flourished, so did a new school of art characterized by an increasingly intense appreciation of the scenic qualities of landscapes. What became known as the Hudson River school of painting was not named just for the scenery depicted (after all, other scenic areas were depicted, by "Hudson River" painters); it was named for the entire phenomenon that produced a new way of seeing the natural world in the United States. And although there were other scenic mountain areas (the White Mountains, for example) that drew tourists out of urban areas, the phenomenon of "seeing nature with the painter's eye" was associated above all with the Hudson, and with the northeast portion of the Catskills just west of the river.[4]

This was the area of the Catskills, after all, that Thomas Cole began painting in 1825. Landscape imagery, such as Cole's depiction of Kaaterskill Clove, became a popular sensation in the art galleries in New



Figure 2-2: Detail showing Catskill Mountain House landscape and trails from Van Loan's Catskill Mountain Guide *(New York, 1897).*



Figure 2-3: View of Kaaterskill Clove from Mountain House trails, today. (Photo by author)

York. The phenomenon was not limited to Cole (and soon other landscape painters), but included contemporary literature and poetry. William Cullen Bryant, James Fenimore Cooper, and many other cultural figures of the day walked the Mountain House trails and made Catskill scenery the subject of their art and literature. Landscape design of the period was also inspired by the new appreciation of landscape scenery. Andrew Jackson Downing, an early and influential figure in American landscape gardening, was a native of the Hudson River town of Newburgh. Many of the leading artists of the day had connections to Hudson River landscapes, to the communities along the river, and to the Catskills. Their work amounted to a new way of conceiving of society's place in what was now being perceived as, and called, the landscape.

At the center of this entire movement was a relatively small bit of terrain—a landscape of a few thousand acres—around a remarkable hotel, the Catskill Mountain House, a hugely popular, first-class hotel perched right on the edge of the Catskill Escarpment, about 2500 feet directly above the Hudson River Valley. By the early 1820s, the Pine Orchard, the Escarpment, the Clove, North and South Lakes, Kaaterskill Falls, and many other features of the area had together become a prototypical landscape of mountain tourism in the United States.[5]

Of course there were other scenes of early tourism, from Niagara to the Natural Bridge in Virginia and, by the 1860s, Yosemite Valley. But the diminutive landscape around the Mountain House shaped an entire idea of outdoor recreation beginning in the 1820s. From the beginning, the mountain house was surrounded by a network of trails that led, and still lead, to all the scenic view points and attractions of the area. Many of these attractions still exist. The Mountain House trails still offer almost the same access and views of the Clove, North and South Mountains, North and South Lakes, and the many points along the Escarpment which offer panoramic views of the Hudson Valley. Many of the geological features and viewpoints along the trail system were given names: Artist's Point, Sunset Rock, the Lemon Squeezer, Druid Rocks, and many others. This was an entire typology of the features of the scenic, mountain landscape, as it should be experienced by the tourist in search of picturesque and sublime effects.[6]

The Catskill Mountain House itself was burned in 1963, but the system of trails around the site remains. Although many of the trails and other features of the landscape are now overgrown, the area remains a cultural landscape of great significance and integrity, awaiting more documentation and (hopefully) appropriate management. The recreational trails around the Mountain House are among the oldest of their type in the country. They are also certainly among the most significant, if we consider that Thomas Cole walked these trails and painted from their viewpoints, and William Cullen Bryant walked them and wrote poetry inspired by his experience (Figure 2-3).

The Park Movement and Tourist Trails

By 1848, when Cole died, an American passion for landscape painting, romantic poetry, and picturesque tourism had created popular support for establishing parks and preserving scenic landscapes in many parts of the country. In the 1840s, for example, Bryant and Downing were the most effective advocates for the creation of Central Park. The establishment of the park was, in a way, ultimately inspired by the experience these advocates were able to have as tourists, especially in the Catskills, and their desire to create the opportunity for similar experiences of landscape beauty nearer the city.

After the Civil War, municipal and state parks were established from Baltimore to San Francisco, and in 1872 Congress created the first national park on the Yellowstone Plateau. One of the most significant group of hiking trails to be found in the national park

system today is in Yosemite Valley, which was established as a state park in 1864. The valley became part of Yosemite National Park (created in 1890) in 1906.[7] The oldest trails in Yosemite are some of the oldest in the national park system, since they date to the period of early tourism to the valley, in some cases as early as 1858. By the 1860s, visitors arrived on horseback and used a system of saddle trails to get around the valley floor. These trails were cut by early entrepreneurs, who homesteaded parts of the valley with an eye to making money off of tourists. In 1874, two horse trails into the valley were improved into wagon roads, which vastly changed the nature of tourism to the valley. A whole new category of hotels could be built, for example, and supplies and materials could be brought in more effectively to serve larger numbers of tourists. The trails on the valley floor were generally improved into wagon roads as well; but some saddle and walking trails remained unimproved, mostly for practical reasons since these trails climbed up the steep valley walls to attractions such as Yosemite Falls and Glacier Point.

Between about 1915 and 1920, the carriage drives on the valley floor were taken over almost entirely by automobiles. During 1920s and 1930s, roadways were modernized and paved, some were relocated, and by 1942, the current valley road system was largely in place. And so again, the road system today at Yosemite used to be part of a larger trail system; and the parts of that original trail system that have remained recreational trails (today's hiking trails) are today among the oldest such trails in the West. The Mist Trail to Vernal and Nevada falls, the Four-mile Trail up to Glacier Point, and the Yosemite Fall trail were all built between 1858 and 1878, and today are listed in the National Register of Historic Places.

The Golden Age of Trail Development

As is the case with many other historic trails, the history of the development of the trails in Yosemite Valley is closely related to the history of roads and transportation generally in the park. Many of the best examples of historic hiking trails in national parks, however, were built specifically as recreational stock trails. They were the result of a "golden age" of concessioner development in the parks, roughly between 1900 and 1930. This was also a period of intensive hiking trail development in the East (as



Figure 2-4: Glacier National Park, Sperry Chalet, one of the trailside chalets built by Louis Hill between 1910 and 1915. (Photo by author)

described, again, by the Watermans), but there were important differences. In the East, trails were being cut by volunteer members of hiking clubs, such as the Appalachian Mountain Club or the Bar Harbor Village Improvement Society. These trails in the White Mountains, around Bar Harbor, Maine, and elsewhere have always been true hiking trails, originally built for recreational walking in scenic areas and to peaks.[8]

In many western national parks, early hiking trails were built by hotel operators or other concessioners, and they were usually built to the higher engineering standards necessary for stock use. Hotel guests would pay an extra fee for stock trip to, for example, the bottom of the Grand Canyon (a trip many still make today). Since such livery concessions could be as profitable as the hotels themselves, there was considerable incentive to cut such trails, and even to invest considerable sums on blasting and the construction of switchbacks. The Bright Angel trail to the bottom of the Grand Canyon is one such example. The West Rim Trail at Zion National Park is another. A wonderful lodge (designed by Gilbert Stanley Underwood) was built in Zion in the early 1920s, and a network of saddle trails were also built by the concessioner around that time. Both trails, and others in the same parks, are today listed in the National Register of Historic Places.[9]

One of the greatest concessioner-financed trail systems is in Glacier National Park, where between 1910 and 1915 railroad magnate Louis Hill spent millions of dollars on a series of magnificent park lodges, as well as a wonderful system of saddle trails.



Figure 2-5: Zion National Park, Angel's Landing Trail, built by the CCC. (Photo by the author)

These trails were eventually taken over and expanded by the National Park Service, once it was created in 1916. Glacier was known as the finest saddle park in the national park system, and today it's known as one of the finest hiking parks, essentially for the same reason: its extensive and well constructed trail system. In addition to the main lodges at lower elevation, Hill also built a series of high elevation chalets, accessible only by trail, which today are being reused as a hut system for hikers (Figure 2-4).[10]

Hill's trails, like most of the era, were built to the more rigorous standards required by stock, which required wide, level treadways and easy grades. Meeting these standards sometimes required the construction of switchbacks, retaining walls, and other heavily engineered features, which normally would not be required for hiking trails used only for recreational walking. When the park service took over the management and expansion of many of these trails in the 1920s, the use of horses and other stock was still common, and so trail work maintained the same types of standards. With the arrival of the Civilian Conservation Corps (CCC) in the 1930s, however, trail design, construction, and maintenance began to change. Stock use gradually declined in many parks, as the era of luxury hotels declined in favor of car camping and other pursuits. At the same time, the CCC made available tremendous resources for trail work. Hundreds of workers were available to cut and maintain trails, an unprecedented situation (and one that was to never recur). While the CCC maintained and even cut new stock trails, they also established many new trails that were intended solely for hiking.

The CCC era constitutes a second major era of historic trail construction, not only in national parks, but in scores of state parks nationwide as well. The craftsmanship for which the CCC was known was built into the very structure of the program (Figure 2-5). The young laborers typically were closely supervised by various professionals, including landscape architects, architects, and engineers. Such supervision would not have been available if not for the high unemployment of the Depression. Experienced craftsmen also typically worked with the crews on the more demanding jobs. Tight, centralized controls were exercised over all aspects of work, including trail construction, as a 1937 trail work manual published by the park service makes clear.[11]

Management and Maintenance Challenges

Historic hiking trails, in general, share certain characteristics that make them quite different from trails that might be cut today. They often feature finely crafted or heavily engineered features, for example, that would not be built today mostly because the cost would be prohibitive. But trail work of this type might also be considered inappropriate to many trail workers today, who feel that trails should lie as lightly as possible on the land and that overt built features of any type should be avoided. In general, historic hiking trails are also a very diverse group of trails, paths, saddle trails, and abandoned wagon roads that have reverted into trails. There are important differences in how and why these various types of trails were originally built, and these differences have implications for management options.

As diverse as historic trails may be, today most are all used for the same purpose: recreational walking. Horseback riding does continue on some trails (including historic bridle trails in Yosemite and elsewhere). Bicycling on trails has of course gained tremendously in popularity, and the conversion of historic carriage roads to this purpose has been particularly successful (although more often new systems of bike trails are constructed to meet this need). But hiking, by far, is the primary use of most historic trails today, regardless of what type of traffic they may have been designed for. The temptation is therefore to manage most trails to standards required for hiking, not for stock use, for example, which in fact is often heavily restricted or banned today. It is also necessary for trail crews to employ the level of craftsmanship and materials that are available. Large timbers, for example, are no longer cut from nearby forests. The availability of the CCC "army" for labor is gone forever. Large crews of skilled masons would be prohibitively expensive to hire, in many cases.

These challenges are familiar to the historic trail managers assembled at this conference. The difficult choices and compromises always necessary in trail management are only made more difficult and critical in cases where trails have been determined to possess the historical significance and integrity to be listed in the National Register. Contextual research and inventories of historic features need to be first steps, for successfully managing historic trails for continued use today, while preserving the historic character and features that make them such highly valued and enjoyable aspects of the public's experience.

Endnotes

[1] Laura and Guy Waterman, *Forest and Crag: A History of Hiking, Trail Blazing, and Adventure in the Northeast Mountains* (Boston: Appalachian Mountain Club, 1989), 41-43; 83-85.

[2] Roland Van Zandt, *The Catskill Mountain House* [1966] (Hensonville, NY: Black Dome Press Corp., 1991), 28-44.

[3] See Raymond J. O'Brien, *American Sublime: Landscape and Scenery of the Lower Hudson Valley* (New York: Columbia University Press, 1981).

[4] Christopher Hussey, *The Picturesque: Studies in a Point of View* (London: G.P. Putnam's Sons, 1927), 2-4.

[5] See Van Zandt, *The Catskill Mountain House*, 101-188.

[6] Many historic guides to the region feature engraved views and maps. See, for example, Lionel De Lisser, *Picturesque Catskills* (Northhampton, MA: Picturesque Publishing Company, 1894); or Ernest Ingersoll, *Handy Guide to the Hudson River and the Catskill Mountains* [1910] (Astoria, NY: J.C. and A.L. Fawcett, Inc., 1989). Current hiking guides include only generalized references to the locations of historic features.

[7] All information on the cultural landscape of Yosemite Valley is taken from the National Register Nomination for the Yosemite Valley Historic District, by Cathy Gilbert and Ethan Carr, 2000.

[8] See Waterman, *Forest and Crag*, 151-166, 183-208.

[9] See National Register of Historic Places nominations, Grand Canyon and Zion trail systems. National Register nominations are available through the Washington Office of the National Park Service, 800 North Capitol Street, Washington, DC.

[10] Ethan Carr, *Wilderness by Design: Landscape Architecture and the National Park Service* (Lincoln: University of Nebraska Press), 156-159.

[11] U.S. Department of the Interior. National Park Service, *Construction of Trails* (Mimeograph, CCC Project Training Series No. 7. Washington, DC: Department of the Interior, Main Interior Library, 1937).

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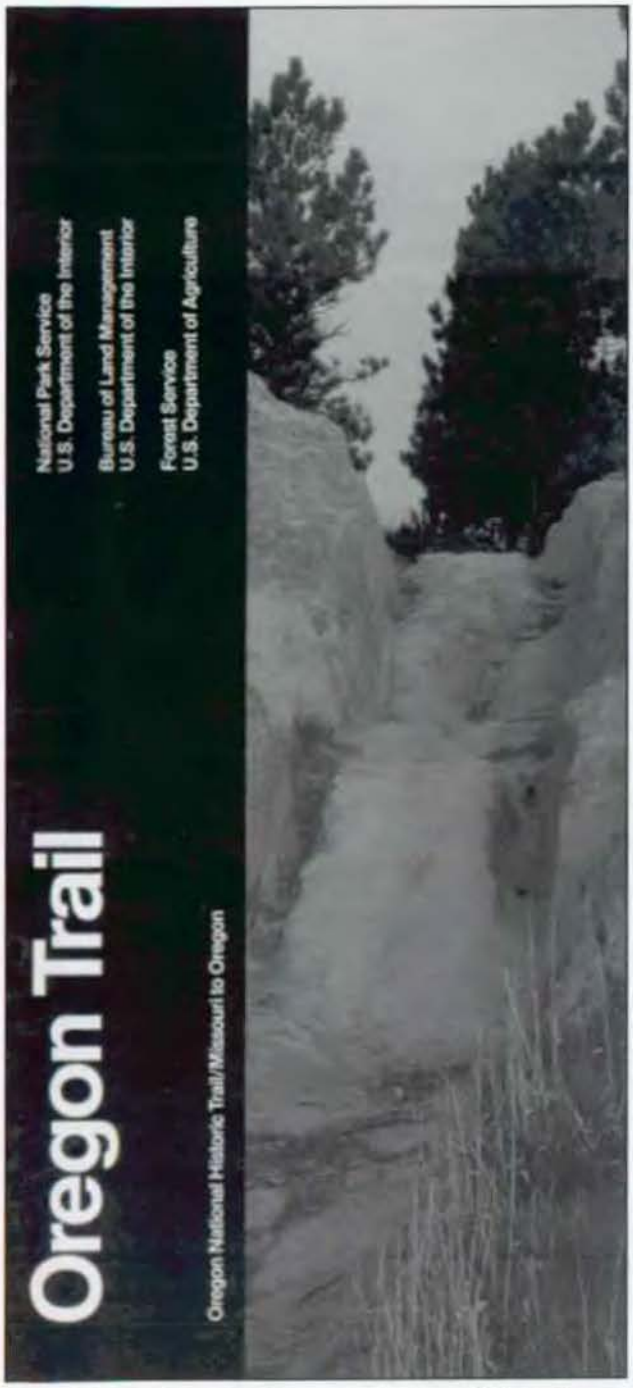


Figure 3-1: The Oregon Trail is one of 14 designated National Historic Trails.

Steven Elkinton
Program Leader
National Trails System Program, Washington, DC

National Historic Trails were created as a Federal activity in a 1978 amendment to the National Trails System Act. Under the authorities of the Act, Federal National Historic Trail administrators carry out a range of authorized functions, including:

- site and segment certification – indicating sections that are open to the public
- route marking – using easily recognized logos
- cultural resource studies
- liaison with other state and Federal agencies, and volunteer organizations
- coordination of interpretation
- planning
- project assistant through challenge cost-share agreements

Today there are 14 National Historic Trails, ranging in size from the 5,000+ miles of the many branches of the California National Historic Trail to the 54-mile Selma to Montgomery National Historic Trail in Alabama (Figure 3-1). They range in time from the recent Civil Rights history back to the Revolutionary War period. Each is described on the back of the *National Trails System Map and Guide.*

Management Challenges and Initiatives

All of the National Historic Trails are in a state of "becoming" -- none are near "completion." Therefore it is hard to know what the full range of issues will be to fully operate them. All, however, are haunted with the typical cultural resource management challenges such as deteriorating structures, landscape intrusions and threatening land use changes, loss of integrity, indeterminate boundaries, difficulties in determining significance, poor or nonexistent inventories, lack of understanding by local communities, and complex and entangling partnerships.

Despite these challenges, cultural resource work on National Historic Trails has been remarkable -- much of this great work has been done in partnerships involving the National Park Service, the USDA Forest Service, the Bureau of Land Management, and non-profit partners such as the Oregon-California Trails Association. Some examples of this work include:

- Archeology to locate historic wagon roads at City of Rocks, Idaho 1995-1996.
- Standardization of mapping to record historic trail conditions, by the Oregon-California Trails Association, developed 1988-1990. Trails sections were mapped according to condition and to distinguish pristine ruts, original traces, impacted original trail, approximate trail location, swales, tracks, general alignments, and obliterated segments.
- Innovative Geographical Information System (GIS) projects with United States Geological Survey along the Lewis and Clark National Historic Trail. Once in the GIS system, the land manager can receive notification of any impacts within a mile of the trail corridor.
- Global Positioning System (GPS) and GIS mapping by citizen volunteers of emigrant trails in northern California to precisely locate complex braided trails and assess condition.
- Interagency coordination to protect sacred sites: the Lolo Trail/Motorway where the Lewis and Clark and Nez Perce National Historic Trails overlap crossing the Bitterroot Mountains in Montana and Idaho.
- Innovative training, especially a course called "Assessing and Evaluating Culturally Significant Landscapes," held in Rock Springs, WY, 1998.
- Comprehensive management planning for the Oregon, Mormon Pioneer, California, and Pony Express National Historic Trails, 1996-1999 -- perhaps one of the largest-scale planning efforts ever carried out by NPS (12 states, hundreds of sites and segments).
- Reenactments. One example is the Overmountain Victory Trail Association's annual march across the Appalachian Mountains to King's Mountain each fall.
- Tribal Reconciliation. One recent example was coordinated along the Nez Perce (Nee-Me-Poo) National Historic Trail at Big Hole National Battlefield in August, 1997, marking the 120th anniversary of that tragic encounter. This event transcends recreation to healing. Trails can be real and symbolic connections between cultures. Some of these initiatives appeared in the January, 1997 issue of *CRM Bulletin.*

Funding Sources

Recently, to address the perpetual plea for funds, our office has been involved in two assistance guides for trails: one for both national scenic and historic trails and the other aimed at Lewis and Clark Trail partners. The first is already out of print, but the second can be accessed at the DOI website <www.nps.gov>. There is a surprising amount of funding available from foundations, federal and state programs, and corporations if you are innovative. Recent funding initiatives include $1.2 billion dollars provided through ISTEA and TEA 21. This money is available through state programs. The Conservation Reinvenstment Act (CARA) may also provide funds through state programs. The Federal Highway Discretionary Fund is another source. I am heartened that a conference like this can be organized to take seriously the challenges of treating historic trails as cultural resources.

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4. Conservation of Historic Resources on the Appalachian National Scenic Trail



Figure 4-1: Myron Avery and Potomic Appalachian Trail Club members scouting a new route for the trail, circa 1930s. (PATC Archives)

Robert Proudman
Director of Management Programs
Appalachian Trail Conference

Note: Robert Proudman was unable to attend the conference. Stephen Elkinton delivered a portion of his presentation. In light of the cultural resource inventories underway along the trail and the recent 75th anniversary of the marking of the trail, Mr. Proudman's abstract and notes are included. Over the next few years it is likely that this nationally designated "Scenic" trail will increasingly be recognized for its historical significance.

The Appalachian Trail is America's First National Scenic Trail. With more than 80-percent federal ownership and control it is uniquely managed by volunteers under Appalachian Trail Conference (ATC) auspices. After a decade, ATC nears completion of natural diversity inventories; we are now using the same private fund raising and contract-methodologies to initiate cultural and historic resource inventories along the Appalachian National Scenic Trail on 270,000 acres of trail corridor lands in 14 eastern states. The history of the development of the Appalachian Trail parallels the 20th century Conservation Movement in America. The ATC focuses on the use of partnerships for effective protection and stewardship. Two current projects on the Appalachian trail include the restoration and interpretation of a Civil War Battlefield and a cultural resource review in Connecticut.

The Resource

The Appalachian National Scenic Trail is a continuous, marked, 74-year-old footpath that traverses the Appalachian Mountain chain from central Maine to northern Georgia, for a distance of 2,160 miles (Figure 4-1). The purpose of the Appalachian Trail, as defined in the Appalachian Trail management principles and other documents, is to provide "a way, continuous from Katahdin in Maine to Springer Mountain in Georgia, for travel on foot through the

wild, scenic, pastoral, and culturally significant lands of the Appalachian Mountains." As the longest linear unit of the National Park System, the Appalachian Trail provides opportunities for millions of visitors each year to traverse and experience countless wild, scenic and pastoral settings. It also affords opportunities for continuous long-distance hiking that are unparalleled anywhere else in the world. The Appalachian Trail is far more than just a footpath, however. It is a 270,000-acre undeveloped greenway of publicly owned land, averaging 1,000 feet in width, that preserves many of the most extraordinary natural and cultural resources of the eastern United States.

In 1968, the National Trails System Act designated the Appalachian Trail as the nation's first national scenic trail and authorized federal land acquisition and encouraged state land acquisition to establish a permanent route and protective corridor surrounding the footpath. At present, although a substantial land acquisition program remains, less than 17 miles of the trail remain in private ownership. The trail and its associated protective corridor connect more than seventy-five public land areas in 14 states, including 6 other units of the National Park System, 8 national forests, and more than 60 state park, forest, and game-management units, many of which include important natural, scenic and cultural resources themselves.

Appalachian Trail Management

The Appalachian Trail Project, which dates back to the early 1920s, is recognized as a remarkable example of private citizen action in the public interest. The initial route of the Trail was constructed almost entirely by volunteers between 1922 and 1937. Since that time, volunteers affiliated with the ATC and its 31 member Trail-maintaining clubs have constructed, reconstructed, and maintained the footpath, as well as a system of more than 250 shelters and associated facilities. In 2000, more than 5,000 volunteers contributed a total of 200,000 hours of work to manage and maintain the trail.

Management of the Appalachian Trail involves a complex network of shared and specific responsibilities, policies, regulations, and land-ownership patterns. The actual maintenance and monitoring of the trail rests with ATC and it affiliated local trail-maintaining clubs. Policies and regulations restricting the use of the trail are controlled by the agencies holding title to the land crossed by the trail. ATC works under NPS (and other agency) auspices to implement all requried NEPA and cultural resource reviews in a timely manner.

The ATC was formed in 1925 for the purpose of constructing, promoting, and protecting the Appalachian Trail. Since that time, ATC has grown into a full-fledged management partner responsible for management and maintenance of the trail. In addition to serving as a federation for the 31 trail-maintaining clubs that maintain sections of the Appalachian Trail, ATC serves as a membership organization for individuals, corporations, and other entities interested in protection and management of the trail. ATC's affairs are governed by a 27-member Board of Managers; it also has a full-time staff of 40 and more than 5,000 active volunteers who assist in maintenance and management of the Appalachian Trail. ATC and its affiliated trail clubs have accepted a formal delegation of responsibility for stewardship and management of more than 100,000 acres of land acquired by the National Park Service to protect the Appalachian Trail. ATC also has entered into cooperative agreements with the U.S. Forest Service and state agencies for maintaining and managing the Appalachian Trail across national forest lands and state lands. The Appalachian Trail Conference and its member clubs are now responsible for most phases of "park" operations but under the direction of well-established agency policies, guidelines, regulations, and resource plan directions.

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THE ACADIA STORY:
REHABILITATION PROGRAM & "ACADIA TRAILS FOREVER"

Acadia National Park has a truly spectacular trails system with Native American carry trails, colonial 18th century settlement roads, and post-Civil War recreational paths. With the help of the Olmsted Center for Landscape Preservation, Friends of Acadia, and a highly dedicated and talented park trails staff, we have been able to make a lot of progress in recent years toward understanding, documenting, and rehabilitating the system. I hope the following presentations by several of the people responsible for making this happen will serve as an inspiration for others to start down this path also.

The Acadia Story begins with our effort to define the extent of the trail system and learn more about how it evolved, as described by Margie Coffin Brown. Back in 1995 we defined a series of tasks to complete to rehabilitate the hiking trail system in a manner sensitive to their historic fabric. Five years later most of these tasks are complete and rehabilitation work is underway.

Concurrent with our documentation of the trail system, the park as a whole needed to address its historic resources. Lauren Meier describes work in progress to prepare a multiple property listing for the National Register of Historic Places, which will include a nomination for the hiking trail system. This nomination will serve as a valuable precedent for other historic linear resources, particularly for those as extensive as Acadia's trail network..

Research on the history of the trail system, paired with documentation of the existing conditions and evaluation of significance, has led us to the development of treatment and maintenance guidelines. As described by Tracy Stakely, these guidelines will allow for informed decisions about what types of work is appropriate for each trail. The document is the result of an excellent collaboration between our field staff and the Olmsted Center.

Information about constructed features on each of our trails has been a key to success. Acadia's Trails Foreman, Gary Stellpflug, describes the methodology he developed for inventory and condition assessment. Begun in the 1970s, these records are a thirty-year history of trail work, reflecting the increased use of our trails and the intensive preservation work needed. Now in a database, the information is used to prioritize work and forecast the funding needed to fully rehabilitate the entire system.

Rehabilitation work is well underway on the Jordan Pond Trail, as described by Acadia's Trails Crew Leader, Chris Barter. Our time invested in research, condition assessment, and consultation with trail expertise from other areas has resulted in a trail solution that both preserves historic character and provides a durable and safe tread. One of our most popular, this pond-side trail is once again "a smooth, easy walk" as described in the 1920s.

Many management issues surfaced as we discussed the long-term care of Acadia's trails. Acadia staff, Judy Hazen Connery, Charlie Jacobi and Gary Stellpflug, describe the management plan in progress to guide decisions and establish goals for the system. Issues addressed include balancing natural versus cultural resource protection, size and configuration of the system, opening or closure of trails in large undeveloped areas, and many more.

Finally, how are we going to fund the rehabilitation work? Friends of Acadia President, Ken Olson, describes the extremely successful "Acadia Trails Forever" campaign. Our Friends group has effectively reached out to our many trail users, and accepted their contributions. We are proud to have the first endowed trail system in the National Park Service, very grateful for the work done by the Friends of Acadia, and well prepared to rehabilitate the trails for future generations.

Jim Vekasi, Chief of Maintenance,
Acadia National Park

5. Scope and Research for the Acadia Trails Cultural Landscape Report
Margie Coffin Brown

6. Documenting Acadia's Historic Hiking Trail System: Multiple Property Listing and National Register Nominations
Lauren G. Meier

7. Treatment and Maintenance Guidelines
J. Tracy Stakely

8. Information Management: Trails Crew Inventory
Gary Stellpflug

9. Jordan Pond Rehabilitation Project
Chris Barter

10. Acadia National Park Hiking Trails Management Plan
Judy Hazen Connery, Charlie Jacobi, Gary Stellpflug

11. "Acadia Trails Forever" A $13-Million Public-Private Campaign to Rehabilitate Acadia's 130-mile Historic Trail System
W. Kent Olson

5. Scope and Research for the Acadia Trails Cultural Landscape Report



Figure 5-1: Stairs built by the local village improvement society in the early 1900s on the Emery Path.

Margie Coffin Brown
Historical Landscape Architect
NPS, Olmsted Center for Landscape Preservation

The hiking trails of Acadia National Park are a significant cultural resource and an important recreational asset. The trails system contains extensive rustic features, including stone steps, wooden bridges, iron rungs and ladders, and elaborate stone cairns, created by local path committees of the village improvement associations and the Civilian Conservation Corps (CCC) during the late 19th and early 20th centuries (Figure 5-1). Much of this work predates the establishment of the park in 1916. Many sections are in poor condition and in need of major rehabilitation work. Ongoing maintenance is also needed to ensure long-term preservation of this historical and recreational resource including both built and natural features. In order to develop rehabilitation and maintenance guidelines a tremendous amount of information was needed about the trail system. This presentation will describe the fundamental building blocks of information needed for the rehabilitation of this extensive cultural resource. The presentations that follow will further describe the subsequent application of the information gathered and implementation of work based on a shared understanding of the resource.

The Olmsted Center for Landscape Preservation, a group within the National Park Service that provides technical support on cultural landscape preservation, began working on the trails project with the staff at Acadia National Park in 1995. Our purpose was to chart a course for the rehabilitation of the trails system that would protect the high quality of craftsmanship and history imbued in the trail system. Why was this necessary? Because routine maintenance was incrementally disassembling or obscuring earlier stone and woodwork, replacing it with contemporary materials and generic trail features. The rustic charm

of Acadia's trails was disappearing due to overuse and routine maintenance. But, at the same time the trails crew, a very skilled and educated group, was asking the question: What should we be doing here?

Scope of the Project

From the start, this has been a team project, involving many disciplines and organizations. In 1995 a multi-disciplinary team identified the following project components:

- Determine the extent of the historic trail system and produce a database including: trail names; date of construction; designer, builder and affiliation; origin, length and destination; and whether the trail is on NPS property and currently maintained.
- Prepare a narrative and illustrated trail history and survey of existing conditions (as part of a Cultural Landscape Report).
- Produce an accurate map of the trail system using Global Positioning System and Geographical Information System technology.
- Stabilize historic sources of information, including the archival storage and duplication of valuable documents relating to the history of the trail system, such as maps and photographs.
- Analyze and evaluate the historical significance and integrity of the trail system (as part of a Cultural Landscape Report).
- Determine whether the trail system or any portion of the trail system is eligible for the National Register of Historic Places and prepare a nomination.
- Conduct an ethnographic traditional use study and incorporate findings into a trails management plan.
- Conduct oral history interviews with individuals knowledgeable about the construction and maintenance of the trail system.
- Conduct a user survey and incorporate findings into a trails management plan.
- Incorporate the visitor experience and resource protection (VERP) process into a trails management plan.
- Document the trail system for the Cultural Landscape Inventory (CLI) and the List of Classified Structures (LCS).
- Develop trails management, treatment and maintenance guidelines. Management guidelines would address issues such as the opening or closing of trails, the treatment of abandoned trails, the prioritization of natural and cultural resource issues, and more. The treatment and maintenance guidelines would address construction techniques, compatible new features and materials, the repair of existing features, and more (as part of a Cultural Landscape Report).
- Complete Section 106 compliance and NEPA documentation.
- Carry out trails rehabilitation work!
- Document work as part of the maintenance program and part of a Cultural Landscape Report.

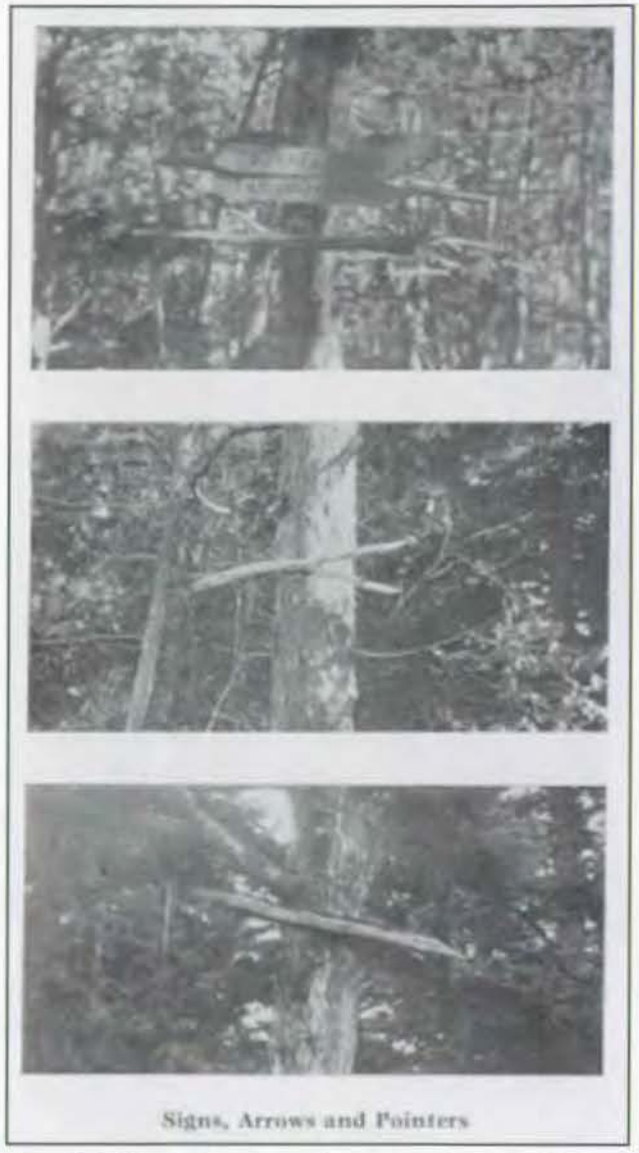


Figure 5-2: Historic documents such as early path guides and historic photographs were microfilmed in an effort to preserve information about the trail system (1928 Path Guide).

Now, five years later, most of these tasks are complete and trails rehabilitation work is underway. I will now describe some of the key accomplishments along the way. In 1995 several team members were concerned about the multiple locations and precarious condition of historical information about the trails. We spent the first year gathering and duplicating information about the hiking trails including old trail maps, guidebooks, correspondence, reports, and photographs, with funds provided by the Friends of Acadia (Figure 5-2). Repositories included libraries, local village improvement associations, historical societies, outing club libraries such as the Appalachian Mountain Club, the Maine State Archives, and several private collections. A source of information that may be useful for many parks are the Civilian Conservation Corps (CCC) records held in branches of the National Archives. These records contained many historical photographs and details on trail construction. The CCC also produced publications with trail construction details (Figure 5-3).

Cultural Landscape Report for the Trail System

The next step was to identify the location and extent of the historic trail system. To do this each trail was assigned a number and a database and computer - aided design (CAD) maps were developed (Figures 5-4, 5-5). Many trails, including those no longer marked, were mapped using a global positioning system (GPS)

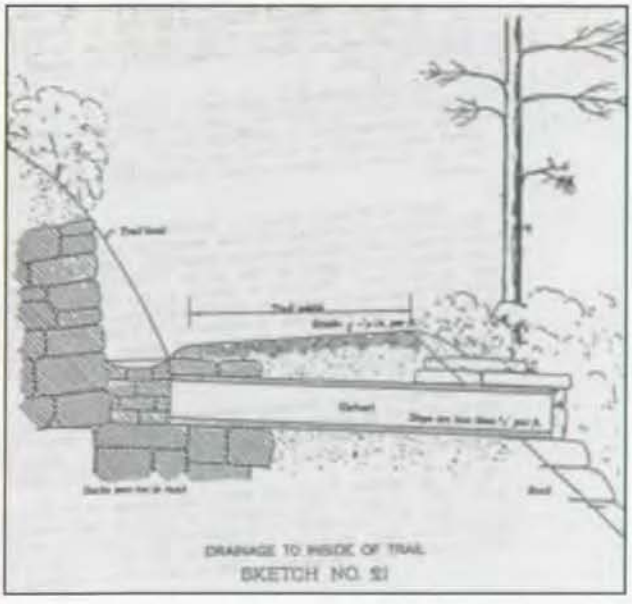


Figure 5-3: Detail for a closed culvert from 1937 manual by Guy Arthur, "Construction of Trails, CCC Field Training."

(Figure 5-6). This information serves as the foundation for a Cultural Landscape Report (CLR), which establishes the preservation goals for a cultural landscape and guides its management, treatment and use. The methodology inherent in the CLR process includes the following steps.

1. Prepare a site history to describe the creation and evolution of the trail system, with an emphasis on the physical character, attributes, features and materials that contribute to the significance of the trail system. Describe the historical context, key individuals and organizations and related periods of significance associated with the development of the trail system.

2. Prepare an existing conditions survey that describes the current configuration of the trail system, including landscape characteristics such as vegetation, views, constructed features, etc. Describe contemporary use, site features, and related natural resources that contribute or influence management and maintenance of the trails system.

3. Prepare an analysis and evaluation of the site history and existing conditions to identify significant trails and trail features in the context of the landscape as a whole. Evaluate the historic integrity to determine if the characteristics and features that defined the trail system during the historic period are still present.

4. Prepare a treatment plan for the long-term preservation of the trail system based on its historical signficance, existing conditions, and use. Describe overall management objectives and the treatment of feature types found on the trails.

5. Prepare a record of treatment to document how the work was accomplished.

This approach is designed for historic properties, such as estates and parks, but the methodology is adaptable and was easily applied the linear resource, the island's some 250 miles of trails. Due to the number of trails, however, the study examined the development of the system rather than the history of the development of individual trails.

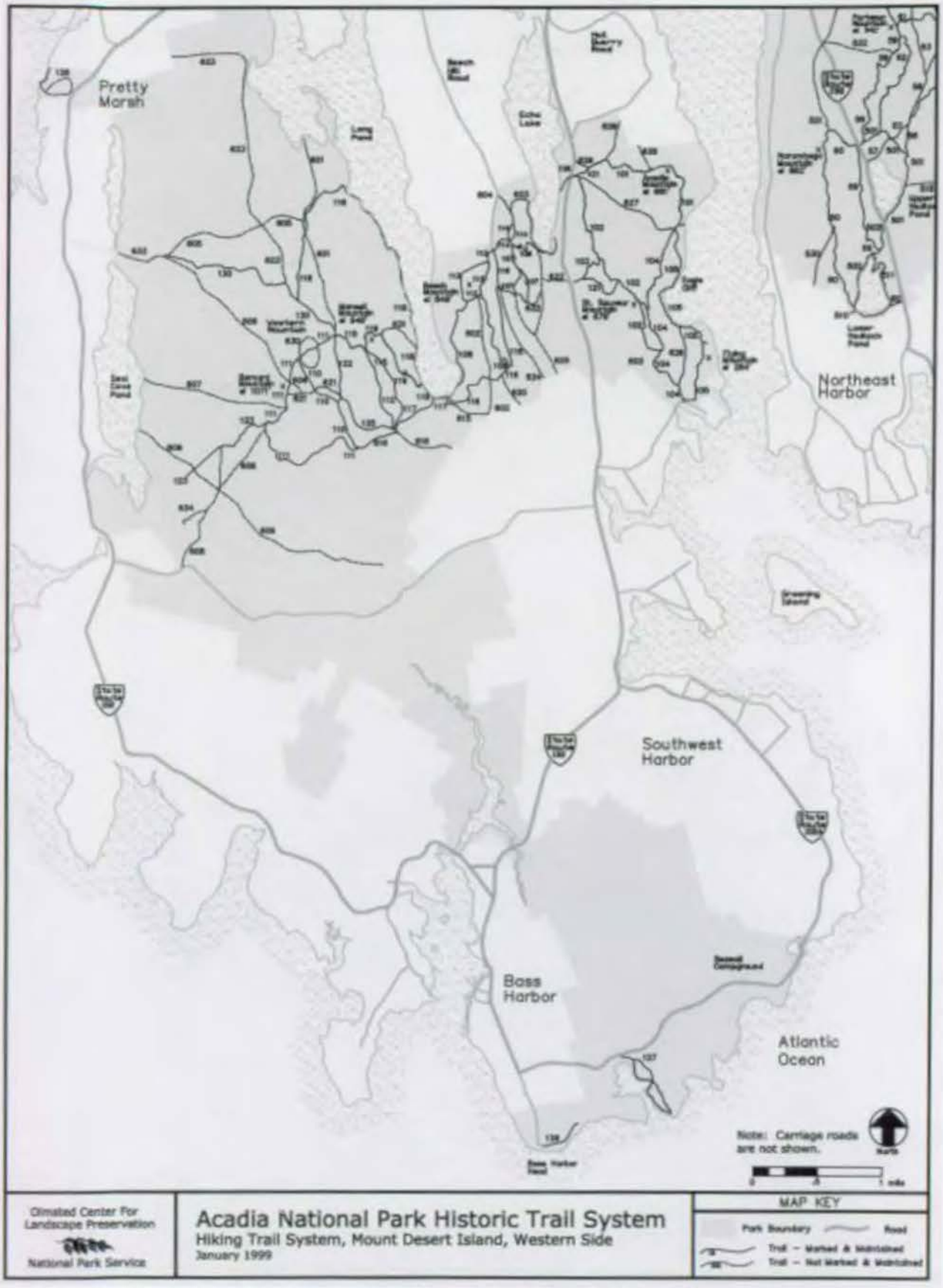


Figure 5-4: Map of the western side of Mount Desert Island. Many of the paths documented are no longer marked or maintained, or have become roads.

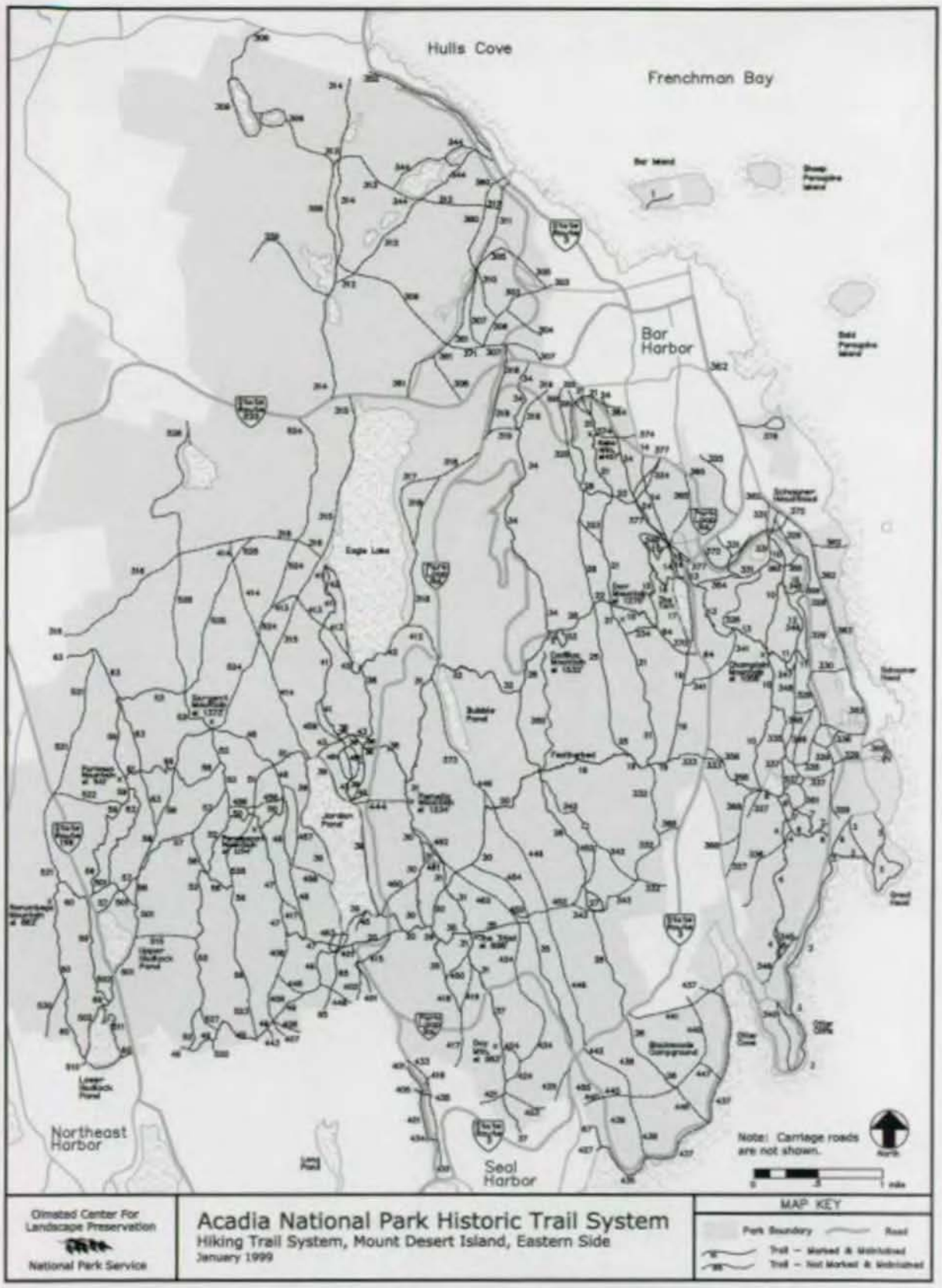


Figure 5-5: Map of the eastern side of Mount Desert Island. Each trail number corresponds to a database file with the year of construction, builder, and whether the trail is currently marked and maintained.

Through research for the first phase of the CLR, we learned much about the trail system. An illustrated narrative describes key periods of trail construction, important individuals, the desired intent of the trail system, methods of workmanship and materials. The influence of key trends that contributed to the evolution of the trail system are described, such as public perception of wilderness and recreation, the impact of automobiles and the creation of the National Park system.



Figure 5-6: Field team ascends the unmarked Homans Path to map the trail using GPS technology.

Three Periods of Trail Development

Of the three circulation systems on Mount Desert Island, roads, carriage roads, and trails, the trail system is the oldest and most extensive. Most trails predate the establishment of the park in 1916 and extend beyond park boundaries, including Native American canoe carry trails, old logging roads, and recreational trails built in the late 1800s and early 1900s by local village improvement societies. Trails built after the establishment of the park include those built by the Civilian Conservation Corps (CCC) in the 1930s and 40s and by Mission 66 crews in the 1950s and 60s. To better articulate the development of the trail system and the built features and characteristics of individual trails, we identified three major periods.

The first period of early trail development extends from before European settlement in the 1600s up to 1890. This period encapsulates the Native American carry trails, early logging roads, popular routes or "scrambles" favored by artists and early tourists who came the island in small numbers up until the Civil War in the 1860s. After the Civil War the island experienced a rapid growth in tourism. Many island guidebooks were printed that described desirable hikes (Figure 5-7). However, trail markings, crossings, and routes were sporadically marked and maintained.

The second major period of trail development begins in 1890, when local village improvement societies were formed with "path" committees, who were responsible for marking and maintaining trails to scenic areas throughout the island. Path maps were drawn, routes were marked, and money, collected through donations, was used to build and maintain trails. By the early 1900s, four villages, Bar Harbor, Seal Harbor, Northeast Harbor and Southwest Harbor had sophisticated and well funded trail programs. George Dorr, who would later become the Superintendent of Acadia



Figure 5-8: The South Bubble Cliff Trail, built in about 1919 by the local village improvement societies, was considered adventurous by some and too dangerous by others. The trail was closed by the park service in the 1950s (Bar Harbor Historical Society).

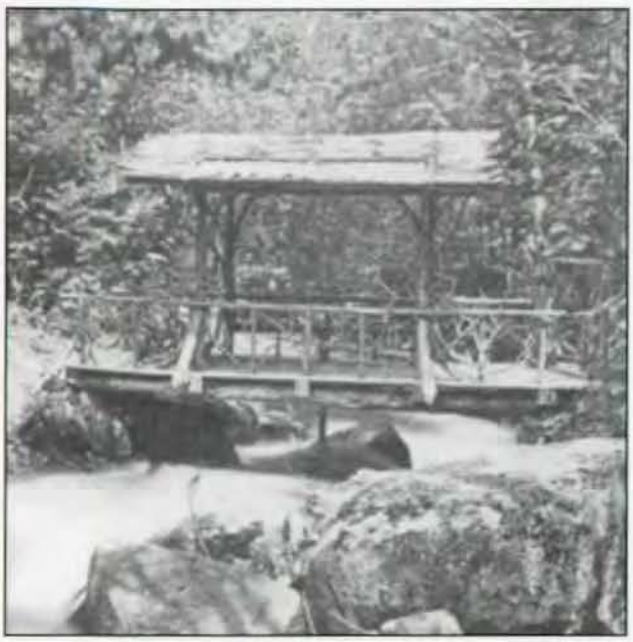


Figure 5-7: An early path led to this rustic foot bridge, built by the landowner in the 1870s (Maine Historic Preservation Commission).



Figure 5-9: The Waldron Bates Memorial (a tablet under the overhanging rock) is one of the earliest memorials. Upon his death in 1909, Bates bequeathed $5,000 to the path system (Acadia NP Archives).

National Park, solicited donations for memorial trails that were actually endowed with maintenance funds. Constructed trails included carefully set stone steps and staircases through boulder fields, rustic wooden and stone bridges, and iron rungs and ladders. Iron was also used extensively to pin stone steps and coping stones to ledges.

Although much of the land became federal property in 1916, when the park was established, local path committees continued to build and maintain trails through the 1920s and 30s. By this time the island was covered with about 250 miles of hiking trails and many considered the network complete. A few ambitious path builders opted to construct trails that seemed to defy gravity such as the South Bubble Cliff Trail (Figure 5-8), but VIA path work dwindled in the 1930s and 40s as the Great Depression and later World War II preoccupied the country. During the Great Depression, two camps for Civilian Conservation Corps (CCC) were established on the island in 1933. They built numerous hiking paths, concentrating on those that would connect with park facilities such as picnic areas, parking areas, swimming areas and scenic overlooks. We know much more about CCC trail construction because of their meticulous records and numerous photographs taken during construction. Information available describes desired routes, grades, tread surface preparation, bridge construction, drainage features, stonework and revegetation procedures.

The third major period for Mount Desert Island's trails begins in 1942 with the reduction of the trail system and obliteration of many trails. During World War II, federal work programs such as the CCC were terminated, ending the construction and maintenance of the trail system. In 1947 a fire on Mount Desert Island obscured many trails and eliminated the homes of many individuals that tended the trails. In the 1950s the park service reduced the number of marked trails to facilitate maintenance, closing those trails that led outside park boundaries, paralleled other routes, were seldom used, or deemed unsafe such as the thrilling South Bubble Cliff Trail. A small flurry of trail construction took place in the late 1950s as part of the Mission 66 program, but overall more trails were closed than opened.

Existing Conditions Survey

Today the park service maintains 118 miles of trails. As part of the second step within the CLR process, the existing conditions survey, we found that many trails retained their original historic craftsmanship, while others were highly eroded or in need of constant repairs. Many trails that fell into disuse in the 1940s or were no longer marked by the park service in the 1950s are in excellent condition with extensive historic stonework. Trails were documented through the trails crew inventory (to be described later), with written descriptions, and photographs. As part of the third step in the CLR process, the analysis of significance and evaluation of integrity, we found the trail system to be very significant with a high degree of integrity. This evaluation process is described in greater detail by Lauren Meier. The fourth step in the CLR process, treatment, is underway and will be described by Tracy Stakely, Gary Stellpflug and Chris Barter. The fifth and final step in the CLR process is not complete, but will be fairly straightforward due to the existing database and recordkeeping program of the trails crew.

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6. Documenting Acadia's Historic Hiking Trail System: Multiple Property Listing and National Register Nominations

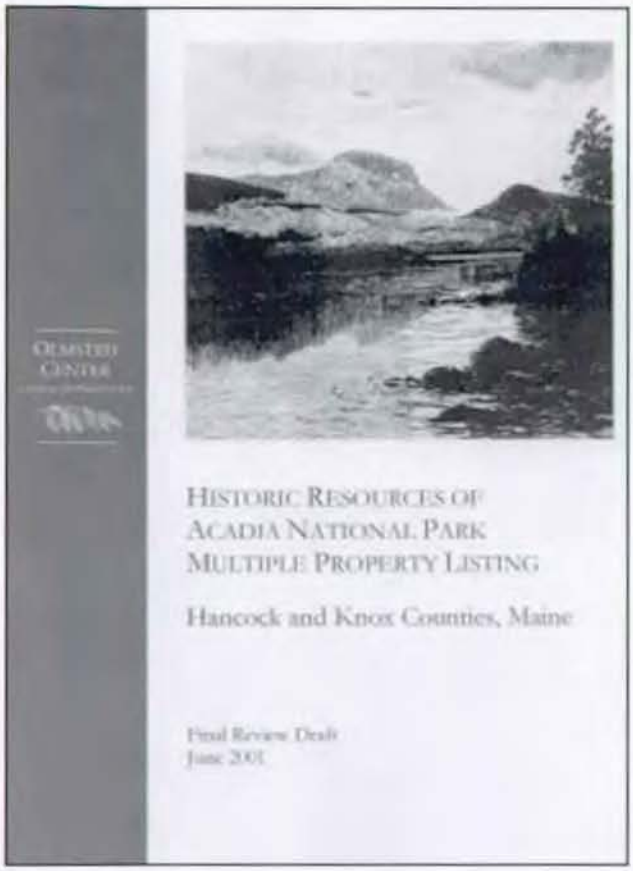


Figure 6-1: Cover of the recently completed draft listing.

Lauren G. Meier ASLA
Historical Landscape Architect
NPS, Olmsted Center for Landscape Preservation

Acadia National Park contains a complex and varied assortment of cultural landscapes and historic structures including vestiges of 18th and 19th Century farmsteads and estates, hiking trails, motor roads, carriage roads, campgrounds, picnic areas, and recreation areas located on Mount Desert Island, the Schoodic Peninsula, and neighboring islands. Documenting and evaluating the significance of the hiking trail system must therefore consider the relationship between this resource and the other historic properties in the park. The Cultural Landscape Report for Acadia's hiking trails, contains an important description of the physical development of the trail system and has identified themes and contexts relevant to their evolution. The next step, to evaluate the historic significance of the trails is being done through a nomination to the National Register of Historic Places.

Acadia's Multiple Property Listing

In 1992, the *General Management Plan for Acadia National Park* recommended that the historic resources within the park be nominated to the National Register of Historic Places through a multiple property listing (Figure 6-1). The National Park Service began a multi-year project in 1998 to prepare nominations for selected historic properties in Acadia National Park including the hiking trails, in consultation with the Maine Historic Preservation Commission. The National Register of Historic Places is a program of the National Park Service that designates historic districts, sites, structures, and objects significant in American history according to four criteria:
Each nomination contains a description of the resource, narrative history and a statement of significance, boundary description, maps and photographs, all contained in the National Register form and

National Register Criteria

A Properties associated with events that have made a significant contribution to the broad patterns of our history.

B Properties associated with the lives of persons significant in our past.

C Properties that embody the distinctive characteristics of a type, period, or method of construction or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components lack individual distinction.

D Properties that have yielded, or are likely to yield, information important in prehistory or history (archeology).

continuation sheets (NP 10-900a). For Acadia, the National Register nominations are being prepared in concert with a multiple property listing titled "Historic Resources of Acadia National Park" that describes three historic contexts:

1. Community Development and the Origins of Acadia National Park (1890-1937)

2. John D. Rockefeller, Jr. and the Development of the National Park Service (1913-1950)

3. Rustic Design 1890-1958, including two sub-themes a.) The Picturesque Style (1890-1950), and b.) Rustic Design in the National Park Service (1916-1958)

These contexts were identified as the three themes that best describe the majority of the park's resources. This project is intended to address historic resources throughout the park, although not all non-contiguous park areas contain properties that are eligible under the aforementioned contexts. Other contexts, such as the Prehistoric Settlement and Use and the Cottage Era, will be addressed in subsequent phases. The National Register of Historic Places Multiple Property Documentation Form nominates groups of related significant properties by documenting themes, trends, and patterns of history that are shared by numerous historic properties. These themes are explained in a series of historic context statements such as those described for Acadia National Park. By aggregating the historic context statements into one cover document, individual nominations can be prepared that focus solely on the specific history and characteristics of a particular historic property. In addition to the context statement, the multiple property form also includes a discussion of historic property types and registration requirements that further serve as a framework for individual National Register nominations.

Once completed, the multiple property listing and National Register nominations are forwarded to the Maine Historic Preservation Commission (SHPO) and to the National Park Service, National Register program in Washington D.C. for formal review and approval. At the same time, the local communities are informed of the project and invited to review and comment on the nominations.

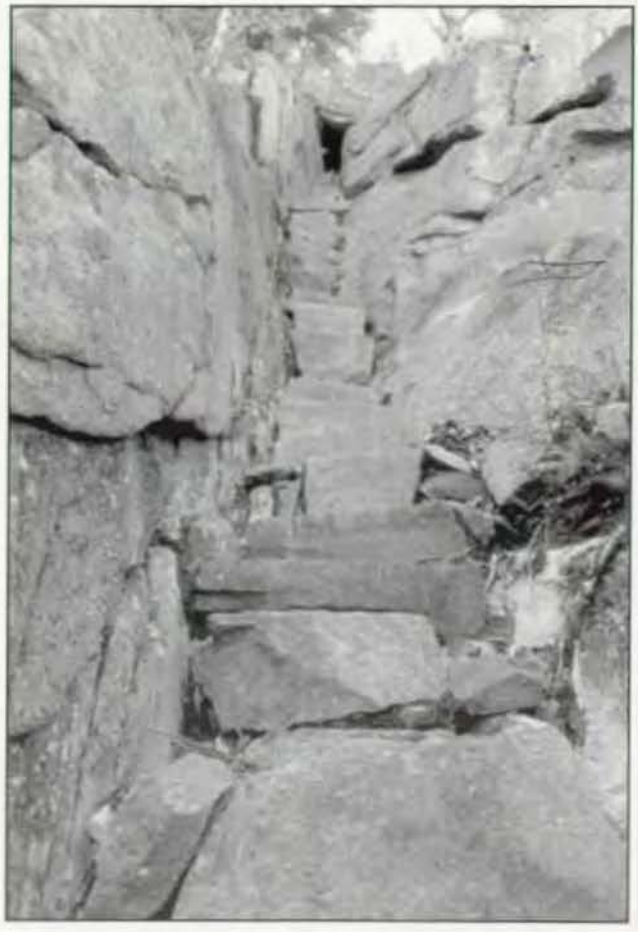


Figure 6-2: Steps built by the Bar Harbor Village Improvement Society on the Champlain East Face Trail.

Significance of Acadia's Hiking Trail System

So how does this approach relate to the history of the hiking trail system and how is it relevant to other trail systems in the United States? The National Register nomination process provides a method of evaluating the Acadia trail system by identifying relevant historic themes and trends, areas of significance, as well as describing the character of the historic property to help clarify what should be preserved. The hiking trail system is the oldest and most extensive circulation system in the park and much of the system existed when the park was created in 1916. In 1890, an organized effort to create a cohesive, island-wide trail system began when the Bar Harbor Village Improvement Association began marking existing trails, as well as mapping, maintaining, and building new trails as part of its effort to improve the physical and cultural qualities of the town. The Bar Harbor VIA had formed in 1881 when about fifty trails existed on the island and incorporated in 1891, consisting primarily of wealthy summer residents intent on preserving the natural beauties of the place.

Similar efforts followed as the Northeast Harbor Village Improvement Society, the Seal Harbor Village Improvement Society and the Southwest Harbor Village Improvement Society incorporated in 1897, 1900, and 1914 respectively. These groups distinguished themselves from their counterparts in other parts of the country by extending their community development efforts well beyond the boundaries of their towns. The four societies ultimately worked cooperatively across the island through a joint path committee. Eventually, this resulted in the construction of approximately 250 miles of recreational walking paths on Mount Desert Island, that linked of the villages with the island's natural scenery (Figures 6-2, 6-3).

The trails created by the village improvement societies are also significant for the quality of their design, which varies depending on the type of trail and its geographic setting. This includes summit trails, coastal trails, woodland trails, and memorial trails, each with its own distinct character, method of construction and



Figure 6-3: "Bates" style cairn used on all island paths as recommended by the joint path committee of the village improvement societies (1928 Path Guide).

SUMMARY

National Register Nomination for the Hiking Trail System

Classification:	Historic district
Contributing resources:	250 individual trails, 17 commemorative plaques, 5 non-contributing trails
Criteria:	A, C
Period of significance:	1890-1942
Areas of significance:	Community planning and development, conservation, recreation, landscape architecture
Applicable contexts:	1. Community Development & Origins of Acadia NP 2. Rustic Design



Figure 6-4: The Andrew Murray Young Trail was constructed in 1926 by the Bar Harbor Village Improvement Association and endowed with a maintenance fund by Mrs. Young. The trail included a memorial tablet and extensive stonework.

associated features (Figure 6-4). Many are highly constructed works of art that fit beautifully into the Acadian landscape, utilizing endemic materials that harmonize with the natural environment. It is these qualities that also exemplify the picturesque design style, a subset of the rustic style described in the multiple property listing. The trails contain an assemblage of rustic features that include steps, drainage features, walls and coping, bridges, and stone paving that remain as outstanding examples of the picturesque style.

In addition to its picturesque character, the trail system is also significant as representative of the NPS rustic design implemented at Acadia beginning in 1916. During the New Deal, workers in federal and state programs such as the Civilian Conservation Corps (CCC) laid and constructed several hiking trails at Acadia and rebuilt and rerouted others as part of the park's recreational trail system. Between 1933 and 1942, the programs of the New Deal contributed greatly to the construction of recreational park facilities at Acadia, including campgrounds, picnic areas, roads, and trails. The CCC constructed eighteen miles of new trails during this period, and about two hundred miles of trails were enhanced and maintained by New Deal programs including the CCC (Figures 6-5, 6-6).

Recent work by historians Linda McClelland and Ethan Carr have highlighted the significance of the early landscape design work in the National Park system. This includes the many programs of the New Deal which produced national standards to ensure that the work throughout the country consistently followed the rustic aesthetic, solved drainage and other functional difficulties, and was well constructed. At Acadia, the large numbers of CCC workers available to implement the trail projects ultimately created trails that would last and much of the stonework and drainage features still remain.

The hiking trail system at Acadia National Park will ultimately be listed on the National Register as a historic district, including 250 individual trails with 17 commemorative plaques. It is eligible according to National Register criteria A and C in the areas of community planning and development, conservation, recreation, and landscape architecture. The period of significance is 1890-1942.

Nominating Linear Resources

Applying the National Register methodology to a linear system like historic hiking trails is a fairly straightforward exercise, with a few exceptions. First, it is essential to evaluate and describe the resource as an entire system, noting major historic trends and episodes. Second, the nomination must document the history and overall character of each trail segment, not necessarily each individual drainage feature, stone, tree, or stair. The boundary of the nominated resource should consider the extent of the constructed features as well associated resources. Here, the boundary is a 30-foot corridor (15 feet from the centerline of the trail) which widens when necessary to accommodate other contributing features such as buildings or monuments. Finally, in the case of the Acadia trail system, only the trail segments that are located within the boundary of the park will be listed, although individual towns could, at a later date, add the connecting sections outside the park boundary. Although there are many other trails listed on or eligible for listing on the National Register, two characteristics of the hiking trail system of Acadia National Park make it unique within the national park system. First, the trail system largely pre-dated the park, so the role of the village improvement societies in the creation of the trail system is unprecedented in the national park system. Second, the total trail system is extensive, with 250 individual trails totaling approximately 225 linear miles. Finally, the trail system and its individual trail segments retain a high level of integrity so that the historic character of many of the park's signature trails is still recognizable. It our hope that the National Register nomination for the Hiking Trails Historic District can serve as a model or prototype for others to come.

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Figure 6-5 CCC stonework at the base of the Ladder Trail (National Archives, Waltham).



Figure 6-6 Completed CCC stonework at the base of the Ladder Trail (National Archives, Waltham).

7. Treatment and Maintenance Guidelines



Figure 7-1: Steps along the Ladder Trail.

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Historical Landscape Architect
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This next portion of the discussion of the Acadia trails project will focus on the continuing collaboration between the Olmsted Center and the park staff in the development of Treatment and Maintenance Guidelines, as part of the Cultural Landscape Report for the trail system. I will give an overview of how this plan has developed to date. Gary Stellpflug will then describe the parks existing trails database and inventory system, which has been beneficial to trails maintenance and extremely useful during the planning process for the trails. Chris Barter will then describe some actual work projects that have benefited from concurrent development of the Treatment and Maintenance Guidelines. These guidelines were initiated after completion of Volume 1 of the Cultural Landscape Report, which covered the first three steps in the CLR process: historical development of the trails, their existing conditions, and preliminary analysis.

These "how to" guidelines were what the Acadia staff was eager to obtain from the very start of this project over four years ago. After the park's successful work on both the carriage road and the motor road systems, rehabilitation of the trails became the next major challenge for park management. And although ongoing maintenance work had certainly continued on the trail system, it had not always sensitive to trails' historical importance. A need was recognized for developing maintenance and rehabilitation practices that were more sympathetic to trail system's significance as an historic resource (Figure 7-1).

Preserving Historic Character

Through the research and analysis involved in producing the Cultural Landscape Report Volume 1 and the National Register nomination, the importance of the

trail system as a cultural landscape became increasingly evident. As a result, it was discovered that maintenance practices that might be standard for other trails, might not be appropriate for trying to preserve the historical character and significance of Acadia's highly crafted trails. For example, replacing historic stepping stones with a modern bridge might ease maintenance tasks and address visitor accessibility issues, but it would also drastically change the trail's character and impact its integrity as a historic memorial trail (Figure 7-2). On many trails the features that add to the trail system's integrity still remain in relatively good condition. Yet, on some trails, many years of neglect and increasing visitor usage have led to the deterioration of many of the significant historic features that were identified as character-defining for Acadia's system, such as collapsing steps, exposed roots, and excessively wide, eroded tread.

Although the park staff was doing what they could to maintain and preserve the resources included in the trail system – a lack of time, funding, and a thorough understanding of the trail's historical development and construction methods was hampering their efforts. In the 1980s, park staff began to recognize the importance of documenting and maintaining the unique features that make Acadia trails different. They began documenting the trails in a system of inventories of trail features, and work logs. This baseline information was helpful not only in the trails crew's work, but also in the early stages of the development of the Cultural Landscape Report for the trail system. By working cooperatively, the Olmsted Center staff and the park staff have been able to combine this existing information with historical data on construction techniques, and in-the-field observations to develop a system for providing treatment and maintenance

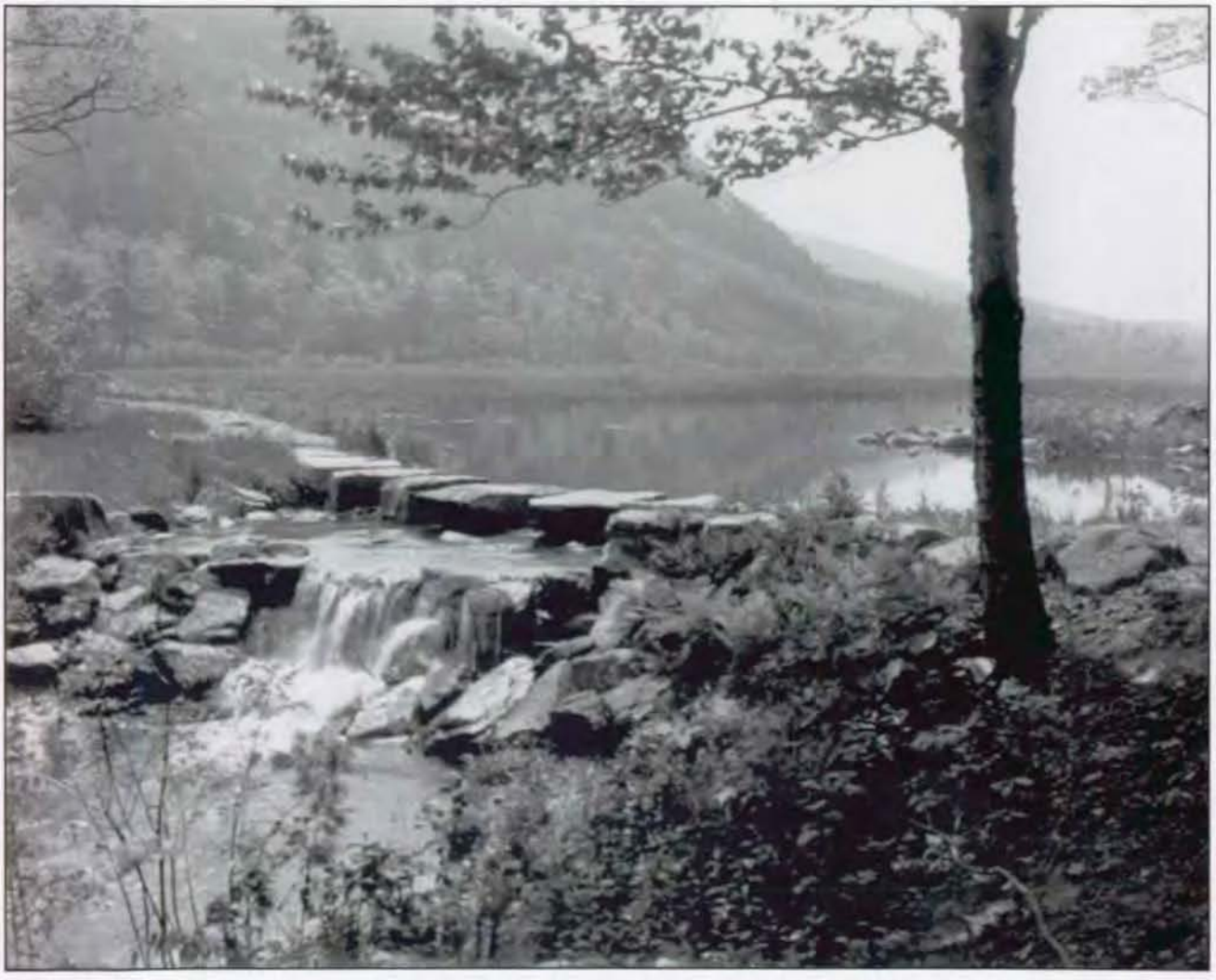


Figure 7-2: Historic view of stepping stones crossing the Tarn near intersection of four memorial paths, the Kane Path, Jesup Path, Kurt Diederich's Climb, and the Beachcroft Path (Acadia NP Archives).

guidelines that are specific to this historic resource. Additionally, other park staff have been concurrently developing a Trails Management Plan that looks at broader issues such as which trails to keep open and how other resources are impacted by proposed trail work. This plan will be described in a later section by Judy Hazen Connery, Charlie Jacobi, and Gary Stellpflug.

So how specifically did we begin developing treatment and maintenance guidelines for the trails? During the first part of the Cultural Landscape Report, we began thinking about a treatment plan for the park and it became clear that the traditional planning process needed to be "tweaked" a little to fit the special needs of this resource. In the CLR process, as previously described by Margie Coffin Brown, the treatment plan is the guiding document for the resource's long-term preservation strategy. Decisions made in the treatment plan are based on the historical information and analysis contained in the first part of the Cultural Landscape Report and are influenced by factors like existing conditions, contemporary use, management goals, and sustainability over time of the recommended treatment.

Treatment Options

During this process, one of four guiding treatment options is chosen based on the information from the Secretary of the Interior's Standards for Treatment of Historic Properties. The four options include:

Preservation – stabilizing and maintaining what you have
Restoration – restoring to a certain date, removing things from other periods
Rehabilitation – allows for new uses while maintaining the historic significance
Reconstruction - reconstructing a missing feature based on historical evidence

After one of these treatment options is chosen, a plan is developed and implemented. In many cases, a preservation maintenance plan is also written to provide guidance for the maintenance personnel in the long-term maintenance of the resource. For a number of reasons, we have decided the Acadia trails plan should be slightly different from the normal treatment plan. Some of the factors we took into account include:

- the enormous size of the resource
- the vast number of individual features present on the trail system,
- the high volume of visitor use and the resulting wear and tear,
- and the reality that a one-time treatment implementation would be highly unlikely for the entire trail system, but ongoing treatment and maintenance would be needed.

Instead of the traditional treatment plan, we have focused on developing one document that includes both treatment and maintenance guidelines for each of the included trails. The information contained in the final plan will allow work to continue on the trails in a manner that preserves the system's historic character, and yet allows for continued work and maintenance as funding and manpower become available over a longer period of time.

In developing the plan, rehabilitation was chosen as the overriding treatment option for the trail system. Rehabilitation is defined as:

> "The process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values."

According to the Secretary of the Interior's Standards, rehabilitation is an option for a historic resource :

> "When repair and replacement of deteriorated features are necessary; when alteration or additions to the property are planned for a new or continued use and when its depiction at a particular period of time is not appropriate."

The trail system certainly fits all of these categories. There were, and continue to be, many deteriorated features in need of repair. Alterations to the system were anticipated for a variety of reasons, including:

- improvement of visitor safety,
- access for the disabled,
- protection of other park resources,
- reconnecting the park's trails with nearby villages like Bar Harbor.

Finally, given the system's long and varied history, and its resulting association with many different groups and time periods, the depiction of the system at one particular time period was not a realistic goal.

The overriding treatment was a relatively easy decision to make. The more difficult tasks came in deciding how to develop treatment guidelines for over 100 trails, each with its own unique features and concerns. One early approach discussed among the team was the division of the trails into two types: Acadia Style Trails and Other Trails. Acadia Style would include the highly crafted memorial trials, like the Emery Path, while the Other Trails would include all other trails in the system, many of which have few if any "highly crafted" features (Figure 7-3). The idea was to develop individual specifications for each of the Acadia Style trails to ensure the character of the trail would not be compromised. Then general specifications would be generated for the Other Trails. We determined, however, that if this process was followed, it would result in a system where 90% of the trails would end up with the same character and features. Much of the unique character represented by the different styles of VIA, VIS, CCC, and other trail features currently present would be lost.



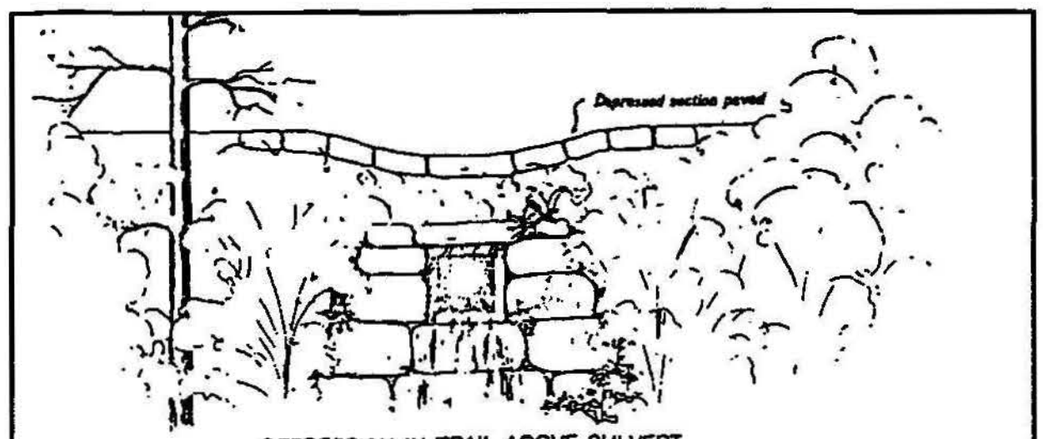
Figure 7-3: Historic view of the Emery Path, example of Acadia style stonework (Acadia NP Archives).

For example, a CCC culvert like the one on the Perpendicular Trail might be lost because this trail might fall into the category of Other Trails (Figure 7-4). When the feature needed to be rehabilitated, the recommendation would not necessarily be to replace in kind. Similarly, VIA stepping stones might not be maintained, since they were not on an Acadia Style trail. In light of these anticipated results, we decided that each of the trails would have to be looked at individually to see what types of features gave the trail its unique character and what types of features should and should not be maintained or added to that trail. In the resulting plan, an individual trail history would be provided. This information, along with a general description of the character of the trail and specific recommendations would be useful for the worker trying to make a decision on what features might be appropriate for certain trails.



Figure 7-4: Closed culvert built by the CCC on the Perpendicular Trail.

In further discussions with the trails crew, we determined that the plan will also have a separate section on the different types of features present in the



DEPRESSION IN TRAIL ABOVE CULVERT
SKETCH NO. 20

Figure 7-5: CCC specifications for closed culverts in Guy Arthur's 1937 manual "Construction of Trails, CCC Field Training."

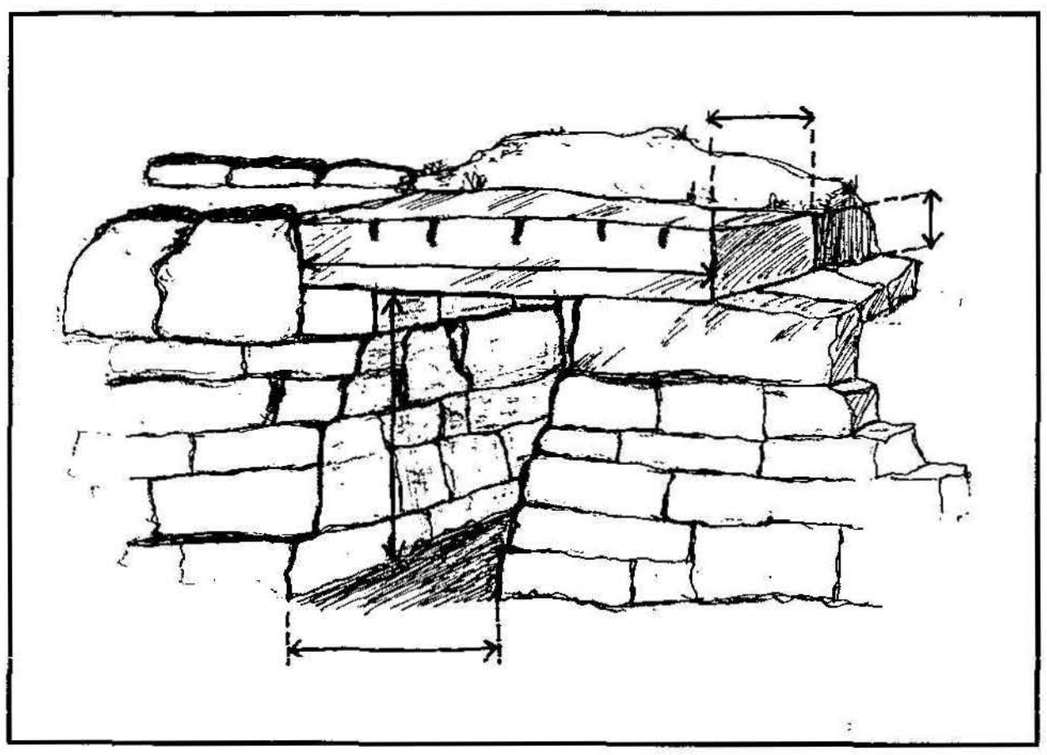


Figure 7-6: Specification sketch for CCC capped culverts in Acadia (drawn by Chris Barter).

Acadia system. Included in this section are photographs, sketches, and written specifications for each feature type. Information on specific features is gathered from a variety of sources, including historical documentation like a CCC trail maintenance booklets (Figure 7-5). In this section of the guidelines, the history of the feature's use at Acadia is discussed, and there are guidelines for when to use certain features, and on what trails they are most appropriate. The resulting document consists of three sections:

1. An introduction to the guidelines will include a summary of the system's history, a discussion of the system's significance, and a justification for choosing rehabilitation as a treatment option.

2. Guidelines for individual feature types present on the trails from the VIA/VIS, CCC, NPS, and other applicable periods will be developed. In this section, photographs, sketches, specifications, and recommendations for appropriate usage are also included (Figure 7-6). We have identified 10 categories of features that are present on the Acadia trail system. They are: Crossings, Drainage, Guidance, Iron Work, Monuments and Structures, Retaining Structures, Route, Steps, Treadway, and Vegetation. Each of these categories has several different types of features present. For example, "Crossings" includes four different types of crossings – bogwalk, bridges, causeways, and stepping stones. In developing the list of features to include in the plan, we used several different sources. Historical information came from the research undertaken for the first volume of the CLR. Additional information came from the trail logs and trail database maintained by the park. Most significant was the input of the trails crew themselves. Their knowledge of the system, and what types of features are present on individual trails was invaluable.

3. Specific treatment and maintenance guidelines will be provided for the 103 individual trails that are currently marked and maintained by the park. Provided for each trail is a trail history, a description of the features present, photographs, and treatment recommendations specific to this trail. The information included in this section comes from the CLR Vol.1, the trails database, and extensive notes and photographs taken by the trails crew during on-site existing conditions inventories for each trail.

The guidelines are intended to be used to answer questions from trails workers. Although they do not give a specific prescription for each trail, the do serve as guide to both management and maintenance staff and give them the opportunity to make informed decisions about what types of work is appropriate for this historic resource. A recently constructed bridge near Great Meadow is one example of how the guidelines might work. Originally, a CCC bridge was constructed on the Great Meadow Trail in the 1930s (Figure 7-7). The new bridge was constructed in a similar style in 1999, with some slight modifications such as log size and design of the abutments. It was added to a recently opened village-connector trail from nearby Bar Harbor into the park and is compatible with the character of the original Great Meadow Trail

and early CCC bridge styles (Figure 7-8). This illustrates how a new feature can be designed to fit into the historic character of the park while still being distinguishable from an original feature, as is called for in the Secretary of Interior's Standards. Chris Barter will describe rehabilitation of the Jordan Pond Trail, which also shows how the guidelines have informed recent trail work.

Collaborative Approach

Although the Treatment and Maintenance Guidelines for the trail system is far from complete, it has been and continues to be a successful collaboration between the Olmsted Center and the park staff, especially those whose day-to-day work involves actual physical work on the trails. The continual sharing of information and ideas, along with the reliance on the expertise of the trails crew is providing a much more useful document for future park managers and maintenance staff.

As mentioned earlier, the trail inventories and database have been useful not only in the past maintenance and management of this resource, but in all phases of the Acadia Trails project including both parts of the Cultural Landscape Report. As the planning documents have developed, they have also informed the inventory and database. As the Treatment and Maintenance Guidelines are finished up, it is likely that the information provided on maintaining features and individual trails will be incorporated in some manner into an updated database and inventory system. Gary Stellpflug's section will give further insight on how these tools were first developed at the park and how they have continued to be effectively used and updated by the trails crew.



Figure 7-7: 1930s photograph of CCC bridge in the Great Meadow (National Archives, Waltham).



Figure 7-8: 1999 photograph of recently constructed bridge on new Great Meadow Loop Trail.

8. Information Management: Trails Crew Inventory



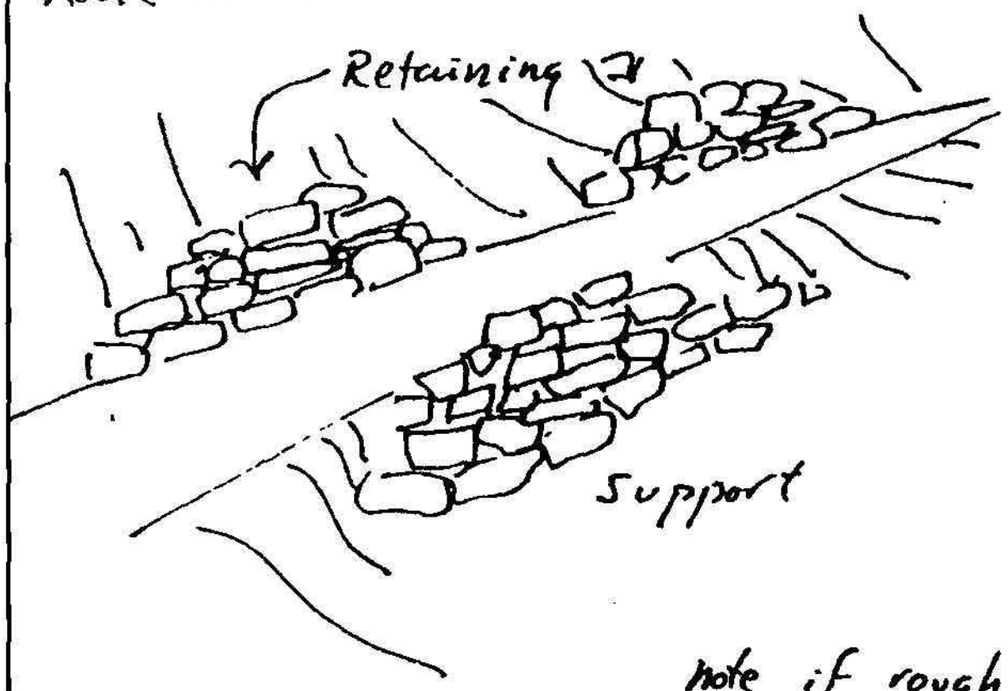
Figure 8-1: Trail crew on Jordan Pond Trail, summer 2000.

Gary Stellpflug
Trails Foreman
Acadia National Park

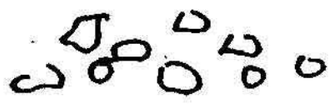
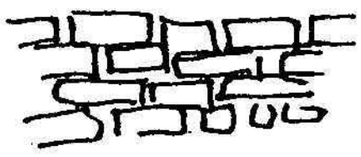
When I began working on Acadia's trails in the late 1970s, I recognized the need for an inventory of the trails. I did a half dozen trails on my own, then in 1985 the trails crew began working on the inventory. We recorded about three hundred pages of handwritten notes. Simplifying our approach, we completed the inventory of nearly one hundred trails by 1987 (Figure 8-1, 8-2). At the same time, the National Park Service's service-wide Maintenance Management System (MMS) arrived at Acadia and all other national parks. This computerized program was designed to assist maintenance managers in their efforts to plan, organize, and direct park maintenance. This was the first big test for our inventory. We added a few trail inventories to the system and found that our information was more detailed than MMS. In the early 1990s, when I had temporarily left the park service, the trails program grew, and more information was needed to direct multiple crews. To respond to this need, Trails Crew Leader, Chris Barter, volunteered during the winter months of 1993 and created a PROfile database. Our hand written inventories were translated into a database. Each feature and work type was given a two-letter code, i.e., SS for stepping stones, and WB for water bar. Quantities and measurements were indicated in linear feet and square feet. Certain feature types, such as steps and stepping stones, were counted (Figure 8-3).

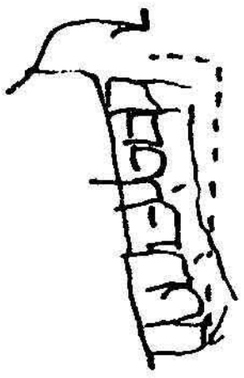
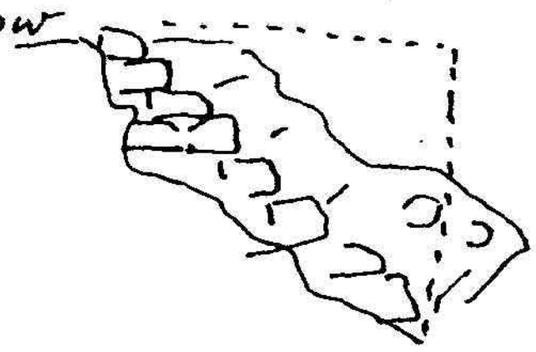
Once the information was loaded into the database, it could be updated, expanded and reconfigured (Figure 8-4). We still use the original form in the field. But we now use the database to generate work logs and reports by feature type. Upon returning to the park in 1999, there are more trail crews and the need to provide information to other cultural and natural resource specialists. We now need a database that is

ROCK WALLS



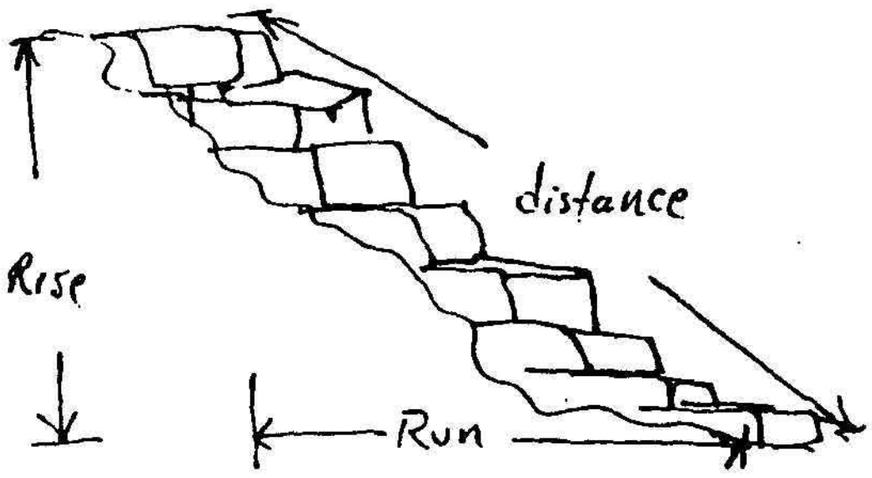
Any wall below the trail is a support wall, any wall above is a retaining wall.
Measure length of wall, measure height of wall, note whether support or retaining.

note if rough or rubble  or laid 

note if "batter" is steep  or low 
- batter is pitch of out side of wall, its angle.

note any characteristics of wall - rock size, curving, any pins into ledge, condition of wall, obscure or very visible.
Remember to note walls in conjunction with stairs or sidewalks, etc.

STEPS



measure trail distance to top or bottom step. Measure rise, run, and distance. Count steps.
Note construction: any pins, walls, coping, missing stones, Note width of stairs, average. Note if steps go up or down in relation to direction of travel.

Figure 8-2: Sample page from Acadia NP Trails Crew manual inventory approach developed in the 1980s.

more user friendly. We plan to convert the database to ACCESS as soon as we find the time to do it.

Our work log indicates the tremendous backlog of work needed on the trails. We use the reports from the database to assign tasks and calculate the work time needed. We plan to continue adding information into the inventory because the nearly thirty years of information increases our understanding of the history and significance of the Acadia trail system.

ACADIA NATIONAL PARK

TRAIL INVENTORY

TRAIL: Jordan Pond

SECTION: 4 | DIRECTION N to S | PAGE 1 of

DISTANCE	FEATURE	??	
2265	Photo		looking ~~back~~ toward S.
2285	culv		the "C" shaped culvert. built ~85 used for reference for ↓
2326	photo		
2352	photo		
2365 – 2429	wall & turnpike		wall begins LHS w/ ditch. very wet area entire turnpike filled w/ crush-rock base
2379	wall	*	NOTE Between 2379 & 4290 there is Always RHS wall unless noted
2379	culvert		OPEN, STONE 4' wide 10-11" gap 8" deep base lined with flat rocks 2 rocks @ side of culvert Built by MCC 11/99
2379	photo		
2416	culv.		open, stone 8-9" gap 8" deep crush lined 2 big rocks & 1 tiny side rock (LHS) on N side 3 " " on S side built 11/99

Figure 8-3: Sample page from Acadia's manual inventory for Jordan Pond Loop Trail indicating distance and feature.

'A	TRAIL NAME	SEC	DISTANCE	TO	FEATURE	MEASURE	AMOUNT	YEAR	DESCRIPTION
39	JORDAN POND								40x34x11". Keep area around them open and flowing toward culv at 1609.
		4	1614	1630	TURNPIKING	LINEAR FEET	16	1988	Short gravel ramp leading up to stepstones at 1624.
		4	1673		REFERENCE POINT				Pit, LHS up stream bed.
		4	1673	1680	TRAIL BRIDGE	COUNT	1	1984	Should be culv eventually
		4	1759	1766	TRAIL BRIDGE	COUNT	1	1984	Same as 1673-1680.
		4	1869		CULVERT	COUNT	1	1988	4'W, 3'L, 12" open gap. Stone.
		4	1912		CULVERT	COUNT	1	1988	4'W, 8'L, open 13" gap. Stone. Gravel/rock lined.
		4	1932		REFERENCE POINT				Pit, LHS.
		4	2031	2054	STEPSTONES	COUNT	11	1988	Over wet hole.
		4	2112		REFERENCE POINT				Pit. LHS.
		4	2112	2118	CULVERT	COUNT	1	1988	21"W, 6'L. Two open gaps of 10" anx 14". Stone,10x13x22" in th middle. A small culvert.
		4	2285		CULVERT	COUNT	1	1988	4'W, 12'L, 9" gap, open, stone. 19" deep. Culvert is "C" shape curve. Rock and gravel lined.
		4	2320		REFERENCE POINT				LHS
		4	2640		REFERENCE POINT				Pit, LHS.
		4	2670		CULVERT	COUNT	1		4'W, 4 1/2'L, 16" open gap. Shallow. "An odd ball."
		4	2980		REFERENCE POINT				LHS, note pile of cedar logs, 4' various, left from '84 work. HOw long will they take to rot away?
		4	2984		STEPSTONES	COUNT	1		
		4	3006	3129	TURNPIKING	LINEAR FEET	123	1984	18 cedar rock boxes above the grounx in muddy area. Filled with rock anx gravel.
		4	3270		REFERENCE POINT				LHS, pit
		4	3324		CULVERT	COUNT	1		5'W, 10'L, 15" open gap. stone. kind of dinky.
		4	3352		CULVERT	COUNT	1	1988	4'W, 5'L, 18" open gap w/ flat stonx base, 16" deep.
		4	3361		WATER DIP	COUNT	1		ditch crosses path
		4	3390		CULVERT	COUNT	1	1988	4'W, 8'L, 12" open gap, 10" deep
		4	3425		CULVERT	COUNT	1	1988	5'W, 15'L, two open gaps, 7 1/2" each. Centerstone is 18x20x32"
		4	3510		CULVERT	COUNT	1		6'W, more like a rock drainage dip.
		4	3535		CULVERT	COUNT	1		6'W, 6'L, two open 10" and 12" gaps 18x11x34", center stone. 4' walkwa follows, gravel fill.
		4	4142	4202	CULVERT	COUNT	1	1983	The following features are listed a being in this area, w/ no specific numbers.
		4	4142	4202	TRAIL BRIDGE	COUNT	1	1984	7' bridge.
		4	4142	4202	TURNPIKING	LINEAR FEET	22	1984	Cedar rock boxes, 2, one is 14', th other 7 1/2', stone and gravel filled. Refilled w/ gravel in 89.
		4	4241	4247	CULVERT	COUNT	1	1983	Stone, 8' long, 12" wide.
		4	4251	4274	TURNPIKING	LINEAR FEET	23	1984	Rock boxes, 2, gravel filled.
		4	4430		REFERENCE POINT			1984	Drilled, cut rock to fit Kubota,

Figure 8-4: Sample page from Acadia NP Trails Crew inventory database for Jordan Pond Loop Trail.

9. Jordan Pond Rehabilitation Project



Figure 9-1: Rehabilitated section of the Jordon Pond Trail.

Chris Barter
Trails Crew Leader
Acadia National Park

As the crew leader for the Jordan Pond rehabilitation project, the first major project since we started the cultural landscape report and treatment plan, I am going to talk about the process of figuring out what to do on that project, from the perspective of someone in the field: including problems and solutions (Figure 9-1). I am going to do my best to distill, from three years of work, a few minutes of wisdom. Because the Jordan Pond Project is taking place alongside the development of the treatment plan, each has influenced the other. In particular, the process we have gone through in solving problems on Jordan Pond has served as a useful guide in solving problems in the plan as a whole. I am going to describe the steps of the process, the recurring questions we asked, and the guiding principles we used – perhaps it is fairer to say "stumbled upon." The process can be described as four steps: fact finding, assessment, specific recommendations, and documentation.

Fact Finding

Through field examination and research documentation, we took a look at what was there and tried to determine when it was built. Since its original marking in the late 1800s, the Jordan Pond Trail has been loved nearly to oblivion. Fix-ups along the trail date from a number of eras. Sorting out the historic versus contemporary repairs required three sources. First, our in-house trails crew records indicate what was built in last 30 years, thanks to the meticulous record-keeping of the trails crew. These include some references to what was taken apart. Second, historical records and photos gathered as part of the cultural landscape report revealed earlier dates of construction and repair. A 1920s description of the trail as "a smooth, easy walk" and an old postcard showing Jordan Pond Trail gravelled and smooth with coping

wall on the sides, indicated that the condition of the trail had eroded substantially since this time (Figure 9-2). The third source, field work, involved looking at what was left along the trail. We also examined a nearby but less trodden path, the Seaside Path, also built by the Seal Harbor Village Improvement Society in the late 1800s using the same construction techniques. Because the trail is virtually abandoned, its not tinkered with as much, and there is more original work. As a broad rule, the abandoned trails on Mount Desert Island are good resource for research on historic trail work. Nearly half of the early 1900s trails are no longer mared. These abandoned trails are like little museums in the woods.

Assessment

In the field we discussed whether the old work suits current needs and whether it was feasible to continue the construction methods and effectively maintain the trail, i.e. was the historic work sustainable. With all of our information in hand, we asked three evaluative questions:

- Is it feasible to reconstruct what was there?
- Will it serve the function it must now serve?
- What other options are available?

In answering the first question, is it feasible?, the answer was "no" for many years. With limited information, time, and funding, simple repairs were carried out rather than major rehabilitation. However, now with the Acadia Trails Forever trails endowment program and rehabilitation guidelines, the answer is, "yes" we can preserve the character of the historic trail, with one major and several minor exceptions.

Natural resource protection must be considered, particularly on a pond-side trail. The historic method of borrowing gravel from nearby pits is disruptive to the pond-side ecosystem. It is also extremely time-consuming. As a result, surface material for the trail tread is imported from an off-island source and carted in over the ice in the winter. The material, a mix that was also used in the carriage road rehabilitation, looks slightly different, the aggregate is blue and gray granite rather that brown and pink granite. It is hoped that as organic mater mixes with the surface, the material will better blend with the surroundings.

The second evaluative question, does the original work serve the current use of the trail? Again the answer is mostly "yes," with some exceptions. The old coping wall was loosely set and would not hold the gravel tread material. In sloped areas, the tread would not hold due to high use. If left unchecked, the tread would gully, erode, and slump to bottom. And finally the historic trail did not adequately address drainage issues. It is possible that the concentration of water changed with the Park Loop Road constructed several hundred feet uphill from the trail. There is also extensive seepage along the entire length of the trail. Ignoring adequate drainage in the past has led to most of the trail's trampled, eroded and rooted sections, making the trail one of the most difficult hikes.

The third question was to evaluate what other options are available. This, in many ways is a judgement call, when one that looks back to the overall goals of the rehabilitation. What, we must ask first, is the level and nature of the rehabiliation? For Jordan Pond, the answer is "high," and "as exact as possible" to achieve this level we considered new techniques of construction and new technology available in the form of materials. These techniques and materials would be applied in such a manner as to preserve the historic character of the trail.



Figure 9-2: Circa 1920 photograph by Charles Townsend.

Recommendations for Treatment

To arrive at specific recommendations for treatment we followed a process, established principles, and monitored results. The process involved several long meetings. The best were meetings of experts with different perspectives. For example a 1997 working group involved expertise from Maine's Baxter State Park, the Applachian Mountian Club White Mountains Trails Program, the Maine State Historic Preservation Office, and staff from the Olmsted Center for Landscape Preservation. Through discussions in the field, the group balanced historical concerns with practical concerns. Within Acadia's Trails Program there has been an ongoing crew dialogue, an effort to keep communications open, and constructive criticism, i.e., "that looks wrong." Much of this dialogue has resulted from trial and error work in field. For example our 1998 wall work style versus the work done a year later.

As a result of the communication process, three major principles have surfaced. First, we should not introduce new features without historical precedent (Figure 9-3). There are only specific cases where we need to deviate from this principle. Those are the use of log cribbing and bogwalk through wet areas as a short-term solution, before major rehabilitation work can take place. Log cribbing is used to stabilize gullies on heavily used areas. Bogwalk is used when natural resource issues require its use, such as on the Jesup Path. Here the historical construction method, a gravel turnpike or causeway, was interfering with wetland habitat. Bogwalk was used to repair a section because it allows for the flow of water. On this section of the Jesup Path and on heavily damaged sections of pond-side trails, such as the west side of Jordan Pond, one must rely on non-historic solutions to preserve the historic route and experience.

Looking at the broader experience offered by the rehabilitation of Acadia's trails, we see that the sum of work accomplished is representative of the original whole. Our rehabilitation work represents the original features, as well as the historic location and feeling. One could concentrate on the individual features and rehabilitate each one and come out with a different whole. Our aim is to use the historic features, materials, and methods as much as possible, but concentrate on rehabilitating the whole trail as part of the historic trail system. For example our year 2000 work on Jordan Pond Trail included two graveled over wooden foot bridges, similar to those seen in historic photographs elsewhere in the trail system. These provide a smooth gravel surface and preserve the trail's character as "a smooth, easy walk." Other additions such as drainage pipes are obscured under stonework accomplished in the historic style.

Documentation of Solutions

Based on our fact-finding, assessment, and available materials, techniques and labor, we have developed solutions that both preserve historic character and provide durable tread. These solutions are documented as part of detailed inventory of all built



Figure 9-3: Log and boulder turnpiking was not historic work and was removed during the rehabilitation.



Figure 9-4: Crew working on Jordan Pond Trail, summer 2000.

features on the trail, their location, condition and origin or replacement history. They are also described in the cultural landscape report and treatment plan guidelines drafted during the project. This process is illustrated by the solutions we came up with for the Jordan Pond Trail. First, throughout the trail, the coping wall was not retaining gravel. A new style of laying the stones along the sides was used so that they retain gravel. Stones are angled and placed "header" style, with careful placement for high points of contact (Figure 9-4). Closely examined sections of wall look slightly different, but the look of the trail as a whole, a gravel surface lined with stone, is nearly identical.

A second problem was keeping gravel surface on slopes. New construction methods were introduced, including stone checks and dips. Checks are rows of stones used to retain the treadway on an evenly sloped section of trail with a grade less than twenty percent. They are often used to rehabilitate a highly eroded area where the original trail surface has washed away and a gully has formed. Rows of stones are set perpendicular to the trail with no gaps in between individual stones. The checks are backfilled with rubble and then covered with a topcoat of tread material. To prevent failure of checks due to erosion or lack of maintenance, the bottom of each check stone is placed at an elevation below the top elevation of the preceding downhill row of check stones. The checks act as "hidden steps" underneath the tread surface, holding back, or "checking" the uphill infill material. These hidden features help preserve the even tread of heavily used trail, which was once a lightly used historic trail. Dips are drainage swales, angled to divert water off the trail, that are discernable only to the drainage-conscious eye.

A third problem was seepage along most of the cross-slope, pond-side trail. Historically there may have been French drains, made up of covered channels of stone, or subsurface drainage, made up of stone rubble under the entire treadway. Over the years these drain systems clogged and were no longer effective. The solution was to add plastic perforated pipe drains under the tread surface. These drains consist of sections of perforated plastic pipe surrounded by gravel and wrapped in geotextile material. Perforated pipe drains have been installed parallel to the trail on the uphill side, to function as side drains, and crossing underneath the treadway, to function as culverts. These drain pipes allow water to flow with minimal siltation. The surface of the trail retains its historical appearance but drains better and is thus more durable.

These solutions are documented in our treatment guidelines as described by Tracy Stakely. Let's let the Jordan Pond Trails speak for itself with before and after photographs (Figures 9-5, 9-6).



Figure 9-5: Eroded section of trail before rehabilitation.

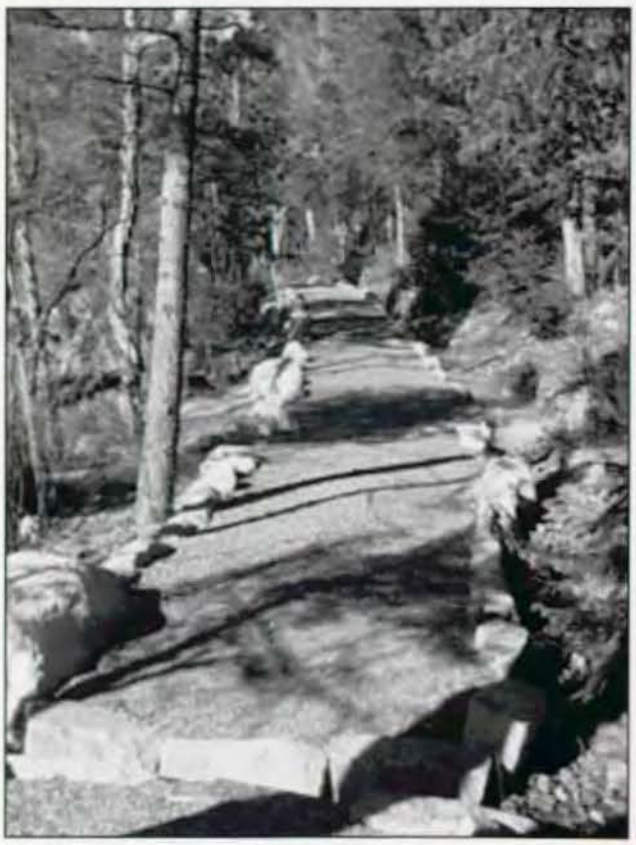


Figure 9-6: Section of trail after rehabilitation, also see Figure 9-1.

10. Acadia National Park Hiking Trails Management Plan



Figure 10-1: The preferred alternative proposes opening the Homans Path, a memorial trail that has been unmarked and unmaintained for over fifty years.

Judy Hazen Connery
Natural Resource Specialist

Charlie Jacobi
Recreation Specialist

Gary Stellpflug
Trails Foreman
Acadia National Park

There are many aspects of preserving historic trails that require management decisions. To guide the rehabilitation, maintenance, and management of trail use within Acadia National Park, the park is preparing a management plan. The *Draft Hiking Trails Management Plan and Environmental Assessment* (hereafter Trails Management Plan) will soon be released for public review. The final management plan will serve as a companion document to the "Historic Hiking Trail System of Mount Desert Island Cultural Landscape Report for Acadia National Park, Maine,Volume 2: Treatment and Maintenance Guidelines" described earlier by Tracy Stakely, Gary Stellpflug, and Chris Barter. This session will describe the planning process: the need for the plan, selecting the planning team, identifying issues to be addressed, developing alternatives, and involving the public.

Purpose and Need for a Trails Management Plan

Until now, the National Park Service lacked the resources to maintain trails in an era of ever-increasing numbers of hikers, and did not fully understand the historical significance of park trails. For many years, trail development and abandonment in the park were haphazard rather than organized and integrated around established goals and criteria. The NPS also lacked information and resources needed to protect cultural features on trails. Many trails are in disrepair and continue to deteriorate, causing natural and cultural resource damage and creating safety concerns.

The Acadia Trails Forever partnership, a funding initiative between the NPS and Friends of Acadia (FOA), now provides the opportunity to rehabilitate and maintain park trails in a coordinated manner, in perpetuity. Nine million dollars have been raised from private sources to be combined with four million dollars of federal funding. Complete rehabilitation of the hiking trail system is expected to take ten years or more.

To guide decisions related to the rehabilitation effort, the park is preparing a management plan. The planning process will establish goals for managing hiking trails, decide which trails are included in the hiking trail system, prioritize trail rehabilitation and maintenance, and shape the visitor hiking experience. A plan is also needed to ensure that trails are sustainable for the long-term, natural resources are preserved along trail corridors, and Acadia's trail system, individual trails, and trail features are protected as nationally significant cultural resources.

The goals and general philosophy outlined in the plan for managing trails and trail use will apply to park land on Mount Desert Island, the Schoodic Peninsula, Isle au Haut, and other park islands. The plan will also address trails on private MDI lands that were originally constructed to connect local communities with the park. Working cooperatively with local landowners, communities, and individuals that use and maintain private trails will be essential for any actions related to trails outside the park boundary.

The plan will address traditional pedestrian use of hiking trails. Carriage roads, multiple use trails and fire roads (such as the Hio Road), and park use by equestrians, bicyclists, and other recreational users are not included. However, because the motor road, carriage road, and hiking trails systems are often connected, management decisions concerning adjoining resources may influence decisions about the trail system.

The Trails Management Plan will decide which trails will be included in the park's mapped and maintained trail system based on established goals and criteria and a systematic review of each trail segment. The NPS must assure that the Acadia National Park trail system offers a diversity of high quality recreational opportunities for hikers. The plan will address the provision of information and education, and trail system layout; in particular, its affect on large contiguous natural areas and experiences on trails.

The plan will not address parking issues or how many hikers can use the trails without unacceptable resource damage or making the trails seem too crowded; parking and carrying capacity issues will require additional information gathering and planning. The Draft Trails Management Plan will provide four alternatives for rehabilitating and maintaining the hiking trail system and managing hiking in Acadia National Park. Public comment on the alternatives will help the National Park Service decide how to best rehabilitate and maintain trails and manage hiking.

Planning Process

Early in the process, we decided to complete the plan in house, using a team approach. The core team consisted of a natural resource specialist, trails foreman, and recreation specialist. Additional team members included a GIS specialist, trails crew staff, the chief ranger, chief of resource managememt, chief of maintenance, and chief of interpretation. Additional consultants included staff from the Friends of Acadia, the Olmsted Center for Landscape Preservation, the National Park Service Rivers and Trails Office, a land resource specialist, air and water quality specialist, wildlife biologist, and botanist. In 1998, park staff met with local trail experts especially knowledgeable about the abandoned trails. The group tested criteria developed by the park to evaluate which trails should be part of the maintained system. In 1999, the park hosted four public workshops to solicit proposals for trail additions and deletions and obtain comments on the draft goals for the trail system. The park also gave several presentations, held an open house, and spoke with related organizations, including contacts with six Native American tribes in Maine. The park also consulted with compliance specialists regarding the National Historic Preservation Act, National Environmental Policy Act, Clean Water Act, Shoreland Zoning, and Maine Natural Resources Protection Act.

Goals for Managing Hiking Trails and Trail Use

Through internal discussions, public input from a series of workshops, and with the help of recent historical research, the NPS drafted the following goals for managing the hiking trail system in Acadia National Park.

Protect Park Natural Resources

Manage the effects of trail development and use on natural resources.

- Minimize soil erosion, vegetation loss and wildlife disturbance.
- Preserve large natural areas without maintained trails as undisturbed wildlife habitat.
- Protect threatened/endangered species, species of concern, and sensitive habitats.
- Protect water quality, including public water supplies.

Protect Park Cultural Resources

Preserve the elements and features that contribute to the national significance of the trail system as a cultural resource, and protect other cultural resources and values, including those associated with Native Americans.

- Maintain historic trail routes and names where appropriate.
- Maintain constructed features such as steps, bridges, walls, ladders, rungs, drainage, tread, marking, and memorial plaques.
- Protect scenic features including rock formations, vegetation, water bodies, and views.
- Protect associated buildings, structures, and developed areas.
- Protect associated archeological resources.

Provide High Quality Visitor Experiences

- Provide safe, high quality trail experiences that access a variety of natural and cultural resources, and vary in difficulty, accessibility, length, risk, and use levels.
- Preserve opportunities for low-impact travel off trail, and opportunities to discover and use abandoned trails.
- Provide pedestrian access to park facilities and destinations; provide loops in heavily used areas; and provide connectors to local communities, bus routes, and other trails, encouraging people to enjoy the park without a car.

Educate the Public

- Offer opportunities to interpret natural, cultural and scenic resources of the park and to educate visitors about low impact use of the park.

Make the Trail System Sustainable

- Manage and maintain the trail system in a sustainable manner with respect to the size of the system, the type and level of maintenance, the source and amount of materials used, and the number of hikers accommodated. Sustainability extends to materials obtained from outside the park. Management and maintenance should also be flexible enough to meet future needs.

Major Issues

With these goals identified, issues arise when trails and trail use affect natural or cultural resources, visitor experiences, communities and neighbors, or park operations. The following is a list of issues addressed in the management plan. While all issues need to be addressed, issues such as whether dogs should be allowed on all trails dominated public meetings and associated newspaper articles about the plan.

- Balancing natural versus cultural resource protection
- Size and configuration of the trails system
- Opening or closure of trails in large undeveloped areas
- Source of construction materials
- Beaver management in relation to flooded trail sections
- Vegetation management at vistas and along trail corridors
- Trail impacts on threatened and rare species, species of concern, and sensitive communities
- Trail use related to possible disturbance to wildlife
- Trail and trail use impacts on water quality
- Trails with severe erosion
- Trails through wetlands
- Unauthorized abandoned trail maintenance and unauthorized new trail development
- Treatment of social trails
- Diversity of visitor experiences
- Providing trails for hikers with special needs
- Public transportation
- Connector trails
- Dogs on trails
- Helping visitors choose appropriate trails to hike

- Maps and information
- Educating visitors about history of the trail system
- Leave No Trace education
- Trail system long term environmental and economical sustainability

Several issues are addressed conceptually in the management plan and in more detail in the treatment guidelines described by Tracy Stakely. These include:

- Preserving the historic character of the trail system
- Level of rehabilitation or priorities for trail rehabilitation
- Trail names
- Trail signs
- Trail markings
- Keeping hikers on trails by guidance, barriers, and ranger patrols

This list of issues highlights the complexity of decisions relating to the trail system. Ideally the management plan and treatment guidelines will work hand-in-hand to provide clear direction for all trail management and maintenance issues.

Trails Evaluation Process

As part of this planning effort, the NPS developed a two-tiered method to objectively review all trails on MDI for inclusion into the park trail system. Three staff members familiar with park trails rated 169 trails, including all currently maintained trails, and all abandoned and new trails proposed for inclusion by park staff or the public.

We operated under the following assumptions:

1. Properly maintained trails are safe for the vast majority of visitors. Safety concerns for trails were addressed in the Visitor Experience evaluation criteria. The Visitor Experience criteria rating was lowered due to safety concerns only for trails that affected the safety of other visitors (for example, hazards to auto traffic) or when trails crossed roads or required roadside walking access.
2. Trails can be properly maintained with expected staffing and funding from the Acadia Trails Forever Program.
3. Many natural resource concerns can be mitigated through trail maintenance or temporary closures.
4. Most trails have little impact to neighbors and communities because they do not connect to adjacent villages or private lands.

For the first evaluation, we developed and weighted these four criteria:

1. Cultural Resource Values - Factor Weighting Value 5
2. Effects on Natural Resources – Factor Weighting Value 5
3. Effects on Communities and Neighbors – Factor Weighting Value 2
4. Visitor Experience Values – Factor Weighting Value 4.

Table 1 describes the criteria in more detail. For all existing trails (as described in the parks trail maintenance inventory), and all trail proposals (abandoned and new), the team scored each criterion on a scale of 0 to 10 for each of the four criteria. The scores for each criterion were multiplied by a factor weighting value (2, 4, or 5) to obtain a weighted score. These weighted scores for each criterion were then added to obtain a total score for each trail.

The highest possible trail score was 160 points for existing and abandoned trails. For proposed new trails, the highest possible score was 110 points because new trails generally had little or no cultural value. All total numerical scores were converted to percentages to allow comparisons between currently maintained, abandoned, and new trails. Higher scores indicated a greater likelihood for retaining or adding a trail to the system.

Alternatives

Based on the issues, applicable laws, and NPS policies, four alternatives were developed: 1) no action, 2) rehabilitation with emphasis on protecting natural resources, 3) rehabilitation to protect natural and cultural resources (the preferred alternative) and 4) rehabilitation with emphasis on protecting cultural resources. Each alternative will contain an analysis of the environmental and social effects. Each will take into account the rich history of trails on MDI, the protection of park resources, community and visitor

Table 1: Trails Evaluation Guideline (considers trail alone, not as part of system)

Criteria	0	5	10
Cultural Resources (FWV 5)	Not historically significant as determined by National Register Nomination (retains little integrity, not highly crafted construction, not associated with significant person, place, or event, was not once part of or fulfills intent of trail that was part of system as of 1947). Does not provide access to cultural resources other than the trail itself. Compromises Native American sacred sites/values.		Historically significant as determined by National Register Nomination (retains most integrity, highly crafted construction, associated with significant person, place, or event, was once part of or fulfills intent of trail that was part of system as of 1947). Provides access to cultural resources other than the trail itself. Protects Native American sacred sites/values.
Natural Resources (FWV 5)	Affects Federal, State, or locally rare species or sensitive habitats. Large natural areas: 1. trailless area greater than 200 acres (50 largest). 2. trail divides habitat into two large blocks of land. 3. habitat divided is especially susceptible to human caused disturbance. 4. trail increases density of trails in/near pristine or high quality area. 5. trail crosses small, high quality habitat patches. High erosion potential difficult to mitigate. No adverse effects on environment from mining/harvesting native materials (inside or outside park). Less than 25 feet from water (stream, lake, vernal pool, ocean) Near/in existing or potential high quality beaver habitat. Risk of contamination to public water supply from improper disposal of human waste is high because trail is less than 200 feet from water, *landscape and soil characteristics preclude* effective decomposition, visitor use is high, and no toilet is available (or will be).		Does not affect Federal, State, or locally rare species or sensitive habitats. Large natural areas: 1. trailless area less than 200 acres (50 largest). 2. trail divides habitat into one small and one large block of land. 3. habitat divided is not especially susceptible to human caused disturbance. 4. trail does not increase density of trails in/near pristine/high quality habitat. 5. trail crosses small, high quality habitat patches. Low erosion potential or easy to mitigate erosion. No adverse effects on environment from mining/harvesting native materials (inside or outside park). More than 25 feet from water (stream, lake, vernal pool, ocean). Not near/in existing or potential high quality beaver habitat. Risk of contamination to public water supply from improper disposal of human waste is low because trail is more than 200 feet from water, landscape and *soil characteristics promote effective decomposition*, visitor use is low, and a toilet is available.
Communities & Neighbors (FWV 2)	Does not connect with towns or villages (GMP/for new trails only). Increases parking/traffic problems outside park and need for policing. Reduces privacy of park neighbors. Does not connect to concentrations of residents or visitors (existing trails). Detracts from community life for residents. Increases maintenance responsibilities for other trail maintainers (VIAs).		Connects with towns and villages. (GMP/for new trails only) Does not increase parking/traffic problems outside park or need for policing. Does not reduce privacy of neighbors. Connects to concentrations of residents or visitors. (existing trails) Enhances community life for residents. Reduces maintenance responsibilities of other trail maintainers (VIAs).
Visitor Experiences (FWV 4)	Does not provide loop in heavily used area. (GMP/for new trails only) Does not connect with park campgrounds. (for new trails only) Does not offer outstanding features of interest to hikers. (views, flora, fauna) Does not form loop or contribute to loop opportunities. (GMP/existing trails) Adds to parking congestion or creates new problems. Not accessible through existing parking or bus system. Does not provide exceptional education opportunities. Provides no opportunity for special populations. Contributes to visitor confusion or visitor conflicts (e.g. climbing/hiking).		Provides loop in heavily used area. (GMP/for new trails only) Connects with park campgrounds (for new trails only). Offers outstanding features of interest to hikers. (views, flora, fauna, thrills) Forms a loop or contributes to loop opportunity. (GMP/for existing trails) Does not add to parking congestion or create new problems. Accessible through existing parking or bus system. Provides exceptional education opportunities. Enhances opportunities for special populations. Reduces visitor confusion or conflicts.

needs and interests, and the economic realities of park management in the 21st century. The first alternative, no action, is required by the National Environmental Policy Act (NEPA) and is used for comparison with the action alternatives.

Lessons Learned in the Planning Process

What are the lessons we have learned from the planning process? First, that planning takes time, at least a year. Second, that the team preparing the plan needs all of the tools available, use data, cost data, historical documentation, GIS data and overlays, and associated expertise. Third, a word of caution: be aware of, and include, as many interested parties as possible, in order to identify and address all pertinent management issues. Fourth, it is very important to have good Friends, such as the Friends of Acadia, to provide funding for the collection of data and the compilation of information. And finally, do not start with a solution and write a plan to justify it. Use the NEPA process the way it was intended to be used! For more info, contact us via the park – we'll be glad to share our experiences and help you through the process.

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11. "Acadia Trails Forever" A $13 Million Public-Private Campaign to Rehabilitate Acadia's 130-mile Historic Trail System

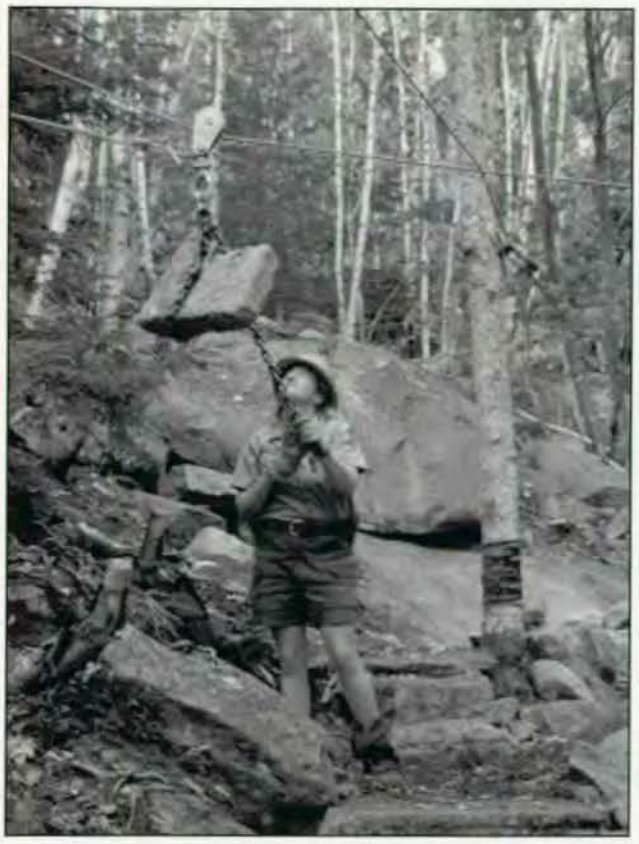


Figure 11-1: Work in progress on Acadia's Homans Path.

W. Kent Olson
President
Friends of Acadia

In 1999 Acadia National Park and the nonprofit organization Friends of Acadia launched their largest project to date. Called Acadia Trails Forever, the $13-million partnership would underwrite a ten-year rehabilitation of the park's entire trail system and privately endow its permanent upkeep. Then-Secretary of the Interior Bruce Babbitt and then-Park Service Director Bob Stanton helped announce the public phase of the campaign on July 29, 1999 and praised it as a model for the National Park System. Friends completed fundraising a year later, ahead of schedule. The landmark restoration is underway (Figure 11-1).

Acadia became the first national park with a privately endowed trail system and the first to use visitor fees to match private funds. Friends of Acadia's lead gift, $5-million from Ruth M. and Tristram C. Colket, Jr., was at the time the largest contribution by individuals to a Maine conservation nonprofit.

Below, annotated for inclusion in these proceedings, is the text of a question-and-answer booklet that Friends of Acadia, in consultation with the park, used to explain the project to donors and the public. Friends welcomes the adaptive reuse of this document by other park-friends partnerships that may wish to conduct similar trails campaigns.

Q&A: 32 questions and answers about Acadia Trails Forever -- The campaign to restore the footpaths of Acadia National Park and maintain them in perpetuity

1. *What is* ACADIA TRAILS FOREVER?
A three-year, $13-million campaign to benefit the trails of Acadia National Park. Friends of Acadia will raise $9 million in mostly private donations[1] and NPS will commit $4 million in federal funds.



Figure 11-2: Acadia Trails Forever logo used on brochures and handouts.

2. *What will the $13 million accomplish?*
ACADIA TRAILS FOREVER will restore Acadia National Park's entire 130-mile foot trail system, re-open roughly 11 miles of abandoned trails, establish five village connector trails and annually maintain all trails in perpetuity (Figure 11-2).

3. *What, exactly, is wrong with Acadia's trails?*
Acadia, Maine's most visited natural area, sustains three million annual visits but encompasses just 45,000 acres. Per acre, Acadia is 16 times more heavily used than Yosemite, which is 22 times larger. Over the years, hundreds of millions of footsteps and the forces of nature have combined to cause: erosion trenches; soil compaction; washouts, mud troughs, rivulets and gullies; blowdowns, avalanches and rock slides; ice damage; frost fractures; rotting of trail signs, bridges and stringers; widening of treadways, trampling of trailside vegetation, and creation of side trails; collapse of retaining walls, toppling of cairns, deterioration of water bars and subsiding of rock steps, etc. — all occurring at rates that vastly exceed the rates of capital reconstruction and cyclical maintenance.

4. *I thought my tax dollars paid the full costs of our national parks.*
Your taxes pay only a portion. Consequently the national parks have accumulated a $6-billion backlog of general maintenance, which grows yearly. Acadia has a backlog of $40 million, not including the trails backlog.

5. *Don't the Park Service and Friends of Acadia already have trail maintenance programs?*
Yes, and they accomplish significant work. But because of limited funding, the trail crews cannot stay ahead of the cycle of natural and human-caused damage.[2]

6. *Why aren't trails a national priority for federal funding?*
Throughout the 378-unit National Park System,[3] trails compete with other urgent maintenance needs. Repairing faulty water and sewage systems, electric utilities, buildings and roads, for example, takes precedence in virtually every national park. Yet even those projects are underfunded. So it will be decades, if ever, before most parks can restore their trail systems properly and maintain them annually . . . unless individual parks develop new sources of revenue.

7. *How, then, will Acadia come up with $4 million in federal money for trails?*
Primarily from a brand new source: entry fees paid by Acadia National Park visitors. Since 1997, Congress has allowed Acadia and 99 other sites to retain 80



Figure 11-3: Ceremony announcing Acadia Trails Forever Campaign and the $5-million lead gift from Ruth M. and Tristram C. Colket Jr. (at right), July 1999. L-R: Friends President Ken Olson, Interior Secretary Bruce Babbitt, Park Service Director Robert Stanton, Acadia Superintendent Paul Haertel.

percent of fee collections, rather than send them to the U.S. Treasury as before. In 1998, for example, Acadia was able to keep $1.8 million in new receipts, about double the sum collected under the old system. The amount is expected to increase yearly. Congress requires that benefited parks spend the fees on repair, maintenance and resource rehabilitation, according to the park's best judgment.[4]

8. *Where does Friends of Acadia come in?*
A husband and wife recently pledged $2 million to Friends of Acadia, and $3 million more if Friends raises another $4 million from other donors. Because those donations will benefit park trails, the Park Service agreed to commit $4 million in new fee receipts and other federal funds to trails. Said differently, Friends of Acadia and Acadia National Park combined the forces of private philanthropy and federal funds to make trails a high priority at Acadia. Without the dedicated fees and the leverage provided by Friends of Acadia's contributions, a comprehensive trails restoration project could not be mounted. ACADIA TRAILS FOREVER is a singular opportunity.

9. *Is this the best time to conduct a capital campaign?*
There is never a perfect time. But given the robust economy, the couple's $5-million lead gift to Friends of Acadia (which includes $3 million in matching funds to double the power of your gift), the decision of NPS to dedicate $4 million in fees and other funds, and the deteriorating but reparable state of trails, now is the best time to halt and reverse the cycle of decline.

10. *What motivated this generous couple to make a $5-million pledge?*
Abiding love for Acadia. Many happy, spiritually important times spent in the park. Desire to give something back and make such experiences available to others. Friends of Acadia's track record. Park's decision to commit $4 million. To create a model public-private trail partnership that encourages other parks and friends groups. To provide a generous cash matching incentive to inspire gifts from other private citizens (Figure 11-3).

11. *So, the lead donors will match every dollar I donate to* ACADIA TRAILS FOREVER?
That's right. The lead donors' challenge doubles the effect of your gift. Their act of immense generosity means all contributions to Friends of Acadia for ACADIA TRAILS FOREVER will be matched dollar-for-dollar up to $3 million altogether!

12. *How will the full $13 million be spent?*
About $7 million will be used for restoring, rehabilitating or building trails. The other $6 million will remain at Friends of Acadia in a permanent endowment whose annual interest will go, in perpetuity, to trail maintenance.[5] Hence, ACADIA TRAILS FOREVER.

13. *Is this approach similar to that used in the successful Friends of Acadia / Acadia National Park Carriage Road restoration and endowment?*
Yes. Friends of Acadia raised $4 million for the carriage road endowment, and the park obtained $6 million in federal funds to reconstruct the roads. The Park Service rebuilt the carriage roads over six years. Since 1995, Friends of Acadia has committed $825,000[6] in cumulative annual maintenance grants. Carriage road grants now exceed $200,000 a year and will be sustained at that level or above in perpetuity.

14. *Will the Friends of Acadia trails endowment be subject to political influence?*
No. Friends of Acadia is a freestanding, self-governed nonprofit, independent from the National Park Service and all other federal, state and local agencies. Like the carriage road endowment, the trails fund will be a permanent asset of Friends of Acadia solely and be managed according to best financial practices. Friends of Acadia will make disbursements only after evaluating each grant request from Acadia National Park.[7]

15. *How will the trails fund be managed?*
Friends of Acadia's Investment & Finance Committee, trustees of the organization's finances, will manage the trails fund as it does Friends' other funds. The committee comprises business and finance professionals with impeccable credentials.[8] They in turn work with qualified investment institutions and advisors who prudently manage the fund for total return. The four-year average return is 14%.

16. *What percentage of my donation will go toward fundraising costs?*
Friends will match if not undercut its seven-year average fundraising cost of 4.2 cents per dollar of support and revenue.[9] Friends will not hire a fundraising firm and is conducting the ACADIA TRAILS FOREVER campaign with existing staff and board and occasional contract help.

17. *Has any public-private trails program like this been tried before?*
No. ACADIA TRAILS FOREVER is unique. Acadia will become the first national park with a privately endowed trail system and a comprehensive program to restore the trails complex. The $5-million lead gift to Friends of Acadia is the largest cash contribution to a nonprofit conservation organization in Maine, and the second largest from living individuals in the history of the 378-unit National Park System.[10]

18. *How long will it take to complete the trail work envisioned in Acadia Trails Forever?*
Ten years,[11] beginning in 2000. As trails are restored to ecological and historic standard, they will be immediately subject to continuous annual maintenance funded by the Friends of Acadia trails endowment.

19. *How much does it cost to restore a mile of trail?*
On average, $29,000 a mile for existing trails, $79,000 a mile for abandoned trails.[12] Trail work is labor-intensive, involving muscle power and simple mechanical devices (Figures 11-1, 11-4). It is conducted in the rugged backcountry, away from most roads and utilities. Almost no heavy equipment can or should be used. (Compare: rebuilding Acadia's carriage roads cost $150,000 a mile; constructing park automobile road costs about $1 million a mile.)

20. *Will Acadia's trails be made too perfect?*
No. The trails will be restored to the way they were before massive visitation and lack of funding took their inevitable toll. Footpaths will be kept rustic and in good condition, as the original builders intended, so that trails will never again deteriorate from human use.

21. *Will improved trails attract many more people to Acadia, causing yet more damage to trails?*
No. The Park Service has begun setting carrying capacities — i.e., maximum numbers of users — for different elements of the park's recreation infrastructure, most recently for the carriage roads. A trails carrying capacity will eventually be set.

22. *What about the misuse of trails?*
ACADIA TRAILS FOREVER is dedicating some funds to a park trails education/information center, promoting leave-no-trace principles, and putting roving staff[13] in the park to educate on-trail hikers.

23. *What about more automobiles and congestion in the park?*
Friends of Acadia, the park and other federal agencies, the Maine Department of Transportation, and local communities and businesses contributed funds to establish a free public transit system on Mount Desert Island, which began basic service in summer 1999. Eventually, an expanded system will allow people to leave cars in parking lots at their hotels and campgrounds, etc., for easy transport to and from many trail heads via continuous-loop bus service. [14]

24. *Will parts of any trails be adapted for wheelchair access?*
The paved loop trail from the parking lot at Cadillac Summit will be evaluated for possible retrofitting for wheelchairs. One or two appropriate frontcountry sites, not yet chosen, will be evaluated. All backcountry paths will remain footpaths.

25. *Are Acadia's trails historically significant?*
Yes. The trail system has roots in the 19th century conservation movement. Before and during the creation of the park, many trails were built by voluntary village improvement associations or funded by private donors. The park itself sprang from private philanthropy. The Park Service is nominating the trail system for inclusion on the National Register of Historic Places, recognition that Acadia's trails are not only functional corridors for foot travel, but also form an integral part of Mount Desert Island's historic and cultural landscape.

26. *Will the trails restoration honor the building styles of Acadia's great path makers of old?*
With partial funding from Friends of Acadia, the Park Service completed exhaustive research about Acadia's trails, culminating in a 422-page book, Historic Hiking Trail System of Mount Desert Island.[15] It documents the history of the 130 miles of existing trails and identifies 110 miles of lost or abandoned paths. Some copies are available on loan from Friends of Acadia headquarters. Trail-by-trail analysis of building standards and motifs will be completed in 1999. Friends and the park are developing a comprehensive reconstruction plan that, where appropriate, adopts the historic trail design specifications of George Dorr, Waldron Bates, Herbert Jaques, Rudolph Brunnow, Andrew Liscomb and others whose unique trail-building 'signatures' are evident on many of Acadia's footpaths.

27. *Will trails at Schoodic and Isle au Haut be included in the project?*[16]
Yes.

28. *What do I get for my charitable investment?*
The satisfaction of helping make tangible, long-term improvements in this place of incomparable beauty and cultural distinctiveness, a place you love. You are helping guarantee that Acadia becomes more resilient to human impacts and natural events, so that you, your family and myriad generations that follow can share Acadia's trails forever. Your gifts renew and extend the noble philanthropic impulses of the park's founders, who harnessed the power of private citizens in the care and betterment of an irreplaceable public asset. Every time you walk Acadia's restored paths, you will feel your gift underfoot . . . and in your heart. There are also terrific tax consequences.

29. *Does ACADIA TRAILS FOREVER offer opportunities for recognizing donors and honoring loved ones?*
Yes. Named gifts are a splendid way to honor your living family and friends, or memorialize those who have passed away, by affiliating them permanently with one of America's most beautiful national parks. All in-park recognition opportunities are subject to the National Park Service's guidelines. Friends of Acadia has independent naming opportunities as well. Friends' representatives will be pleased to discuss all opportunities with you on request.

30. *Will a major gift to Friends of Acadia for ACADIA TRAILS FOREVER interfere with my annual giving?*
Thanks for asking. Friends of Acadia hopes that you will, if possible, make a major gift or pledge to ACADIA TRAILS FOREVER and will continue your regular giving as before. That way, Friends of Acadia can maintain a balanced operating budget and continue its other conservation programs, such as banning jet skis, defending Acadia against other threats, helping develop the island-wide transit system, petitioning Congress, etc.

31. *What kinds of major gifts do you seek for Acadia Trails Forever?*
Cash, appreciated securities, irrevocable trusts, bequests, insurance policies, certain kinds of salable real estate (e.g., houses, apartments, land, buildings) and yachts, etc.[17] We will be glad to discuss ideas with you.

32. *If I make a written pledge, how long will I have to pay it off?*
Ideally from one to three years, but more time if needed.[18] Friends of Acadia will be pleased to accommodate your charitable plans and schedule. Gifts are tax deductible. A pledge form is attached.

For more information about ACADIA TRAILS FOREVER, *please contact:*

Charlie Tyson, Chairman,
ACADIA TRAILS FOREVER

Lee Judd, Chairman of the Board
Friends of Acadia

Ken Olson, President, Friends of Acadia

Annie Schwartz,[19] Director of Development, Friends of Acadia

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207-288-3340 or 800-625-0321.
www.friendsofacadia.org.



Figure 11-4: Acadia crew hauling gravel across ice for the Jordan Pond Trail rehabilitation.

Endnotes

[1] Private fundraising actually took under two years, from December 1998 through July 2000. As of late 2001, pledges and income exceeds $9.2 million. Quiet fundraising continues for supplementary needs.

[2] The park has a first-rate trails staff supported by selfless and committed volunteers recruited primarily by the park, Friends of Acadia, the Appalachian Mountain Club and others. By 2001, Acadia Trails Forever funds had already substantially increased the number of paid trail workers while incurring no loss in volunteerism.

[3] Now 387 units.

[4] Acadia has two of a hundred designated fee demonstration sites in the National Park System. Thanks to the leadership of Park Service Director Bob Stanton and Acadia Superintendent Paul Haertel, the Park Service gave early preliminary approval to the proposed use of entry fees for Acadia Trails Forever. Because actual fee demonstration expenditures are decided at the park level pursuant to overall Congressional and Park Service policy, the partners did not have to engage in the lengthy and difficult process of seeking Congressional funds, a process that affected the nonetheless successful carriage road campaign.

[5] Revised allocation: est. $6.5 million in three Friends of Acadia endowments (general trail maintenance $5 million, Acadia Youth Conservation Corps $1 million, Ridge Runner Program $0.5 million). The remaining $2.5 million in private funds, together with the park's $4 million, underwrites capital reconstruction and trail programs.

[6] Cumulative grants to the carriage roads reached $1.2 million by 2001.

[7] Formal memorandums of agreement govern major financial relationships between Friends of Acadia and the park. These are the "good fences" that make the parties "good neighbors."

[8] Indeed, volunteers were crucial in the whole campaign as policy setters, fundraisers, donors, and advisors, and the full staff was engaged. Every board and staff member pledged, and many senior park staff.

[9] By year's end 2000, Friends of Acadia's audited five-year cost of fundraising was 3.7 cents per dollar of revenue.

[10] The $5-million record has since been broken by another Maine conservation nonprofit. It is not known whether other friends-of-national parks groups might have secured larger multimillion-dollar gifts from living individuals.

[11] As the project has moved forward, the numbers have been reviewed, or "ground truthed." If the partners learn that more time and/or more funds are needed, we will adjust accordingly.

[12] Ditto.

[13] Including Ridge Runners.

[14] As of this writing, the Island Explorer propane powered bus system has operated for three summers. Ridership jumped from 143,000 in 1999 to 239,000 in 2001. Hikers have used it extensively for one-way and loop walks. The system, to which Friends of Acadia has contributed $140,000 from non-trail funds, is an integral part of the Acadia National Park hiking experience.

[15] The excellent work of the Olmsted Center for Landscape Preservation, a conference co-host.

[16] Disjunct sections of the park.

[17] Acadia Trails Forever has garnered almost 1,200 gifts, ranging from five dollars to $5 million. The majority of gifts were for $100 and under, making the campaign an effort that spanned economic categories.

[18] Some donors pledged over five years. Pledges are generally coming in at the anticipated rates or better.

[19] Kelly S. Dickson is the current Director of Development.

CASE STUDIES: DOCUMENTATION, IMPLEMENTATION, AND MANAGEMENT

There is a tremendous amount of work underway on historic trails across the country. This is not surprising. Our trails, many over 100 years old, are well loved and used. What is surprising is the level and care with which this work is being carried out to preserve historic trail construction methods and materials. These nine case studies represent some of the finest examples of work on federal, state and privately managed trail systems. Several of the case studies emphasize methods for documentation of historic trail design characteristics, construction methods, and materials. For the Wonderland Trail, the NPS Cultural Landscape Inventory served as the foundation for documentation and resulted in the discovery of many historic features. At Chiricahua, archeological survey and documentation techniques were applied to a damaged trail and will serve as guidelines for repairs. A third methodology, that developed by the Historic American Engineering Record, has traditionally documented the design and construction of historic roads, but may also be applied to trails.

Several projects have moved from documentation into the implementation of work. At Tsankawi, historic Puebloan trails were rehabilitated with infill stonework to prevent further erosion, while a multitude of social trails were delineated or eliminated. At Jefferson Rock, a heavily used section of the Appalachian Trail was rebuilt using compatible yet distiguishable stonework. At Minute Man National Park, a new trail was designed to parallel a historic route. At Allegheny Portage NHS, new materials were used in a way that would highlight, stabilize and preserve extant historic features but also provide universal accessibility.

Management issues, relating to users and trail maintenance, were discussed in most case studies. Universal access was discussed for several projects, including Minute Man, Allegheny Portage, Cuyahoga National Park, Arcadia Sanctuary, and Dinosaur Footprints. These trails kept grades at or less than five percent. Discussions followed regarding the 1999 Accessibility Guidelines for Outdoor Areas, and how additional trails with steeper grades may be made accessible, similar to the efforts underway at Acadia NP. The importance of trained trail crews was well-illustrated by the California Conservation Corps/Americorps Backcountry Trails Program. A few of the case studies described projects that were planned and implemented by contracted professionals, which allowed for discussion of the pros and cons of in-house expertise versus contracted projects and the implications for long-term maintenance.

Margie Coffin Brown
Olmsted Center for Landscape Preservation

12. Documenting and Maintaining a National Landmark Trail: The Wonderland Trail, Mount Rainier National Park
Susan Dolan, Ethan Carr, Carl Fabiani

13. Documentation and Preservation of Historic CCC Trails in Chiricahua National Monument, Arizona
Scott Travis

14. Documenting Linear Landscapes: HAER's Park Roads and Parkways Program as a Model for Historic Trails
Todd Croteau

15. Preservation of a Prehistoric Puebloan Trail System
Shaun Provencher

16. Trail Rehabilitation at Jefferson Rock, Harpers Ferry National Historical Park
Maureen De Lay Joseph

17. Trail Rehabilitation Techniques at Minute Man National Historical Park and Allegheny Portage Railroad National Historical Park
Kyle Zick and John Tauscher

18. Adaptive Rehabilitation, Management, and Trail Maintenance in Cuyahoga Valley National Park
David Humphrey

19. New Trail Construction Methods, Arcadia Sanctuary and Dinosaur Footprints
Joseph Chambers

20. Funding Strategies and the CCC/Americorps Backcountry Trails Program
Peter Lewis

12. Documenting and Maintaining a National Historic Landmark: The Wonderland Trail, Mount Rainier National Park



Figure 12-1: Contemporary photograph showing the curvilinear alignment and generous width of the Wonderland Trail. (July 2000)

Susan Dolan
Historical Landscape Architect
NPS, Seattle Support Office

Ethan Carr
Historical Landscape Architect
NPS, Washington Support Office

Carl Fabiani
Chief of Trail Maintenance
Mt. Rainier National Park

The Wonderland Trail at Mount Rainier National Park is a 93-mile system of connecting trails that completes a loop around Mount Rainier (14,410') in Mount Rainier National Park (Figure 12-1). This presentation describes the history and significance of the trail, as well as current efforts to document and maintain the characteristics and features that make the trail an important cultural landscape. First, Ethan Carr provides a historical overview and describes the significance of the trail as a contributing resource in the 1997 National Historic Landmark nomination for Mount Rainier. Second, Susan Dolan, describes the Cultural Landscape Inventory, completed in the summer of 2000, of 25 miles of the trail. The inventory team found a broader range of characteristics and features than formerly acknowledged, particular in terms of the integrity of the trail's alignment and historic structures. And third, Carl Fabiani, Rainier's Trails Crew Foreman, describes his responsibility for all aspects of maintenance on the trail, including practices such as replacing wood structures with permanent or simpler structures in order to reduce maintenance costs. He also describes compliance issues related to NEPA, the Wilderness Act, and the National Historic Preservation Act. Together the panelists present a case for how research, documentation, and maintenance can and should be coordinated in the management of a nationally significant hiking trail.

National Historic Landmark Designation

The Wonderland Trail was blazed between 1908 and 1915 by a group from the Seattle-based climbing club, The Mountaineers. The trail varies in elevation from 2400' to 6750', often traversing the "wonderland" zone just above the treeline (around 5000'), but just below the mountain's extensive system of glaciers and snow fields. The trail was built to allow access to many of the "parks," or subalpine meadows on the slopes of Mount Rainier, famous for their summer-long displays of wildflowers. After The Mountaineers' blazed the encircling route, early national park rangers improved the trail as an equestrian route for fire and poaching patrol. The patrol system was one of the first comprehensive development projects in the young park, with the Wonderland Trail as its centerpiece. During the 1920s, a series of patrol cabins were built along the Wonderland Trail, at one day's travel distance apart. Subsidiary trails were built emanating from the Wonderland Trail, radiating into the four corners of the park, and allowing patrolling rangers to penetrate deep into the backcountry. By the late 1920s, the Wonderland Trail's alignment was complete. Between 1933 and 1942, the Civilian Conservation Corps added refinements to the trail, by building numerous footbridges, drainage structures, retaining walls, and trail signs. These features were made of rough-hewn lumber or native stone, and were generally over-scaled in their proportions, to compliment the scale of their park context.

In 1996, the Wonderland Trail was included as a "contributing structure" in the Mount Rainier National Park National Historic Landmark (NHL) district, a historic district which included most of the frontcountry (developed) areas in the park, as well as historic backcountry structures, such as the trail. The NHL district was designated because of the significance of the many examples of rustic architecture, park village plans, and other aspects 1920s-1930s national park planning and design in the park. The Wonderland Trail followed the route of what was originally proposed to be an automotive road "round-the-mountain," but the National Park Service (created in 1916) soon rejected that idea. The experience of the Wonderland Trail remains today very much as it did to the group of Mountaineers who blazed it in 1915.

The Wonderland Trail is the only trail in the national park system (excluding trails that commemorate historic routes or events) to be designated a contributing resource in a NHL district. The integrity of the trail corridor as a designed landscape is therefore a concern for park managers. The trail also passes through the federally designated Wilderness and maintenance must be accomplished within that context.

Cultural Landscape Inventory

In the summer of 2000, a Cultural Landscape Inventory was carried out on the Wonderland Trail to document the trail's alignment, physical context, and multitude of features, such as wood bridges, drainage structures, and switchbacks, and to understand these in terms of the trail's history. The Cultural Landscape Inventory would determine how much of the trail had changed since its 1908-1942 period of significance, and how much of the original alignment and original features still remained.

At the outset of the Cultural Landscape Inventory project, the inventory team learned from Mount Rainier's Trails Crew that much of the Wonderland Trail had been replaced or renewed since the Civilian Conservation Corps left the park in 1942. The alignment of the trail was thought to be relatively unchanged, but many of the original wood drainage structures had been replaced with fiberglass or PVC culverts, and many original bridges now had contemporary replacements. Particularly during the Mission 66 program in the late 1950s and early 1960s, there was a vast reduction in the number and variety of bridges, and the size and scale of materials used.

The inventory crew, two University of Washington graduate students in Landscape Architecture and one historical landscape architect from the Columbia Cascades Support Office, had low expectations of finding original fabric along the trail. Instead, the crew anticipated needing to evaluate the relative compatibility of contemporary features, rather than evaluating the historic integrity of original features. Contemporary features along the trail would be considered compatible with the historic character of the trail if they reflected a similar rustic character in their materials, scale, form, and method of construction as the original features from the period of significance.

the historic method of construction of wood bridges, using whole logs for sills, stringers, and curb rails, and hand split logs for the decking, that were sometimes laid in an alternating sequence of bark-side up, followed by bark-side down. All the bridge lumber was held together with 8 inch-long steel drift pins. Once the teams' eyes were attuned, it wasn't difficult to differentiate original construction from later additions to the trail. Greater conservation of natural resources and more limited funding and labor in the years after the Second World War had resulted in changes in the selection of materials and modifications to construction techniques. Later drainage structures were made of fabricated materials, and bridges were often made of milled, rather than hand-hewn lumber.

The 12-week inventory project drew a number of conclusions. One was about the alignment of the trail, confirming that the 93-mile route had changed very little since its first comprehensive mapping in 1928, and therefore retained historic integrity. The trail still appeared as a full-bench cut, with a gentle back slope, a fill slope, a side ditch (where needed on the wetter sides of the mountain), a gentle gradient, and a smooth, curvilinear alignment. All of these aspects of the alignment were consistent with trail construction guidelines written in the 1930s. Deviations from the curvilinear alignment occurred when the trail occupied the route of a former Native American trail, or a former miners trail, which were typically much more direct. The inventory also concluded that the width of the trail tread retained integrity, even though at first it seemed unlikely that such a conclusion could be drawn. During the early days of fieldwork, the trail's width appeared highly variable, from 5 feet to less than 2 feet, and somewhat puzzling. Later on, more research helped shed light on a historical pattern that still remained. During the 1920s and 1930s, the trails width was increased to 5 feet in segments between developed areas, such as the trail segment that links the rustic park villages of Longmire and Paradise (see Figure 12-1). In the highest elevations, where the trail traversed subalpine meadows, it was built much narrower, allowing for fewer users and the protection of the greatest amount of wildflower meadow. The same pattern of width still remained, graduating from wide to narrow between lower and higher elevations, and between developed areas and more remote parts of the park.

The inventory also concluded that along certain segments of the trail, particularly those that were more remote and less heavily used, a significant number of historic drainage features and bridges still existed. The historical research revealed that during the period of significance, many hundreds of bridges were built along the whole length of the trail. These were built to accommodate pack animals, and were typically 3-stringer bridges of 5 or 6 feet in width. Research also yielded that the bridges were built in a wide variety of forms, some with more elaborate handrails or decking patterns, some with log cribbing, but most were much longer than absolutely necessary to span a particular drainage. The fieldwork revealed that the process of replacing original bridges had had a large impact on the character of the trail. Newer bridges tended to be only one of two types, rather than a wide range of different styles. The two common contemporary types were a 2-stringer bridge, or a foot log, both more diminutive in size than the originals. The impact of the newer bridges was to scale down the form of the features along the trail, reduce the apparent variety, and sometimes depart from the rustic style altogether. The newer, milled lumber bridges were much crisper in appearance than their original rustic counterparts and foot logs sometimes bore steel cable handrails, a material unseen during the period of significance.

The inventory work also concluded that the very latest additions to the trail often represented a return to some of the historic construction techniques, and were very compatible with the character of the trail. For example, in recent years, the park has returned to using hand-split cedar for bridge decking, rather than milled lumber, and is once again using hand-forged drift pins to reconstruct bridges. Additionally, while some earlier replacement fiberglass culverts tended to be visible under the trail tread, later PVC culverts were often installed with dry stone headwalls and were as well concealed as their original wooden counterparts.

Ultimately, the Cultural Landscape Inventory found the Wonderland Trail retained integrity of alignment, gradient, width, some drainage infrastructure, and a number of bridges. However, one observation became clear as a result of the project. That in light of the amount of losses that have occurred since the period of significance due to changes in management philosophy and available resources, the historic integrity of the trail could be substantially diminished

by further loss of the remaining historic features. The significance of the trail as part of a National Historic Landmark District, one of few hiking trails to have such status, merits the preservation of the remaining original features, and their replacement in-kind, rather than with contemporary alterations. The in-kind replacement of the original features is the most accurate way to retain the over-scaled, highly textured and rough-hewn character of the historic trail. These discoveries and observations have led to a decision to implement a second phase of the Cultural Landscape Inventory in summer 2001, when all the remaining historic bridges throughout the 93-mile route will be identified and located, to guide their subsequent replacement in-kind.

Trails Maintenance Program

The Wonderland Trail was built to a very high standard because people at that time often traveled in large groups and were supported by pack stock. The trail is wide, routing is direct, grade is typically consistent (given the rugged terrain), wood structures are very sturdily built, and the tread is generally smooth. These traits give the trail a character of openness and ease of travel. In many areas the hiker has the freedom to enjoy the surrounding country while walking, rather than having to carefully watch their footing on the trail itself.

As chief of trail maintenance, my desire is that the NHL designation for the Wonderland Trail will help financially support the maintenance and preservation of this trail. Maintaining this trail to its original standard and character is expensive. Trail work is very labor intensive and labor costs money. Building stock type bridges instead of simple footlogs is expensive and uses considerable natural resources. Trees of suitable size and type are often not available at bridge sites. We need to purchase logs and materials, then fly them into work sites. This is expensive. Adequate financial support will be critical to meeting NHL standards.

Some of the historic CCC standards are now preserved by the park. The trails crew now uses drift pins, made by a local blacksmith, to preserve the CCC-style of bridge construction. Logs are split by hand rather than using milled lumber. These specifications, as well as other historic features and construction techniques, are documented in a handbook for the trails crew.

I know that the NHL designation will have many legal requirements to comply with. A number of years ago 97% of Mount Rainier National Park was designated Wilderness. For many years after that the Trail crews were nearly at war with the Wilderness managers over the interpretation of the Wilderness Act and how that affected trail maintenance. In recent years many new environmental laws are being interpreted in a manner that can delay even routine trail maintenance for years.

Trails are really very dynamic structures. Every year trail tread and trail bridges are destroyed by flood, earth slides, fallen trees or mudflows. Rebuilding these areas can require new locations or new and different structures. Total preservation of the original trail is obviously not possible however the standard and character of the trail can be retained by duplicating original construction standards.

When the CCC built the Wonderland Trail they had complete freedom to use natural resources as they wished. We no longer have this ability. This means that in many places we will have to eliminate the original elaborate wooden structure and replace it with an alternate and preferably more durable structure. We have done much of this at Mount Rainier and still maintained original standard and character of the trail.

Environmental regulations tell us that we can not work in streams, or put any fill in wetlands, or disturb any wildlife or plants. It is very difficult to maintain trails without doing all of the above to some degree. Compliance people need to understand that trail work requires some environmental disturbances, minor that they are. Trail crews need training to improve our methods and techniques to better comply with Wilderness, environmental, and historic legislation.

One of our greatest needs is that the people who write and implement the rules and the folks who work in the field will work closely together and the result will be rules that will work. At Rainier, we are developing a trail handbook for trail maintenance and construction of trail structures relevant to our trail system, which will also address compliance issues and criteria.

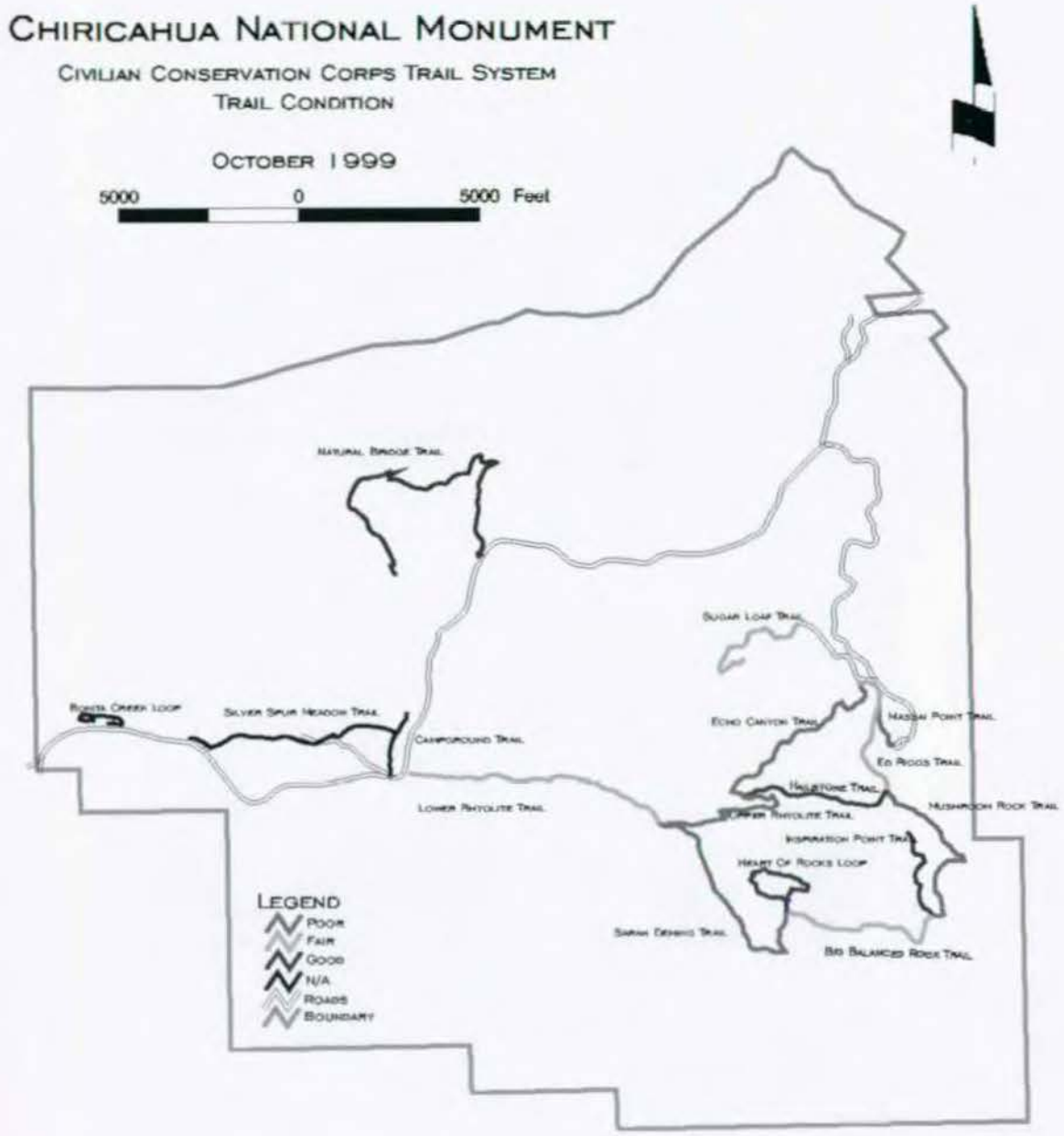


FIGURE 1. COMPARATIVE CONDITION OF TRAILS. TRAIL IN POOR CONDITION EXHIBITS SUBSTANTIAL LOSS OF FABRIC WITH ACTIVE COLLAPSE OCCURRING AT ONE OR MORE LOCATIONS. A TRAIL IN FAIR CONDITION EXHIBITS MODERATE LOSS OF FABRIC WITH POTENTIAL COLLAPSE AT ONE OR MORE LOCATIONS. TRAIL IN GOOD CONDITION EXHIBITS MINIMAL LOSS OF FABRIC WITH TRAIL FEATURES RETAINING HISTORIC INTEGRITY.

13. Documentation and Preservation of Historic CCC Trails in Chiricahua National Monument, Arizona



Figure 13-2: Historic photograph, October 1935 of lookout platform at Massai Point constructed by the CCC. (NPS, Harpers Ferry)

Scott E. Travis
Archeologist/Cultural Resources Program Manager
NPS, Southern Arizona Support Office

On August 8th, 1999 a severe thunderstorm swept across Chiricahua National Monument. Within hours rising water and debris damaged park facilities including the campground, maintenance yard, housing area, and roadways. In addition, significant portions of the backcountry trail system, constructed by the Civilian Conservation Corps between 1934 and 1939, sustained considerable damage. Trail tread, water bars, retaining walls, causeways, gully plugs, and creek crossings all sustained variable amounts of deterioration that will require stabilization and repair (Figure 13-1). In many locations, the trail system received sufficient damage to warrant closure. Given the extent of the impacts, overall safety considerations, and the historic character of the trails it is imperative that the trail system be documented in a thorough and systematic manner.

Documentation Objectives

The objectives of trail documentation include:

1. Examination of all available information regarding the history of the trail system (e.g. original plans, project reports, preservation/maintenance reports, photographs, oral histories, etc.) within the historical context of CCC trail and National Park Service landscape design (Figure 13-2).
2. Documentation of the character and condition of each trail and associated features by utilizing a standard recordation format that includes overall schematic maps, detailed maps, attributes of trail features, photography, and field sketches where applicable. This documentation will facilitate understanding of the overall trail design and contextual landscape, structural character, use of the trail through time, variations in condition, and all agents of deterioration presently affecting the

trail system.

3. Analysis of the character and condition of the trail system that will both enhance appreciation of the historical significance of the trails and provide comprehensive treatment guidelines.

Methods: Documentation and Assessment

As with any human artifact, the historic trail system of Chiricahua National Monument reflects intentional design and functional necessity. In addition, the trail system exhibits the unmistakable signs of long and continuous use, previous repair, and the relentless effects of natural deterioration. Therefore, the documentation of the trail system must be able to illustrate the overall design of the system while at the same time noting subtle variation in trail features and condition. The following discussion outlines documentation guidelines and objectives.

The basic unit of observation for documentation purposes is the individual trail. Roughly analogous to an archeological site, historic structure, or component landscape, each of the thirteen historic trails will be recorded as a single unit that exhibits a variable number of trail features and contextual attributes. Figure 13-3 and 13-4, outline priorities for trail documentation and rehabilitation.

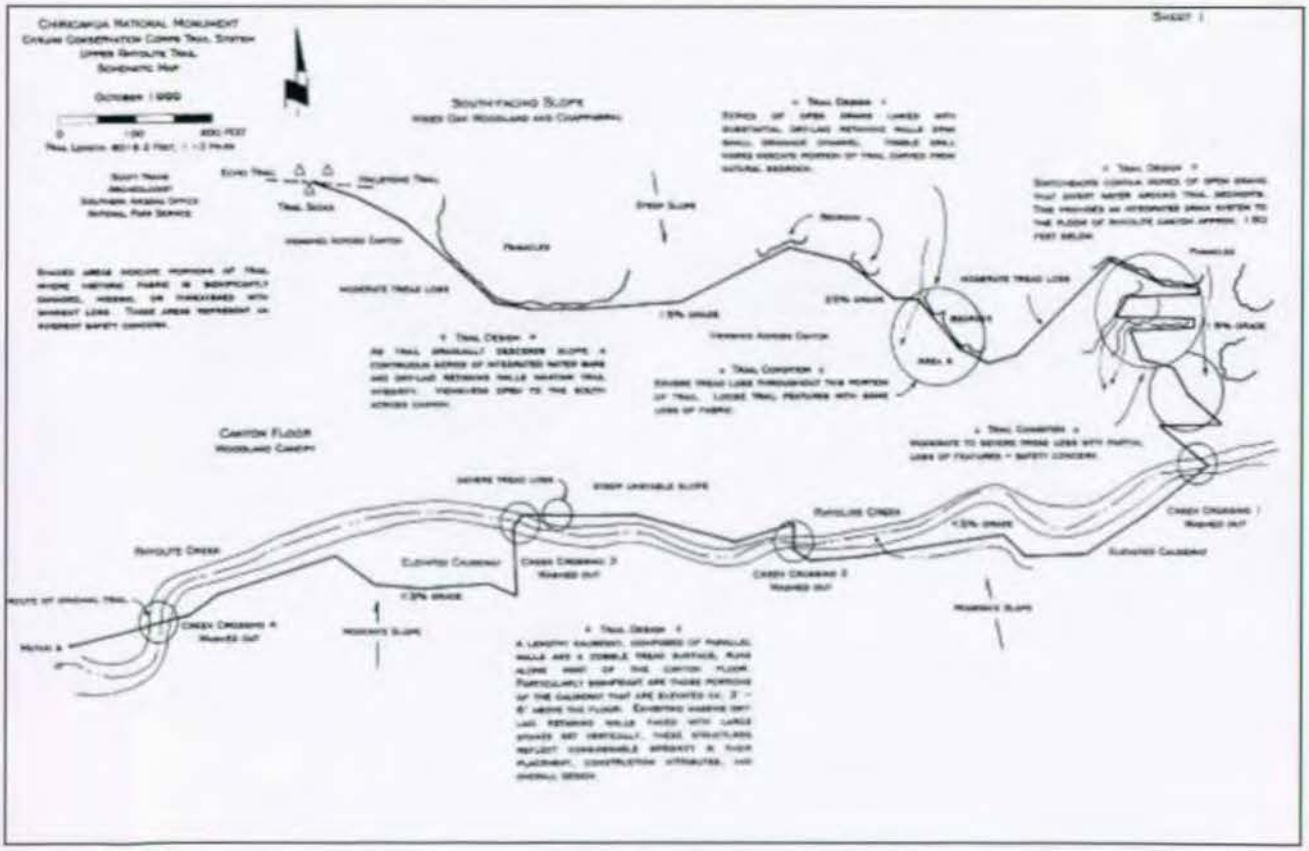


Figure 13-3: Example of schematic map of eastern portion of Upper Rhyolite Trail. Circles identify areas exhibiting substantial deterioration and safety hazards.

Levels of Documentation

Documentation of the trail system involves three distinct levels or components designed to achieve an increasingly detailed inventory and assessment of trail attributes. As designed, this strategy encourages analysis at various levels of resolution – i.e. trail features, individual trails, and the overall trail system - while also facilitating comparative analysis of the intrinsic character and design of the trail system

Level One. Documentation of the trail system begins with linear transects of each trail, taking note of length, orientation, grade, general character, condition, and contextual landscape. This documentation results in broad-scale schematic maps that detail trail design, major preservation concerns, and critical safety issues along with accompanying notes and photography. Inherently, this level of documentation provides a comparative perspective for viewing the thirteen individual historic trails as an overall trail system and evaluating both landscape characteristics and historic integrity (see Figure 13-3).

- Schematic Maps. 1" = 100' scale provides abstract view of trail with dominant landscape features, design components, and areas of significant deterioration illustrated. Additional annotations include statements regarding key preservation problems, safety concerns, and trail history.
- Field Notes. Notes should emphasize overall character and condition of trail, particularly in relation to contextual landscape, and discuss thematic issues related to overall trail system. Further, a thorough discussion of construction materials, structural systems, and various agents of deterioration should be included in the field notes.
- Field Photography. General photography covering trail environmental context, significant design components, and examples of condition.

Trail Name	Length (miles)	App # Features	App # Water Bars	Level of Damage	Comments
Lower Rhyolite Trail (Prefix - LRT)	1.5	12	17	Severe	Heavy damage to trail tread with erosion scouring a ditch in the middle of the trail. Suggests repair work to tread, water bars and CCC retaining walls.
Upper Rhyolite Trail (Prefix - URT)	1.1	20	91	Severe	Extensive flood damage with large piles of rock debris, tread damage throughout, water bars washed out, ditches filled, and damaged CCC retaining walls. Suggests extensive repair and possible rerouting at specific locales.
Echo Canyon Trail (Prefix - ECT)	1.6	50	192	Severe	Extensive flood damage including loose tread covered with rocks, deterioration of CCC retaining walls, missing curbs, and drainage ditches clogged with sediment and stones. Suggests repair of existing retaining walls and water bars, installation of additional check dams
Mushroom Rock Trail (Prefix - MRT)	1.2	25	69	Severe	Received the greatest flood damage in terms of CCC structures. Extensive repair throughout this trail is required including reconstruction of key facilities providing flood control.

Figure 13-4. Sample form for Preliminary Trail Assessment

Level Two. Enhancing the initial documentation, level two involves the preparation of detailed measured maps that illustrate specific features within the context of the trail corridor. During this process each feature or component is assigned a unique number and evaluated for general context, feature type, size, condition, integrity, level of threats, amount of lost fabric, and treatment recommendations. This inventory provides a method for documenting and monitoring each trail feature regardless of size or character as well as facilitating preservation planning and treatment at the feature level (see Figure 13-5, and Figure 13-6).

- Trail Corridor Maps. 1" = 20' scale provides for visual representation of trail corridor including contextual landscape with individual trail features drawn to scale and identified by unique number[1]. Contextual attributes include slopes (gradual, moderately steep, steep), drainage (small, medium, large), configuration of adjacent topography, treeline, density of vegetation (sparse, moderate, dense), prominent rock formations, viewsheds, unusual vegetation, seeps, waterfalls, approximate grade on trail, and areas of exposed bedrock.
- Catalog of Trail Features. Inventory of trail features and relevant attributes - Feature Inventory Manual.
- Enhanced Field Photography. Detailed feature level photography.

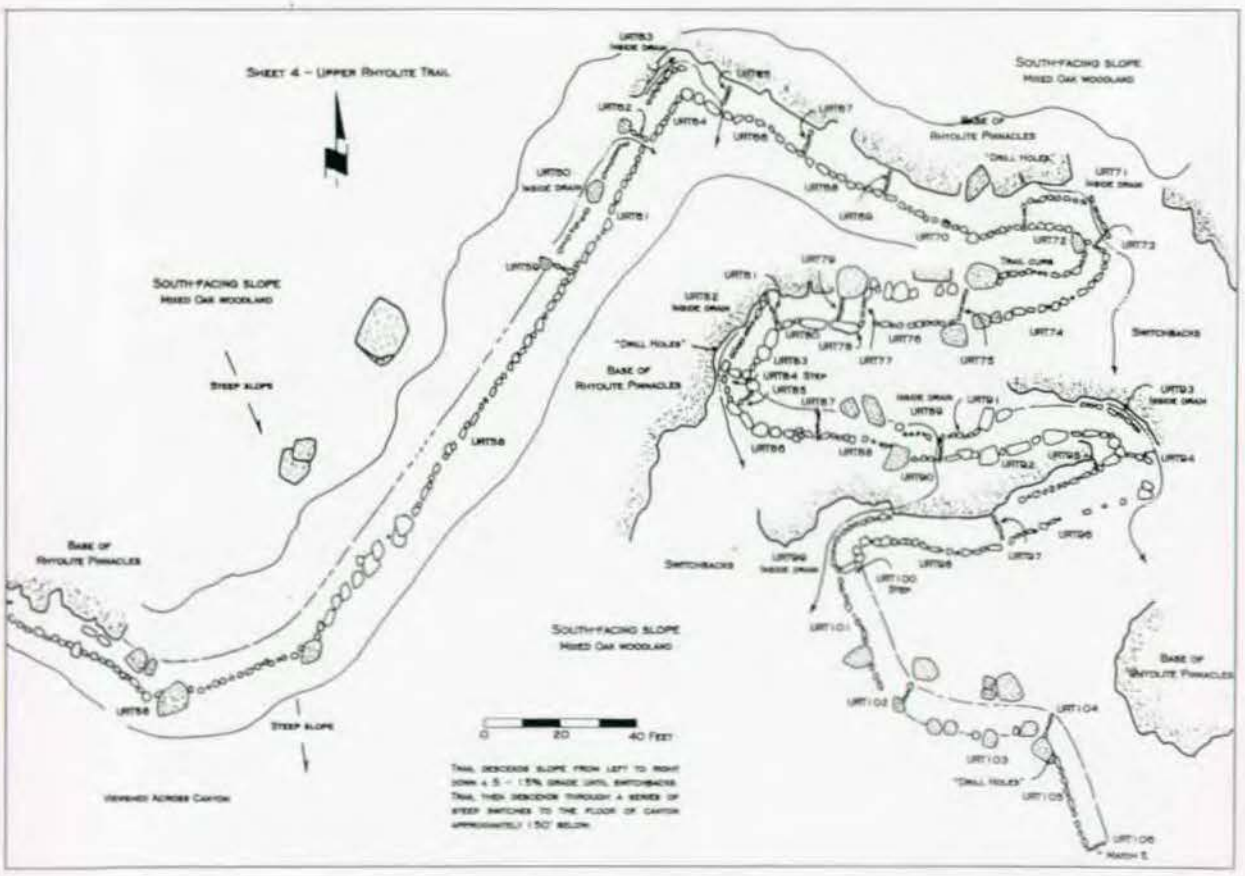


Figure 13-5. Example of trail corridor map that covers same area as schematic map shown in Figure 13-3 of the Upper Rhyolite Trail.

Feature Inventory
Upper Rhyolite Trail

3/27/2000

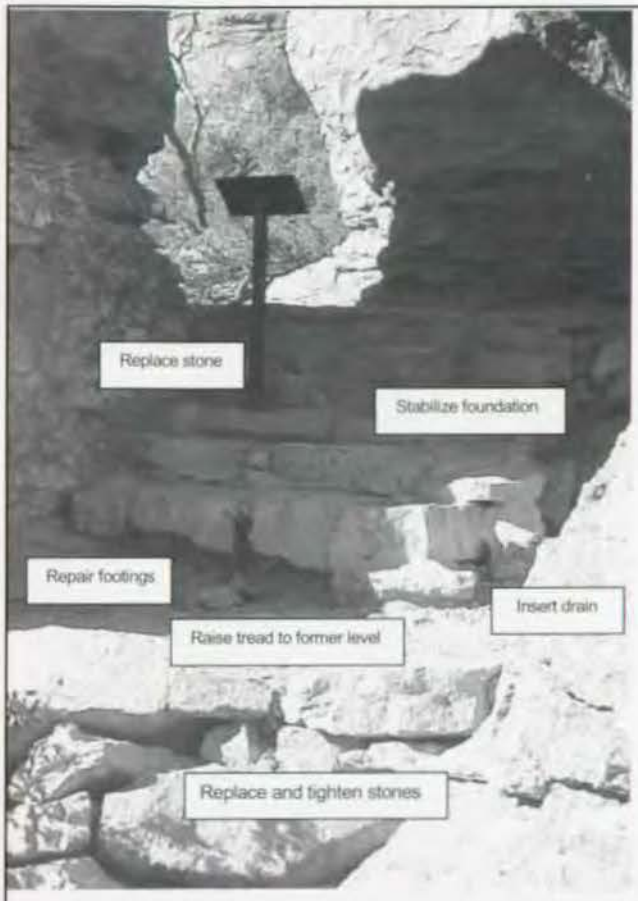
Fea #	Context	Type	Size	Condition	Integrity	Threats	Sq Feet	Treatment	Comments
1	Slope	Trail Sign	Small	Fair	Fair	Moderate	2	S/R	Repair stone trail head sign - possible CCC
2	Slope	Retaining wall	Large	Fair	Good	Moderate	8	S/R	Repair wall, maintain grade and install checks.
3	Slope	Waterbar	Small	Poor	Good	Moderate	4	S/R	Construct check and fill.
4	Slope	Retaining wall	Medium	Good	Good	Moderate	0	Tread Repair	Maintain grade and install checks.
5	Slope	Waterbar	Small	Poor	Good	Moderate	0	Stabilize	Construct check and fill.
6	Slope	Retaining wall	Medium	Good	Good	Moderate	0	Tread Repair	Maintain grade and install checks.
7	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.
8	Slope	Retaining wall	Large	Fair	Good	Moderate	0	Tread Repair	Raise tread 4" and install checks.
9	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.
10	Slope	Retaining wall	Very large	Poor	Good	Severe	10	S/R	Repair wall. Raise tread 4" - 8" and install checks.
11	Slope	Waterbar	Small	Poor	Good	Moderate	0	Stabilize	Construct check and fill.
12	Slope	Retaining wall	Large	Poor	Good	Severe	73	S/R	Repair wall, maintain grade and install checks.
13	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.
14	Slope	Retaining wall	Large	Fair	Good	Moderate	1	S/R	Repair wall, maintain grade and install checks.
15	Slope	Waterbar	Small	Poor	Good	Moderate	0	Stabilize	Construct check and fill.
16	Slope	Retaining wall	Medium	Good	Good	Moderate	0	Tread Repair	Maintain grade and install checks.
17	Slope	Waterbar	Small	Poor	Good	Moderate	1	S/R	Construct check and fill.
18	Slope	Retaining wall	Small	Good	Good	Minimal	0	Tread Repair	Maintain grade and install checks.
19	Slope	Waterbar	Small	Poor	Good	Moderate	0	Stabilize	Construct check and fill.
20	Slope	Retaining wall	Large	Good	Good	Minimal	0	Tread Repair	Maintain grade and install checks.
21	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.
22	Slope	Retaining wall	Very large	Good	Good	Minimal	0	None	No work required.
23	Slope	Waterbar	Small	Good	Good	Minimal	0	Stabilize	Construct check and fill.
24	Slope	Retaining wall	Very large	Good	Good	Moderate	0	Tread Repair	Maintain grade and install checks.
25	Slope	Waterbar	Small	Fair	Good	Moderate	2	S/R	Construct check and fill.
26	Slope	Retaining wall	Medium	Good	Good	Moderate	0	Tread Repair	Maintain grade and install checks.
27	Slope	Waterbar	Small	Poor	Good	Severe	7	S/R	Construct check and fill.
28	Slope	Retaining wall	Large	Fair	Good	Moderate	6	S/R	Repair wall, maintain grade and install checks.
29	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.
30	Slope	Retaining wall	Medium	Fair	Good	Moderate	0	Tread Repair	Raise tread 8" and install checks.
31	Slope	Waterbar	Small	Good	Good	Moderate	0	Stabilize	Construct check and fill.
32	Slope	Retaining wall	Medium	Fair	Good	Severe	0	Tread Repair	Raise tread 8" and install checks.
33	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.
34	Slope	Retaining wall	Large	Poor	Good	Severe	24	S/R	Repair wall. Raise tread 4", install checks, reset curb.
35	Slope	Waterbar	Small	Fair	Good	Moderate	0	Stabilize	Construct check and fill.

Figure 13-6: Catalog of Trail Features



Figure 13-7: Historic photograph, October 1935 of lookout platform at Massai Point constructed by the CCC. (NPS, Harpers Ferry)

Level Three. A final stage of documentation includes additional maps, measured drawings, and photographs of those features that exemplify trail character, illustrate particularly significant deterioration, or that require preservation treatment. In the latter case, all features identified for treatment require systematic documentation prior to and after treatment. Measured maps, drawings, and photographs, prepared at appropriate scale and augmented with interpretive or analytical sketches illustrate function, construction details, aspects of deterioration, etc. (Figures 13-8 and 13-9).



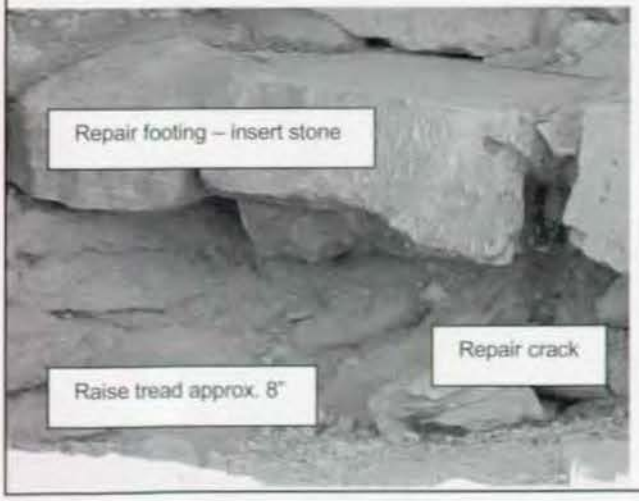


Figure 13-8: Feature Form

Trail: Massai Point Nature Trail
Date: October 15, 1999
Feature #: MNT 27
Location: South portion of trail overlooking upper end of Rhyolite Canyon – approximately 300 feet from trail head.
Context: Hilltop **Aspect:** South
Feature Type: Stairway **Size:** Small

Feature Description: Stairway constructed of flat tabular to blocky slabs of rhyolite set in cement mortar on a rubble foundation abutted to the base of rhyolite pinnacle. Each riser is composed of two to five individual stones of variable size and covers a vertical drop of approximately four feet. Voids are filled with small angular fragments of rhyolite or cement. Stairs lead from trail down to a platform, created by a stone retaining wall (MNT 28), that provides a scenic overlook into the dense woodland and rhyolite pinnacles of upper Rhyolite Canyon. In addition, a metal interpretive sign (recent) has been installed on one of the stair steps.

Feature Condition: Stairway risers all show signs of deterioration – cracked and missing stone, collapsed stones, basal erosion of footings and loss of foundation material – leading to uneven and potentially unstable step surfaces. While the abutted portion of the stairway appears stable, the basal footings of the outer side are actively eroding. The area adjacent to exposed footings is unstable and subject to channeled drainage from trail surface. Platform exhibits substantial loss of tread material, thereby contributing to loosening of retaining wall (MNT 28). The installation of a metal interpretive sign may have contributed to deterioration of step. Previous repairs are evident in numerous cement patches and placement of stones to provide support for deteriorating stairway foundations.

Treatment Description: Loose and missing stones reset in comparable cement mortar. Stabilize exposed foundation of stairway and install small drain to divert water from stairs through retaining wall. Repair riser footings throughout – repair and/or replace loose and missing stones, reset in comparable cement mortar. Tighten retaining wall and replace missing stone, restore platform tread to original level.

Detail of bottom step illustrates extent of eroded footing with loss of cement mortar, small chinking stones, and foundation fabric. Center stone exhibits additional fractures and appears to be almost entirely undermined. Stabilization includes preparation of new footing, insertion of fashioned support stones, repair of joint, and replacement of platform tread material to original level. Long-range preservation should incorporate periodic monitoring, particularly for erosion of platform surface, and maintenance as required.

Figure 13-9: Trail Feature Types

Feature Type	Description	Treatment Guidelines (Preliminary)	Photograph
Stairway	❑ Rock stairways consist of variable number of risers/ steps constructed of flat tabular stones set in cement, cut into bedrock, or a combination of both. Stairways may be tied into natural features, enclosed by walls, or free-standing.	❑ Carry out detailed inspection of structural integrity. Structural intervention may be required. ❑ Stabilize and/or repair structural footings, walls, and walking surfaces. Specific sections may require stone and mortar replacement, tightening of loose or dislodged stones (particularly caps), and patching of cement surfaces.	 Massai Point Nature Trail
Steps	❑ Steps are relatively small to large flat tabular stones generally placed below a retaining bar to provide a shorter or intermediate platform. Steps are not set into trail tread surface or integrated with other trail features.	❑ Stabilize and/or repair steps by repositioning individual stones, repairing associated tread surfaces, and reinforcement with additional retaining bars without altering the historic character or appearance of step.	 Upper Rhyolite Trail
Switchback Corner	❑ Complex dry wall structure that integrates multiple walls on either side of a trail with a variety of trail features (e.g. open culverts) to ensure the integrity of trail at turning point. Switchback corners may be viewed as either an integrated structure or as individual features and range in size from relatively small to very large.	❑ Stabilize and/or repair switchback corners to insure proper function. Specific features may require stone replacement, cleaning, moderate rerouting across tread surfaces, and reinforcement with additional retaining bars without altering the historic character or appearance of the corner. ❑ Monitor all switchbacks for any changes in condition or integrity	 Ed Riggs Trail (Echo Spur)
Trail Curb	❑ Single stone-width features that demarcate trail boundary and minimally inhibit erosion of tread surfaces. This type of feature, placed on the margin of a trail, is often minimally embedded in the trail tread and is consequently easily displaced.	❑ Stabilize and/or repair trail curbs by resetting individual stones, repairing associated tread surfaces, and reinforcement with additional retaining bars without altering the historic character or appearance of curb.	 Massai Point Trail

14. Documenting Linear Landscapes: HAER's Park Roads and Parkways Program as a Model for Historic Trails

Todd Croteau
HAER NPS Park Roads and Parkways Program Manager



Figure 14-1: Views can be especially useful in landscape documentation, revealing relationships of complex design features and circulation patterns (HAER drawing for Acadia's Roads and Bridges).

For the past twelve years, the Historic American Engineering Record (HAER) has been conducting a systematic survey of roads and related resources in America's national parks and parkways. The goal of this program is to create a thorough visual and textual record of historically significant roads, bridges, and ancillary landscapes in America's national parks and parkways. The documentation includes large-format photographs, measured and interpretive drawings, and detailed historical narratives. The results of these studies are provided to park managers and added to the HABS/HAER collection at the Library of Congress. The graphic documentation component initially focused on bridges and other engineered structures, but as the program evolved it expanded in scope to address broader cultural landscape concerns. Traditional site plans and elevations have been augmented with conceptual drawings illustrating design concerns, construction practices, experiential factors, and temporal changes (Figure 14-1).

Application of HAER to Hiking Trails

Considerable potential exists for adapting the methodologies developed by HAER for park road documentation to address other cultural landscapes such as historic hiking trails. There are many parallels between these two types of resources in terms of design, construction, historical development, and social function. Both hiking trails and park roads were designed to provide access to scenic resources while constraining the negative impact of visitors on their natural surroundings (Figure 14-2). Both roads and trails employ a variety of design techniques to showcase natural scenery and both have traditionally relied heavily on natural materials and rustic or naturalistic aesthetics. While hikers and motorists move at different speeds and in different proximity to the

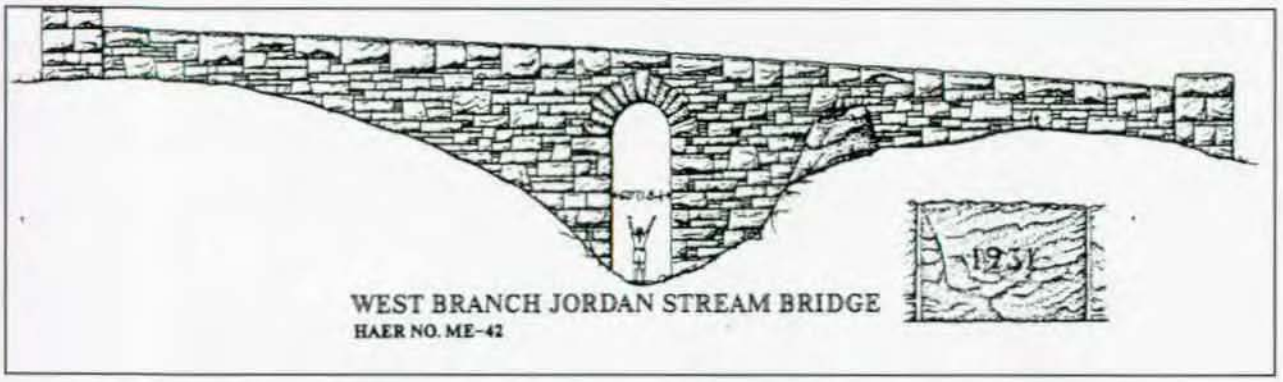


Figure 14-2: A section illustrates the relationship of roads and trails (HAER drawing for Acadia's Roads and Bridges).

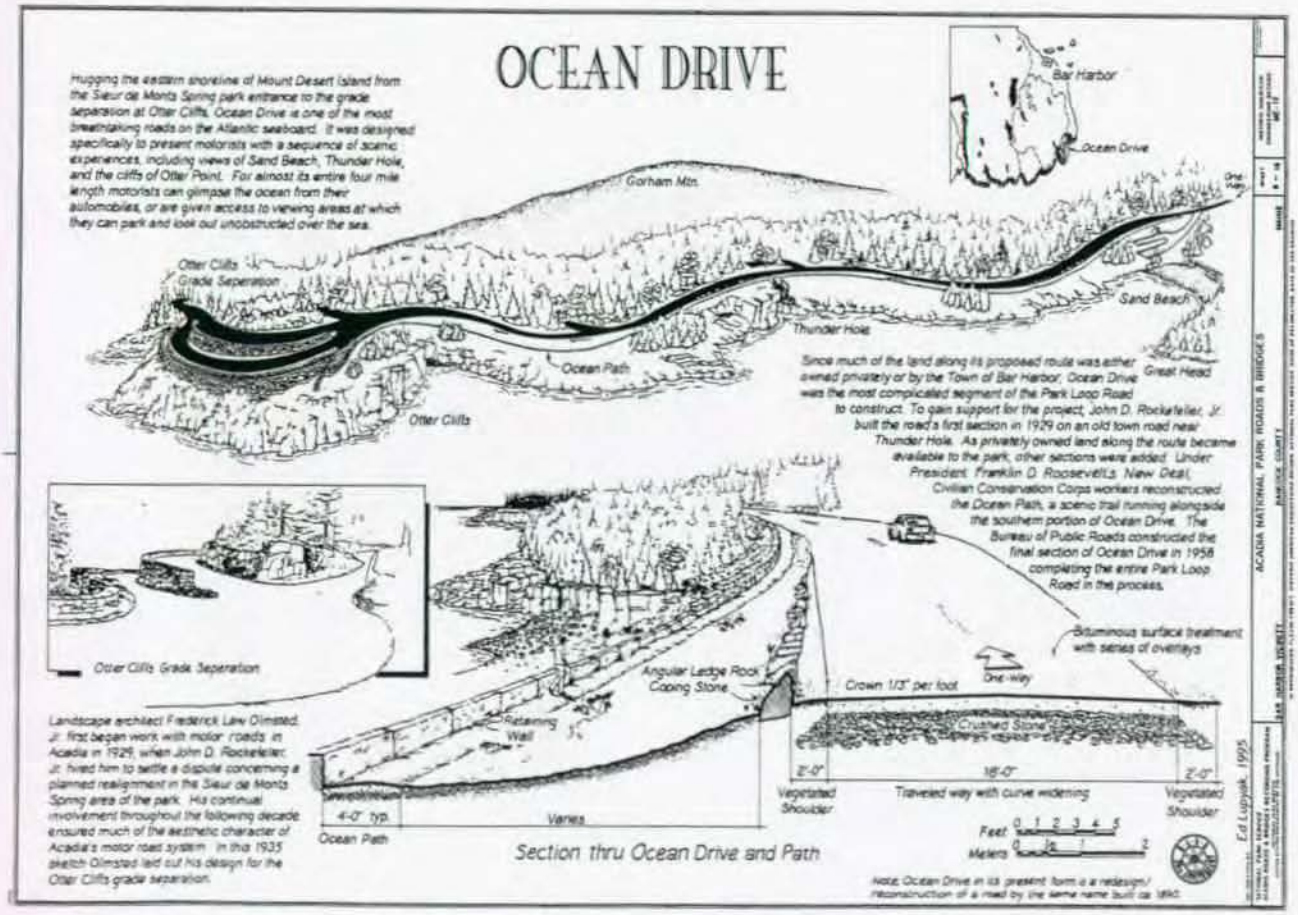


Figure 14-3: Perspective drawings, sections, and descriptive text broaden our understanding of the built environment (HAER drawing for Acadia's Roads and Bridges).

natural environment, both experience the landscape as a dynamic, almost cinematic progression of continually changing views, vistas, and sensory perceptions. Because of these many similarities, the techniques developed by HAER for park road documentation could readily be adapted to help identify, articulate, and preserve the unique qualities and distinguishing characteristics of historic hiking trails in the national parks and elsewhere (Figure 14-3).

Access to HABS/HAER Documents

The Historic American Buildings Survey (HABS) and the Historic American Engineering Record (HAER) collections are among the largest and most heavily used in the Library of Congress Prints and Photographs Division. Many drawings have been posted on a website, which is accessible through the Library of Congress website (http://memory.loc.gov/ammem/hhhtml/habshome.html). There is also a link to the HABS/HAER website.

In addition to serving as permanent records of historically significant structures and landscapes, HAER documentation is a valuable resource for cultural resource managers, interpreters, and anyone else interested in the development, use, and management of America's cultural landscapes. HAER research provides baseline documentation and background research to aid management decisions and provide design guidelines for engineers, architects, and landscape architects. HAER drawings, photographs and histories can also be used to create brochures, interpretive panels, and museum exhibits that communicate historical processes, design strategies, and management concerns to the general public. Many parks have recognized the value of HAER documentation in helping to analyze, record, manage, and interpret their road systems (Figure 14-4). Extending these benefits to the preservation and management of historic hiking trail systems would be a logical and valuable extension of this successful collaborative cultural resource management program.

Historic American Landscape Survey

In 2000, the Historical American Landscape Survey (HALS) was established to compliment HABS and HAER. The intent of HALS is to document significant historic landscapes throughout the country via measured drawings, large-format photography, written narrative and other documentation techniques. HALS will also try to document the dynamics of landscapes. To implement the program, a Memorandum of Understanding has been established between the American Society of Landscape Architects (ASLA), the National Park Service (NPS), and the Library of Congress (LOC). As the program develops, information will be posed on the the HALS website (www.cr.nps.gov/habshaer/).

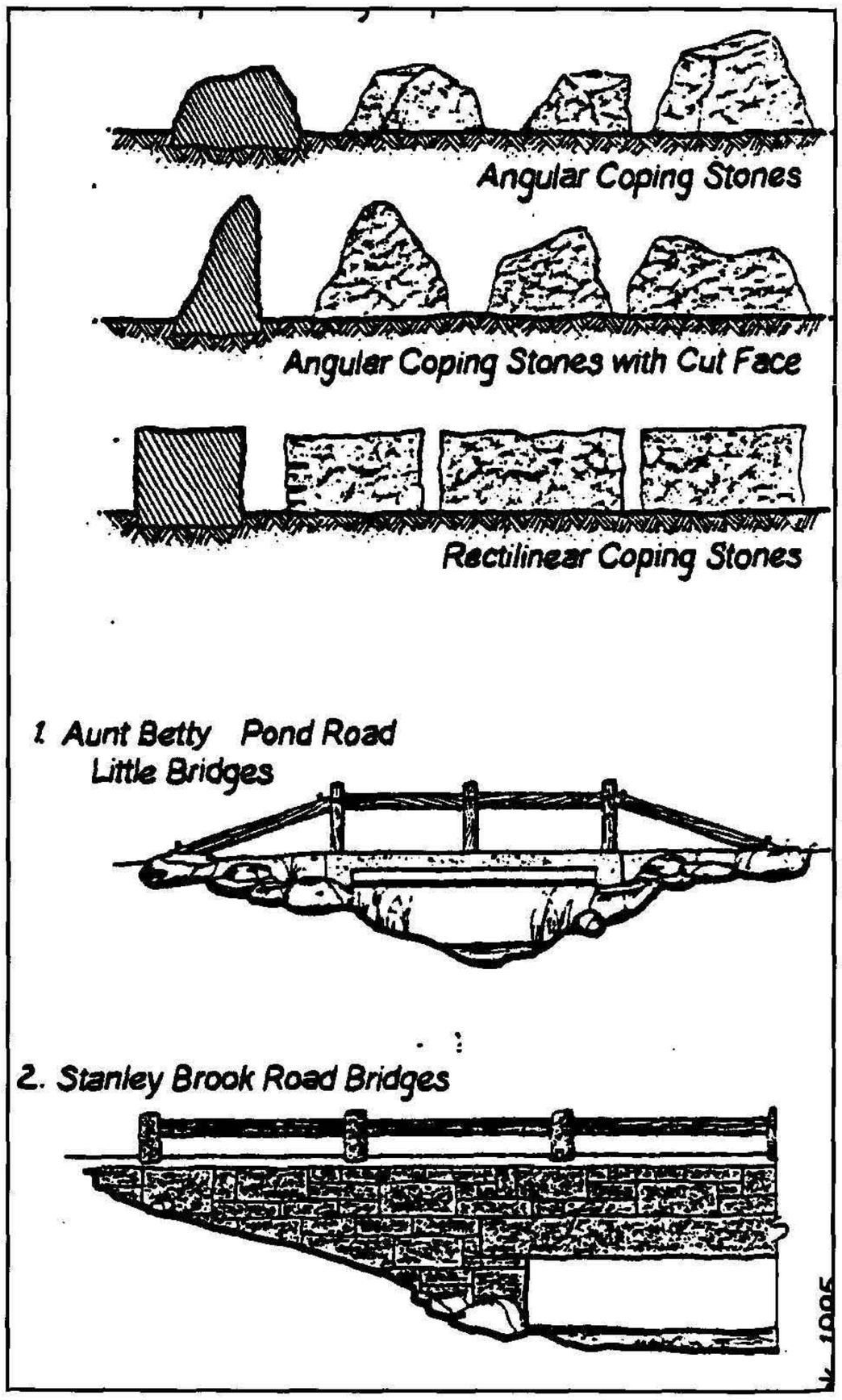


Figure 14-4: Many objects associated with linear landscapes can be identified, surveyed, and drawn through the use of measured drawings (HAER drawing for Acadia's Roads and Bridges).

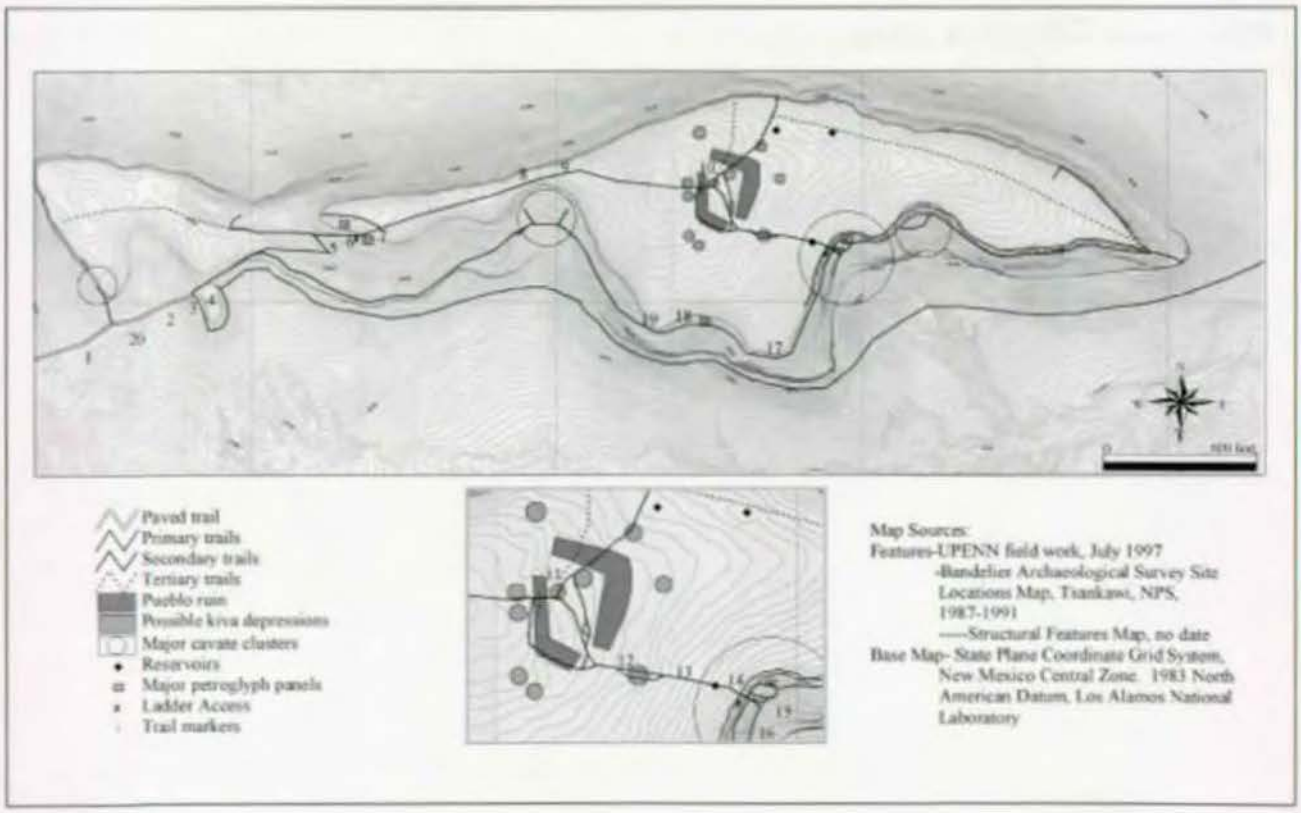


Figure 15-1: Site map of Tsankawi Unit, Bandelier National Monument.

had caused further hydrological damage by creating new arroyos and deepening existing ones. According to San Ildefonso elders, all of the above processes desecrate the sacred nature of the site and offend Tsankawi's Tewa descendants.

In late 1996 and early 1997, discussions between the park, the Architectural Conservation Projects Program (CAC) of the Intermountain Support Office, Santa Fe and the University of Pennsylvania (UPENN) began to consider ways to address some of the problems. Bandelier National Monument invited the University of Pennsylvania Architectural Conservation Laboratory to the park to investigate deterioration issues in both Frijoles Canyon and the Tsankawi Unit. Although preliminary surveys indicated that cavate resources in Frijoles canyon were seriously compromised, the investigation focused on Tsankawi Mesa as the primary resource.

Funding was provided through a Cultural Resources Training Initiative Grant, Cultural Cyclic, and Fee Demo programs, which are all National Park Service resources. One common thread ran through the planning effort. It was decided early on to actively consult with a tribal entity closely associated with Tsankawi. Communication lines were opened with San Ildefonso Pueblo, located five miles south of Tsankawi. Issues were discussed with the San Ildefonso Governor and Tribal Council on March 3, 1998.[1] Three months later, a training effort entitled "Beyond Compliance: Heritage Preservation for Native American Ancestral Sites" produced a site preservation and CRM training program which discussed cultural, physical, legal, and logistic issues associated with ancestral site preservation. The active participation of San Ildefonso was anticipated, welcomed, and resulted in specific and direct recommendations effecting the scope of work. In conjunction with providing labor for the summer's work, six participants in the training were hired from local Pueblos and worked through the summer of 1998 in order to provide a sense of purpose and cultural continuity from the site to the present day. In addition, the State Office of Historic Preservation was actively consulted on preliminary site visits and during the training to clarify its role and function.[2]

Trail Infills

Visitation to Tsankawi Mesa over the past eighty years has followed what is believed to be a primary prehistoric circulation route around the mesa. The result of this focused foot traffic was the severe deterioration of the soft Tsirege and Otowi Tufa rock. Through comparing early photographs with present day conditions, mechanical erosion averaging sixteen inches and as much as six feet in some places was seen (Figure 15-3, 15-4).

Initial designs for trail fill relied heavily on the use of geotextiles for aggregate separation and stability in addition to water filtration through the fill. However, once onsite work commenced, it was discovered (through the advice of John Kellywood from the Bandelier roads and trails crew) that the geotextile was an unnecessary and complicated solution. A more elemental fill requiring only tufa and pumice was chosen as the preferred material. However, one small fill was installed with a geotextile wrapped core of rubble to act as a comparison test. As well, in one particular case, another fill at a large and complicated

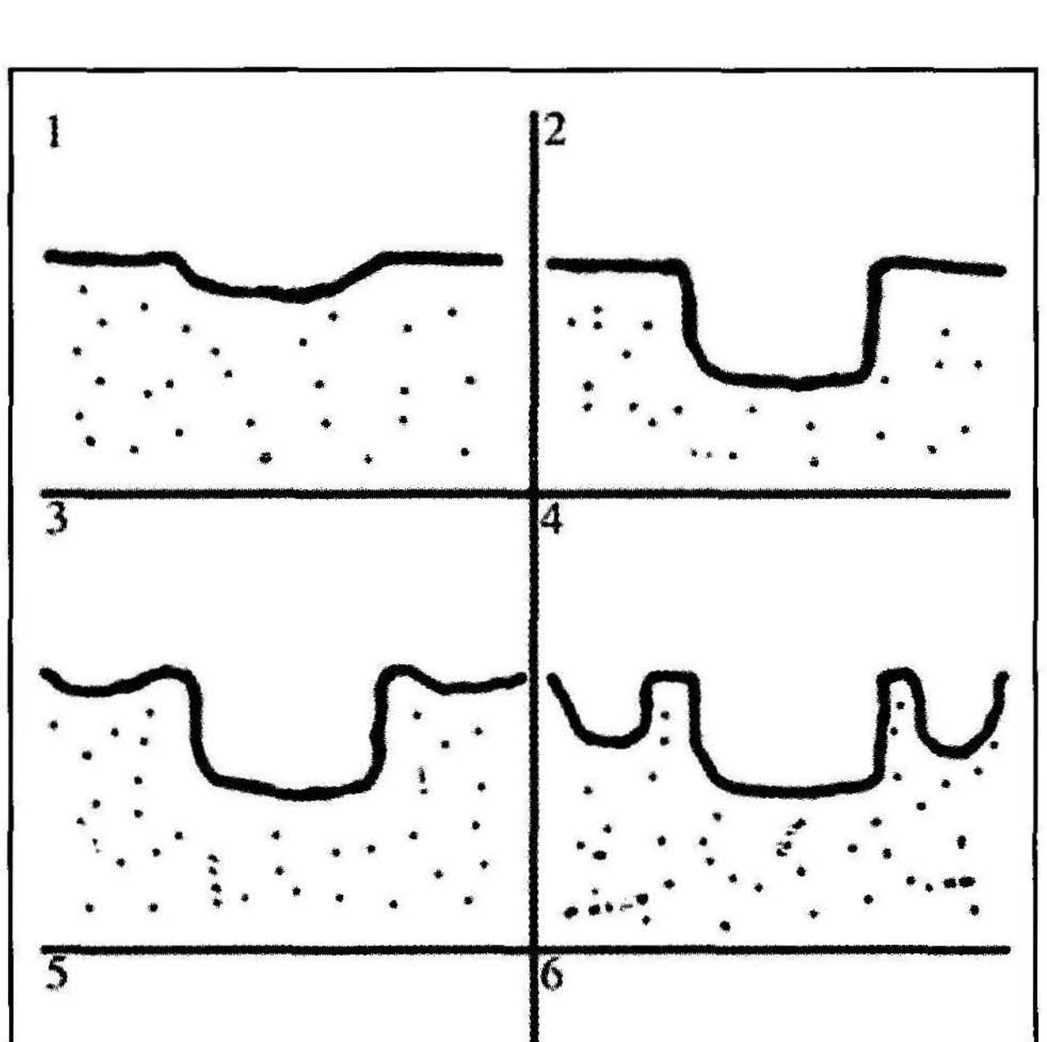


Figure 15-3: Section diagrams showing the progression and extent of erosion in the tufa rock.

crevice site utilized a geotextile layer. This situation will be discussed later in this text.

Materials needed for trail fills were tufa rocks of compatible hardness and color (for base courses, steps, and soil retainers), crushed tufa (for filler and surface pumice anchoring), and pumice (for aesthetic compatibility, walking surface, and sacrificial material). All of these materials were not collected on site due to the potential impact on archeological sites an for erosion prevention. Materials had to be either collected off the mesa (tufa) or carried to the worksite (pumice and geotextile). Approximately 150 tufa rocks total were collected from the base of the mesa and brought to various trail fill sites.[3]

Trail fills were constructed by first placing a step or anchor stone at the lowest downslope point in the fill section. This is the most important stone as it will eventually take most of the pressure from foot traffic and water flow through the fill. These stones were carefully shaped and wedged in the trail to provide the tightest fit. Sometime exact settlement was impossible



Figure 15-4: Visitor use has eroded Puebloan routes.



Figure 15-5: Horizontally placed overlapping steps installed for visitor trail.



Figure 15-6: Back to back, set-behind steps installed for visitor trail.

and smaller rocks were carefully pounded in around the anchor to wedge the stone in place. After the initial stone was placed, the best route was selected for the remaining upslope steps. If the section was particularly deep, these prime locations (narrow spots, curves) were used to wedge larger, less well shaped stones to act as anchors for the heavier amount of fill to be placed behind and on top. In these deeper sections, this was a crucial element to the design as to prevent too much pressure building up in one place (the bottom anchor stone). As well, particularly deep sections required a higher rise to bring hikers up to a safe level of travel within the trail. This was done in two places with two stair-like methods. First, by stacking larger, shaped stones on top of one another with only a slight overlap, a deep spot with little anchoring could be sufficiently raised with more vertical than horizontal force holding the stones in place. Secondly, for a location with a sufficiently narrow pinch, larger shaped stones were placed high and against the back (set-behind) of the preceding stone (Figures 15-5 and 15-6). Rubble fill supported each successively higher stone.

Larger crushed tufa, approximately five inches in diameter was then placed in the bottom of the trail between steps and anchor stones and more finely crushed tufa was placed on top to a depth three inches below where the final level of fill was to be. The remainder of the surface was filled with pumice for a walking surface. However, just under the surface of the pumice layer, at the places where footsteps were most likely to land, a slightly larger stone was placed to provide a solid impact point that would prevent foot traffic from digging into the pumice while retaining the pumice in situ (Figure 15-7).

The fill in the large crevice mentioned earlier was an exception in the general fill design due to its vertical height and horizontal depth, and required the use of a geotextile, to allow the flow of water through the fabric while retaining the separation of different sizes of aggregate. The fill process here required a base course of stones of approximately twelve inches in length laid in the bottom of the crevice. On this was placed crushed rock with a five-inch diameter. At this level, a geotextile layer was applied with particular consideration to filling in larger gaps between the stones below. The two succeeding layers were of a more finely crushed rock of approximately two inches in diameter and a top layer of pumice with strategically placed stepping stones. This fill method leaves enough space between the lower, larger stones for water flow while keeping the smaller aggregates from falling down into the fill, significantly decreasing the amount of material needed to fill the crevice. In all, six trail sections were filled in for a total of 143.5 feet completed.

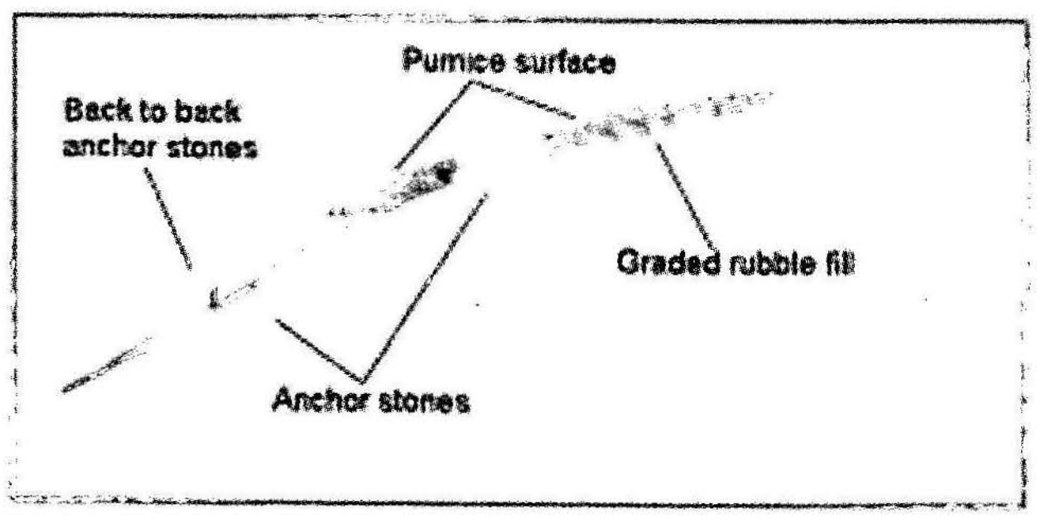


Figure 15-7: Section of trail construction materials.

Slash Barriers

A number of issues on Tsankawi were solved with the simple solution of spreading slash (mostly pinon/juniper branches) on the ground or arranging it into woven barriers. This material has the simple capability to act as both a cultural and natural resource protection device. On the mesa top, in and around the Pueblo village ruin are a number of areas where slash was placed as a deterrent to visitor non-compliance with the official trail route.

The top of Tsankawi Mesa is relatively denuded of its original vegetation. Grazing in the late nineteenth century combined with off-trail visitor traffic has left this part of the mesa with an almost exclusive pinon/juniper cover. The large amount of space between these trees contains little of the grasses indigenous to this ecozone and is in fact worn down to bedrock in many areas. Under the direction of the Bandelier Resources Manager, a low, fence-like barrier of slash was placed between trees to completely cordon off a section of mesa top. On two occasions since the slash barrier was placed, members of the crew rebuilt and more strongly entangled branches in order to heighten and strengthen the barricade.

Kiva and Trail Slash Fills

Twelve kivas have been identified in and around the village ruin, of which only two are within the central plaza. These two kivas, plus one found immediately outside the southeast corner were selected to be filled with slash, effectively covering the trails running through them and denying access from other directions. Slash for these fills was obtained from the "gravelyard" and the "helipad" areas of Bandelier, loaded on the stakebed truck and brought to the staging area. Bundles of slash were then carried up the mesa to the worksite and placed on the trails and in the gaps between vegetation on the perimeter of the kivas.

Slightly different methods of fill were used in each kiva filled. Due to the difference in vegetation around each of the kivas, a decision had to be made as to how to most effectively deny access without totally obstruction its view. The kiva located in the northwest corner was filled primarily by slashing over the connecting trail. The northeast kiva was enclosed by slashing in the vegetation gaps on its perimeter. Lastly, the kiva outside the southeast corner of the village ruin was filled using a combination of both methods.

During the slashing in of the kivas, members of the crew independently decided to deposit slash in a kiva to the northwest of the village ruin. Being located off the primary trail in an overgrown area, this kiva is not normally seen by visitors. However, it did show signs of foot traffic through it. This intrusion particularly upset members of the crew who felt that this kiva (as well as others off the primary trail) should remain as unseen and untouched as possible.

Three weeks after the kivas were filled in, a problem arose that required more slash material. A new social trail had become extant around the eastern side of the southeast kiva. This was due to visitors who travel in an opposite direction around the mesa than what is outlined in the self-guided tour. When confronted by the newly blocked trail through the kiva, the visitors would walk to the right, through the brush to the parallel primary trail. This in effect created a new route, which could only be eliminated by blocking access to the original trail to the kiva. Two of the twelve truckloads of slash were used to fill in this eighty-seven foot long remnant of the primary trail.

Stability Tests for Trail Surface Materials

According to the Bandelier roads and trails division, the 920 foot long and three- foot wide asphalt trail that led from the gate to the edge of the mesa had been in place for at least twenty years and had undergone at least two paving campaigns. This trail, though relatively maintenance free and durable, was problematic for two primary reasons.

First, the smooth and easily walking surface of the asphalt trail was misleading to visitors. Many people began their walk at Tsankawi thinking this surface continued for the entire loop and consequently thought the entire trail was accessible to all. The result was a large percentage of visitors beginning the hike in improper footwear, with baby strollers, and on crutches. As well, elderly and disabled visitors were led to believe that the hike would be relatively easy when in fact it involves some steep climbing, two ladders, and dangerous footing.

Second, the asphalt trail had negative environmental consequences. The material itself leached petrochemicals into the soil, threatening local water and soil resources. The physical barrier created by the trail altered the entire southwest slope's hydrology by cutting off natural drainages in addition to increasing the runoff funneling through culverts. This increased flow to particular areas exasperated an already developed arroyo system, which originated in the grazing practices of the late nineteenth century. The result is a number of arroyos over ten feet deep.

The above results of the paved surface necessitated the trail's removal.[4] Although the area involved had been surveyed during the Bandelier Archeological Survey and no sites had been recorded, Project Archeologist Mike Elliott conducted a cultural resources inventory in the area of effect for a potential trail reroute. An unrecorded cultural site was located, necessitating SHPO consultation. The time frame for the year's project work did not allow for this, and further work on this element of the project was postponed.

Four potential trail material test patches were installed in order to monitor their performance over the following year. The initial test patch, installed on July 2, 1998 utilized Road Oyl™ a product by Soil Stabilization Products. A multi-agency, joint training

exercise was staged for trail planning projects at Battleship Rock, Santa Fe National Forest and Coronado State Monument. Various members of Bandelier's Resource Management division, representatives from the National Forest Service, and New Mexico State Monuments were in attendance.

Pilot Trial Material Test – Road Oyl™ This material was tested due to the all-organic nature of the product, and the claims of asphalt-like strength with a dirt-like appearance. It was installed in an eight-foot section directly in front of the contact station. In addition to removing all asphalt from the test area, all contaminated dirt directly below it for approximately six inches was also removed. Installation went according to product specifications.

Following the pilot test, three other trail material tests were performed. These were installed with the following characteristics in order to standardize testing and reduce variables. All tests:

- were between twenty-five and thirty feet long.
- were installed on a sloping portion of the trail.
- had all asphalt and contaminated soil below removed.
- had a heavy base of rock (approximately six inch maximum length) obtained from the "amphitheater" area of Bandelier, lined one layer thick and no wider than thirty-five inches, as the bed of the trail test route.
- were laid out with a slight curve to simulate future trail positioning.
- surface materials were condensed with a motorized compactor.
- had their trail sides infilled and sloped to match the surrounding topology and to promote sheet erosion.
- were lined with slash to prevent gullies from forming alongside the compacted trail surface.
- were installed with a water bar made of hand-formed tufa from the site, with associated drainages in order to simulate possible future trail surfaces.

Trail Material Test #1 - EMC²™ This was a second, less expensive product by Soil Stabilization Products designed primarily for consolidation and minimizing dust for dirt roads. The thirty-foot long test was installed after removing the culvert that ran underneath the trail, 260 feet from the contact station. Aggregate used was the product's specified base course of #200 sieve size or less than ¾ inches.

Trail Material Test #2 – Modified Soil This test was installed 180 feet from the contact station with all of the above characteristics. The mix consisted of a one to twelve mix of Portland Cement™ and aggregate that was color matched to the surrounding soil. As well, approximately five shovels of lime were added to the mix to promote cohesion.

Trail Material Test #3 – Soil Only This final test was installed 150 feet from the contact station. Composed solely of soil, this was the most quickly installed test. Soil used was the same as that used in the modified soil test.

Results and Assessments

Overall, the project was very successful. By the end of the summer of 1998, the following assessments were made.

Pinon/juniper slash The slash barriers and surface cover locations throughout the mesa proved very effective by summer's end. Wildflowers were flowering in the kivas by the end of the summer and grasses were re-establishing on social trails.

Test Trail Fill Material Tests Of the three test sections (Road Oyl, EMC², mud, amended soil), EMC² by Soil Stabilization Products was the most successful. There was little material loss, the material withstood foot abrasion well, and there was no color change. The Road Oyl test did not adhere well to its component parts, and the color was much too dark despite the use of local soils. Both the mud and amended soil tests proved inadequate with the arrival of the summer rains which caused the trails to become much too muddy for walking.

Tufa Trail Infills The trail infills proved highly successful both technically and in terms of public relations. The materials proved very sympathetic to the resource, and held their strength and color through the summer seasonal rains. However, the pumice surface did wash off immediately. Visitors to the mesa vocalized their appreciation for the improved and safer walking surface and visitor non-compliance was visibly reduced.

Tribal Relations The strengthening of National Park Service and San Ildefonso tribal relations was perhaps the most rewarding aspect of the project. Open lines of communication were established along with a sense of trust between the two entities. In the years following the Tsankawi Project, the Pueblo has become more involved in park planning and the youth workers have returned to the park for summer employment each successive season.

Endnotes

[1] Collaboration with the park, CAC, and UPENN led to a Cooperative Agreement Modification with UPENN to support a thesis project and a training program.

[2] Roy Weaver, Superintendent of Bandelier provided continued support and guidance throughout the project. Management personnel for the Tsankawi Project consisted of Charisse Sydoriak, Resources Manager of Bandelier National Monument as Park Project Director, Jake Barrow of IMSF-CAC as Project Manager, Virginia Salazar, Program Manager for Curation IMR-SF as supervising consultant for Support Office assistance, Mike Elliott as Project Archaeologist, and Shaun Provencher of IMSF-CAC as project field leader. Frank Matero, UPENN, coordinated the training and consulted on design, while Bob Pruecel acted as consultant on Pajarito Plateau Anthropology in the training activity. Pueblo advisors were Martin Aguilar and Adeladio Martinez of San Ildefonso. Pueblo participants included Lawrence Atencio (San Juan), William Bebout (San Ildefonso), Patrick Cruz (San Juan), Naiomi Naranjo (San Ildefonso), Paul Quintana (Cochiti), and Adrian Roybal (San Ildefonso).

[3] Collection was carried out in accordance with a YYY *Tsankawi Project Cavate Treatment Rocks Collection* form.

[4] The asphalt trail was removed in 2000.

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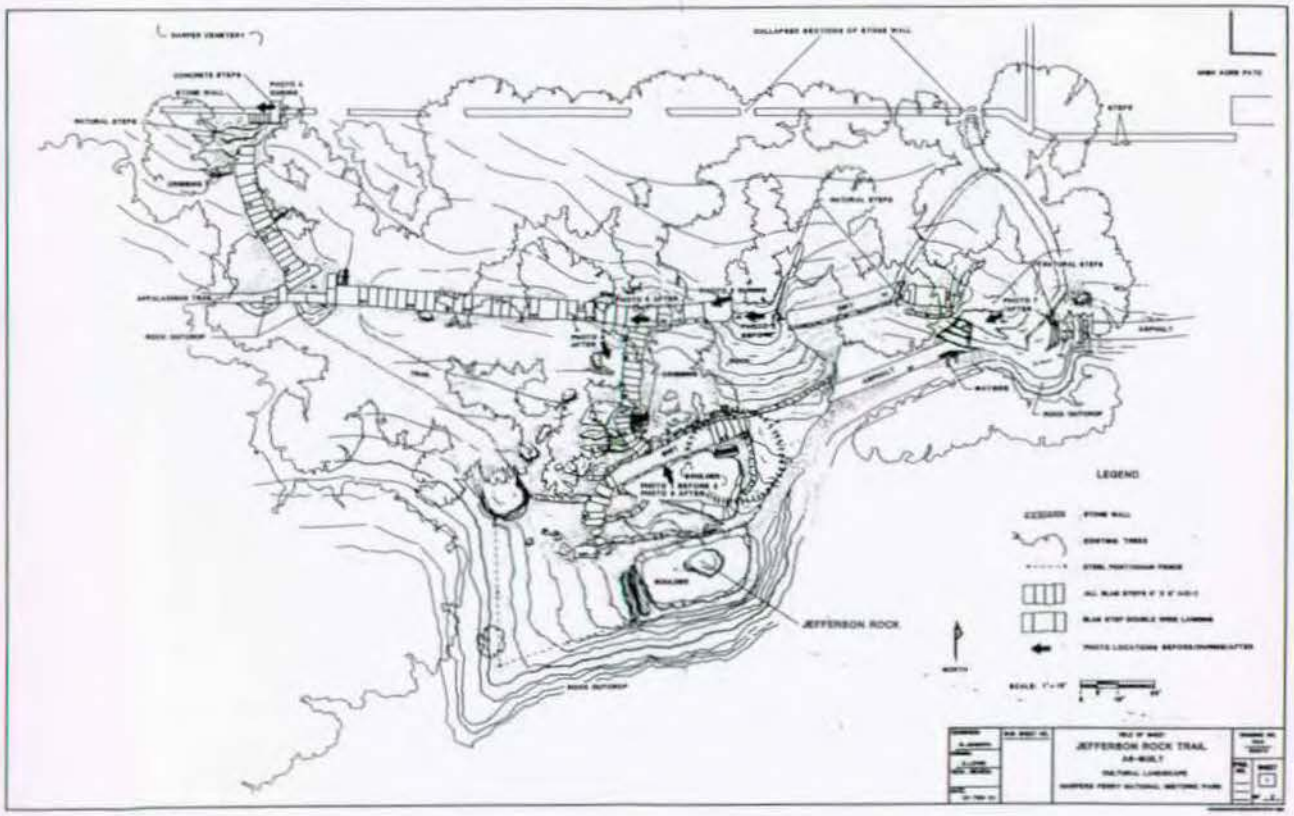


Figure 16-1: Map of project area.

16. Trail Rehabilitation at Jefferson Rock, Harpers Ferry National Historical Park



Figure 16-2: Jefferson Rock area in foreground, with view to Harpers Ferry at the confluence of the rivers. (Painting from Ed Beyer's "Album on Virginia," 1857, courtesy of Harpers Ferry National Historical Park.)

Maureen De Lay Joseph
Regional Historical Landscape Architect
NPS, National Capital Region

This presentation will describe the successful rehabilitation of a section of trail within a National Historic District, in Harpers Ferry, West Virginia. The Jefferson Rock Trail is a quarter mile segment of the larger 2,160 mile long Appalachian Trail, where it crosses the Potomac River, near the confluence with the Shenandoah River (Figures 16-1, 16-2). The trail begins in the historic commercial district within the National Historical Park and courses up the rocky face of the hillside to Jefferson Rock, a prominent and historic vantage point above the rivers.

Historical Significance

The Jefferson Rock Trail retraces the steps taken by Thomas Jefferson in 1783 when he declared the spectacular view from the rock was "worth a voyage across the Atlantic." Since the beginning of the nineteenth century, the rock's longstanding association with Jefferson's descriptive words has attracted painters, photographers and tourists to the site. In the 1810s, steps were carved in to the bedrock leading up to the hill and the approach to the rock was a worn dirt path. In the 1850s four red sandstone piers were placed underneath the rock to stabilize and support the formation. In the 1930s the trail was designated as part of the Appalachian Trail and the Appalachian Trail Club improved the trail system by constructing a series of stone steps leading up to the Jefferson Rock area. In 1953, the National Park Service purchased the area, and subsequently added asphalt walkways and handrails. The National Park Service then made subsequent additions to the trail system in the 1970s and 1980s to provide easier access to the area. With these changes, the natural beauty of the vantage point continues to draw visitors up the steep trail to view the rivers and the historic town below.



Figure 16-4: Completed rehabilitation of the Appalachian Trail in the Jefferson Rock area, September, 2000.

Project Description

Years of neglect and visitor abuse to the Jefferson Rock site created an eroded slope behind Jefferson Rock. A matrix of undefined trails ran up the hillside to the Appalachian Trail and Harpers Cemetery. Because of this, invasive plants such as Japanese honeysuckle had become established within the Jefferson Rock area. Design recommendations centered on the revegetation of the slope to stop the erosion behind Jefferson Rock, and the redefinition of the Appalachian Trail (AT), trails connecting to the AT, and trails around Jefferson Rock.

In 1990, a team of landscape architects, historians, archeologists, and historical architects developed a cultural landscape report for the commercial area of Harpers Ferry National Historical Park. In the final report, published in 1993, the team designated the Jefferson Rock Trail as a significant and distinctive feature of the historic area. The historical research and analysis conducted within the cultural landscape

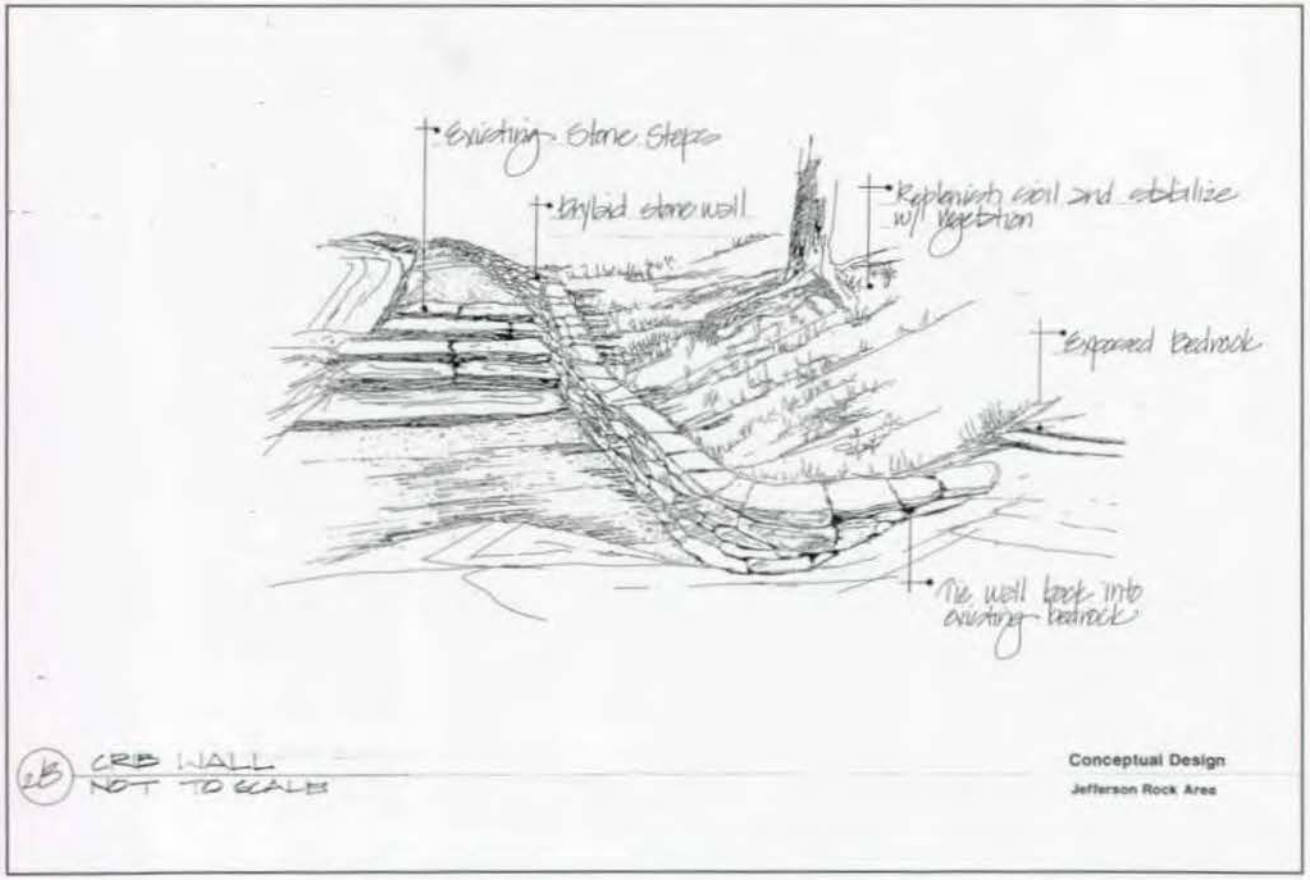


Figure 16-3: Conceptual design for the Jefferson Rock area to preserve existing steps and stabilize eroded slope with a dry laid retaining wall.

report served as the guide for the proposed design recommendations. After further refinement, the centerpiece of the design proposal included the construction of stone steps from the Jefferson Rock staging area to the AT and the construction of a series of stone walls to stabilize the eroded hillside behind the rock. To maintain the craftsmanship of previous stone work produced by stone masons in the 1850s and by the Appalachian Trail Club in the 1930s, design standards were produced to follow this historic workmanship (Figure 16-3). To preserve the rustic character of the AT and the area around the "Rock," native stone was the preferred material for the trail project. The historic material needed for constructing the proposed stone steps and dry laid retaining walls, Harpers Shale, was no longer quarried. A substitute material that matched the color and texture of the native stone was used.



Figure 16-5: Moving 1,500-pound stone steps down the hill to the work site.

Accessibility to the site, size of materials and weather were factors in implementing the project. In twelve weeks, with volunteer labor and National Park Service support, the crews set 86 new stone steps weighing approximately 1,500 pounds apiece and constructed 280 linear feet of dry laid stone wall (Figures 16-4, 16-5, 16-6). After the steps were installed, the National Park Service implemented the final phase of the project — the planting plan. The vegetation design controlled soil erosion on the slopes above Jefferson Rock and blended the new stone steps with the surrounding landscape.



Figure 16-6: Completed dry laid walls as proposed in Fig.16-3, using imported stone similar in color and texture to the original local Harpers Shale.

Methodology

The key step in developing a successful solution to any historic trail preservation project is the clear articulation of goals and objectives to serve as guiding principles. This should be based on a thorough analysis of the physical history and existing conditions of the trail system. Once goals and objectives are defined, the following process, based on the methodology used for the Jefferson Rock Trail redesign, can serve as the template for implementing a successful project.

1. Document your existing resources – historic and natural – to understand their complexities and how they relate to each other as we did within our cultural landscape report.
2. Define the goals and objectives for your project.
3. Prepare a preliminary design that incorporates the project objectives (treatment guidelines and plan).
4. Define historic details to replicate and/or develop new details that will compliment the historic trail.
5. Select materials that are compatible with the historic trail system.
6. Establish a relationship with a cooperating non-profit organization (as we did with the Appalachian Trail Conference and Potomac Appalachian Trail Club) to assist in locating volunteers to work on a project.
7. Develop a work plan with all interested parties.
8. Prepare conceptual design sketches for a shared vision of the project outcome.
9. Hire experienced crew leaders to teach and serve as mentors to volunteers.
10. Treat each volunteer as a needed asset to the project.
11. Create a welcome atmosphere for the work force and provide perks for volunteers such as housing, picnics, gatherings with dignitaries, and other special events.
12. Provide all necessary materials in a timely manner.
13. Finally, give volunteers a sense of ownership and accomplishment in their work.

17. Trail Rehabilitation at Minute Man National Historical Park and Allegheny Portage Railroad National Historic Site



Figure 17-1: Illustration of the Battle Road, April 19, 1775. Portions of the Battle Road are preserved within Minute Man National Historical Park.

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Carol R. Johnson Associates, Inc.
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John Tauscher
Landscape Architect
NPS, Boston Support Office

This presentation describes two new trails built though historic sites, with many sections along historic road and rail alignments. These two new trail projects in construction are at Minute Man National Historical Park, in Concord, Lincoln, and Lexington Massachusetts and at Allegheny Portage Railroad National Historic Site, in Cresson, Pennsylvania. One corridor is significant for its association with the American Revolution and the other for its association with America's Industrial Revolution. Both projects required an awareness of the historical significance of the landscape, and remaining historic features and characteristics. These physical remnants, and the associated interpretive story, were used to guide the new trail design as a primary factor, followed by the pragmatic issues of grading, drainage, etc.

Minute Man National Historical Park-Battle Road Trail

As a consultant, Carol R. Johnson Associates, Inc., a firm of landscape architects, worked with the National Park Service to design a trail that fulfilled the enabling legislation that says the park must preserve and protect the landscape of April 19, 1775 (Figure 17-1). Why is this one day so important? This was the beginning of the American Revolution. Paul Revere's ride and the Battle of the Old North Bridge had ended, but many hours and many miles of the "Running Battle" continued that day through the towns of Concord, Lincoln, and Lexington. The road the British regulars marched down, and the adjacent farmland where the colonial militia followed were the

scene of the battle and is still very evocative landscape over two hundred years later. As is true for many historic transportation routes, the "battle road" of April 19, 1775 evolved into a modern road covered in asphalt. The NPS made great strides to transfer ownership of the local roads to the government from the local towns and to purchase the homes along this road in order. These NPS acquisitions allowed us to propose taking local roads out of service and returning them to their 1775 appearance and limit their use to pedestrians and bicycles. It was also the opportunity to remove vehicular circulation from the historic scene and the visitor experience.

The project area included 5 miles of the original battle road. It is important to note that was only a portion of the full "Running Battle" which continued into Boston for another 15 miles. Because of current vehicular circulation and land occupancy about half of the five miles of battle road would be similar in materials, appearance, etc. to 1775 and the other half would be a new trail. The new trail had to be appropriate in the historic scene, had to traverse steeper topography, and cross wetlands. The width and surface treatment of the new trail had to be slightly different from the original battle road to avoid confusing the visitor.

The new trail had a separate set of design issues from Battle Road. Alignment was one of the biggest since a route was not predetermined by history. The staff at Minute Man NHP did the pre-design work to determine desire lines (connecting the historic sites), avoiding cultural or natural resources and also factoring in the status of some of the properties (all were under Federal ownership, but some were under term reservations or life tenancies). Following that "pre-screening" we, as consultants, were able to double check the alignment to insure that universal accessibility could be achieved, drainage could be accommodated naturally, etc.

Trail Width Studies

The "Battle Road" construction was actually much easier than the new trail (Figure 17-2). The alignment was predetermined since it followed the original 1775 route. The existing asphalt was removed and a clay/sand mixture was installed (Figure 17-3). The trail surface was designed based on NPS archaeologists recommendations from original battle road sampling.

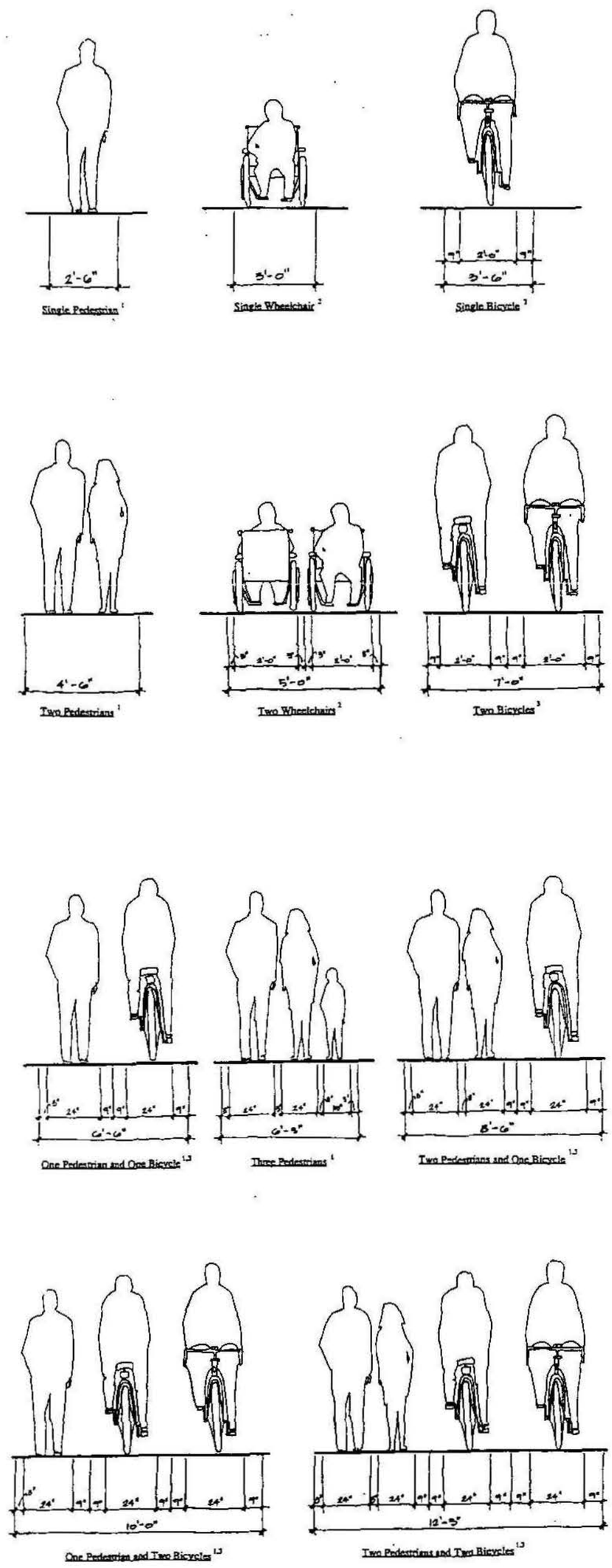


Figure 17-2: Width studies for different sections of the trail.

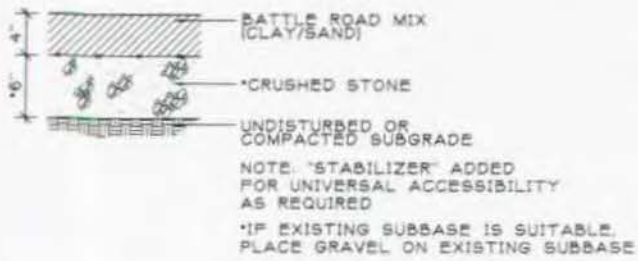


Figure 17-3: Cross section of Battle Road materials.

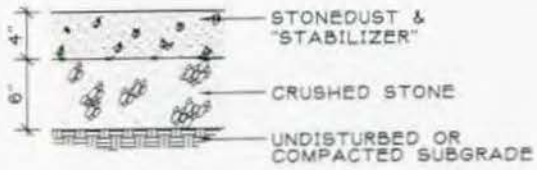


Figure 17-4: Cross section of new trail materials.



Figure 17-5: Bikers are required to walk on boardwalks, which are five feet wide and partially made of recycled plastic.

We proposed adding a binder to insure the surface was accessible and to reduce the expected maintenance. The binder we used on Battle Road and the new trail is called "Stabilizer," which is an organic binder made from *Plantago*, a desert plant (Figure 17-4). When activated with water it swells and becomes sticky. Since the binder is thoroughly mixed with the trail surface it binds it all together. It is important to note that even though the new battle road trail followed the original alignment from 1775, the original surface in most cases is 2 feet below the new surface. Over the years, with new roadway design standards, the bumps and dips were filled over and layers of paving materials have protected the original surface.

As an aside, both projects being discussed were designed to be universally accessible. Maintaining 5% running slopes in the topography the sites shared was not an easy task. Accessibility also determined what the trail surfacing could or could not be, or how the boardwalks would be detailed. Ultimately, it was our goal to design the trail so it was completely universally accessible, but in no way would that requirement of the project be a visual intrusion or visually evident.

In colonial times wetland areas were also seen as a resource, but not because they were valuable ecosystems. Instead, they were valued for their "fresh hay." The colonists ditched and drained the wetlands to control the water level. We cannot do this today and actually in Massachusetts are very limited to the activities that are allowed in wetlands. We were able to have the proposed trail cross these wetlands with boardwalks by designing them in a very ecologically minded way. The boardwalks were 5' wide, the minimum for two way accessible traffic, the height was the maximum allowed before handrails were required, the posts which supported the boardwalks in the wetland soil were made of recycled plastic so they would not leach chemicals into the water supply (Figure 17-5). The result is an enjoyable and educational trail connecting historic sites throughout the linear park. The surface, consisting of boardwalks and gravel surface hardened by the desert plant "Stabilizer," supports heavy pedestrian, bicycle and wheelchair use, while blending with the historic setting.

Allegheny Portage National Historic Site, Staple Bend Tunnel Trail

A different type of trail surface was required for visitors to the early industrial landscape at Allegheny Portage in Pennsylvania, where the impacts of canal and railroad construction changed America forever (Figures 17-6, 17-7). In the early nineteenth century, cargo shipped from Philadelphia to Pittsburgh traveled for ten days over circuitous roads. To improve the speed of shipments, a canal system was proposed. The mainline canal would connect Philadelphia and Pittsburgh and would ultimately reduce the 10 days of travel to 3. A canal was started from each of the two cities knowing that the Allegheny Mountains stood in the way. The designers at the time assumed a 4 mile long tunnel would be built under the mountains, although at that time, no tunnel of any length had been constructed on this continent.

As reality set in, the designer realized that alternatives to this 4 mile long tunnel were needed. They decided to do a very unusual thing-to portage the canal boats over the Allegheny Mountains-hence the name. This was accomplished by pulling the canal boats out of the water onto railroad cars. Steep slopes were traversed by pulling the canal boats up 10% grades called incline planes. In between incline planes were fairly flat areas called "levels." Our project included incline plane #1, the Staple Bend Tunnel, and part of Level #2.

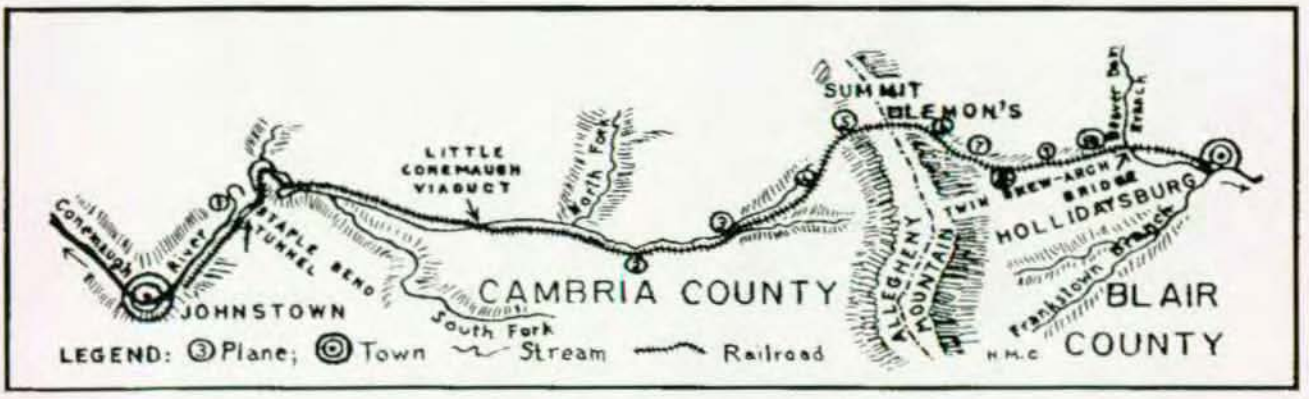
Although, many of the trail detailing issues were similar to those at Minute Man, the story of the place was not and this caused us to approach the trail alignment, width, and appearance differently. We strove for a landscape that embraced the extant elements and designed the trail to be evocative of the railroad geometry, palette of materials, and architec-



Figures 17-6 and 7: Historic view and map of the Allegheny Portage.



Figure 17-8: Historic sandstone sleepers, which were used instead of railroad ties, were preserved in the trail surface.



The Allegheny Portage Railroad.
This map from Historical Leaflet number 19.
By Julia Smith McMillan.

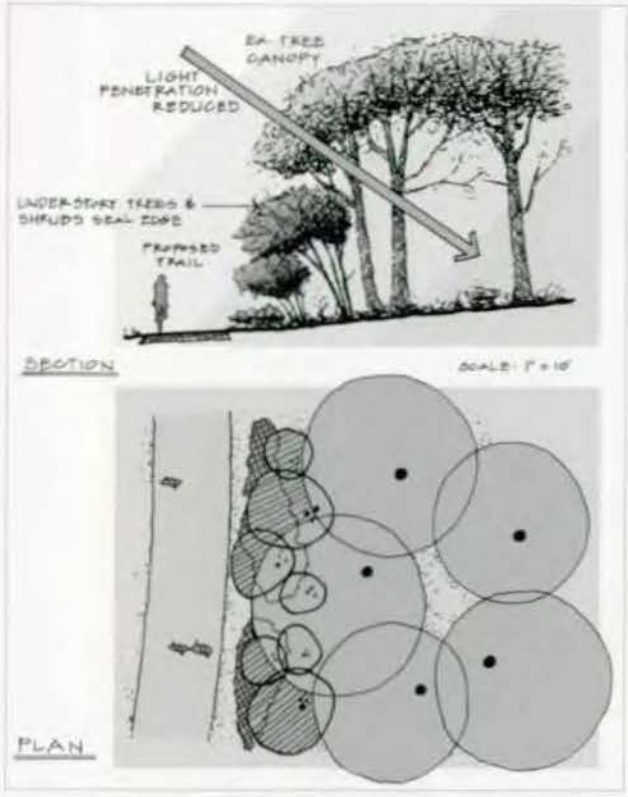


Figure 17-9: Forest edge sealing with tree and shrub seedlings to prevent encroachment by invasive species.

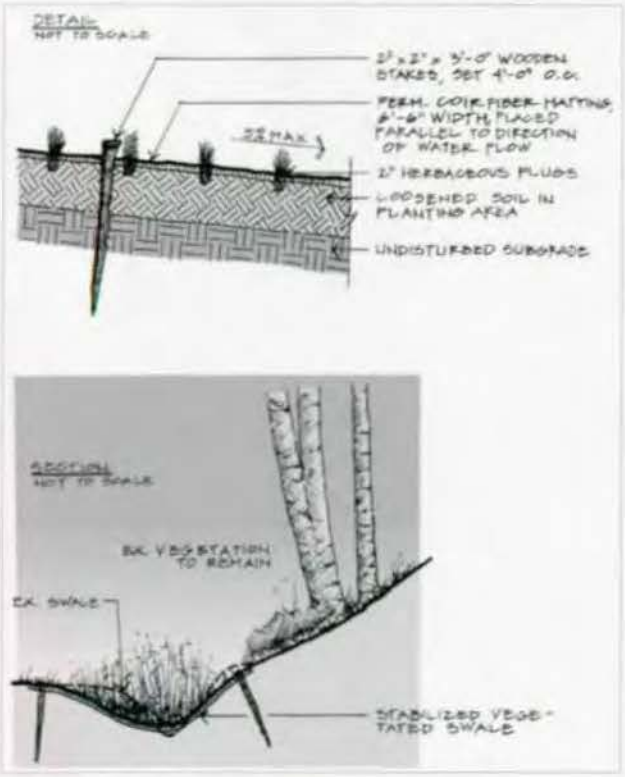


Figure 17-10: Swale seeding and plug planting.

ture. Many of the original elements of the Portage Railroad remain, although, in "ruin." The tunnel portals were originally highly crafted cut sandstone gateways in the classical style. The many cut sandstone culverts and retaining walls remain as well. The most important remnant of the railroad are the sandstone sleepers which were used in lieu of ties (Figure 17-8). The regular spacing of the square sandstone blocks makes the visitor very aware of the previous use.

We therefore were charged with designing a trail that highlighted, stabilized or preserved existing resources while maintaining universal accessibility. We were fortunate that the builders of the portage railroad understood the importance of good drainage because huge volumes of water build up during storms in the Allegheny Mountains. Even after 170 years water flows very carefully through high crafted culverts. In some cases the culverts are not functioning or their integrity is not certain. We proposed TV camera investigation to inspect the interior masonry and dye testing to verify proper drainage and to locate unknown outlets.

A very important aspect of the Staple Bend Tunnel project was the revegetation of disturbed areas with native planting. We specifically identified seed mixes that were native to this site and installed seed collected from Pennsylvania. Seed mixes included forest understory, meadow, low velocity swale and high velocity swale. A very aggressive seeding program with herbaceous plug and tree seedling installation was proposed to limit the growth of Japanese Knotweed-a very invasive plant (Figures 17-9, 17-10).

The retaining walls around the Staple Bend tunnel portals were not in good repair. The surcharge from the extremely steep slopes uphill of the walls ultimately was too great to withstand (the typical slopes are 1 ¼:1, run to rise). In some cases we were able to remove the eroded topsoil that obscured the retaining walls and rebuild minor parts of the walls. In other cases, complete reconstruction was necessary. To give the walls increased life we provided improved drainage behind the walls and installed level spreaders uphill of the tunnel to divert the majority of storm water away from the walls (Figures 17-11, 17-12).

Use of Contractors

In summary, for both projects, the work was designed and documented for public bidding and implemented by contractors. For the scope of these projects that worked very well. The scope of the work was clearly identified and was well within the realm of trades in the regions. The design team and the NPS was able to document elements to be removed, retained, repaired, etc. in such a way that the contractor would understand the "care" that was needed for these projects. Likewise, the design team anticipated that large equipment would be used, which was advantageous for the most part, but had to be restricted for certain tasks.

Construction of new trails along historic corridors requires careful attention to historic remnants. These must be highlighted, stabilized, and preserved, in addition to carrying out the fundamentals of trail design: good drainage, and sound tread construction, but with the new requirements for universal accessibility.



Figure 17-11: East portal before repairs



Figure 17-12: East portal with repaired retaining walls and improved drainage.

18. Adaptive Rehabilitation, Management, and Trail Maintenance at Cuyahoga Valley National Park



Figure 18-1: Lock 37 on the Ohio & Erie Canal.

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Supervisory Landscape Architect
Cuyahoga Valley National Park, Ohio

This presentation describes the rehabilitation of the Towpath Trail adjacent to the Ohio & Erie Canal while adhering with Section 106 of the National Historic Preservation Act. Key to the success of the effort was preplanning that was conducted with representatives of the Midwest Archeological Center of the National Park Service, Ohio Historic Preservation Office and the Advisory Council on Historic Preservation. Additionally, the presentation describes the challenges overcome to adaptively rehabilitate and restore the trail in the floodplain of the Cuyahoga River, the upkeep of the Towpath as a major component of the park maintenance operation, and efforts underway to develop the Towpath beyond the park boundary. This includes the impact of legislation passed by Congress in 1996 to create the Ohio & Erie Canal National Heritage Corridor (Figure 18-1).

Background

In February, 1825 the Ohio Legislature authorized construction of the Ohio to Erie Canal from the Ohio River north to Lake Erie, a distance of 308 miles. On July 4, 1825 groundbreaking occurred for the "gigantic" undertaking. In 1832 the entire canal was completed and opened to boat traffic. Total initial construction cost for the Ohio Canal System was $13 million. The original main canal channel was 26 feet wide on the bottom, 40 feet wide at the waterline (wide enough to allow two boats to pass easily), and a minimum of 4 feet deep. On the side nearest the river a ten foot wide towpath was to be built. On each side of the channel, woods and underbrush were to be cut back 20 feet to minimize the possibility of falling trees blocking the canal.

The Cuyahoga Valley National Park (formerly National Recreation Area) was established in 1974. The

33,000 acre unit of the National Park Service is situated in northeast Ohio between Cleveland and Akron. The park's 1977 *General Management Plan* recognized that the historic Ohio & Erie Canal should become the principal recreational resource of the park, once rehabilitated and restored. Commercial use of the Ohio & Erie Canal ceased as a result of damage caused by a devastating flood in 1913. The Ohio & Erie (O&E) Canal and the associated Towpath Trail are listed on the National Register of Historic Places. A portion of the O&E Canal is designated a National Historic Landmark. The O&E Canal Towpath is ADA compliant and is linked to two metropolitan park districts as well as numerous spur trails to local adjacent communities (Figure 18-2).

Towpath Trail Development Program

Following the establishment of the park in December, 1974, a suitability and feasibility study for the Ohio & Erie Canal was completed by the NPS in October, 1975. It recommended: "preservation, interpretation, and use of the canal right-of-way...as a trail along as much of the route as possible." The park's 1977 *General Management Plan* reinforced the concept of preserving the remains of the Ohio & Eric Canal through the Cuyahoga Valley National Park. The park developed a comprehensive "Trail Plan and Environmental Assessment" in 1985 in which the remains of the Ohio & Erie Canal were described as "the single most significant and extensive historic feature within the recreation area." The highest priority trail proposed for development in the 1985 Trail Plan was the "Towpath Trail."

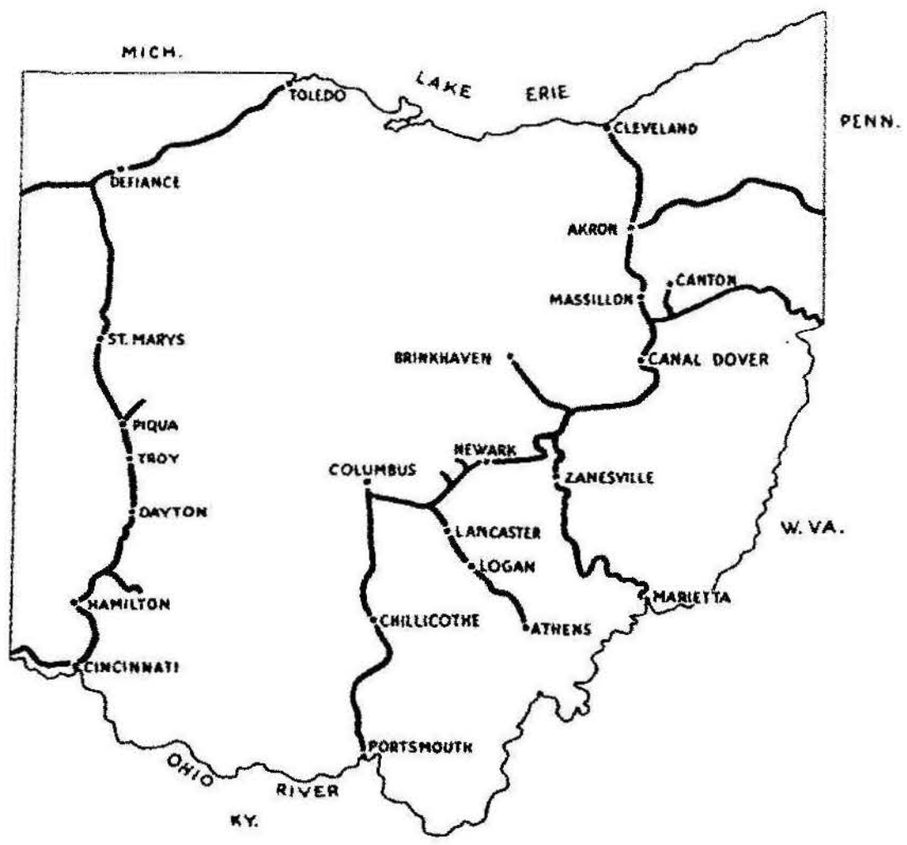


Figure 18-2: Map of the Ohio Canal system, mid nineteenth century.

Challenges To Be Met

In 1985, the majority of the Ohio & Erie Canal was owned by the State of Ohio. Over a period of years the state and federal government negotiated a transfer. The property was deeded to the National Park Service in 1989. An additional four-mile section had been deeded by the state of Ohio to a local metropolitan park district before Cuyahoga Vally NP was formed in 1974. An easement was negotiated allowing the NPS to construct and maintain the trail on Akron Metropolitan Park District property, from Peninsula to Everett. Although generally abandoned since 1913, informal use of the towpath as a hiking/bridle trail was still occurring on many of the remnant sections, both in the national park and along much of its entire length through the state of Ohio. Many of the abandoned sections were badly overgrown with vegetation. In some cases the O&E Canal was completely destroyed, either by natural processes such as erosion or by man caused changes.

The Programmatic Agreement

Once the concept of adaptively rehabilitating the O & E Canal Towpath was agreed upon, the NPS sought funding, and initiated project planning, and development. To abide with NPS Cultural Resources Management Guidelines, a four party "Programmatic Agreement" was developed to comply with Section 106 of the National Historic Preservation Act.. The agreement was executed in August, 1990 by the NPS, Akron Metropolitan Park District, The Ohio State Historic Preservation Office, and the Advisory Council on Historic Preservation.

Stipulations were developed that the NPS was responsible for abiding by. A "Task Directive" was developed and approved in March, 1990. A systematic, phased archeological survey was required. It was conducted by staff of the Midwest Archeological Center of the National Park Service for the entire proposed alignment of the trail. A "Historic Structure Report" consisting of a historical data section and an architectural data section was required to be completed. Planning and development of the trail was phased, with each of the four parties reviewing and approving plans for each phase prior to construction.

Construction

Ceremonial ground breaking for construction occurred at "Red Lock" (lock 34) in late 1989. The 20-



Figure 18-3: View of Lock 37 in the late nineteenth century from the deck of a canal boat, showing a dwelling and general store.



Figure 18-4: View of Lock 37 approximately one century later with recreational use of the Towpath Trail.

mile long trail was opened October 17, 1993. Historically a dwelling and general store existed adjacent to lock 37. All that remains are the lock and associated water control structures, and, of course, the Towpath (Figures 18-3, 18-4). Historically a bridge was constructed in the 1880s to allow for the Valley Railway to pass over the O&E canal. After the flood of 1913 the bridge was removed and the canal filled in (Figures 18-5, 18-6). After the flood of 1913, from south of lock 26 to the north end of Akron, the canal was obliterated by the construction of Riverview Road. Due to the fact that the canal had been removed in the south end of the park, a new alignment was required.

In the vicinity of the Ohio Turnpike (I-80), the canal had been removed in the 1950s so as to provide borrow material for the I-80 bridge approaches over the valley. In addition to sections of the canal being removed by man, Mother Nature reclaimed other areas as well. At "Stumpy Basin" the old canal basin had evolved into a wetland - U.S. Army Corps of Engineers permits were required for developing a boardwalk through the area. Once completed the Cuyahoga River migrated northerly threatening the integrity of the boardwalk. The riverbank was stabilized to minimize erosion. Some areas of the towpath were still in use as access to agricultural land. Development of the Towpath Trail was straight forward in these locations. Natural hydrologic processes also breached the canal in many locations along its alignment. In these locations a case-by-case assessment was done to determine the most suitable type of structure needed to accommodate the situation.

Rehabilitation of the Towpath also included restoration of significant historic structures along the alignment of the canal, such as the historic house at Lock 38. The "Locktender's House" was adaptively rehabilitated as the Canal Visitor Center. Restoration



Figure 18-5: Canal prism near Valley Railway, before rehabilitation.



Figure 18-6: Same section as 18-5 after tunnel installation.

of significant historic structures also included interpretation of the aspects of history pertaining to the impacts of the Ohio & Erie Canal to the region. The Boston Store was rehabilitated as a facility interpreting the history of canal boat building. Restoration of the Hunt Family Farm in the National Register District of Everett included interpretive panels on the Hunt family and their life in Everett, as well as general information about the park.

Interpretation

Waysides, signs, bollards and mileposts are an integral component of the Towpath Trail (Figure 18-7). Three sided informational kiosks were designed and installed at each trailhead and major visitor use facility along the 20-mile length of the Towpath Trail in the park. The kiosk design is so popular that the local metropolitan park districts have adopted it for use in their parks. The canal was still extant north of Ira Road, but beaver had created a wetland that needed to be accommodated. A boardwalk was built and interpretive waysides developed to tell their story. A bench and wayside were installed immediately adjacent to the site of the aqueduct over Furnace Run Creek (Figure 18-8). The wayside below depicts the style of aqueduct that was installed. The park utilized the bow string truss bridge design at several locations along the Towpath Trail.

Trail Development Program

The park has completed development of 172 miles of trails in the park, including 75 miles of hiking trails, 21 miles of bridle trails, 23 miles of bike/hike trails (Towpath & connector), and 53 miles of ancillary trails (connector, hike, multi-purpose, and cross country ski). Visitation at Cuyahoga Valley National Park has averaged 3.5 million for the past few years. Visitation on the Towpath Trail is a huge portion of that total. Usage on the Towpath has been between 1.5 and 2.0 million the past couple of years. The NPS encourages access to the Towpath Trail by means other than automobiles. However, access by car is still the principle means of getting to the Towpath Trail. Thus, well designed parking facilities were still an important part of the planning program.



Figure 18-7: Typical towpath trail kiosk.



Figure 18-8: Towpath in Peninsula, Ohio. Typical bench used along towpath in foreground.

19. Exploring New Trail Construction Methods, Two Case Studies



Figure 19-1: Accessible trail in Arcadia Sanctuary in Easthampton, Massachusetts.

Joseph Chambers
Assistant Professor of Landscape Architecture
Penn State University

This presentation describes two trail design projects for significant historical and natural landscapes — located at the Dinosaur Footprints Reservation in Holyoke, Massachusetts and the Massachusetts Audubon Society's Arcadia Sanctuary in Easthampton. Both projects required new construction of accessible trails through areas where protection of both fragile aquatic habitats and historic resources were necessary (Figure 19-1). They presented construction and management problems that required special attention if the resource was to be enjoyed without being destroyed or overwhelmed. The work at the Dinosaur Footprints site, a master planning project, was to design an accessible trail network and parking lot on a site where the entire substrate was part of the historic resource. The intent of the Audubon Sanctuary project was to make accessible historically significant views to the Connecticut River oxbow as well as experience a chain of vernal pools. The design consultant, Walter Cudnohufsky Associates, experimented with new construction techniques and helped brainstorm inventive management strategies, with interesting results.

Dinosaur Footprints Reservation

Located in Holyoke, Massachusetts, the Dinosaur Footprints Reservation is a site where observations of great significance were made by the study of dinosaurs tracks (Figure 19-2). It is one of two prehistoric track sites in the United States where a record was left in the soil of different individuals of the same dinosaur species running side by side. Writing about this site in the 1970s, paleontologist John Ostrom surmised that dinosaurs might have run in herds like mammals, and unlike reptiles. With this article, scientific analysis of dinosaur behavior was born, which is now a major area of study. For the five universities nearby in the Connecticut Valley, the site is a field trip destination

both for the tracks and for the site's outstanding geology lesson – clearly legible layers sedimentary rock turned up on an incline by the volcanic activity of adjacent Mount Tom. The whole surface of the site is pocked with fossilized tracks and raindrop imprints to a depth of several feet.

Despite their significance, these 90 million year old tracks are freely climbed on, sprayed by road salt every winter and have often been painted by vandals. Several of the tracks have been chipped out and stolen as souvenirs. The site is a favorite partying and trash dumping location. Though residents of the nearby town of Holyoke visit the site, it is generally for its access to the river where there is an excellent fishing rock. Some visitors come to see the tracks, but the reservation is not a well enough known attraction to bring income to The Trustees of Reservations, who manage the site without admission fees. For years the Trustees have made efforts to police the site, but, making little progress and with deterioration of the prints continuing, a master plan study was commissioned. The intent of the project was to devise a means of protecting the tracks and of improving the image of the property thus building visitation and a new constituency.

Protecting the tracks turned out to be very difficult. Structures were discussed but the cost was prohibitive and the impact to the site potentially devastating. Open structures, like pavilions or glass covers, were considered but rejected because, without good policing, they would have been the targets of vandalism. Chemically protecting the tracks was discussed, but sealing the surface does not work and the consolidants



Figure 19-3: Accessible path to Dionsaur Footprints.

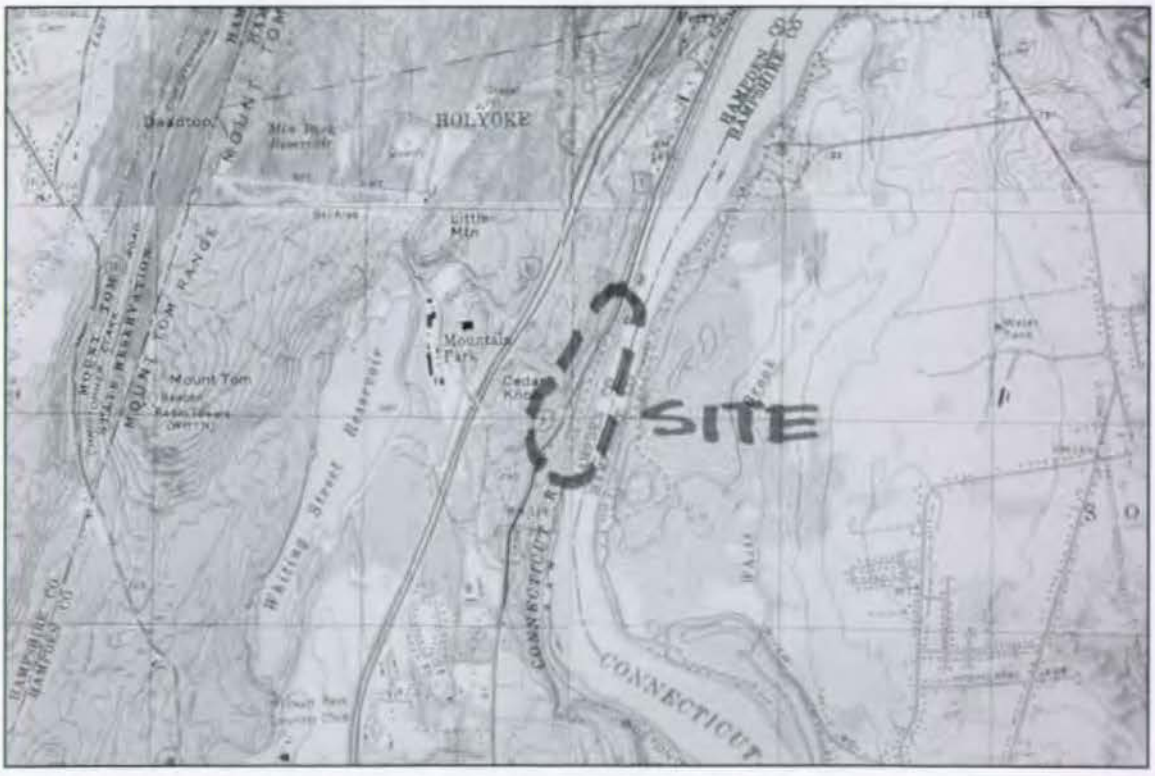


Figure 19-2: Site location of Dionsaur Footprints Reservation in Holyoke, Massachusetts.



Figure 19-4: Site location of Arcadia Sanctuary.

available now are not compatible with the ground water that seasonally rises in the rock. (Though there is research going on which holds promise for the near future.) In the end, the best solution was to close the site seasonally and tarp the tracks in winter.

Efforts to improve visitation to the site were not much more successful. The steepness of the site (most of it over 15%) made it very difficult to expand the parking facilities from the existing six cars capacity without regrading the site and destroying the possibility of future finds. Strategies were discussed, from fencing and closing the site to await more opportune conditions, to staging an archeological dig to uncover the entire site so that the dig facilities (policing, scaffold, temporary staging and access) could be used to expand visitation. In the end, despite the financial burden to the Trustees, it was determined that improvement to the facilities – accessible trails and more parking – coupled with a local education program were the best if not only course of action (Figure 19-3). The master plan recommended a boardwalk to contain walkers and protect the dinosaur tracks. Boardwalks were designed to span the rocks with tracks and an adjacent stream. The connecting paths were formally defined, using an old road bed and some of the existing social paths.

Arcadia Sanctuary

Located in Easthampton, Massachusetts, the Arcadia Sanctuary site is the principle means of access to the Connecticut River Oxbow, made famous through descriptions by Timothy Dwight and paintings by Thomas Cole, who was recognized as the father of the Hudson River School of landscape artists in the early 1800s (Figure 19-4). Though once thickly populated with farms, the area is now unihabited but crisscrossed by a network of old roads, which are now used as walking trails. The trails lead through an unusual and subtle wetland landscape. The plane in which the site lies is imprinted with the outlines of tributaries that stopped running when the river changed course in the 18th Century. The hollow landforms left by the oxbow are now vernal pools, flooded with groundwater in the spring. Despite the generally flat terrain, the trails climb and descend steeply in several places up and down embankments to give visitors close proximity to the water.

To improve wheelchair access to this historically and naturally significant landscape, the Massachusetts Audobon Society evaluated several alternatives. Making these trails accessible to visitors, by realigning and paving them, would be prohibitively expensive and would impact this fragile environment. The

access strategy that Mass Audubon adopted was to make a short loop trail that would give the good sample of this landscape, in close proximity to the entry of the site. The trail goes through the Visitor Center's interpretive display area, out a backdoor and onto a boardwalk, which winds through vernal pools. From the pools the site makes a turn around a favorite birding meadow with excellent views of the surrounding landscape and ends up back at the parking lot. This boardwalk is also used for environmental education programs (Figure 19-5).

The challenge in building the trail was meeting multiple criteria: to install boardwalk footings without compromising the hydraulic stability of the aquatic environment or destroying vegetation; to make the boardwalk feel generous without visually overwhelming the historic landscape setting; and to descend the steep bank and get close to the water at a grade appropriate for wheelchair use. It was discovered that helical metal piers, available for about 80 years in the utility structure and concrete construction industry, were flexible enough to allow all of the criteria to be met. Sources include A.B. Chance Co., Fasteel (Dixie Piers), and Atlas Systems. The piers are extremely low impact during construction because the piers and installation equipment may be hand carried to the site. The piers basically disturb no soil and can be driven into the ground immediately next to trees. Because they displace almost no floodwater, they meet U.S. Army Corps Standards. It is quick and easy to adjust the height of the tops of piers in the field, making them easy to conform to onsite conditions while maintaining ADA standards and reducing the deck-to-adjacent-grade distances (lessening or eliminating the need for guardrails). The piers are very long lasting, fast to install and removable. The only drawbacks of the helical piers seems to be their expense (about 150% of the cost of wood posts) and that they cannot be driven into rocky soils.



Figure 19-5: Boardwalk constructed on helical metal piers.

20. Funding and Labor Strategies, the CCC/Americorps Backcountry Trails Program



Figure 20-1: California Conservation Corps in the field, 2000.

Peter Lewis
Director
California Conservation Corps/Americorps
Backcountry Trails Program

I would like to share some of the experiences and knowledge I have gained directing the California Conservation Corps' Backcountry Trails Program. Each year almost 100 very lucky young men and women leave behind the comforts of family, home, friends, and the amenities of our modern times to live in a world beyond the electrical grid, where time is marked by the phases of the moon, and the slower pace of the unfolding seasons (Figure 20-1). The mission of the California Conservation Corps is to provide meaningful work and educational opportunities to assist young men and women in becoming more employable, while protecting and enhancing California's environment, human resources and communities. The participants of the California Conservation Corps' Backcountry Trails Program are selected from diverse backgrounds and geographies. They spend five months deep in the mountains of California, mastering the time-tested techniques of trail maintenance and reconstruction. Some will make their homes in Yosemite, following the snow melt up the Jack Main Canyon, others will discover the majesty of Kings Canyon, and live beneath the alpenglow in the Dusy Basin. The coastal redwoods will shelter another crew for a month, before they move to the Sierra and fix trails that follow old emigrant routes.

But this is no vacation. These people have been selected for a very challenging assignment: they are being sent into the mountains to maintain and reconstruct wilderness trails, repair meadows damaged by hikers, and learn the skills to have their work withstand the rigors of time. None of them currently have these skills mastered, but will spend the following months acquiring the knowledge and strength to take native material and create structures which fit the topography and withstand the elements and hard use.

They will accomplish this with minimal tools, and plenty of honest sweat and effort.

This tradition has been passed along from generations of western trail workers who left their marks in stone. Many of the constructed trails in California's National Parks date back to the 1920s when National Park Service trail crews began building a network of recreational trails. Their efforts were carried out in the 1930s when the Civilian Conservation Corps harnessed the energies of impoverished young men to work in the woods. We currently employ many of the same trail techniques used then. Those that are unfamiliar with this work and type of experience are familiarized through a video on the Backcountry Trails Program produced by our office. Much of the trail work is being accomplished through the AmeriCorps Program, which teaches youth about service while rebuilding trails around the country, similar to the Park Service work of the 1920s and CCC work of the 1930s (Figure 20-2).

Our work would not be possible without outstanding partners who share the burden and the sense of purpose to keep our partnership going. We have worked for more than two decades with Yosemite and Kings Canyon National Parks. We also send crews to help the US Forest Service with their trails on the Klamath, Shasta-Trinity, Stanislaus and Inyo National Forests. Other crews will begin their season in California State Redwood Parks while the High Sierra is still burdened with snow. Since we began to send crews to the Backcountry in 1979, we have restored nearly 5,000 miles of trail.

AmeriCorps has selected our program as one of their premier examples of environmental service, and provide each of our members with a substantial education award. We also are generously supported by the Yosemite Fund, which is one of Friends of Acadia's sister organizations. Trail work in the twenty-first century does not come cheap. We have found multiple ways to keep our program solvent, despite



Figure 20-2: 1921 trail crew in Yosemite Valley, California.

across-the-board reductions in state funding. Without strong collaboration and partnerships, only a few wealthy and famous places will be able to keep their trail systems in top shape.

Trails Crews versus Contractors

Note: After viewing a video on the backcountry trails program, conference attendees discussed strategies for accomplishing work, specifically the use of trails crews versus contractors. The following are some of the points raised…

To preserve historic trails, it is critical that trails crews should be trained, retained, and promoted so that they in turn can disseminate information on sustainable trail practices. Investing in one's self and one's trails program, rather than contracting out work, allows the trails program to build up skill level. It is then feasible to work effectively with and train unskilled labor. Whereas contractors are paced by time and money, a trails crew is paced by the latitude of the project. Often in working with contractors, more money is spent preparing the specifications than is available to fund the work, and there may be no long-term maintenance strategy. On the other hand, sometimes it is not a matter of money, but rather finding the needed trail construction expertise. In rural areas, there may be no contractors available, and a backcountry trails corps is a more viable source for trail work. In urban areas, use of contractors may be easier than employing trails corps. The group in attendance contained representation from states where there are strong trail corps programs, including California and Maine. But many other states have limited trail corps programs. Or, there are limited contractors, because there is not a steady stream of work and funds. There are instances where a contractor can work successfully, such as the case where a contractor may hire a trails corps member or crew. If a contractor is employed repeatedly, work arrangements and performance are typically better. Volunteer work programs may be used but the work must be unusual or exciting to draw a crew!



Figure 20-1: California Conservation Corps in the field, 2000.

BIOGRAPHIES

Chris Barter is Trails Crew Leader at Acadia National Park, and has worked at the park since 1989. In addition to his duties in the field, where he has been heading up the Jordan Pond Loop Trail rehabilitation, he is the crew's information specialist. He has been extensively involved with the development and writing of the Treatment Plan for Acadia's trails and is a consulting member of Acadia's Trails Management Team. Chris holds a BA in Music from Bates College, an MFA in Writing from Vermont College, and teaches British Literature and Expository Writing at College of the Atlantic in Bar Harbor. His poetry has appeared in a number of national literary magazines, including *The Georgia Review.*

Margie Coffin Brown is a historical landscape architect with the National Park Service's Olmsted Center for Landscape Preservation in Boston, Massachusetts. Her work in cultural landscape preservation includes the development of maintenance plans, cultural landscape reports, and treatment plans for national parks throughout the northeast including Acadia National Park's hiking trail system. She recently received an Albright Wirth Grant to research and write about historic trail rehabilitation guidelines. She has a Master's degree in landscape architecture from Harvard Graduate School of Design.

Ethan Carr is a Historical Landscape Architect with the National Park Service and is based at the Denver Service Center. He was responsible for the National Historic Landmark (NHL) nomination for Mount Rainier in 1997. Since then he has worked for Scenic Hudson in Poughkeepsie, NY, and the NPS Denver Service Center. He is author of *Wilderness by Design: Landscape Architecture and the National Park Service* (1998).

Joseph Chambers is an Assistant Professor of Landscape Architecture at Penn State University. Prior to teaching and research, he worked in private practice for landscape architecture and architecture firms in Massachusetts, including Walter Cudnohufsky Associates. He holds a Master's degree in landscape architecture from Harvard Graduate School of Design.

Judy Hazen Connery is a Natural Resource Specialist at Acadia National Park. She is assisting with the development of Acadia's Hiking Trails Management Plan. She has been hiking, interpreting, and protecting natural resources on Acadia's trails since 1984. Judy currently serves as the park's environmental compliance coordinator and has also been involved in a number of park planning efforts.

Todd Croteau, is Program Manager for the HAER NPS Park Roads and Bridges Recording Program and has been documenting historic roads and cultural landscapes for more than ten years. He is a graduate of Rhode Island School of Design.

Susan Dolan is a Historical Landscape Architect with the National Park Service and is based in Seattle. She is responsible for the coordination of the Cultural Landscapes Inventory (CLI) in the NPS's Columbia Cascades Cluster. She also prepares historical contexts and treatment plans for cultural landscapes in the Pacific Northwest.

Steve Elkinton has served as NPS Program Leader for the National Trails System in Washington, DC, since 1989. Steve worked with Environmental Planning and Design, Inc. in Pittsburgh before joining NPS in 1978. His early NPS career included 7 years with the Denver Service Center field office in Falls Church, VA, and 4 years as supervisory landscape architect at Cuyahoga Valley NRA in Ohio. He has a degree in landscape architecture from the University of Pennsylvania.

Carl Fabiani is the Chief of Trail Maintenance at Mount Rainier National Park in Washington. A lifelong resident of Wilkeson, Washington, Carl has worked on the trails of Mount Rainier for 35 years and managed the trail program for the last six years. He and his wife, Dinni, and son, Forrest, love being outdoors and traveling, especially to Alaska in the winter.

Steve Griswold is the Trails Supervisor at Olympic National Park and has worked on trails in national parks for over twenty years. Previous positions include trails supervisor at Rocky Mountain National Park in Colorado, chief of facility management at Haleakala National Park on Maui and at Big Bend National Park in Texas, backcountry supervisor at Kings Canyon National Park in the Southern Sierra of California, and crew leader at Yosemite in 1970. He has been on assignments to many other NPS areas, including Grand Canyon, Mount Rainier, Colorado National Monument, and the Guadalupe Mountains. He has received several Albright-Wirth employee development grants to investigate trails at varied locations - the most recent in 1999 to look at the trailwork of the Incas in Peru. He is author of *A Handbook on Trail Building and Maintenance* (1996) and has a Master's degree in landscape architecture from the University of California at Berkeley.

Paul F. Haertel is the twelfth superintendent of Acadia National Park, appointed in 1994. He began his NPS career in 1962 as a seasonal ranger at Isle Royale National Park while studying forestry at Michigan College of Mining and Technology. He was a ranger at California's Kings Canyon and Sequoia parks and at Washington's Mount Rainier. He served as superintendent at Fort Clatsop, Lava Beds National Monument, Lake Clark National Park, and as Chief of Management and Operations for the Alaska Region, he was a key player in policy development and wilderness park administration after the passage of the Alaska lands legislation, which created several new national parks. He also served as Associate Regional Director in the Alaska Regional Office. Paul received a Citation for Meritorious Service of the Department of the Interior for his superior execution of duties involved with the Beringian Heritage International Park project in Alaska.

David Humphrey is a Supervisory Landscape Architect for the National Park Service at the Cuyahoga Valley National Park and serves as Chief of the Technical Assistance and Professional Services Division. His office has completed planning and development of the Ohio & Erie Canal Towpath Trail, Brandywine Falls decks and boardwalks, Canal Visitor Center, Hunt Farm Information Facility, rehabilitation of Everett Village and numerous construction projects. In 1991 he authored "The Evolving Landscape at Cuyahoga Valley National Recreation Area," published in CRM by the National Park Service. He has served as president, vice president and secretary/treasurer of the Western Reserve Section of the American Society of Landscape Architects.

Charlie Jacobi is a Recreation Specialist at Acadia National Park and focuses on social science issues within the park. He is assisting with the development of Acadia's Hiking Trails Management Plan and is an avid hiker. Charlie has been involved in the Village Connectors project and Acadia Carriage Road carrying capacity study. He has also photo-documented many of the hiking trails within the park that are no longer marked.

Maureen De Lay Joseph is the Regional Historical Landscape Architect for the National Park Service's, National Capital Region. She served as the project manager for the Jefferson Rock project when she was the park landscape architect for Harpers Ferry National Historical Park. She completed a Cultural Landscape Inventory for the Jordan Pond House at Acadia National Park in 1997.

Peter Lewis has served as the Director of the California Conservation Corps/AmeriCorps Backcountry Trails Program since 1987. He spends most of his time tucked away in an office, living the virtual reality of trails. The California Conservation Corps trains and leads trail crews to maintain and rehabilitate trails in National Parks, National Forests and California State Parks. Previously he worked as a crew supervisor for the California Conservation Corps throughout the 1980s and on the trails crew at Yosemite National Park throughout the 1970s. His first summer in the Sierra changed his life. He dropped out of Columbia University, stowed away on a Swedish Freighter, drive a motorcycle through Europe in the winter with cardboard stuffed down his pants for insulation, then somehow managed to return to Yosemite the next summer to rejoin the crew. He has a Master's degree in forest science from the Yale School of Forestry & Environmental Studies.

Lauren Meier ASLA, is a historical landscape architect with the Olmsted Center for Landscape Preservation, which is based at the Frederick Law Olmsted National Historic Site in Brookline, Massachusetts. Her work with the Olmsted Center includes cultural landscape research, planning, and treatment projects for national parks throughout the Northeast, including preparation of the National Register documentation for Acadia National Park. She holds a Master's degree in landscape architecture from the Harvard Graduate School of Design.

W. Kent Olson became, in 1995, President of Friends of Acadia, an independent organization that raises funds for Acadia National Park, protects it from threats, and advocates on its behalf. Governor Angus King named him to the Maine Environmental Priorities Council. He earlier served as Director of Special Projects at The Conservation Fund, President of American Rivers, and Executive Director of The Nature Conservancy of Connecticut. He started his nonprofit executive career in 1971 as the youngest person ever appointed General Manager of the Appalachian Mountain Club Hut System, and was later publisher and editor of AMC books and magazines. He earned a master's degree in natural resources management at Yale.

Robert D. Proudman has served as the Director of Management Programs for the Appalachian Trail Conference since 1981. Before that, he worked for the National Park Service's A.T. Park Office in Boston and then Harpers Ferry, W. Va. He began his career as Appalachian Mountain Club's first fulltime Trails Supervisor and led that group's initial forays into Acadia National Park to do trail service work in the early 1970's. He is the author of AMC's *Trail Building and Maintenance* (first two editions), and ATC's *Appalachian Trail Design, Construction, and Maintenance*, recently republished by the Conference and cited by both NPS and the Forest Service, USDA, as central direction for the Appalachian National Scenic Trail's care and maintenance.

Shaun Provencher is a Cultural Landscape Technician working on the National Park Service-wide Cultural Landscape Inventory and is based at the Pacific Great Basin Support Office in San Francisco, California. He previously worked with the Architectural Conservation Projects program of the NPS Intermountain Support Office, in Santa Fe, New Mexico, and as a finish painter at the Society for the Preservation of New England Antiquities. As part of the University of Pennsylvania Historic Preservation Masters Program, he completed a Masters thesis entitled "Tsankawi Mesa Preservation Plan" in 1998 under a cooperative agreement with Bandelier National Monument, New Mexico.

J. Tracy Stakely is a Historical Landscape Architect working with the National Park Service's Olmsted Center for Landscape Preservation in Boston, Massachusetts. His experience in cultural landscape preservation includes development of cultural landscape reports, treatment plans, and maintenance guidelines for a number of properties, including Acadia National Park, Eisenhower National Historic Site, Gettysburg National Military Park, and Cape Cod National Seashore. Tracy holds a Master's degree in landscape architecture from Louisiana State University.

Gary Stellpflug is the Trails Foreman at Acadia National Park and is involved in the development of the trail system management plan and treatment guidelines. He returned to Acadia in 1998 after management positions in New York and Maine State Parks. As Trails Foreman at Acadia in the 1970s he completed a detailed inventory of the Acadia trails system which has served as the backbone of Acadia's maintenance program for the past 25 years.

John Tauscher is a Landscape Architect for the National Park Service Boston Support Office and is the Project Manager and Contract Supervisor for the Minute Man National Historical Park Battle Road Trail Rehabilitation Project. This multi-phased project now provides safe visitor access along the historic Battle Road used during the War for Independence. The trail includes interpretive waysides, granite markers, and historic structures. Most of the trail is ADA accessible. John has also worked in private practice in a design/build firm, and as a partner in a civil engineering firm. He is a graduate of the landscape architecture program at Michigan State University.

Scott Travis is the Archeologist/Cultural Resources Program Manager in the National Park Service's Southern Arizona Office. With over 16 years in the NPS, he has participated in the inventory, documentation, evaluation and preservation of a wide variety of cultural resources. As Chief of Resource Management at Canyon de Chelly NM, he completed a comprehensive archeological survey of Canyon del Muerto that included detailed studies of trails that have been used for roughly 2500 years. He is currently working with a team to document and preserve historic CCC trails of Chiricahua NM. This will provide the foundation for a long range trails preservation program. He holds both a BS and MA in Anthropology and History from Northern Arizona University.

Jim Vekasi has been the Chief of Maintenance at Acadia National Park since 1991 and is the Project Manager for the Acadia Hiking Trails Rehabilitation Project. He supervises the operation, maintenance and rehabilitation of roads, carriage roads, trails, and buildings and has led or participated in numerous historic road and trail rehabilitation and cultural landscape planning projects. Jim previously worked as the park engineer at Glacier National Park, a design engineer at the National Park Service's Denver Service Center, and as a Roads Engineer in the Kingdom of Tonga as part of the Peace Corps. He holds a degree in civil engineering from the University of Michigan.

Kyle Zick is a Landscape Architect and Associate and Project Manager at Carol R. Johnson Associates, Inc., where he manages a variety of historic park and recreation projects. He holds a degree in Landscape Architecture from Purdue University and attended Heriot Watt University-Edinburgh College of Art, Edinburgh, Scotland, 1990-91. He received an Honor Award-Accessible Design in Public Architecture from the Commonwealth of Massachusetts Architectural Access Board.

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U.S. Department of the Interior