NEVADA FALL CORRIDOR:

A CULTURAL LANDSCAPE

REPORT

by

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A THESIS

Presented to the Interdisciplinary Studies Program: Historic Preservation
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"Nevada Fall Corridor: A Cultural Landscape Report," a thesis prepared by Marti M. Gerdes in partial fulfillment of the requirements for the Master of Science degree in the Interdisciplinary Studies Program: Historic Preservation. This thesis has been approved and accepted by:

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An Abstract of the Thesis of

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Title: NEVADA FALL CORRIDOR: A CULTURAL LANDSCAPE REPORT

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This study describes existing conditions, evaluates significance and historic integrity, and recommends treatment strategies to preserve historic elements of the Nevada Fall Corridor cultural landscape in Yosemite National Park.

It reports findings from field investigation that examined and inventoried landscape features such as stone retaining walls, treadway material, bridges and causeways, and water features on both current-use and abandoned trail segments.

The site was examined numerous times over a three-month period, with a followup visit one year later. Libraries and other archives were consulted for written and photographic historic documentation, which were analyzed against current conditions.

The process also involved review of comparison documents as well as national guidelines set forth by the National Park Service.

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There is a wall that runs for miles along a back road between Toronto and Niagara-on-the-Lake, Ontario. This project began there years ago, when I saw this, my first dry stone wall, and knew I had to learn more.

For Fred, my best friend and strongest advocate, and a true member of the Ranger Club.

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I. INTRODUCTION

Historic Overview and Context

Early visitors to Yosemite Valley couldn't help but know they were in a special place. Whether Native American or Euro-American, trapper or miner, sheepherder or wealthy matron, none could absorb that first glimpse of lofty cliffs and chain of waterfalls without a pause. And many did more than that, judging by the eloquent reports and legions of visitors that followed first news of the valley's wonders. Yosemite's reputation is undisputedly well deserved. The immensity of stone, forests climbing steep granite shoulders, waterfalls for miles on end, snow-capped peaks, and pristine streams – all combine in a small geographic region, roughly a mile wide by seven miles long, to showcase nature's finest work.

The creation of national parks in America is grounded in /9th-century views of landscape and its preservation, and how built features can harmonize with the natural environment.[1] These perceptions developed from 18th- and early 19th-century traditions of English gardening that came to America and were popularized through the mid-1800s writings of horticulturalist and landscape designer Andrew Jackson Downing. Aware of the powerful emotions that nature could evoke, Downing advocated reverence of wild

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1 **Linda Flint McClellan,** *Building the National Parks* **(Baltimore & London: Johns Hopkins University Press, 1998), 17.**

places and the sublime,[2] stimulating an appreciation for them as sites to be preserved.3 His fostering stewardship for such "pleasure grounds," as he termed them, [4] aided in the establishment of America's national parks, which were envisioned as "pleasuring-ground(s) for the benefit and enjoyment of the people."5

Yosemite's designation as a national park came in 1890 after decades of increasing interest and use by Euro-Americans, which followed centuries of inhabitation by Native Americans. The region's written history extends back to 1772, when Father Pedro Font, a Franciscan missionary, looked across the great valley and termed it "una gran sierra nevada" – a great snowy range – and sketched it on his map. Indigenous peoples had occupied the area for at least 10,000 years before Font's visit, with thirteen tribes in the Sierra alone,[6] but once Anglo settlement began, it accelerated rapidly. Early trappers and miners stumbled on the area beginning in 1833, and in 1851 the valley itself was "discovered" by Army troops chasing intransigent Indians.?

In 1853, a San Francisco *Herald article* extolled the virtues of Yosemite Valley, and with this publication came the end of the valley's relative obscurity. Two years later, the world saw its first images of the region after a young artist, Thomas Ayres, produced illustrations of Yosemite Valley for an 1856 issue of *California Magazine, a* new

[2] Ibid., 19-20.

[3] Ibid., 34.

[4] Ibid., 20

5 Ibid., 34.

[6] George E. Gruen, *Fire in Sierra Nevada Forests* (Missoula: Mountain Press Publishing Company, 2001), 5

[7] Lafayette H. Bunnell, Steven P. Medley, Hank Johnston, *Discovery of the Yosemite and the Indian War of 1851 Which Led to That Event* (El Portal, Calif: Yosemite Association, 1991), 118

publication by gold-seeker-turned-publisher James Mason Hutchings. Hutchings, who later became a Yosemite innkeeper, published an account of his trip with Ayres in an August 1855 *San Francisco Chronicle that* was distributed by newspapers nationwide,8 inspiring another group of adventurers to explore the valley later that summer. Two of this group – brothers Houston and Milton Mann returned in the fall of 1856 to construct a trail using an Indian route, the Mono Trail that began at the southwestern reaches of the park. The Mann brothers' trail extended to Nevada Fall, one of Yosemite's earliest and most popular destinations – and a key element of this study.

Establishing the boundaries for Yosemite – the second national park in the United States (the *first* was Yellowstone, designated in 1872) – began with a survey of the region undertaken in 1863 by the California State Geological Survey. The following year, Congress deeded nearly fifty square miles of the valley and its big-tree groves to the state as the Yosemite Grant.[9] The Grant was overseen by the Yosemite Board of Commissioners, headed by landscape architect Frederick Law Olmsted,[10] who visited the valley and Mariposa Grove of Big Trees in 1864-5. In August 1865, he produced a report for his fellow commissioners that "went far beyond the business at hand in its philosophical scope."[11] In his report, Olmsted stated his belief that it was the

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[8] Hank Johnston, The *Yosemite Grant: 1864-1906* (Yosemite National Park: Yosemite Association, 1995), 28-29.

[9] Linda Wedel Greene, *Historic Resource Study Vol. 1* (Yosemite National Park: U.S. Department of the Interior), xxvi.

[10] Johnston, 58.

[11] Ibid., 64.

government's duty to provide "natural scenes of an impressive character" for everyday citizens to enjoy as a respite from daily concerns.[12] He noted the state's obligations in regard to the Yosemite Grant:

> The main duty with which the commissioners should be charged should be to give every advantage practicable to the mass of the people to benefit by that which is peculiar to this ground and which has caused Congress to treat it differently from other parts of the public domain. This peculiarity consists wholly in its natural scenery. The first point to be kept in mind then is the preservation and maintenance as exactly as is possible of the natural scenery; the restriction, that is to say, within the narrowest limits consistent with the necessary accommodations of visitors, of all artificial constructions and the prevention of all constructions markedly inharmonious with the scenery or which would unnecessarily obscure, distort, or detract from the dignity of the scenery.13

Olmsted's vision established the foundation for protecting natural wonders while making them accessible for the enjoyment of all'[4] — language echoed in the 1916 Organic Act that set forth the purpose of the National Park Service:

> ... to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.15

When the Yosemite Grant was established, only two improved trails existed in the park: the "Vernal Fall Trail" to Nevada Fall,'[6] and the Mirror Lake Trail!' Two years

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[12] Ibid., 65.

[13] Ibid.

[14] McClellan, 17.

[15] www.nps.govilegacyforganic-act.htm

[16] This trail was built by the Mann brothers; it approached Nevada Fall from the southwest, then went downriver to Vernal Fall.

[17] *Pathways: A Story of Trails and Men* (Lodi, Calif.: End•Kian Publishing Co., 1968), 21.

later, in 1866, a bridge was built to enable easier access to the top of Nevada Fall, enticing even more sightseers.[18] John Muir arrived at the park in 1868, and in the years that followed, more trails, bridges and hotels were added, more photographers discovered the valley's "scenic banqueting" prospects,[19] and in 1890 Yosemite National Park became reality. A year later, the War Department deployed cavalry to patrol the park, and in 1892 the Sierra Club was formed.

The turn of the century brought the first automobile to the park and a visit from President Theodore Roosevelt. Park development took a sour turn in 1913, however, with the loss of an important element, Hetch Hetchy Valley, the next major watershed north of Yosemite Valley. Viewed by John Muir as a second Yosemite because of its scenic grandeur, Hetch Hetchy Valley was envisioned by the City of San Francisco as the ideal site for a reservoir to prevent another fire like the 1906 conflagration that burned much of the city." After years of political battles, the valley's fate was doomed in 1913 by passage of the Raker Bi11,[21] which granted Hetch Hetchy's water rights to San Francisco and the eventual construction of a dam that would drown the valley's natural wonders. Some believe the loss of Hetch Hetchy led to the death in 1914 of John Muir, who had spearheaded the years-long fight to preserve Hetch Hetchy.

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[18] *Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove,* 1866-67, 2.

[19] Carl P. Russell, *100 Years of Yosemite* (Yosemite National Park: Yosemite Natural History Association, 1968), 147.

[20] Roderick Nash, *Wilderness and the American Mind* (New Haven: Yale University Press, 1973), 161.

[21] Russell, 162.

Muir's death came the same year Yosemite's management was assigned to the Department of Interior, which subsequently encouraged road and trail improvements. In 1916, the Organic Act was passed, setting forth the purpose of the National Park Service, and in 1919, the park discovered the advantages of surplus Army dynamite, using it with "splendid results" for wail work.[22] That same year, the state of California officially ceded jurisdiction of the park to the federal government,[23] and in 1926 the first year-round highway into the valley was opened. With easy automobile access, visitor numbers grew along with new concerns over the park's well being. In 1953, the first vista clearing took place after a park stopover by Frederick Law Olmsted Jr., who noted the encroachment of trees and brush that early Indian inhabitants had regularly cleared and burned. In 1958, El Capitan was summited, in 1970 prescribed burning began to clear underbrush, and in 1984 the park was named a World Heritage Site. Since then, Yosemite has experienced its share of floods, landslides, and political changes.

The one relative constant for the region remains its geographic makeup. Yosemite sits in the midst of the Sierra Nevada Range in central California **(Figure** L1). The central mass of the Sierra is predominantly granite in the form of a massive single fault block. To shape the Sierra, this fault block shifted upward and tilted west, pushing up the granite and metamorphic slates that flank the range and the basalt and other volcanic forms that cap it. The east and north faces of Sierra peaks are steep, while the south and

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[22] *Report of the Director of the National Park Service to the Secretary of the Interior for the Fiscal Year Ended June 30, 1919* (Washington: Government Printing Office, 1919), 25.

[23] Ibid.

[24] George Wueithner, *Yosemite: A Visitor's Companion* (Mechanicsburg, Penn.: Stackpole Books, 1994), 46.

western faces slope more gently.[25] Yosemite Valley, on the western edge of the Sierra, is a nearly level trough running generally northeast-by-east about a mile below the adjacent region; the rim top is a series of irregular walls, jagged peaks, and domes.

At its upper (northeastern) reach, Yosemite Valley divides into three canyons down which descend forks of the Merced River via a series of waterfalls, including Vernal and Nevada falls **(Figure L2).** At the valley's mouth (in the southwest end) the trough narrows and loses its U shape to form the usual V of other, less glaciated **valleys** 2[6] Glacial action is evident throughout the park, with "glacial polish" (or "slickrock") frequent as well as granite formations, carved canyons and moraines. Timberline arrives near 10,000 feet or higher, with forests running far up many slopes. The park contains dozens of mountains higher than 12,000 *feet*, and more than a hundred above 10,000 feet [2]

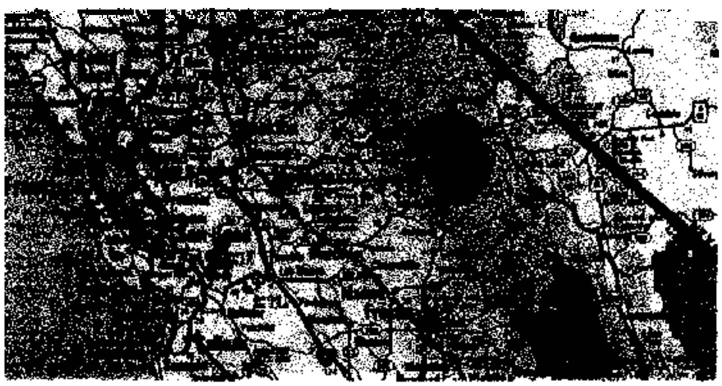

Figure I.1. Yosemite National Park – just right of the center of the map lies west of the Sierra Nevada Range in California (Courtesy Rand McNally).

[25] Ansel F. Hall, *Handbook of Yosemite National Park* (New York: Putnam, 1921), 297; J.D. Whitney, *The Yosemite Guide-Book (State* of California, 1869), 39; Freeman Tilden, *The National Parks: What They Mean to You and Me* (New York: Alfred Knopf, 1951).

[26] Whitney, p. 57.

[27] Ibid.

Climate factors dramatically into how the region was formed and how it has weathered over time and is evolving. The park is subject to extreme freeze/thaw in winter, with massive ice buildups that remain for months, and drenching thunderstorms in summer that can wash away bridges, dams, and solid stone formations. Lightning sparks dozens of fires every year that have burned thousands of acres of pristine forests. It is an ecosystem constantly in flux, posing long-term challenges for those who inhabit it.

FigureI.2. The 1878-1879 Wheeler Survey resulted in this map of Yosemite (Courtesy Yosemite Research Library).

One area still in flux is that encompassing Vernal and Nevada falls, which was formed by a glacier that came down Merced Canyon. The Merced River follows the canyon from the rim downstream to create Nevada and Vernal falls and eventually reach the valley floor.[28] Vernal Fall plunges 317 feet and spreads 100 feet wide at its top during peak flows in late spring, with a nearly perpendicular descent. Another mile-and-a-half up the trail is 594-foot high Nevada Fall; the top of this waterfall stands 1,880 feet above

[28] William **H. Matthews HI, A** *Guide to the National Parks* **(Garden City, N.Y.: the Natural History Press),** 379.

the trailhead at Happy Isles on the valley floor.[29] Geologically, these two waterfalls help form a glacial stairway of immense benches that step their way from the valley floor to the rim at Little Yosemite Valley, just beyond Nevada Fa11.3°

The Nevada Fall Corridor is a cultural landscape dating back to Native Americans who first blazed part of the trail from the valley to the southern branch of the Mono Trail.[31] This landscape also contains artifacts from the park's earliest tourist days the corridor's higher reaches feature the park's oldest stonework, still intact and functioning more than 130 years after the masons laid down their tools. In the late 1880s, visitors came from afar to revel in the park's renowned scenery and stay a night or more in popular Snow's Hotel at the foot of Nevada Fall. On the way up, they would take water for their horses at the trough a half-mile from Happy Isles, stop for the view at Illilouette Gorge, lunch beside Emerald Pool, and pause atop the switchbacks at Liberty Cap Gully – the same scenic sites and views that visitors appreciate today. While Snow's Hotel has vanished – only a few shards of glass and crockery remain on the site – the Nevada Fall Corridor and its history persist, with more than 3,000 hikers traveling through its rich heritage each summer day.

29Jeffery P. Schaffer, *High Sierra Hiking Guide Yosemite* (Berkeley: Wilderness Press , 1996), 54-58

[30] Matthews, 379.

Purpose, Scope, and Methodology

The purpose of this report was to develop and prepare a cultural landscape report for a historic landscape, the Nevada Fall Corridor. This included inventorying and assessing the cultural resources that define the corridor, and recommending treatment strategies to preserve and restore historically significant elements and meaning for current and future generations.

This report involved both field and archival investigation. Field investigation included current and historical documentation of the corridor's cultural landscape features such as stone retaining walls and stone treadway (known in the park *as* riprap); condition assessment of landscape characteristics; determination of historic integrity; and recommendations for maintenance and preservation.

Library and other archives – including the Yosemite Research Library, the Bancroft Library at the University of California, Berkeley, archives at the El Portal Administrative Building at Yosemite National Park, and texts gathered from numerous libraries around the country via inter-library loan – were consulted for written and photographic historical documentation. This included information about trail history (gleaned from monthly and annual reports, architectural plans, and numerous books and periodicals), photographs, maps, drawings, air photos, and park historic contexts. The research and analysis followed steps outlined in the *Guide to Cultural Landscape*

[31] **National** Paris Service, "Mist Trail" m *List of* ***Classified Structures*** **(National Park Service,** 2002).

Reports: Contents, Process, and Techniques[32] and the *Guide to Developing a Preservation Maintenance Plan for a Historic Landscape*[33] as templates.

Description of Study Boundaries

The names "Nevada Fall Trail," "Vernal Fall Trail," and "Mist Trail" can be confusing, because over time their alignments have changed or one name has been used on several sections. The "Vernal Fall Trail" begins at Happy Isles on the valley floor and travels about half a mile up to Vernal Fall Bridge **(Figure L3).** From there, it gently ascends another quarter-mile to Register Rock, where an intersection splits the trail into the true "Mist Trail" section to the top of Vernal Fall or the John Muir Trail up to Nevada Fall. To further confuse matters, "Vernal Fall Trail" sometimes also refers to the 1961 bridle path that begins at Happy Isles and leads to the junction at Register Rock, where it merges with the John Muir Trail to Nevada Fall. The true "Mist Trail" is the foot path that runs from Vernal Fall Bridge up through the mist flanking Vernal Fall, then climbs a set of stone steps, travels up a cliff wall, and finally tops the fall. The section of trail from Happy Isles to Register Rock originally was a shared corridor, with use by equestrians and hikers, but in 1961 a separate horse path was constructed. Both the foot and horse routes eventually reach the summit of Nevada Fall.

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[32] Robert R. Page, Cathy A. Gilbert, and Susan Dolan, *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques* (GPO: National Park Service, 1998).
[33] Margaret Coffin and Regina M. Bellavia, *Guide to Developing a Preservation Maintenance Plan for a Historic Landscape* (Boston: National Palk Service, 1998).

Figure I.3— Sections of the Nevada Fall Corridor are known by various names. This figure delineates those names along with major landmarks (USGS Half Dome Quadrangle, 1997).

Confusion can also stem from the term "Nevada Fall Trail." Because the Vernal Fall/Mist Trail route leads eventually to Nevada Fall, some call this route the Nevada Fall Trail "Nevada Fall Trail" has also been applied to the bridle path section that begins at Happy Isles and connects with the John Muir Trail segment to the top of Nevada Fall. Due to this intermingling of routes and names, for the purposes of this thesis the joint corridor will be called the Nevada Fall Corridor, a term used in the National Register nomination

The corridor begins at the footpath !railhead at Happy Isles near the southeast end of Yosemite Valley. The trail ascends the north side of the Merced River to Vernal Fall Bridge, continues up to Vernal Fall's summit on a bench, then gently climbs to the Silver Apron Bridge. A junction below Silver Apron Bridge offers a connector trail to Clark Point and the John Muir Trail, or the steep route past Silver Apron Bridge and up Liberty Cap Gully to the top of Nevada Fall. From the top of Nevada Fall the route loops back via the John Muir Trail, then down past Clark Point to the junction near Register Rock.

Here it returns back along the bridle path to the trailhead at the Happy Isles water tank (or back on the footpath to Happy Isles). The total distance is seven miles, not including the connector leg to Clark Point from Silver Apron Bridge, which adds about a half mile.

(See Appendix for additional maps.)

II. NEVADA FALL CORRIDOR SITE HISTORY

Development and Designers

Development by Native Americans

Sections of the Nevada Fall Corridor were first used and improved upon by indigenous inhabitants of the region — the Sierra band of the Miwok Indians known as Awahneeches[1] — who developed a trail system known as the Mono Trail, which meandered throughout the park.[2] The Miwok's regular trade with the Mono Indians took them east out of the valley through the Vernal and Nevada falls corridor.3 Simultaneously, a branch of the Mono Trail led from the valley floor up through Liberty Cap Gully to Little Yosemite Valley[4] and may have been the trail used by cavalry who first entered Yosemite Valley seeking Chief Tenaya's band in 1851. [5] Early maps show

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Margaret Sanborn, *Yosemite: Its discovery, Its Wonders and Its People* (San Francisco: Sierra Club Books, 1981), 42.

[2] Information about the name "Mono Trail" is scant. Peter Browning's *Yosemite Place Names* summarizes its route but gives no data about who named it or why. It first appears on the Hoffmann and Gardner map of 1863-67,

[3] Carl P. Russell, *100 Years in Yosemite* (London: Cambridge University Press, 1931), 74.

[4] Linda Greene and James B. Snyder, *National Register Nomination* Sect. 5 (Yosemite National Park, 1989): 1.

[5] Linda Wedel Greene, *Historic Resource Study Yosemite: The Park and Its Resources Vol. 1* (Yosemite National Park: U.S. Department of the Interior, 1987), 85,

the Mono Trail bran ping at Tuolumne Meadows, with one arm heading north and another more southerly to cross Little Yosemite Valley. [6] It is this southern Indian trail that Euro-Americans would use inl 856 to forge a more definitive route to Nevada Fall from the Wawona area of the park.'

The Indians shared their trail knowledge with sheepherders who came later to Yosemite. The sheepherders explored the region in search of new browsing areas and overland routes, discovering some areas long before map-makers did. [8] Often it was the sheep – or, before indigenous peoples arrived, deer and other wild animals who picked out routes. These trails seldom took the most direct alignment, instead wandering the path of least resistance,[9] a practice that would change with the more directed human intervention that followed.

Early Tourism in Yosemite National Park

In the early 19th century, walking and climbing trails grew in popularity in the American East as writers and artists – particularly those connected with the Hudson River School – popularized the idea of nature tourism. Painters such as Thomas Cole and Albert Bierstadt used light effects to dramatically portray wilderness elements such as misty rivers and vivid sunsets, a style that evolved into the Romantic movement. Their

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[6] Greene, *Historic Resource Study,* 77-78.

[7] James H. Lawrence, "Discovery of the Nevada Fall," *(Overland Monthly,* October 1884): 370.

[8] Jim Snyder, Robert W. Barrett and James B. Murphy Jr., *Wilderness Historic Resources Survey 1989 Season Report* (Yosemite National Park, 1990): 15.

[9] Ibid., 65-66.

work appealed to many Americans seeking an emotional, individual connection with nature,[10] and Yosemite fulfilled those desires. Followers of Romanticism hoped to experience the "sublime," so embraced Yosemite in response to eloquent descriptions in periodicals and paintings by artists such as Bierstadt, Thomas Ayres, and others. Their evocative renditions of gave easterners their first vivid perspectives of the new American sublime landscape,[11] and Yosemite soon became the Niagara Falls of the West, enticing artists with "some of the grandest, most sublime scenery in the country."12

The photographers followed, with works by Carleton Watkins reportedly being forwarded to President Lincoln to influence the establishment of the 1864 Yosemite Grant. Such renderings helped fix Yosemite in Americans' minds as a place of grandeur, awe, and mystery, and — for Romantics seeking rugged landscapes with mountains and grand trees — Yosemite became a national treasure worthy of an arduous journey. [13] The valley also drew those of with spiritual inclinations, including Ralph Waldo Emerson and his transcendental adherents, who viewed it as a pilgrimage to Eden. [14] In the 1860s, according to art historian Kate Nearpass Ogden, nature was considered " 'part and parcel'

[10] John F. Sears, *Sacred Places* (Amherst: University of Massachusetts Press, 1998), 134.

[11] Kate Nearpass Ogden, "Sublime Vistas and Scenic Backdrops: Nineteenth-Century Painters and Photographers at Yosemite," *California History* (Summer 1990): 139.

[12] Ibid., 134.

[13] Sears, *Sacred Places,* 125.

14 Ibid., 134.

of God, and the divine presence was evoked most clearly by nature in its most sublime manifestations. Such places obviously included Yosemite Valley."15

The early tourists to Yosemite — though almost always members of the leisure class — were hardy enough to endure rough days in the saddle and few amenities once they reached their goal, but soon visitors began to expect comfortable accommodations. It was this type of traveler that Albert and Emily Topple Snow had in mind when they built a hotel at the foot of Nevada Fall in 1870, beginning the long history of the Nevada Fall Corridor's popularity. The Yosemite Valley Board of Commissioners'[6] had earlier granted Albert Snow a lease to establish a hotel at the site. To build the access trail, Snow partnered with Stephen Cunningham, a former miner turned Yosemite innkeeper and trail builder," who had received permission in 1869[18] to build a horse trail from Register Rock to the base of Nevada Fall. Subsequently, Cunningham built the section of trail below Vernal Fall, while Snow built the section above the waterfall, crossing the Merced River to Snow's Hotel —also known by its Spanish translation, La Casa Nevada — via a bridge the state built in 1866.'[9] By April 1870, Snow's first building at Casa Nevada, the

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15 Ibid., 139.

16 The board of commissioners was the park's overseer, granted authority by the 1864 Yosemite Grant. See "Development Under the Yosemite Valley Commissioners" below.

17 Hank Johnson, *The Yosemite Grant: 1864-1906: A Pictorial History* (Yosemite National Park: Yosemite Association, 1995), 34.

1g Cunningham's permission came through Galen Clark, "Guardian" of Yosemite, appointed by the commissioners for day-to-day administration,

19 Johnson, *The Yosemite Grant,* 86.

Alpine House, was open for business and soon became a popular stopover for lunches as well as a place to stay overnight **(Figure H.1).**

The Snows added to their enterprise over the next few **years, despite an** earthquake and landslides that forced rebuilding, so that by 1875 they could house forty overnight guests in a compound of a half dozen structures Emily gained a reputation as a quirky, personable host, with comments in the hotel's guest register remarking on her free-flowing alcohol and repartee. But by 1889, ill health and old age forced the couple to abandon their beloved business, with Family dying that fall and Albert following two years later.2°

Figure H.1 – Snow's Hotel ca. 1880, by George Fiske (YMPRL History Hotels, Neg. 1667).

In 1890, the Yosemite Valley Commissioners, who oversaw commercial enterprises in the new park, granted a new lease for the use of Casa Nevada but the new lessee only lasted two years before quitting. The hotel never reopened and by 1899 was in ruins. What was left burned to the ground in 1900,[21] leaving just a few square-cut nails and shards of glass and crockery to identify the site today.

[20] Ibid., 152.

[21] Ibid.

Development Under the Yosemite Valley Commissioners

In 1864, Yosemite Valley, including the Mariposa Grove of Big Trees, was granted to the State of California as a public trust. Overseeing the Yosemite Grant was a board of commissioners, with landscape architect Frederick Law Olmsted named first chairman and Galen Clark first Guardian (superintendent).[22] It was to the board that Clark wrote regular reports on park progress and needs, including comments on trail development.

Figure H.2 –The **wooden ladders at Fern Grotto circa 1870, by Gather (Neg. #5054, Courtesy Yosemite Research**

Because trail builders in Yosemite during this had only hand tools, they relied on natural features and obstacles to help determine the easiest alignment and drainage control. Trails were often cut into existing banks, constructed water breaks were small, and switchbacks were sometimes shortened to avoid crossing natural drainages.[23] Over time, trail builders developed more sophisticated methods of construction to meet the challenges of constructing mountain trails that could endure heavy use by tourists, many of whom toured the park by horse.

The challenges to trail-building included surmounting cliff faces and fording raging rivers, obstacles that early trail builders showed remarkable facility in

z2 Russell, 184.

23 Jim Snyder, Robert W. Barrett and James B. Murphy Jr.: 66.

overcoming. As early as 1866-1867, Clark reported improvements to the trail "from the valley up the canon of the Merced to the Vernal Fall" and the building of a bridge at Diamond Cascade (above Vernal Fall), making the trip to the summit of Nevada Fall "a matter of no great difficulty.'[24] Connecting the area in between the foot of Vernal Fall and Diamond Cascades/Silver Apron *was* a matter of great difficulty, however, because the base of the waterfall lay at a dead-end beneath a sheer rock face with a deep overhang. But by 1857, this area, known as Fern Grotto for the maidenhair ferns nestled in its moist shade, had a precarious but functional set of ladders installed for use by tourists in reaching the top of Vernal Fa11.[25] Suggestions to upgrade the ladders came as early as 1866, in Clark's "Report to the Commissioners" that urged improvements including a set of steps or a staircase in place of the ladders "which are awkward and perhaps even dangerous for the ladies to climb." It is unclear when wooden staircases replaced the ladders, but rock steps cut into the cliff face replaced the staircases in 1897 (Figure H.2).26

In 1868, Clark's report urged commissioners to build a trail to the area above Vernal Fall to avoid "the difficult and fatiguing climb up the ladders."[27] Clark's 1870-1871 report followed this suggestion with more specificity, encouraging a trail "which

[24] *Report of the Commissioners 1866-7:* 9.

[25] Peter Browning, *Yosemite Place Names* (Lafayette, Calif.: Great West Books, 1988), 96.

[26] Ibid.

[27] *Report of the Commissioners 1868-9.*

takes the traveler out by way of the Nevada Fall and the Little Yosemite and around by Glacier Point and the Sentinel Dome." (This report also advised "removing embarrassing and vexatious restrictions to travel," which were unspecified. [28]) This new route was completed by 1873, when Clark's report noted trails being built "from the Little Yosemite to the base of the Nevada Fall... These improvements have ... (opened) new views, saving time, and imparting the charm of variety to (tourist) excursions." [29]

The latter work, up Nevada Fall, was done by John Conway,[30] hired in 1870-1871 to survey and build the trail from the valley floor up to Glacier Point, which included the segment to Nevada Fall from Snow's Hotel. Conway was self-taught as a trail builder, using a stick to determine how a route should fit along the fall line, "dippin' (the stick) this way and that, just to see them angles."[31] Conway brought masonry experience learned as a miner, adapting his underground experience to the topographic challenges of mountainsides to avoid areas prone to slides and washouts. The stone-paved trails he designed tended to be steep and narrow but accommodated drainage extremely well and thus required less maintenance. [32] They also show remarkable beauty, skill, and stunning longevity even today, with the stone riprap above Vernal Falls (leading from Emerald

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2s *Third Biennial Report of the Commissioners to Manage of the Yosemite Valley and Mariposa Grove of Big Trees, 1870-1.*

" *Report of the Commissioners, 1873:* 4.

3o "John Conway, Trail Builder in Sierras, Passes Away," *Merced Star* (March 15, 1917): 1; and Browning,196. Conway was born in Indiana, contrary to some park reports that say he was from Scotland.

31. Jacobsen, "What a Yosemite Hero Says for Himself," *San Francisco Bulletin* (July 20, 1907): 13.

32 Jim Snyder, Robert W. Barrett and James B. Murphy Jr.: 69-70.

Figure H.3 John Conway's work from 1870 shows skillful drainage as well as an eye for art on the ground.

Pool to Clark Point) laid freestanding - not tied to an outside wall but still able to take and shed water - yet functioning well 130 years later (Figure H.3).33

Conway also built the trail from Snow's Hotel to Nevada Falls, with help from Albert Snow, by whom he was contracted to build the trail.[34] In 1870-1871, Snow built the horse trail from the valley floor to Register Rock (so named for the travelers, including painter Albert Bierstadt, who "registered" their names on it), then from Register Rock climbing via switchbacks to Clark Point **(Figure 1L4)** and down to the Silver

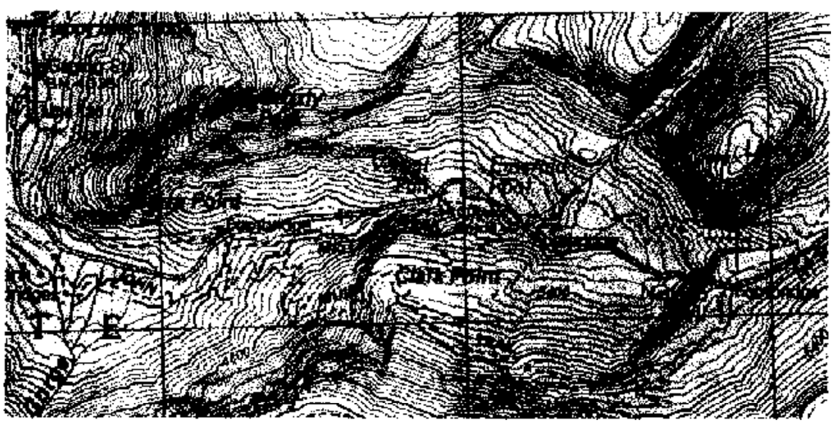

Figure 11.4 - Clark Point lies between Emerald Pool and the John Muir Trail. Register Rock is at the junction of the John Muir Trail and the paths to Happy Isles (USGS map, Half Dome quadrangle, 1997).

[33] Tim Ludington, telephone interview, January 29, 2004.

, [34] Vincent Merritt's trails summary, YNPRL Trails file: 6; and Linda Wedel Greene, *Historic Resource Study*, 87.

Apron above Emerald Pool (this latter section being where Conway installed beautifully crafted riprap).35

Another short section of trail went to Snow's Hotel via a steep narrow trail just beyond the north end of Silver Apron Bridge. Snow also built this segment in 1870, but George C. Anderson constructed an unfinished section nearby in 1882, [36] In the fall of 1881, the commissioners had contracted Anderson to build a new trail to Snow's Hotel that bypassed the "discomfort and peril of the mists and ladders" at Vernal Fall and avoided a laborious 1,300-foot climb from Register Rock to the summit of Vernal Fa11.[37] Anderson, "the Scottish blacksmith of Yosemite Valley,"[38] had earlier claimed fame at Yosemite for being the first person to climb Half Dome, a feat he accomplished in 1875. Along with his blacksmith experience he was a carpenter and a former seaman,

Figure H.5 – George Anderson's 1882 trait switches back from the current main trail to Vernal Fall Bridge.

[35] Greene, *Historic Resource Study,* 87-88.

[34] *Report of the Commissioners, 1884,* **t8.**

[37] *Report of the Commissioners, 1882, 5.*

[31] Greene, *Historic Resource Study,* 84.

assimilating skills he later used in climbing *as* well as trail building. For the route to the top of Vernal Fall, Anderson proposed a broad, moderately graded (for the time period and conditions) route "to offer an easy and delightful walk" By the 1882 report, his trail — the width of a carriage road — was finished to the "beginning of the last bluff, at the Vernal Fall," with the "confident expectation" that Anderson and his men would literally blast through the bluff over winter.[39] This never came to pass, however, with Anderson discovering it was impossible to cut through the massive granite outcrop.

Anderson's trail still exists, with a long section used by tens of thousands of Yosemite visitors every year because it forms the current alignment to Vernal Fall Bridge. Where the original Mist Trail ran up the south side of the Merced River the route that is now the bridle path — Anderson's task in 1882 was to approach the top of the falls from the north side of the river. Thus, the lower section of his trail is what tourists

Figure H.513 — Anderson's trail fragments lie Just off the current trail, while part of his original alignment Is incorporated into the route used today (USGS Half Dome Quadrangle, 1997).

'' **Ibid.**

use today for the first two-thirds of the way to Vernal Fall Bridge, where the trail crosses to the south side of the river. At the highest point on the north-side trail before the bridge, a sharp switchback – identifiable by a massive retaining wall **(Figures 11.5 and 11.513)** – departs from the main trail to an abandoned length. This fragment is the lower section of the Anderson trail, much of which is in remarkably good condition. The first switchback has been mostly obliterated by slides, but other retaining walls and treadway remain solidly functional. The trail dead-ends abruptly above a talus slope that descends near Vernal Fall Bridge.

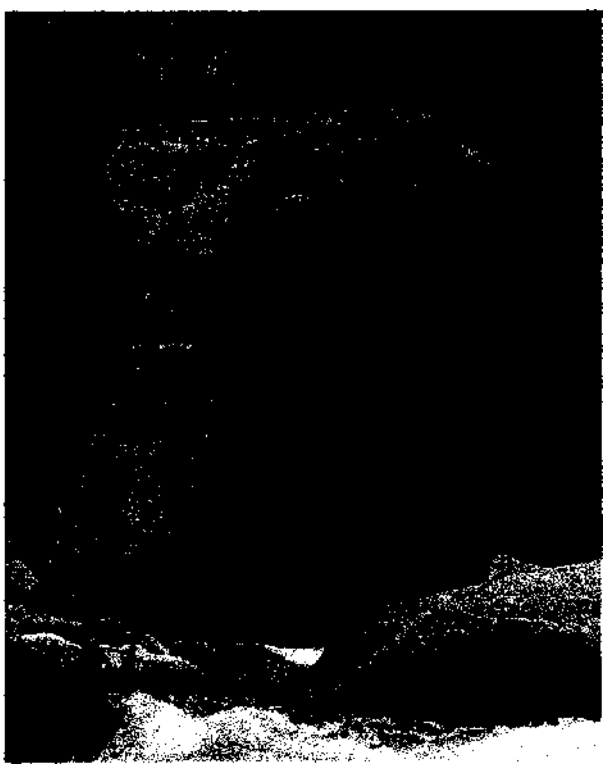

Figure H.6. The current footpath follows Anderson's 1882 trail, which underpins the S-curve wall halfway up to Vernal Fall Bridge.

Anderson's trail also underpins the cu rent alignment at the curving, parapet wall at the foot of Illilouette Gorge halfway to Vernal Fall Bridge. This wall section rounds a bend in the trail above a pool and small rapids in the Merced below **(Figure 11.6).** Anderson's original retaining wall is visible at the base of the newer wall sections that were built in 1929 and later.[4o] Anderson built

[4e] **Linda Greene and** James B. Snyder, *National Register Nomination* (Yosemite: National Park Service,1989), Section **7, page 6.**

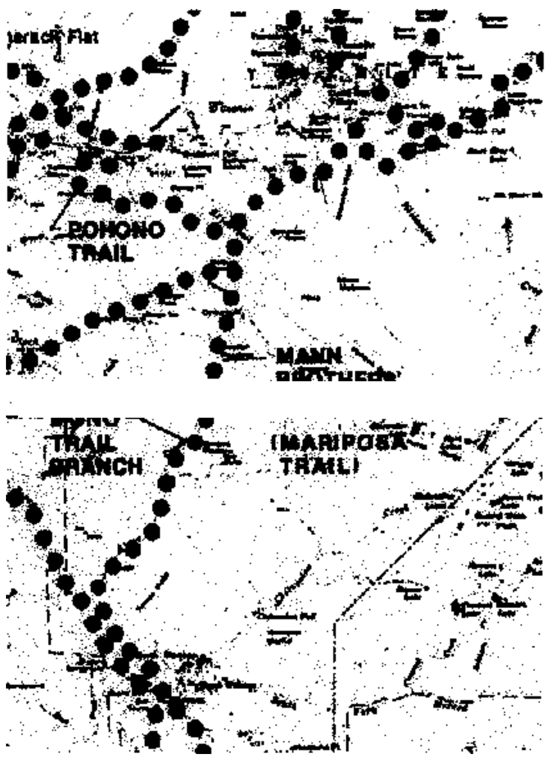

Figure 11.7 —The Mann brothers used the Mono Trail Branch from the southeast reaches of the park to access Nevada Fall in 1856. Highlights show the route, with Vernal and Nevada falls rioted in darker highlight at top (Greene, Historic Resource Study, 1987).

his trail into the cliff, supporting it with rubble walls where possible but otherwise carving it into the rock or using existing ledges. More retaining walls — and the parapet section — were added in 1929 during major construction, when the trail also underwent "experimental oiling." [41]

The other 1882 Anderson trail work hes above Vernal Fall on the topmost length of his route that intended to connect Happy Isles direcdy to Snow's Hotel. This fragment extends along the north shore of Silver Apron, lying about twenty feet below a section of trail ibat crosses a broad granite outcropping en route to Snow's Hote1.[42] This Anderson fragment winds northwest, paralleling the Merced., and includes extant low retaining walls.

Two years after Anderson built his piecework trail, the 1884 commissioners' report addressed the status of these unfinished fragments. One result was ccm.struction 1885 of a bridge near Register Rock to comiect the unfinished Anderson trail on the north

[41] Completion Report No. 14, "Reconstruction of Mist Trail" (Yosemite National Park, 1931): 2.

[42] Greene, *Historic Resource Study,* 88.

side of the Merced with the longstanding path on the river's south side – thus connecting the "celebrated Vernal Callon trail and the well known trail to Nevada Fall" for the first time.[43] The 1884 report also recommended other work on the corridor, noting that the footpath from Register Rock to Fern Grotto – the overhang at the switchback just below the top of Vernal Fall – was in "very rough" condition. The report suggested placing "flat rocks as stepping stones through the spray" along with railing," and to replace the wooden ladders (the latter finally accomplished in 1897).45

The 1885-1886 report to commissioners noted construction of the long pack trail from Snow's Hotel to Glacier Point, then called the Echo Wall Trail, later termed the Glacier Point Trail and now known as the Panorama Trail. This was the initial constructionof a section of the Nevada Fall Corridor eventually known as the John Muir Trail."

In 1890, Yosemite became officially designated as a national park – and grew significantly in the process. Where the Yosemite Grant encompassed slightly more than fifty-six square miles, the new federal reserve totaled 1,457 square miles. This also began an era of dual administration, with the state of California overseeing Yosemite Valley,

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[as] *Report of the Commissioners, 1885-6.*

" *Report of the Commissioners, 1884,* 18.

[45] Johnston, *The Yosemite Grant,* 150

[46] Half Dome Quadrangle (Denver. United States Geological Survey, 1997); King and Gardner, "Map of the Yosemite Valley" (Sacramento: Yosemite Valley Commissioners, 1865).

and the federal government in charge of the much larger surrounding area, which included the Nevada Fall Corridor.47

Development Under the Army

When the U.S. Army assumed control of Yosemite in 1891, then-Lt. and future park superintendent Harry C. Benson took note of the "named well-known trails" in the park. They included a branch trail leading to Nevada Fall from Wawona in the far southwest reaches of the park.° An undated map of "early trails" in the park illustrates Benson's description[49] – a route from Wawona following an early Indian trail, the Mono Trail Branch, which was used by the Mann brothers in 1856 to develop the first tourist trail to Nevada Fa11[5°] **(Figure 11.7).** Benson's description noted that, other than this and two other trails far from the Nevada Fall Corridor, "there were no marked or defined trails" elsewhere in the park. He explained that at the time, the entire region north and east of the valley "was an unknown country except to sheep herders."5'

Sheepherders were responsible for many early segments of Yosemite's trail systems. Army patrols focused on keeping illegal sheep out of the park to such an extent that in

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°Johnson, *The Yosemite Grant,* 190.

48 Col. Harry C. Benson to Chester Vergsteeg, June 23, 1924. Benson file, YNPRL: 1.

49 Denver Service Center Map 104-25013, May 1987.

S0 Lawrence, "Discovery of the Nevada Fall": 370.

51 Col. Harry C. Benson to Chester Vergsteeg, June 23, 1924. Benson file, YNPRL: 1. Also, Yosemite archeologist Laura Kim noted in a February 19, 2004 email that it was "fairly typical for the early sheepherder and possibly cavalry trails to be overlays of Indian trails."

1904, troops counted 49,600 sheep "trespassing" in the park[52] – and undoubtedly ranging over scores of miles of Yosemite trails. Sheep had grazed unfettered by Army patrols between Wawona and Yosemite Valley for years, [53] so could well have traveled the trail leading toward Nevada Fall. On their sheep-hunting patrols, Army troops were supplied with hatchets to blaze trails that weren't yet marked; additionally, Benson estimated that from 1905 to 1908, "I had trails constructed around the entire Park by contract" as well as trails he and Lt. N.F. McClure blazed themselves in 1895-1896.54

"Very little" was done by way of trail development, however, during the first three years of Anny occupation. [55] When Benson arrived in 1895, he began riding with "Indian Scouts," a practice he engaged in for the next three years to learn "trailing." In addition to honing his Indian-taught trail-building skills, whenever he captured sheepherders (and their sheep), he forced them to lead him out by a different trail than he used to follow them in; he would blaze this trail as well, leaving a system of marked trails throughout the park.[56] Benson noted that, "the amount of labor expended by me personally and my details in improving these trails was very great."

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[52] *Report of the Acting Superintendent of the Yosemite National Park to the Secretary of the Interior, 1904:* 18.

[53] Harry C. Benson letter, recipient unknown, July 18, 1924.

[54] Harry C. Benson to Chester Vergsteeg, June 23, 1924. Benson file, YNPR: 2.

"Harry C. Benson letter, recipient unknown, July 18, 1924. No other information was found about Indian-taught trail-building techniques.

[56] Ibid., 9.

Benson was not the first or last of the "Army environmentalists" at Yosemite. Among the Sierra Club's first members were cavalry officers assigned to California parks,[57] and it was Lt. McClure who made the first detailed map of Yosemite Valley, in 1896 (see page 258), and wrote the first description of the park's backcountry. [58] Benson, who ran the park from 1905-1908 while California transferred administration over to the federal government,[59] was hailed in the *Sierra Club Bulletin* for his "prophetic vision" on the environment,[60] and even John Muir lauded the army for its supervision of Yosemite, writing during his first visit: "Blessings on Uncle Sam's soldiers! They have done their job well, and every pine tree is waving its arms for joy."61

Development Under the National Park Service

Two events in 1913 helped shape Yosemite's cultural and natural landscape: The park was turned over to civilian administration from the Army, and automobiles were first admitted into the valley.[62] Three years later, Stephen T. Mather, the first Director of the National Park Service, stated his intent to "remake the park into a public pleasuring

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[57] Harvey Meyerson, "Forgotten Legacy — U.S. Army Environmentalists at Yosemite," *JOW Journal* 38, 1 (January 1999): 41.

"*Sierra Club Bulletin,* January 1896.

" Ibid,, 43.

6o Francis P. Farquhar, "Colonel Benson," Sierra *Club Bulletin,* 12, 2 (1925): 175-179.

[61] Linnie Marsh Wolfe, ed., *John of the Mountains: The Unpublished Journals ofJohn Muir* (Madison: University of Wisconsin Press, 1978), 351-2.

[62] Robert C. Pavlik, "In Harmony With The Landscape: Yosemite's Built Environment, 1913-1940" *California History* (September 1990): 182.

ground."[63] Achieving that would require the right staff, and for trail work Mather had the right man in Gabriel Sovulewski **(Figure H.8).** Sovulewski had been acting superintendent of the park under Army management since 1908; his tenure overseeing Yosemite as a park supervisor lasted through 1936 (with some change in title).

Figure H.8

Sovulewski, 1934.

Eventually called the "dean of national parks trail builders," Sovulewski left an important legacy in national park trail work, designing and overseeing construction of some 300 miles of mountains trails in Yosemite – about half the park's network at the time 64

Sovulewski had ideal credentials for trail design, having walked or ridden a large percentage of the park's trails in various professional capacities ranging from animal packer for the Army to park supervisor. He based trail design in large part on keen observation, evident in this 1930 memo from then-park Superintendent Charles Goff Thomson to Sovulewski summing up the latter's trail-building acumen:

> I certainly do like your method of studying these locations from the viewpoint of a complete picture – the making accessible of the choicest scenery, the landscaping, safety to users, and your keeping in mind the cost of future maintenance.65

Harry Benson, park superintendent from 1905-1908, credited Sovulewsksi thusly:

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bid.

[64] Jan Kowalik, "Master Trail Builder of Yosemite," *Polish Heritage* (Spring-Summer 1976).

[65] Superintendent's memo, August 21, 1930 (YNPRL, Sovulewski file).

> The successful working out of trails and the continuation of developing them is due largely to the loyalty and hard work of Mr. Gabriel Sovulewski. Too much credit cannot be given to this man (who) made it possible for the later building of trails when the Government saw fit to appropriate money for that purpose b6

Not all would agree with Benson's praise of Sovulewski's trail management however, later in his tenure at the park. By 1915, Sovulewski had discovered the use of explosives to develop trails, placing emphasis on taking the trail to scenic viewpoints,

Figure 11.9 –"Jackhammerrnen" drill a dangerous slab on the Rock Cut in November 1930 (Completion Report #63, 1931).

creating direct routes by use of cut-and-fill techniques, and easing steep grades rather than, in some instances, following the natural contours of the land as Conway had advocated[67] As trails foreman Jim Snyder wrote in 1990, these "road-based" trail-building techniques led, in some cases, to "building monuments of rock on the environment "– work that even Snyder tes, in hindsight, he himself was guilty of condoning. [68]

An example of work using explosives was Sovulewski's most

" Ibid_, **10.**

[67] Jim Snyder, Robert W. Barrett and James B. Murphy Jr., *Wilderness Historic Resources Survey 1989 Season Report* (Yosemite National Park: U.S. Department of the Interior, 1990): 73-75.

"Ibid.

challenging trail project, the 1931 Rock Cut between Clark Point and Nevada Fall Bridge. He sited almost the entire trail location himself, with "no pains spared to bring in all views and natural features to add to the interest of the trail." [69] Once he'd flagged the trail, the next challenge was **finding workers willing to** labor under the dangerous conditions the location posed, as noted in this excerpt from his monthly report: "Progress on the solid rock wall is rather slow, due to the fact that we are handicapped by loss of time on account ofjacichammermen quitting frequently. It is difficult to get the right kind of man to work over the precipice."" No wonder, given that, "in places, the men weir suspended from ropes on the steep, bare rock 40 feet above the final trail bed during drilling operations" [71] (Figure H.9). One man was killed during the project.

Figure H. 10. The Rock Cut enabled easier access to Nevada Fall (ComPletion RePort #63,1931).

Most construction along the corridor, however, entailed less danger, despite the discovery by 1919 of the "splendid re,sults" possible using dynamite for trail work in the

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[69] Completion Report No. 61, "Vernal Falls Bridge to Rock Cut" (1931).
" Gabriel Sovulewski, supervisor's monthly report, Sovulewski file, Yosemite National Park Research Library (July 1930).

7! Completion Report #63, -Through Rock Cut to Nevada Falls," Job. No. 506.1 (July 1931): I.

park_[72] In addition to the Rock Cut **(Figure 11.10).,** Sovulewski put TNT to work in 1931 on a new trail between Vernal Fall Bridge and Clark Point. The work below Clark Point included construction of stone retaining walls averaging four feet in height but upito ten and twelve feet high in some sections, requiring excavation and blasting for foundations. The trail was six to seven feet wide, with grades usually below fifteen percent but with short lengths periodically reaching eighteen percent (a significant decrease over the original grades of up to forty percent). Importantly, "no pains (were) spared to bring all views and natural features to add to the interest."73

The section between Silver Apron and Clark Point had been cut through originally from Register Rock to La Casa Nevada. From La Casa Nevada it continued up through Liberty Cap Gully to the top of Nevada Fall. It was this section that the park sought to replace with the Rock Cut, intending to abandon the Liberty Cap Gully route because it was continually being destroyed by rock slides (three times between 1906 and 1931) and was unnecessarily fatiguing due to its climbs and descents.74

The Rock Cut route still maintains its original alignment — as does the old Liberty Cap Gully route, which was never abandoned despite the park's intention to do so. The gully route still is subject to frequent rockslides and still gets rebuilt because of its use *as* a winter rescue route (it is also used in summer by hikers wanting to make a loop). [75] In

[72] *1919 Department of the Interior Report,* Yosemite National Park Research Library, 25.

[73] Gabriel Sovulewski, *Supervisor's Monthly Reports* (1930): 3.

[74] ibid.

[75] Jim Snyder, email correspondence, February 2, 2004.

1955, a winter flood destroyed the switchbacks at the base of Nevada Fall; they were "hastily and poorly rebuilt" because it was believed the route had been supplanted by the 1931 Rock Cut so there was no need to carefully maintain this segment.76

Little new work was done on the Nevada Fall Corridor between 1931 and the end of World War II. A December 1934 memorandum from park Superintendent C.G. Thomson to several park foremen noted the existence of "a policy against the construction of any new trails, truck roads, or roads" for over two years!' Also, no records show any work being done on the Nevada Fall Corridor by Great Depression relief agencies such as the Civilian Conservation Corps (or Emergency Conservation Work), the Public Works Administration, or the Civil Works Administration. The corridor had, by 1931, been carved out — and in some places literally set in stone — so CCC crews were sent elsewhere in the park.

The 1930s did bring improvements to the Nevada Fall Corridor, however. An excellent example of Rustic architecture was constructed in the form of the comfort station built in 1934 at Vernal Fall Bridge. The building well reflects the Rustic "parldtecture" made famous in the 1930s in parks throughout the country. Featuring battered stonewalls and a shake roof, the building was one of three comfort stations erected near trailheads in 1934 in Yosemite to better accommodate the new crush of visitors that had grown thanks to better automobiles and roads. [78] The Rustic style

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[16] Ibid.

[ʺ] Thomson to Wosky, Hilton, Sovulewski and McKown, Trails Box 83.

[ʼʼ] Robert C. Pavlik, In Harmony With The Landscape: Yosemite's Built Environment, 1913-1940" *California History* (September 1990): 188.

emphasized use of native materials to better blend buildings with their environment, appearing handcrafted or even primitive. Albert H. Good, in his 1935 *Park Structures and Facilities,* noted that the style:

> through the use of native materials in proper scale, and through the avoidance of rigid, straight lines ... gives the feeling of having been executed by pioneer craftsmen with limited hand tools. It thus achieves sympathy with natural surroundings and the past.79

This was true with the Vernal Fall Bridge comfort station, which was tucked behind a tree **(Figure H.11)** and constructed with native stone so that it seemed to disappear into the rock ledges and talus near the bridge.

Another development in the 1920s and 1930s was the experimental use of asphalt emulsion, or bitumen, to mitigate dust on the trails (this is is discussed more in Chapter IV). The method involved applying a thin spray of oil and spreading a layer of crushed rock on top, hardening the surface of the tread.

Figure H.11. The Vernal Fall comfort station, built in 1934, represents the Rustic architecture style of the period.

Little in the way of major construction occurred on the corridor again until 1960-1951, when the new bridle path was built between Happy Isles and Vernal Fall Bridge so

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[79] Albert H. Good, *Park Structures and Facilities (U.S.* Department of the Interior, 1935), 3-4.

pedestrians could finally be separated from equestrians. This one-and-one-half mile section began near the current water tank at Illilouette Creek and included construction of two steel Bailey Bridges (still extant). The project involved blasting and leveling, and installation of culverts.[8°] In 1971, the Mist Trail section – from the junction of the bridle path below Vernal Fall to the top of Vernal Fall was reconstructed. The project involved 1,486 feet of six-inch concrete pavement, 714 feet of masonry guard wall and two one-and-one-half inch pipe rails for safety atop the falls.81

Figure H.12. Remnants of original dry laid stone work **remains visible in** retaining walls **along the switchbacks up Liberty Cap Gully.**

In summer 1973, another rock fall came down from Liberty Cap and obliterated twelve switchbacks in the ziusigs from the bottom to the top of Nevada Fall. Crews restored the switchbacks with a narrow tread and riprap rather than steps because the route was being used for winter rescues requiring horses More than 2,700 feet of trail was rebuilt, with

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[t○] **Completion Report #380, "Happy Isles to Vernal Fall."**

"Completion Report #491, "Reconstruction Mist Trail."

[g2] Ibid.

new retaining walls, treadway, and waterbars.[83] (This new route followed the earlier alignment.[84]) Jim Snyder, trails foreman at the time, said his crew was short of people "and a little green," so the quality of the stone work – especially of the switchbacks at the top of the gully – wasn't as high as he would have preferred. But he stressed that it was never intended for "anything but foot traffic and administrative stock use for emergency passage."85

The reconstruction work on the stonework through Liberty Cap Gully and the steps through the mist in many cases has, however, been done with care and an eye to retaining the historic character, and at least one section of retaining wall in the gully appears to be original work dating to 1870 **(Figure 11.12).** The most recent reconstruction here, in 1997-1998, included the top switchback section that "floated out" when an overflow channel filled up in a flood.[86] Just two years earlier, in 1995, the top switchbacks were rebuilt, again following a washout. (The 1997 flood also extensively damaged the Nevada Fall Bridge, which had been redecked and railed in 1995.)

Other stonework along the trail has also suffered destruction from nature's intervention and has been rebuilt *as* needed, again sometimes hastily. The section between Register Rock and the top of Vernal Falls through the mist originally was

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' Completion Report #513, "Emergency Reconstruction Mist Trail."

" Jim Snyder to Linda Greene letter (February 9, 1988): 7.

"Jun Snyder, telephone interview, February 9, 2004.

" Tim Ludington, telephone interview, January 29, 2004.

riprapped for more than half a mile in 1928, but has been rebuilt at least once, in 1971, and has been patched since then as needed. Above the mist section and up to Fern Grotto (see map page 262), the steps were completely rebuilt in 1998. On the bridle path, 737 feet of new trail was added and/or rerouted in 1975-1976 on the upper end, including construction of a rock-and-concrete ford, the clearing of 200 feet of wash "to correct drainage problems," and obliteration of 330 feet of the original trail to soften the grade 9°

An important change in trail work occurred after 1974, when trail crews in Yosemite got their first Pjonjar jackhammer, a gas-powered tool for breaking rock in remote areas.[91] This tool allowed crews to cut up boulders into smaller, more workable stones, but it also made some newer crewmembers think it essential for all trail work. As Snyder noted:

> Some crews were drilling everything, including riprap rock, even though good, usable rock lay nearby. With the Pjonjar, rockwork and drilling came to be ends in themselves in the 1980s. Just as explosives had, a technology became more important than trail work ... (We unwittingly) created maintenance problems almost as large and complex as those Sovulewski created in the 1920's and'30s as he opted for the technology of explosives over more labor intensive skills. It is easier now to understand Sovulewski because, in hindsight, we have walked much the same trail he did.92

[17] "Final Report on Reconstruction of the Mist Trail Job #506.2" (January 31, 1931).

11 Completion Report #491, "Reconstruction Mist Trail."

° Tim Ludington, email correspondence, March 22, 2004.

" Completion Report #520, "Reconstruct Nevada Falls Horse Trail."

[91] Jim Snyder, Robert W. Barrett and James B. Murphy Jr., *Wilderness Historic Resources Survey 1989 Season Report* (Yosemite National Park: U.S. Department of the Interior, 1990): 73-75.

[92] Ibid., 87, 89.

Snyder observed that the Pjonjar enabled "riprap without context," where masonry skills thousands of years old "were turned on their heads, and cutting rock became an end in itself" with rockworic taking "precedence over its function in a irail." [93] Less attention was paid to drainage, future maintenance concerns, and whether the trail was comfortable.

Construction projects in the Nevada Fall Corridor have slowed in recent years due in large part to budget cuts, but changes to the trail are planned in the near future – a motivating factor behind this report.

Conclusion

The popularity of the Nevada Fall Corridor stems to the 1850s, when the first Euro-American trail builders took note of the beauty of Nevada and Vernal falls and established a trail for early tourists seeking a "divine" sense of nature. Entrepreneurs responded by building inns for the increasing number of visitors, most of who included a visit to the two waterfalls, frequently stopping at Snow's Hotel

These first trails followed paths established by Native Americans, but by the late 1870s, these trails were tourist corridors within Yosemite Grant boundaries. John Conway, George Anderson, Albert Snow, and Stephen Cunningham were important early trail builders, establishing a significant dry-laid stone tradition in Yosemite.

After the Army handed Yosemite's control to civilian administrators in 1913, Gabriel Sovulewski began a long era of trail design, completing some 300 miles of mountain trails in the park including the Rock Cut to the top of Nevada Fall. The

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[90] Ibid., 88.

experiment of oiling the trails with an asphalt emulsion, or bitumen, also came in the late 1920s and 1930s. The Great Depression brought federal-relief crews to Yosemite, but none worked on the Nevada Fall Corridor, which, except for the 1934 Rustic comfort station, saw no significant additions from the late 1930s through the 1950s.

The bridle path construction of 1961 added a new route toward the waterfalls, but since then the corridor has remained much the same. Storm damage has resulted in many replacement bridges and trail sections, but John Conway's original riprap above Silver Apron remains in good condition, along with wall fragments in Liberty Cap Gully, the original switchbacks up to Clark Point, and portions of George Anderson's 1882 retaining walls.

It is a testament to these early trail builders that so much of their work remains in good condition more than 100 years later. They were driven to establish themselves as successful entrepreneurs, sometimes failing – as Anderson did north of the Merced – but usually meeting their goals. Hikers and equestrians who travel the Nevada Fall Corridor today literally follow in the footsteps of Conway and his colleagues, whose work – if properly conserved – should provide for the enjoyment of current and many future generations to come.

To achieve that, the corridor's integrity should be preserved, restored, or rehabilitated, as appropriate. While rockslides and destructive storms can't be prevented, poor construction methods or inappropriate choice or use of materials can. To identify these issues, the next section of this report examines the corridor's current condition and identifies areas of concern.

III. EXISTING CONDITIONS

Introduction

This existing conditions inventory documents the cultural landscape characteristics of the Nevada Fall Corridor. The inventory is divided into seven sections, the end points for which are either landscape features (e.g., a bridge or a waterfall) or trail junctions within the corridor. The end points reflect findings from fieldwork and archival research that revealed each section as a separate study area due to historical associations. The map chosen for the base map was the 1997 USGS Half Dome Quadrangle 7.5-minute series, the most recent USGS map available.

The discussion for each of the seven sections of the corridor was organized using landscape characteristics as defined in "Landscape Lines," a companion document to *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques.*[1] The latter is a 1998 publication that addresses how Cultural Landscape Reports are used for management purposes in the national park system. "Landscape Lines" deftneslandseape

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[1] Robert R. Page, Cathy A. Gilbert and Susan A. Dolan, "Landscape Characteristics,"A *Guide to Cultural Landscape Reports: Contents, Process, and Techniques* (Washington: National Park Service, 1998).

characteristics as the tangible and intangible "processes and physical forms that characterize the appearance of a landscape and aid in understanding its cultural value."[2]

Landscape characteristics include the following categories:[3]

• *Natural Systems and Features are* natural aspects that influenced how a landscape developed, such as climate, hydrology, and indigenous plant communities. Features associated with natural systems include rock outcrops and ravines .[4]

• *Spatial Organization* is the three-dimensional organization that defines a space, including vertical, horizontal, and overhead planes. [5] On the Nevada Fall Corridor, these include Fern Grotto and stone staircases.

• *Land use* comprises activities that shaped and organized a landscape due to human interaction. For the corridor, this would be hiking, horseback riding, picnicking, and sightseeing.

• *Cultural traditions are* practices that influenced land use, patterns of division, building forms and the use of materials. This does not apply to the corridor.

• *Circulation* defines the systems of movement in a landscape. [6] On the corridor, this includes the trail's width, tread material, and alignment.

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[2] Ibid., 3-4.

[3] Ibid., 6-11.

[4] Ibid.,7.

[5] Ibid.

[6] Ibid., 8.

• *Topography* is a landscape surface's three-dimensional configuration, to include slope, solar aspect, and elevation, and pertains to built features such as earthworks and drainage ditches. Examples of such features on the Nevada Fall Corridor include causeways, switchbacks, and dams.

• *Vegetation* includes plant communities and individual specimens. Because of the expanse of the Nevada Fall Corridor and the absence of intentional plantings, discussion of vegetation in this report is limited to descriptions of plant zones along the corridor.

• *Buildings and Structures* include those sheltering human activities (buildings) and those constructed for other purposes (structures). On the corridor, buildings include the comfort station; structures include bridges and retaining walls.

• *Views and Vistas* comprise prospects in a range of vision. Views are expansive prospects; vistas are controlled and discrete .[7] The discussion about these features in the corridor is limited to views.

• *Constructed Water Features are* the built features and elements using water. On the corridor, this is limited to the watering trough a quarter-mile up from Happy Isles, and the water fountain at Vernal Fall Bridge.

• *Small-Scale Features* are elements that provide detail and diversity, such as benches and signs. On the corridor, these include directional signs and iron railings.

• *Archeological Sites are* ruins such *as* road traces or structural remnants. On the corridor, they are limited to the Casa Nevada (Snow's Hotel) site. (Abandoned trail sections are discussed under Circulation.)8

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[7] Ibid., 10.

These features and elements were assessed using the following criteria:9

Good – The cultural landscape shows no clear evidence of major negative disturbances and deterioration by natural and/or human forces.

Fair – The cultural landscape shows clear evidence of minor disturbances and deterioration by natural and/or human forces, and some degree of corrective action is needed within three to five years to prevent further harm to its historical and/or natural values.

Poor – The cultural landscape shows clear evidence of major disturbance and rapid deterioration by natural and/or human forces. Immediate corrective action is required to protect and preserve the remaining historical and natural areas.

Unknown – Insufficient information was available to make an evaluation.

The documentation here is through written descriptions, maps, and photographs arranged by the seven sections of the corridor. Fieldwork was undertaken primarily in spring 2003, with followup site visits in October 2003 and April 2004.

This document may also serve as a record of the landscape at a particular point in time so may be of use for future historical research purposes.

Route Description

The Nevada Fall Corridor is a roughly seven-mile trail system that begins on the eastern edge of Yosemite Valley at Happy Isles. Key stopping points and destinations

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[8] Ibid., 11.

[9] Robert R.. Page, Cathy A. Gilbert, and Susan A. Dolan, *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques* (Washington: National Park Service, 1998), 67.

along the corridor **(Figure EC.1)** are Vernal Fall Bridge, Register Rock, the top of Vernal Fall, Emerald Pool, Silver Apron Bridge, the top of Nevada Fall, and Clark Point. Historically, an important destination was Snow's Hotel, also known as La Casa Nevada,

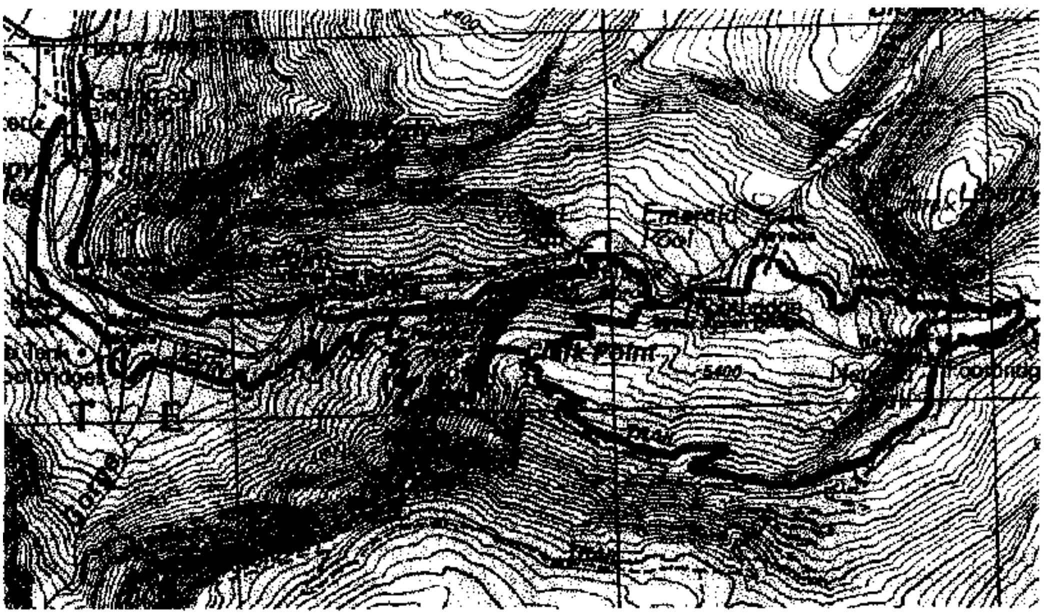

Figure EGA — Landmarks and section end points along the trail include bridges and geographic features (USGS Half Dome Quadrangle, 1997).

which was built atop a **granite** plateau near the base of Nevada Fall. A main reason this corridor was developed was specifically to reach the hotel.

Today the trail corridor begins **at Happy** Isles in the northeast corner of Yosemite Valley. It initially parallels the Merced River on both sides — one trail runs along the river's north side and is for hikers; the other trail travels along the river's south side and is for equestrians. After about a mile on each trail, the two user groups face different options for continuing on. The equestrians can only continue up the John Muir Trail, but hikers have a choice of three loops in this trail system.

The first loop routes hikers to the top of Vernal Fail then to the summit of Nevada Fall and back down the John Muir Trail to Happy Isles. A second loop goes to the top of Vernal Fall, takes a connector trail to Clark Point, then returns to Happy Isles via the John Muir Trail. A third loop, taken primarily in the off season by those familiar with the corridor, routes hikers up the footpath to Vernal Bridge then returns via the bridle path; this hiking route is discouraged by the park when horses are using the path since the bridle path is designated for stock use only.

The trail can also be viewed in discrete sections that link destination points. The footpath that begins at Happy Isles travels about a mile to Vernal Fall Bridge. The bridle path, which also begins at Happy Isles, is slightly longer than a mile and terminates near Register Rock, about a quarter mile beyond Vernal Fall Bridge. A 200-foot long trail connects these two paths at Register Rock.

From Vernal Fall Bridge, hikers can climb to the top of Vernal Fall and view Emerald Pool before proceeding to the top of Nevada Fall, or they can hike up to Clark Point and back down the John Muir Trail to Happy Isles. If they continue to the top of Nevada Fall, their trail joins the John Muir Trail and reaches Clark Point. From Clark Point, hikers descend via the John Muir Trail to Vernal Fall Bridge and Happy Isles.

For equestrians, from near Register Rock the trail climbs to Clark Point, where riders have two choices: They can turn northeast and descend to Silver Apron Bridge then climb up to the top of Nevada Fall, or they can continue southeast from Clark Point and climb directly to the top of Nevada Fall. Because horses cannot navigate the steps below the summit of Vernal Fall, they must return to Happy Isles via the John Muir Trail (unless they are headed to the backe,ountry).

Existing Conditions Section 1

Overview

Section 1 begins at the Happy Isle trailhead on the north side of the Merced River and ends at the comfort station across Vernal Fall Bridge, for a total of approximately 4,500 linear feet or about four-fifths of a mile **(Figure CU).** The route travels due south alongside the river the first 2,000 feet with moderate elevation gain, passing historic stone steps that lead to the river and a spring developed in 1929 into a mortared rubble watering trough. At approximately the 2,500-foot mark, the trail turns east. Illilouette Gorge is visible to the south here, while below the trail the Merced River flows over a rocky stretch of rapids. A parapet S-curve wall travels along this segment for 300 feet. Section 1 continues east on a gentle grade past another spring and through two areas of talus, then crosses Vernal Fall Bridge and ends at the comfort station.

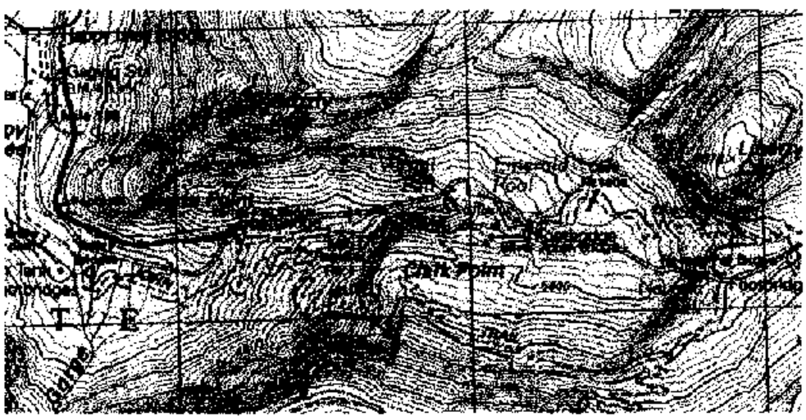

Figure C1.1. Section 1 begins at Happy Isles and stays on the north side of the Merced River *en* route to Vernal Fall Bridge (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey. 1997).

Existing Conditions Section 1

Overview

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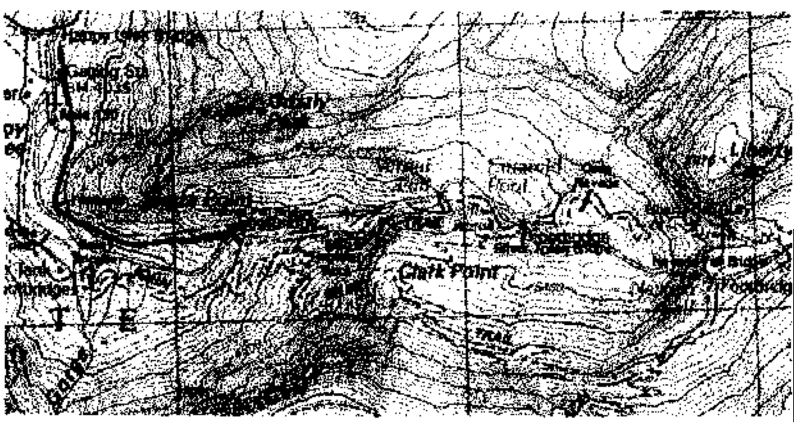

Figure C1.1. Section 1 begins at Happy isles and stays on the north side of the Merced River en route to Vernal Fall Bridge (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey. 1997).

This section also contains a remnant trail built by George Anderson in 1882 in a failed attempt to reach the top of Vernal Fall on the north side of the Merced Rivet

Description of Existing Conditions

The trail begins across from the weather station at Happy Isles (by a footbridge washed out in the 1997 flood), at a sign that gives distances for the High Sierra Loop Trail. The trail immediately enters a boulder-strewn area flanked by oak trees alongside the Merced River. In spring, several large puddles of water stand in the trail through here, one large enough to prompt hikers to walk off the trail to avoid it. Numerous areas of deteriorated bitumen an asphalt-like surface treatment – occur throughout this section, while many water bars (to funnel water off trail) and soil retainers (to retain soil/bitumen rather than divert water) have been installed as erosion-control measures. These have met with mixed success depending on their siting and construction. Random dry-laid stone edging occur throughout this section, most of it rebuilt but some situated atop the original low retaining walls. At the 675-foot

Figure C1.2. Thirty-three steps lead to the river from **the main trail 675 feet from the tralihead.**

mark, thirty-three steps **(Figure C1.2)** and three landings lead to the river. These steps are almost unnoticeable from the main trail so are rarely used and remain in good' condition; the type of the stonework and amount of moss indicate they date to 19292 when the trail up to Vernal Fall Bridge underwent major construction.[3] At the 775-foot mark, a spring sends water over the trail. A mortared-stone catch basin/watering trough was built here in 1929 to capture water for horses; two pipes beneath the tread accommodate most overflow and direct it off trail. The U-shaped trough is eighteen inches wide, fourteen-and-a-half feet long, four-and-a-half inches deep, with the basin measuring six inches at its deepest. Repairs were made in 2003 to unclog the two drainage pipes and repair the tread surface at the northern corner of the basin, which had severely deteriorated and exposed the pipes, creating a tripping hazard, The concrete used to repair the tread is a high-aggregate mix that does not match the surrounding tread in color – the repair is bluer than the surrounding bitumen – but may weather over time to blend in. The high-aggregate texture of the concrete is not likely, however, to weather to a good match. The trough is in good condition but has a continual seep through a weak mortar joint near the north corner. The basin was not designed to hold the spring's

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' Conditions, defined in A *Guide To Cultural Landscapes, are* the following: Good - shows no clear evidence of major negative disturbances and deterioration by natural and/or human forces. Fair - shows clear evidence of minor disturbances and deterioration, and some degree of corrective action is neeed within three to five years to prevent further harm to the historical and/or natural values. Poor shows clear evidence of major disturbance and rapid deterioration by natural and/or human forces. Immediate corrective action is required to protect and preserve the remaining historical and natural areas.

[2] Tim Ludington and Steve Griswold, personal interview, April 10, 2003.

[3] Completion Report #11, "Final Report on Reconstruction of Mist Trail" (Job /45062, January 1931); Jim Snyder, email correspondence, March 4, 2004.

C1.3 – At the 1,070-foot mark, the view of Yosemite Falls and nearby Panorama Cliff is obscured by conifers.

maximum flow rate, resulting also in continual spillage over the top in peak flow weeks. Riprap tread near the spring remains more intact than the bituminous sections.

Advancing up the trail, a slickrock area on the trail's east side occurs at the 1,070-foot mark, opening the view east and upward. To the west, conifers obscure the former view here of Yosemite Falls and nearby Washburn Point **(Figure C13).** A rock slide on this section of trail occurred in early 2004, with boulders and trees tumbling from the east side of the trail over to the west side, slightly opening views to the west. Just past the quarter-mile mark, the trail turns east and a parapet stonewall begins at the 1,600-foot mark.

C1.4. An S-curve retaining wall dating to 1929 follows a bend in the Merced River about a half-mile up the trail

With a slight S-curve **(Figure** C1.4), the wall follows a bend in the Merced River below. The parapet wall was built in 1929 on top of the grade-level retaining wall constructed in 1882 by George Anderson. [4] Anderson's original walls are visible at the base of the newer (1929 and later) wall sections,[5] and are in good condition. The parapet wall was added in the major trail construction drive of 1929, when the trail was widened with explosives and the surface underwent "experimental oiling." [6] The parapet wall is a mortared random rubble design thirty-two inches tall, eighteen inches deep, 315 feet long, and sits on a retaining wall that extends thirteen-and-a-half feet above the forest floor below. Most of it was built in 1929 but reconstruction work (including repointing) was completed and some additional length added in 1991.[7] The condition of the parapet section is good but its masonry standards are not high quality; little attention was paid to overlapping stones/breaking joints to increase strength, however the stone chosen blends well into the surroundings and the wall is stable. The parapet is constructed of random rubble laid roughly three courses high, with large, sometimes fist-sized, mortar joints. The wall includes scuppers for drainage, and the trail here includes soil retainers and waterbars to direct water toward the scuppers. The bituminous tread through this section is extremely deteriorated, often to the point of non-existence and posing tripping hazards. The waterbars and soil retainers are in fair to good condition.

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[4]

[5] Linda Greene and James B. Snyder, ***National Register Nomination,*** 1989, section 7, page 6.

[6] Completion Report #11, "Final Report on Reconstruction of Mist Trail" (Job #506.2, January 1931).

[7] Steve Griswold, personal interview, April 10, 2003.

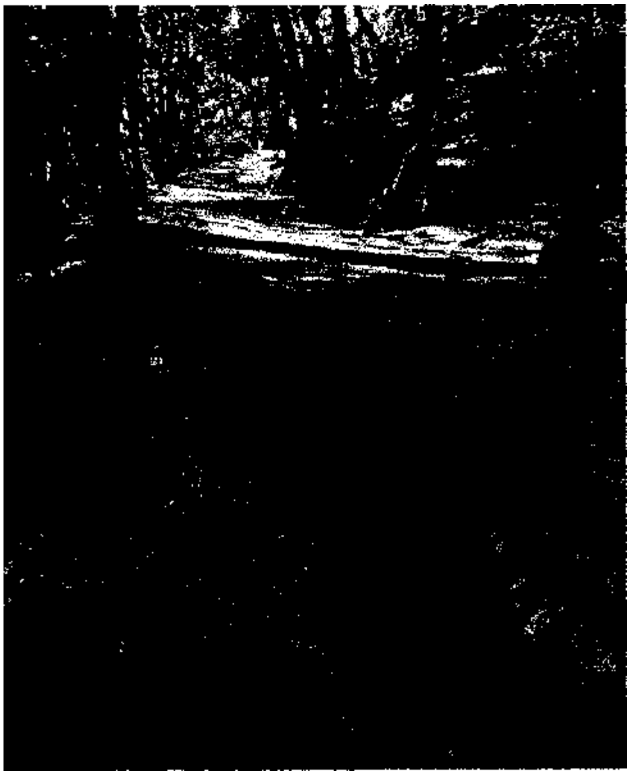

Figure C1.5 Wall sections such as this provide an edge to the trail. Most are dry-laid random rubble.

The parapet wall ends at approximately the 1,900-foot mark. The highest elevation on the trail before Vernal Fall Bridge occurs at about the 2,100-foot mark, where the trail runs through a talus section for approximately 200 feet. Some original lengths of retaining wall, dating to the 1929 work, remain in the area between the parapet wall and a spring at the 2,350-foot mark. These wall sections, which provide an edge to the trail, are ten to twenty feet in length **(Figure C1.5)** and are in good condition. At the 2,500-foot mark the grade resumes a gradual climb, with more broken tread and some historic retaining wall fragments in fair to good condition. A section of large talus begins at the 3,000-foot mark. This length – which is treeless so provides good views of Illilouette Gorge and points southwest – is bordered on both sides by large rubble from landslides over the years, with some attempt of ordered stone borders on either side. Presumably, some of those borders were knocked askew by subsequent rockslides. They are in poor to fair condition.

Figure C1.6 – A massive retaining wall built by George Anderson in 1882 remains extant three-quarters of a mile up Section 1.

An extant fragment of George Anderson's 1882 trail departs the main trail at a switchback at the 3,350-foot mark, noted by the massive original retaining wall at the switchback **(Figure C1.6).** Portions of this wall are in remarkably good condition. This abandoned trail runs 300 feet to the first switchback, now a jumble of rocks from slides, then smoothes and widens out into the wide carriage road Anderson had as his original design intent. Another partial washout occurs at the 635-foot mark, but otherwise the trail is almost fully intact over the next 400 feet. Condition ranges from poor to good. Several sections of original retaining wall remain **(Figure C1.7),** not elegant in design but sturdy enough to

Figure C1.7 Though not elegant in design, several sections of original retaining wall on Anderson's trail were crafted well enough to remain standing more than 100 years later.

withstand more than 130 years of weathering and remain in good condition. This abandoned section runs a total of 930 feet from the main trail, ending where it *is* blocked with vegetation and rubble mid-trail and no evidence of where Anderson intended to next advance.

Figure C1.8 —Vernal Fall Bridge demonstrates a scaled-down Rustic architecture design, with rubble masonry supports and timber posts and rail.

Returning to the trail, the big-talus section runs 155 *feet* with large rocks and boulders extending on both sides of the trail for hundreds of feet. The trail surface here is entirely decomposed granite in good condition. The trail next advances into smaller talus and moves into a forest of small conifers and oaks then slopes down steeply as it approaches Vernal Fall Bridge, situated at the 3,850-foot mark.

The bridge, eighty-five feet long, is Rustic in design with timber posts, deck, and rail over steel tnisses supported by mortared, rubble-masonry walls, two of which stand in the Merced River and two on the banks of the river (Figures C1.8 and C1.9). The posts and rails were replaced in 2003; the posts are twelve-inch by twelve-inch posts, the rails are five-and-a-half inch squaiv and two rails high, and stand forty-two inches above the decking. True two-inch by twelve-inch planks provide the decking. The passageway is 122 inches wide. All the wood is treated and the bridge is in good condition. New posts and rails were installed in 2003; these feature chamfered posts, a method that invites in

Figure C1.9 – **Vernal Fall Bridge is supported with steel for better longevity in Yosemite's severe weather.**

moisture and accompanying rot[8] by exposing more wood urfaces, but which also serves to better reflect the Rustic style.

The view from the bridge is of Liberty Cap to the northeast, Vernal Fall to the east, and Illilouette Gorge to the west. Immediately south of the bridge stands a mortared rubble water fountain. It measures thirty-two inches wide by thirty-two inches tall by twelve inches deep at the top, with a base twenty-four inches deep. It is in fair to good condition.

Approximaxely sixty feet beyond the south end of the bridge stands the comfort station (Figure C1.10). Built in 1934, the mortared, random-rubble masonry design is Rustic in style, with low, dry-laid stonewalls bringing up the grade on one side of the building. The building, recently repointed and in good condition, stands tucked behind as

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8Prior to the replacement, several posts had rotted deeply enough that visitors used them for ashtrays and trash receptacles.

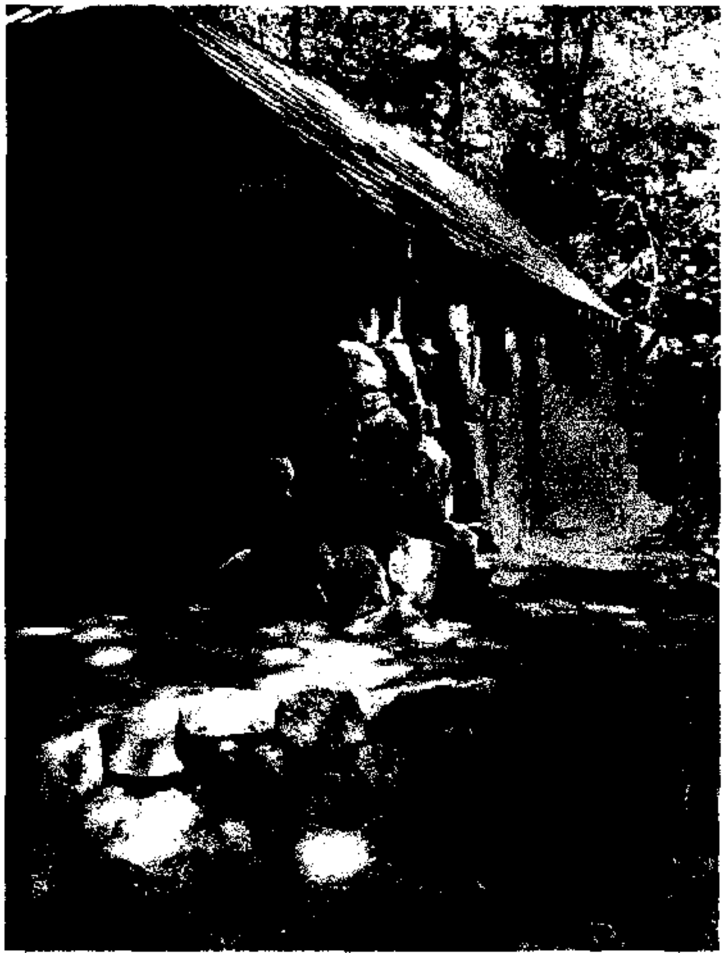

Figure C1.10 — The comfort station features battered stone walls recently repointed.

tree and otherwise blends well with the environment, which includes scattered granite rocks and boulders near the bridge. The interior measures twenty-four-feet-eight inches by nine-feet-four inches, with one room each for men, women, and storage. The walls are of rubble masonry, five feet to five-and-a-half-feet thick at the base, built in a battered style that tapers to eighteen inches at the plate line. The interior floors are concrete under tongue and groove. The roof was engineered for heavy snow loads, with a 1:1 pitch and cedar shingles ten inches by twenty-four inches. [9] A sewer line installed in 1971 from Happy Isles to the comfort station runs unobtrusively beneath the bridle path (Section 3). [10]

[9] Linda Greene and James B. Snyder, *National Register Nomination*, 1989, section 7, pages 7-8.

www.den.nps.goviarnoeba/TICMC.NSF March 13, 2003.

Behind the comfort station, a narrow trail climbs stone steps then descends to the bridle path on the south. The steps are a mix of historic and reconstructed sections that, after initially keeping a visible alignment, begin to meander, fade, and gradually re-emerge before finally meeting the bridle path. Their condition is fair to poor.

Landscape Characteristics

Natural Systems and Features. The design and development of this segment of trail was undertaken to improve access to the top of Vernal and Nevada falls and points beyond. The original route (Section 4) climbed to Clark Point only to descend to Silver Apron and climb again to Nevada Fall, proving discouraging for some travelers. The realignment of Section 1 in 1882 presented its own challenges, however, with rivers, talus slopes, and rock outcrops – specifically the cliff face on which George Anderson built the 1882 trail. This feature (over which the S-curve wall extends) was subsequently dynamited in 1929 to flatten the grade and increase safety. The two talus areas on this section continue to pose potential problems for maintenance and safety due to rockslides. The Merced River also influenced the alignment of this trail segment, which follows the river's course for the section's entire length. Anderson's routing attempted to stay on the north side of the Merced, but this proved impossible given his time and budget and the expanse of bedrock on the river's north side.

Spatial Organization. Section 1 begins in flat terrain flanked by large rocks and boulders in a filtered canopy of primarily oaks and laurels. As the trail climbs, forest density increases so that upon reaching the spring, the trail is relatively enclosed in all directions by conifers. The canopy opens up again as the trail crests the hill at the S-curve wall. At this point, the trail presents views to the south with the river immediately below, while trees – and an outcrop through which the trail was cut – confine the north side and overhead plane. The trail gradually heads back into trees after the S-curve wall, and resumes a gentle climb. When it reaches the talus area, it again opens up on both sides and overhead the length of the talus zone. From here, the path leads through trees and descends slowly to the bridge, where views open to the east and west but remain contained by the forested north and south.

Land Use. Land use related to the trail is recreational, providing scenic views and connections to the larger trail system. The design for Section 1 considered not only scenic points along the way but also access to destinations at higher elevations; Anderson's goal was a carriage road to bring the maximum number of visitors to the two waterfalls and Snow's Hotel. Until 1961, when the new bridle path was built on the south side of the river, Section 1 was a shared corridor used by both equestrians and pedestrians. After 1961, Section 1 changed to hiker use only.

Circulation. This section begins at Happy Isles and includes the current bridle path and a remnant of Anderson's trail. Both were designed to connect Happy Isles with the top of Vernal Fall; Anderson's path dead-ended completely, while the extant section eventually connects, through Section 2, to the summit of the waterfall. This section connects with other segments to form a looped network of trail lengths providing access to key destinations in the Nevada Fall Corridor.

The surface tread along this section is bituminous – oiled and dusted with aggregate, then hardened over time – averaging six feet in width, installed to mitigate dust and erosion. Edge treatment includes occasional rows of low stone borders of native material. At the S-curve wall, the parapet design provides a distinct edge and needed safety bather and is integrated with naturally occurring boulders. In the talus beyond the S-curve wall, the tread is primarily decomposed stone bordered loosely by randomly placed large rocks. Reaching the bridge, the tread consists of wooden planks, with severely deteriorated bituminous aprons on either side.

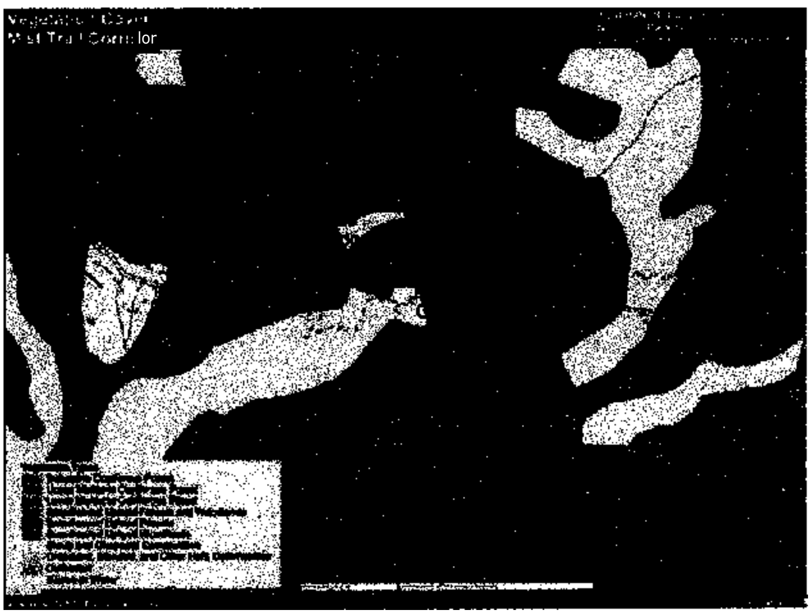

Figure C1.11– A lower **montane coniferous** forest **occupies most of the Nevada Fall Corridor, with live oak, pine, fir, and sequoia predominating (Map by Kent Van Wagtendonk, Yosemite National Park, 2004).**

Vegetation. In the lower elevations near Happy Isles, vegetation is comprised of a lower montane coniferous forest **(Figure C1.11** above; a larger version is on page 261) characterized in the lower elevations by live oak, gray pine, and madrona. As the elevation increases, Ponderosa pine, white fir, Douglas fir, and incense cedar increase. In summer, Indian paintbrush, penstemon, and other wildflowers grow beside the trail with various grasses. Vegetation does not encroach upon the trail except in one notable location, where a tree grows from the base of the S-curve wall (away from the trail).

Buildings and Structures. Major structures along Section 1 include retaining walls, the watering trough at the spring, the bridge, and the comfort station.

These structures reflect work primarily by the National Park Service, which designed and built the trough and the parapet wall (1929), the bridge (various versions beginning in 1908), and the comfort station (1934). In 1882, George Anderson constructed the retaining wall below the parapet wall and the retaining walls on the abandoned section leading off from the current trail near the talus zone. Each brought different expertise and materials and equipment to their projects – where Anderson and his crews relied mostly on hand labor and native materials, NPS crews used explosives, hand labor, and some imported materials.

Typical minor structures associated with this section include segments of remnant walls and elements such as stone borders, waterbars, and soil retainers too numerous to list"

Views and Vistas. Section 1 views tend to be discrete with two notable exceptions – at the S-curve wall that overlooks Illilouette Gorge and the Merced River, and from Vernal Fall Bridge looking east to Vernal Fall and west down Illilouette Gorge. Historically there was a view just above the spring at the slickrock on the trail's east side (see Figure C1.4 above), toward Yosemite Fall and Panorama Cliff,'[2] but conifers now obscure this view.

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[11] This list is not exhaustive. A detailed inventory — beyond the scope of this report — should be completed and added to the List of Classified Structures, and evaluated for eligibility.

[12] Report of the Commissioners (1885-6): 9. "The views at various points on the Vernal Callon trail — embracing within their scope Yosemite Falls, Glacier Point, Too-loo[p]-a-we-ack Falls...."

Constructed Water Features. Constructed water features of Section 1 include the 1929 watering trough at the spring and the 1981 water fountain at the bridge. The trough is of mortared nibble designed to hold water that emerges from a spring. Two pipes were installed beneath the trail to drain excess flow but appear to still be partially plugged despite repairs to the catch basin in 2003. The water fountain, built in the 1980s, is constructed of small stones set in mortar.13

[13] Jim Snyder, email correspondence, March 10, 2004.

Existing Conditions Section 2

Overview

Section 2 travels east from Vernal Fall Bridge to the top of Vernal Fall and ends at the junction near Silver Apron, a distance of approximately 3,500 linear feet, or just under three-quarters of a mile **(Figure C2.1).** [1] 1t parallels the Merced River the entire **distance, climbing** gently the first 900 feet and passing the junction at Register Rock, then abruptly begins the steep climb up the stone steps. This is a steady ascent, broken by a few landings but otherwise continuing on a sharp incline. Approximately 375 steps take visitors through this section, termed the Mist Trail for the spray generated by Vernal Fall. The final 180 steps, which begin above the heaviest mist, have an especially steep tread-riser ratio. The trail continues past Fern Grotto, so named for the ferns that

Figure C2.1 – Section 2 map (USGS Halt Dome Quadrangle. Denver: U.S. **Geological Survey. 1997),**

[1] USGS Half Dome Quadrangle (Denver: U.S. Geological Survey, 1997); **and** site visit May *17,* 2003.

grow in the cleft of an overhanging rock at the top of the steps section, and up the cliff face to the plateau atop Vernal Fall. At the top the trail meanders slightly southeast, following the river's course along an exposed bedrock area known as Silver Apron, a popular place for hikers to lunch in the sun beside the water. Section 2 ends 800 feet beyond the top of Vernal Fall at the junction for the trail to Clark Point.

Section 2 also includes a 200-foot spur from Register Rock to the junction with the bridle path (Section 3) at the John Muir Trail. This spur's main feature is Register Rock, named after travelers – including painter Albert Bierstadt – who in the 1860s-1880s added their names to the stone.

Description of Existing Conditions

Section 2 begins with the gradual climb from the comfort station at Vernal Fall Bridge, bearing east and remaining on the south side of the Merced River. At approximately the 100-foot mark – not visible without striking out into the woods off the current trail – a vestige trail remains. It winds through the woods, paralleling the current trail for several hundred feet before rejoining the path near Register Rock. This remnant, in poor to fair condition, was where the original alignment on the river's south side connected to the route up through the mist. A flat area midway suggests former campsites; above these, a nondescript boulder purportedly contains faint signatures dating from 1860-1865, but this boulder was not found during either 2003 or 2004 site investigation.2

[2] **Linda Greene and James B.** Snyder, *National Register Nomination, Mist Trail* (Yosemite: National Park Service,1989), section 7, 6,

Returning to the current trail, the surface is severely deteriorated bitumen with numerous drop offs and potholes. Puddles were numerous during spring site visits to this area. Loose rocks form a rough border, with a few retaining-wall segments that appear to date to pre-Depression era construction along the corridor **(Figure** C2.2). The walls range from poor to fair condition. At the 1,975-foot mark, the trail meets the intersection of paths either continuing east along the river to Vernal Fall (the Mist Trail), or heading southwest toward Clark Point (the John Muir Trail). Historic stamped-metal signs point the way; in use for decades by the park, these signs appear several decades old and are in good condition. They measure twenty-seven inches in width, with the height dependent on the number of destinations listed **(Figure** C2.3).[3] They are difficult to read in certain lighting because of their rough, stencil-like lettering. A contemporary gate at this junction bars the way during winter months when ice on the steps makes travel extremely dangerous.

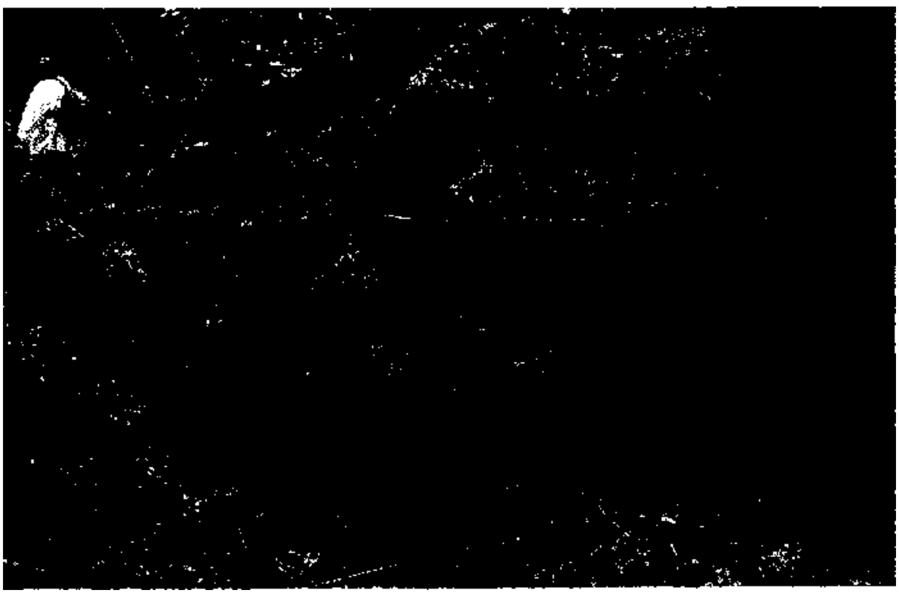

Figure 2.2 – The trail is edged in a few places with retaining wall fragments that appear to date to the pre-Depression construction.

[3] Jim Snyder, personal interview, April 8, 2003. Re: height of the signs, the minimum found was seven inches, the tallest more than three feet.

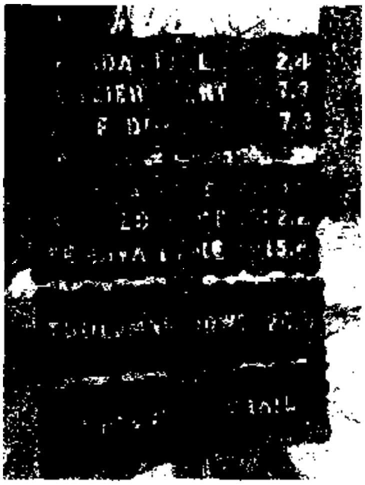

Figure C2.3 — A historic metal sign points the way at the intersection near Register Rock.

This junction is also the location of Register Rock, long used as a rest stop, meeting point, and place to tie horses while walking up for a closer view of Vernal Fall. The site today is starker than in the years when it served as a toll station or blacksmith shop, at one point housing a cabin beneath its overhang. A few modem-day visitors have left their mark in the form of graffiti, as did earlier tourists who felt moved to sign their names here.

About thirty feet beyond the gate to the left of Register Rock, remnants of the original trail emerge below. At the 300-foot mark, steps lead from the main trail **(Figure C2.4)** to a distinct abandoned segment that runs parallel to the current trail but closer to the river. Some of the steps to the remnant trail appear original but others clearly have been rebuilt. They lead to Lady Franklin Rock (described below) and the remains of the original trail, which is well defined for 250 feet before leading up toward the current trail and vanishing. This abandoned fragment is in good condition, narrow but flat and of moderate grade. It advances east from Lady Franklin Rock, a popular photographic point **(Figure C2.5)** named for an early visitor carried in a litter

Figure C2.4 — At the 300-foot mark past Register Rock, steps lead from the main trail down to Lady Franklin Rock.

Figure C2.5 – The view from Lady Franklin Rock remains a popular photographic point today.

by porters up the trail for a view of the waterfall in 1863.4 A contemporary wooden sign nearby displays a John Muir quotation.[5] Returning to the current trail, an iron pipe stands upright in the middle of the trail six feet past the steps to Lady Franklin Rock. This was from a small interpretive sign, part of a series along the trail in the 1970s that pointed out the view at Lady Franklin Rock; these signs, for various features along the trail, were removed in the late 19808.6

The trail next proceeds below a massive slickmck section. The original route through here formed a precarious trail tucked in against the glacial-polished bedrock on the south edge, held in place with small retaining walls and steps notched in ledges and joints. The current alignment, develo ped with explosives, is wide and flat, with severely

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[4] Linda Omens and James B. Snyder, *National Register Nomination,* 1989, section 7, page 2.

"...rocky strength and permanence combined with beauty of plants frail and fine ... water descending in thunder, and the same water gliding through meadows and groves in gentlest beauty."

[6] Jim Snyder, email correspondence, March 10, 2004.

Figure C2.6 — This riprap has weathered well since it was installed in 1997.

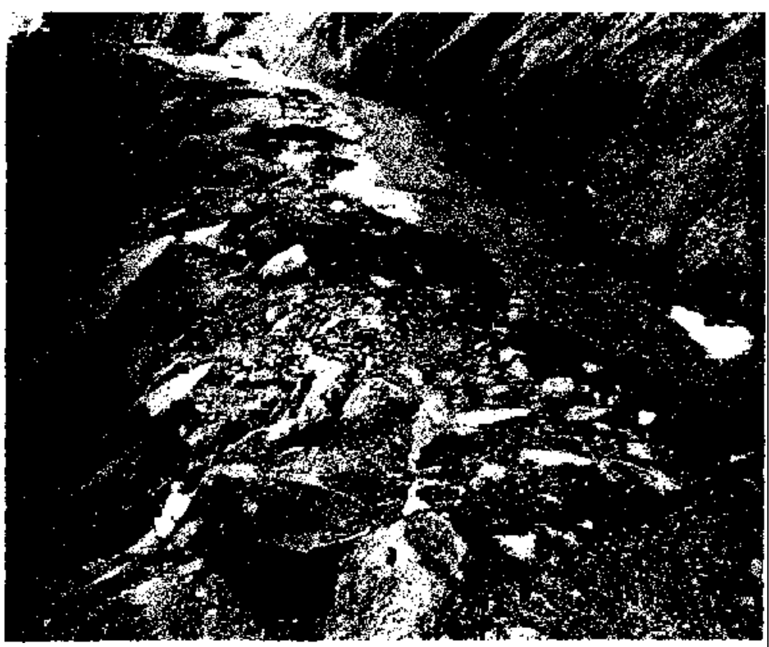

Figure C2.7 — Compared to Figure C2.6, this section of trail – which was not riprapped — has eroded significantly.

deteriorated bitumen en route to the base of the steps. The first segment of steps begins 900 feet from the intersection at Register Rock. This section begins with a broad flight of steps at the foot of the slickrock, which channels immense amounts of water and debris directly onto the trail in wet months and promotes ice buildup in winter. Puddling occurs frequently, often at the foot of the bituminous sections that have not allowed water to infiltrate to the soil beneath. As a result, the treadway has been rebuilt numerous times, most recently in 1997 when stone steps were installed to replace the bituminous surface that had given way. [7] This riprap appears to have weathered well **(Figure C2.6),** especially when compared to other sections just above this location that were not riprapped and have continued to erode **(Figure** C2.7).

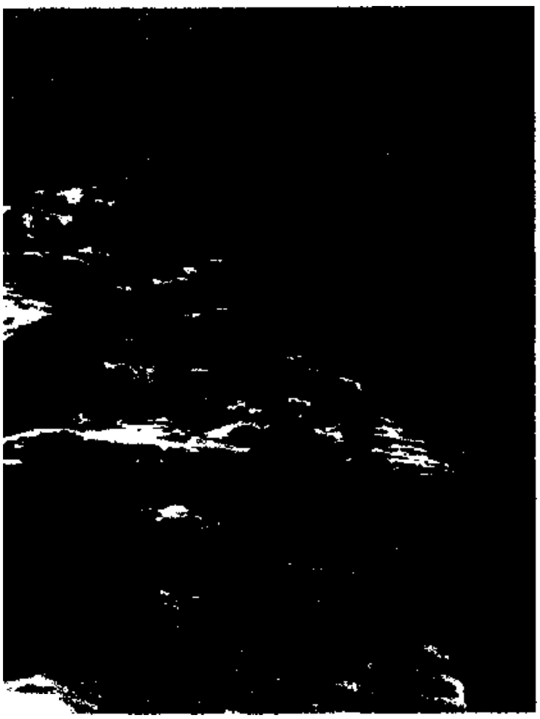

Figure C2.8 – Pedestrians pass beneath this talus "tunnel" to reach the main overlook in the seasonally misty section of the trail.

This first section of steps – 132 steps in all including landings – extends roughly 350 linear feet and ends at the first iron railing. The railing, installed in 1929, is welded inch-and-a-quarter pipe and is used elsewhere in Section 2 (described below). It is in fair to good condition. Continuing upward, visitors climb up sixty more steps, midway passing a leaning-rock "tunnel" (Figure C2.8) twenty feet long and likely original, just before reaching the main overlook and the final pitch of steps. This 192-step section was rebuilt in the 1980s [8] and occasionally uses mortar to hold stones in place. Toward the end of this section, a series of overlooks provides rest and photographic points, all of which are too wet and shaded for comfortable use in spring, so most hikers congregate at the base of the next section to

[7] Steve Griswold, personal interview, April 10, 2003.8

[8] Ibid.

dry off, snack, rest, and warm up. This has resulted in a wide area of trampled soil on the river side of the steps.

The next (and final) sweep of 181 steps begins 2,800 feet, or just over a half-mile, from the junction at Register Rock (Combined with the lower steps section, the total steps number 373 today, compared with 554 before the 1980 rockslide.[9]) These steps at first are very sharply dimensioned and do not blend well with the contours of the natural setting.

Figure C2.9 – Workers use a short highline to move rock along the trail corridor (Tim Luddington, 1998).

Within 100 feet, however, the rockwork resumes a more organic form, being more rounded in shape and more random in placement. The tread-to-rise ratio also becomes more organic along with the width, which varies widely. The steps here are slightly tipped to help hikers maintain traction, but this does not seem to have adversely affected drainage.

This last stretch of riprap steps was rebuilt most recently in 1998[10] **(Figure C2.9)** and runs directly up the fall line at the edge of the cliff, hugging the rock until dead-

[9] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, 3.

[10] Tim Ludington, email correspondence, March 19, 2004. This section was built under Dave Kari's supervision, and was the fifth phase of Mist Trail reconstruction since 1981.

ending in Fern Grotto; the original route angled toward Vernal Fall then made a sharp turn to the ladders." The current staircase features an exceedingly steep tread-riser ratio up to the railing at the base of Fern Grotto, forcing hikers to use "giant" steps to go from one step to the next. This makes for an arduous section, difficult especially for backpackers, but the stonework appears durable and blends well with the surroundings. Where this section runs beneath the Fern Grotto overhang, the stonework fits tightly into adjacent stones and the ground, and sheds water well despite occasional mortared sections.

Fern Grotto cont'ins one of the most historic extant elements of the Nevada Fall Corridor cultural landscape – signatures from 1860 etched into a granite crevice **(Figure C2.10).** Completely obscured from casual view so still undisturbed 140 years later, they remain in remarkably good condition. Fern Grotto is also where the wooden ladders (and later a wooden stairway) led visitors, between 1858 to 1897, to the top of the waterfall.[12] At the top of the ladders, travelers followed stone steps down from the cliff

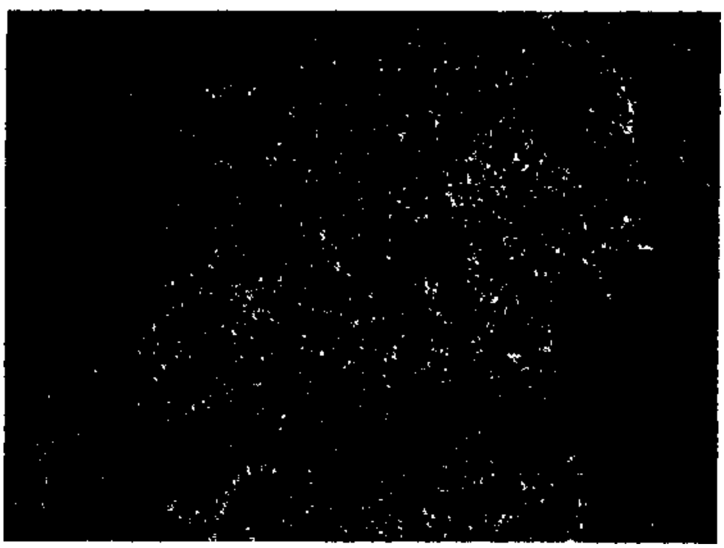

Figure C2.10 – Signatures dating to 1860 remain legible in a granite crevice at Fern Grotto.

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[11] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, 3.

[12] Johnston, *The Yosemite Grant 18644906,* 150.

top to the slickrock at the summit of Vernal Fall.° Roughly thirty of these steps still exist along with other riprap elements. These are in good condition.

When the wooden stairway was finally removed in 1897,'[4] in its place footholds were carved more horizontally into the cliff face north of the grotto for the final pitch to the top of the waterfall. This is the route used today. The final 200 feet up this exposed rock segment is protected by the 1929 iron railing that remains in fair to good condition. The railings are one-and-a-quarter-inch welded iron pipe two rails high on the exposed sections going up from Fern Grotto **(Figure C2.11),** and three rails high along the edge of the waterfall's bedrock apron. They are spaced on six-and-a-half-foot centers, sulphured in holes hand drilled into the rock, with all

Figure C2.11 – Railings protect hikers on the exposed section to the top of the fail from Fern Grotto.

[13]Linda Greene and James **B.** Snyder, *National Register Nomination,* 1989, section 7, 3.

[14] Johnston, *Yosemite Grant,* 150.

drilled into the rock, with all joints welded.[15] The railing continues along the top of the waterfall, extending the length of the open slickrock. The east end of this granite ledge gradually drops off to a forested plateau southeast of the waterfall.

Braided trails wend their way along this plateau for 700 linear feet, passing a remnant foundation 125 feet from the fall's summit (and 25 feet south of the main trail) that *may* have been the floor of a privy.[16] This element measures fifty-three inches wide by two inches high by a measurable nineteen inches deep (it extends farther into the soil). Emerald Pool extends roughly 265 feet from the top of Vernal Fall. Just beyond the edge of the pool, a contemporary outhouse lies off the main trail, and the base of Silver Apron begins Another 300 feet takes travelers to the junction with the Clark Point trail, where Section 2 ends.

Landscape Characteristics

Natural Systems and Features. Some of the Nevada Fall Corridor's most difficult terrain lies in this section, which is subject to ongoing rock falls as well as winter-long ice buildup and summer thunderstorms that scour hillsides. Designers and builders faced major obstacles in deciding where and how to place this trail. Rocks and boulders stud the first section alongside the Merced River, a massive granite outcrop bisects the middle, and the final portion dead-ends at a massive overhang. These factors proved daunting enough to trail developers that, for the first 40 years of the park's existence, the Mist

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[15] Completion Report *411,* "Final Report on Reconstruction of Mist Trail, Job #506.2" (Yosemite National Park, January 1931).

[16] Jim Snyder, personal interview, April 8, 2003.

Trail section was considered the backdoor route to the top of Vernal Fall, with the far less-direct route via Clark Point the preferred alternative.

The combination of harsh climate and extreme topography here compelled George Anderson's 1882 unsuccessful attempt for a trail north of the river. When this did not work, attention turned to improving the existing trail south of the river. These endeavors included replacing the precarious ladders at the Fern Grotto overhang with a wooden staircase, which in turn was replaced with stone steps cut into the cliff face. Eventually the trail near the base of the waterfall was moved slightly farther inland and, when explosives were introduced, the granite outcrop was dynamited to create a level surface. Despite these efforts to control nature, the mist section remains so dangerous in winter that it is closed.

The Merced River also provided challenges to trail development. One of the first goals was to span the river above Vernal Fall, accomplished in 1866 at Silver Apron. A bridge adjacent to Register Rock provided a crossing below the waterfall in the late 1800s but after storm damage this was rebuilt at the current location in 1908. Because of spray from the river, the trail poses hazards from the middle of the stone staircases to the top of the waterfall. In winter the mist forms ice on the tread, and year-round there are risks from slipping down the rocky slope toward the river.

Two long-term geologic features of Section 2 are Lady Franklin Rock and Register Rock. The former remains popular with travelers undaunted by a short scramble to reach this viewpoint, which juts into the Merced. Register Rock still offers visitors a chance to appreciate its sheer size, and serves as a resting and meeting point.

Spatial Organization. Section 2 begins at the open plateau at the bridge and immediately begins climbing. The trail initially parallels the river's course inland so loses much of the open feel it would have closer to the water. The junction at Register Rock opens to a broad, flat plateau north of the rock. Leaving the junction, the trail advances along the river and the sense of enclosure increases as the path travels through pines and firs. Filtered views of the Merced and its riverbank boulders are visible to the north past trees and boulders that close in the trail. After Lady Franklin Rock, the trail progresses through a virtually treeless section; immediately left lies the river, while on the right a solid granite face looms upward. At the steps, the trail ascends steeply and is open overhead with a sheer drop on the left to river rocks below. The only interruption to the overhead plane is through the twenty-foot talus "tunnel" between the two flights of steps.

Another change occurs at these steps, as the trail climbs through a scattered forest of conifers and moves away from the outcrop on the south. The trail is extremely steep here and rises on large stone steps that end at Fern Grotto, which is enclosed on three sides and overhead. The path here turns sharply north and clings to the cliff face as it climbs a steep pitch of granite en route to the summit of Vernal Fall. The top of the waterfall is open on all sides and to the sky, with a forested plateau commencing approximately 100 feet east of the cliff.

Land Use. Section 2 was developed for recreational use, in particular for access to Vernal and Nevada falls, Lady Franklin Rock, and Snow's Hotel. Trail builders used these views and destinations strategically in determining their construction plan. Lower down the trail, Register Rock's immensity has long made it a beacon of activity, serving as a toll station, a livery stable, a blacksmith shop and, in the 1970s, a rock-crushing site. Today it serves as a junction and meeting point.

Circulation. The current trail and abandoned remnants factor into this section's circulation pattern. In the abandoned lengths near Lady Franklin Rock and above the comfort station, the surface is soil and duff with scattered rocks. In the current-use section, deteriorated bituminous material serves as much of the surface from the bridge to the base of the steps. This material was installed to mitigate dust and ease erosion. The trail width remains the same as Section 1, about six feet. The shoulder treatment includes stone borders and low retaining walls, some of which are original.

Vegetation. White fir, Douglas fir, giant sequoia, and incense cedar comprise the main vegetation on Section 2, along with summertime wildflowers and grasses. Within the spray zone of the mist section, a variety of ferns and other perennials preferring a moist environment flourish in summer. No vegetation encroaches upon the trail in this section except for summer flowers and grasses.

Buildings and Structures. The two sets of staircases, both rebuilt in 1997-1998, comprise the major structures in this section. The upper-section steps afford the steepest tread-to-riser ratio of the entire corridor, rising on large stones installed after the 1997 storm damaged the existing staircase. As they near Fern Grotto, the steps decrease to a more pedestrian-friendly dimension. Typical minor structures here include retaining wall and stone border fragments, and waterbars and soil retainers too numerous to list.[17] This section also includes structures of contemporary construction, primarily rebuilt retaining walls and stone borders, which were not evaluated.

"A detailed inventory - which was beyond the scope of this report - should be completed and added to the List of Classified Structures, and evaluated for eligibility.

Views and Vistas. Key views in this section are of Vernal Fall from the bridge and from Lady Franklin Rock. Hikers who reach the top of the waterfall are also rewarded with the view upriver: the waters of Diamond Cascade rushing over Silver Apron toward Vernal Fall, and Nevada Fall in the distance.

Small-Scale Features of this section include the historic directional signs at the Register Rock junction, and the iron railings along the steps and cliff face at Fern Grotto that extend along the Vernal Fall apron.

Existing Conditions Section 3

Overview

Section 3 begins at Happy Isles and ends at the junction with the John Muir trail 200 feet above Register Rock, for a total of approximately 6,000 linear feet or slightly more than one and-one-eighth mile **(Figure C3.1).** The first 2,000 feet lead due south and parallel the Merced River. Between the 2,000- and 3,000-foot markers, the trail turns southeasterly and passes a water tank at the 2,750-foot mark. It dips due south briefly then heads east, crossing two steel Bailey bridges built in 1961 over Illilouette Creek, then resumes paralleling the Merced River. The path continues through a relatively flat corridor for a quarter of a mile, utilizing several causeways built to ford the series of intermittent streams that flow north here from the Illilouette Gorge watershed. A

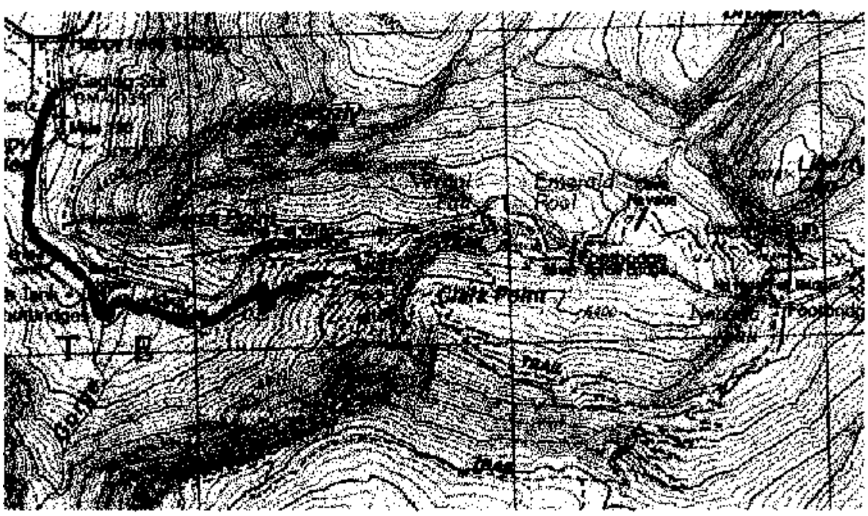

Figure C3.1 Section 3 map (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey. 1997).

series of switchbacks begins near the 5,750 mark, from which the trail climbs steadily up to the junction at the John Muir Trail.'

Historically, Section 3 developed as an ancient Indian trail leading up to Vernal and Nevada falls on the south side of the Merced River. In 1856 the Mann brothers based their route on this Indian path, and in 1858 Stephen Cunningham improved the trail.[2] This remained the main tourist route to the two waterfalls until George Anderson blazed his trail north of the river to Register Rock in 1882.3

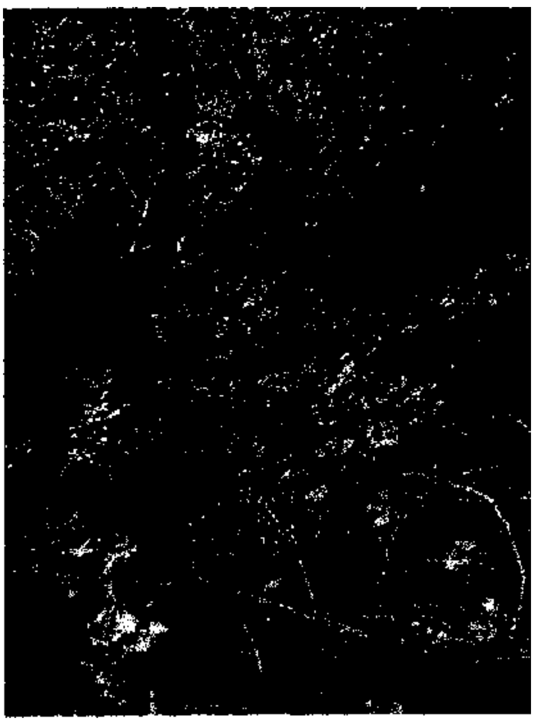

Figure C3.2 — Vestigial paths near the old hatchery are recognizable by faint stone borders and a flat, narrow treadway.

Beginning in 1902, changes to the alignment of this section occurred as various pipelines for water, power, and a fish hatchery were installed!' Some original sections remained in use at least until the 1961 project established a separate bridle path on the Merced's south side. In 1985, a new bridle path was built, using the 1961 alignment but widening and paving it.5

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[1] USGS Half Dome Quadrangle (Deriver U.S. Geological Survey, 1997), and site visit May 17, 2003.

[2] *Report of the Commissioners* (1866-67): 2.

[3] Hank Johnston, *The Yosemite Grant: 1864-1906* (Yosemite National Park: Yosemite Association, 1995), 102.

[4] *Report of the Commissioners For Years 1901-1902* (1902): 3-4; and Stephen T. Mather, *Second Annual Report of the National Park Service* (Washington: Government Printing Office, 1918), 134-135.

Description of Existing Conditions

The trail today begins near the Happy Isles Nature Center on a level, asphalted path that winds due south alongside the Merced River. The trail begins in an open area approximately thirty feet west of the Merced River, traveling a four-foot wide path through primarily oaks and laurel, dogwood, currant, and the occasional young cedar tree, and is edged by grasses.

A narrow service road parallels the trail much of the first quarter-mile, sometimes as close as six feet away from the path but not obtrusive since it is seldom used. After about 100 feet the trail rises via causeways above a boggy area fed by intermittent streams alongside, with areas of sedges and grasses.

At approximately the 300-foot mark, the trail climbs into a cedar forest amid large talus; behind, the North Dome looms above the valley. As the talus increases in size, so do tree height and density, and the trail feels more closed in. Young cedars predominate, completely shading the trail. A randomly piled border of stones twelve to thirty inches wide edges the trail through the talus; this edge is not especially ordered but appears as rocks flung out the way to create the treadway.

The trail reaches the first of a series of dry-laid retaining walls (from the 1961 and 1985 work) that form causeways elevating the treadway above the area's bogs and

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[5] **Jim Snyder to Linda Greene letter (February 9, 1988): 5.**

intermittent streams; they push the trail up approximately twelve feet at their highest point. The trail maintains a six–foot width, with the tread alternating from decomposed granite to soil with large riprap loosely installed. The stone border and trail alignment is organic as it winds through the forest.

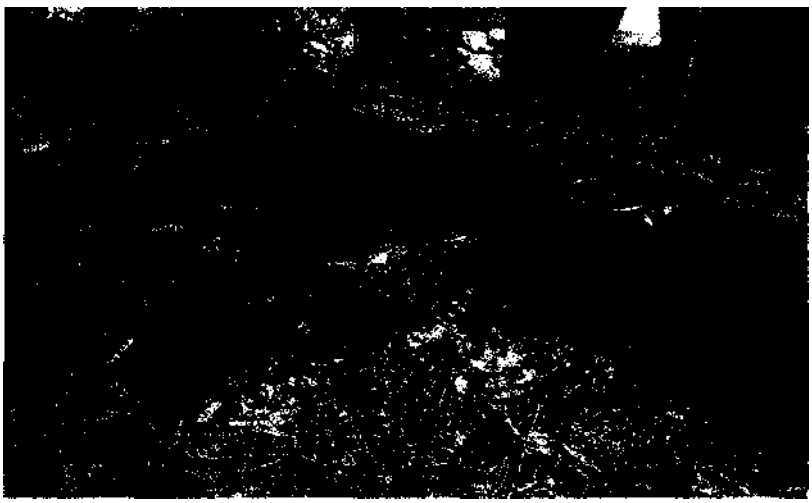

Figure C3.3 – This **mortared-rubble tank remains at the former hatchery site. This served as the hatchery intake (note large pipe at bottom left), with the valve that regulated water flow still extant.**

About 850 feet from the trailhead, and 75 feet east of the trail, lie the remains of the fish hatchery that operated here between 1918 and 1957. Vestige paths run close to the river here, distinguishable by faint stone borders and a flat, narrow treadway **(Figure** C3.2).[6] These paths are in poor to fair condition. Some of the abandoned segments pass near the deteriorated hatchery structures, which include a penstock (Figures C3.3), scattered pipe, and decaying timbers attached by rusted bolts and cables. The penstock is in fair condition while the pipe and timbers are in poor condition.

[6] *This may* have been the Mann brothers' 1856 trail, Cunningham's 1858 improvements, or 1870 work by Albert Snow *(Report of the Commissioners* (1884), 19).

At about the 1,100-foot mark, the trail rises on a causeway supported by dry-laid stone retaining walls, then crosses a bridge **(Figure C3.4).** Of relatively recent construction, the bridge has steel stringers on cement piers supported by mortared rubble walls, with timber rails and posts. It is in good condition. This structure, which will be called Horse Bridge #1 in this report, is forty-two feet long with seven-and-five-eighth-inch rails and two-and-a-half-inch by eleven-and-a-half-inch plank decking. The posts are eight inch and the rails are cut diagonally at each end, where they extend three feet beyond the decking. Steel stringers run the length and are set on wood sills on a concrete base above random rubble dry-laid masonry abutments. The planks are of treated lumber in good condition with limited warping. The rails and posts are painted brown and the paint is peeling badly. One rail shows severe checking, however it appears cturally sound. The top of the rail stands thirty-two inches from the deck, and the passageway is six feet wide. The rubble abutments are in good condition. Stone steps lead up to the bridge, while a bituminous apron leads south.

Figure C3.4 – Horse Bridge #1 stands about a quarter-mile from the Happy Isles trailhead.

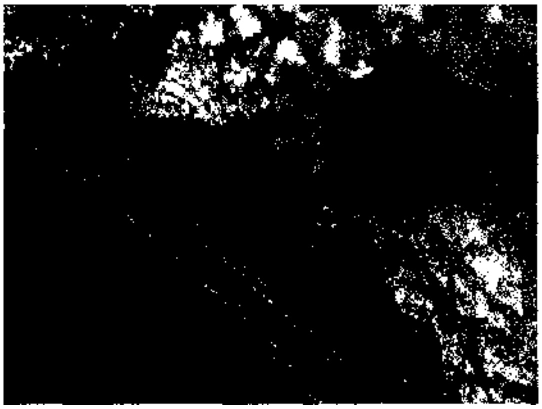

Figure C3.5 – A riveted **steel** culvert runs **through the base of the isolated causeway. The rivets are three-quarter inch diameter.**

Immediately west and paralleling the bridge stands an abandoned, isolated causeway that apparently sewed as the original trail prior to the 1961 construction, judging by the riveted, iron culvert that cuts through the its base. The iron culvert **(Figure C3.5)** probably dates the causeway to the 1910 dam (described below), because a similar pipe was found near that dam. The pipe measures thirty inches diameter, with three-quarter inch rivets spaced every half inch. The pipe is in good condition while the causeway is in poor condition. The causeway, which no longer connects to a trail, 11111s 130 feet in length and is built of large random rubble, some forty-eight inches wide. The causeway is three feet wide, with another two feet of stone-border edging and a maximum height of nine feet from the forest floor. This structure was the original crossing over the runoff channel that is now spanned by Horse Bridge #1.

Immediately beyond the asphalt apron of the bridge, travelers reach a junction where the historic causeway, the current trail, and a black, upright water main converge. The trail makes an abrupt turn east at this point, crossing a bituminous causeway that provides good views of Sierra Point/Grizzly Peak to the south. At the end of this first causeway, roughly fifty feet long, the tread returns to decomposed granite or soil, but as it begins to climb, random riprap appears occasionally, with no clear pattern of intent. The trail is five feet wide here with a large stone border on the south to build up the grade. A contemporary culvert passes beneath the causeway.

Shortly after this, at approximately the 1,500-foot mark, an abandoned pipeline leads east from the trail and parallels the Merced River before terminating at the 1910 dam (described below). Continuing on the bridle path, the treadway appears to not be installed riprap but stone extant on the path when originally designed. Roughly 150 feet beyond where the pipeline left the trail, the treadway – decomposed granite and soil with occasional stones – abruptly meets an asphalt section hanging approximately ten inches above the soil treadway, forcing a big step up to continue on the path. Clearly, more asphalt at one time provided the surface possibly all the way back to Happy Isles, but it is nowhere to be seen today.

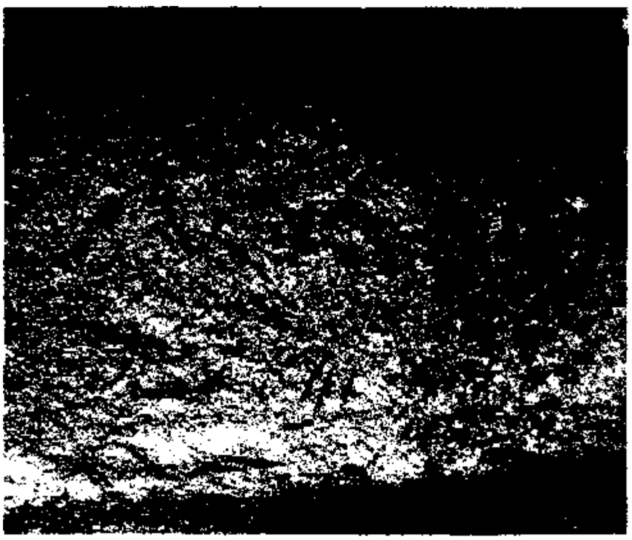

Figure C3.6 – A large boulder near the water tank exhibits illegible signatures that date to the 1860s.

At the 1,750-foot mark, a massive boulder with illegible signatures dating to the 1860s[7] sits on the west edge of the trail **(Figure C3.6).** Approximately 100 feet past this rock, a faint trail leads east over a well-constructed, dry-laid stone retaining wall (Figure C3.7) almost completely covered with moss and tucked between two boulders. This causeway is approximately twelve feet long and four to five feet wide, reaching six-and-

[7] Ibid.

a-half-feet up from the forest floor. This wall is in good condition, with a deep cover of moss and rocks darkened with age.

Figure **C3.7 – This dry-laid retaining wall** forms a causeway on a faint trail leading to the 1910 dam.

This abandoned wall and trail fragment are likely part of the original south-side path because it continues on toward the river, arriving after 200 feet at a small dam, stamped with "1910," that was probably the intake for the Valley water system. [8] This trail winds through the woods on a two-foot wide soil tread with random stone borders and stone steps leading down to the river. A few two- and three-foot cedars grow in the middle of the trail, and vintage pipe lies across one section; one old section of riveted culvert, like the pipe beneath the historic causeway beside Horse Bridge #1, is visible beneath a section of trail. Some of the stone steps and border along this trail are in good condition, other portions are poor to fair. At the beach, an old steel grate lies on the ground and the

Report of the Commissioners for Years 1901-1902 (1902): 3-4. Park historian Jim Snyder (email correspondence, March 18, 2004), notes the dam may have been used for the power plant as well but *its* main purpose was for the water system.

Figure C3.8 — George Anderson's 1882 dry-laid wall bolsters newer construction. His work used smaller-

dam wall offers historic valve works and ladder rungs for perusal. Oaks and laurels predominate en route to the water, but at the shore the vegetation is primarily tall cedars.

From the **small** beach, looking north reveals a panorama of the S-curve parapet wall of Section 1 (as well as views of the rapids on the Merced and the dam structure itself). Looking across the river at this wall, it is possible to distinguish the segments built by George Anderson in 1882 from those built by the park service in 1929 and later. The early work is thy laid, with remarkably small-diameter stones forming the base courses. The modem work above it is of much larger-dimension stones, some several feet wide, and is mortared. **(Figure** C3.8) The original electric plant construction for the park included a powerhouse at

Figure C3.9 — An abandoned trail terminates at this small dam at the Merced River.

Happy Isles connected by a pipeline extending upriver; the pipeline that terminates at this dam **(Figure C3.9),** however, is probably not part of the power plant but more likely part of the 1910 Valley water system.[9] These elements are in good condition.[10] The dam wall is two feet deep, fourteen-and-a-half wide, and nine feet tall. An iron valve wheellturning mechanism atop the dam is twenty-nine-and-a-half inches in diameter and in good condition.

Figure C3.1 0 Wood Bridge #2, rebuilt in 2003, stands at the 2,000-foot mark from the trailhead.

Back at the main trail, the service road *lies* approximately 150 feet southwest. The tread along here is riprap or soil, with random stone borders as the trail roes through huge talus, with an occasional large-diameter fir appearing among mostly younger conifers. At the 2,000-foot mark stands a bridge rebuilt in 2003 **(Figure C3,10),** which will be referred to as Horse Bridge #2. This bridge stands sixty feet northeast of the water tank, where the service road terminates. The bridge features six-inch rails turned forty-five degrees diagonally, ten-inch posts with chamfered ends, and a rail height of thirty inches. The decking is two-and-three-quarter-inch by eleven-and-five-eight inch planks. The overall length is forty-four feet. The stringers are steel

9 Jim Snyder, email correspondence, March 18, 2004.

1o The hydropower plant operated until 1918, when it was dismantled and given to Sequoia National Park (Stephen T. Mather, *Second Annual Report of the National Park Service* (Washington: Government Printing Office, 1918): 134-135).

with wood sills on mortared rubble masonry abutments (there is no cement base here as on Horse Bridge #1). The planks are true four-by-twelves. All the wood is treated and none painted. Soil retainers of riprap lead up to the bridge, while a bitumen apron leads off the east end. This bridge crosses Illilouette Creek, which flows into another arm of the creek before both merge with the Merced River about 200 feet north.

Figure C3.11– The two Bailey bridges cross tributaries of the illilouette Gorge watershed.

Immediately south of this bridge visually is the first of the two Bailey bridges installed in 1961. Designed originally for the Army, Bailey bridges are pre-engineered, interchangeable steel components known for ease of installation and ability to weather well; they are still manufactured. To reach Bailey Bridge #1, travelers continue 245 feet past Horse Bridge #2 on the main trail to a junction of a trail leading west to Bailey Bridge #1 or east to Bailey Bridge #2. Eighty feet of trail separates the two Bailey bridges."

These Bailey bridges have two-and-a-quarter-inch by eleven-and-a-quarter-inch plank decking **(Figure C3.11).** A wooden curb, three-and-three-quarter inches by five-and-three-quarter inches, runs the length of the inside along the floor, presumably to

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" **The water tank at the service road terminus stands midway between Bailey Bridge #1 and Horse Bridge #2.**

protect hooves. All wood is treated. Cyclone fencing sheaths both sides, and the rails are steel I-beams; all the steel is zinc-silicate coated under paint Bailey Bridge #1 is sixty-five feet long, with the rail top forty-one-and-a-half inches from the decking. It is eighty-six inches wide between the steel posts that frame each side. At the ends of the bridge, upright rebar posts secure the cyclone fending that runs vertically between the rail and the deck. Each bridge is essentially a bridge within a bridge: Steel stringers and joists lie beneath a wooden stringer and joist system. The view from this bridge encompasses trees that form a canopy on all sides and the creek rushing toward the bridge from two or more areas to the south (depending on the season). Bailey Bridge in is eighty feet long and features bituminous surfacing over the planks, with the center deeply rutted. The apron leading up to it is concrete with large riprap serving as aggregate. The view from this bridge is more impressive than from the first, with more water flowing beneath. Structurally both bridges remain in good condition except for the bituminous layer on the second bridge and peeling paint

Figure C3.12 – After the Bailey bridges, the trail becomes a series of causeways bisected by culverts through an area of seasonal bogs and streams.

Fifteen feet beyond this bridge, the surface becomes eroded bitumen as the trail moves through a filtered canopy of mostly oaks, with some cedar and fir, and large talus on the south. Approximately 500 feet past the bridge, the asphalt has eroded completely to exposed soil; the edge is bordered with stones on either side. Here – at the 3,250-foot mark – the creeks converge from the south off the Illilouette Gorge watersbed. The trail enters a section of causeways bisected by culvert systems with three to five pipes side-by-side for drainage **(Figure C3.12).** The first causeway is 100 feet long, the second approximately 200 feet in length; approximately 200 feet of decomposed granite/soil and riprap tread runs between the two. The two causeways cross numerous intermittent streams and seasonal bogs, and open up the trail overhead as they push out the forest. Their surface is concrete, six feet in width, with the treadway two to three feet above the water line depending on season. Some small sections of the concrete have crumbled, presumably from horse impact, and the trail surface is in poor to fair condition, with ruts and deteriorated asphalt. The causeway structures themselves are in good condition.

Figure C3.13 – Stone steps climb up **from a chute installed in the mid-1970s to channel debris from frequent storms into one area for easier cleanup.**

From the end of the second causeway, the trail travels eighty feet before turning and climbing on a northerly heading. The trail is primarily riprapped through here and passes through an area of very large talus on either side of the trail. It is quite shaded as it climbs; about 170 feet from the turn the trail reaches a well-crafted set of stone steps, after which the tread become bitumen for approximately forty feet. At approximately the 4,000-foot mark, the trail crosses a seventeen-foot-wide chute and begins climbing for the next 2,500 feet. Both sides of this chute feature stone steps in good condition **(Figure** C3.13). The chute was constructed in 1975-6, creating a debris-flow channel to focus runoff into one section rather than be distributed along the trail over several dozen feet.12

Figure C3.14 – A waterbar in good condition drains water off the trail.

The floor of the chute is concrete – which is not visible due to leafy debris and soil buildup – so trail crews can bring in mechanized machinery after washouts to clear away rock after storms. The trail was realigned when the chute and the steps in Figure C3.13 were installed.[13] The original trail ran higher up the hill, where fragments of flat stretches remain extant.

Asphalt tread resumes at the end of the chute, most of it severely deteriorated but with some attempts at patching with a higher-aggregate mix. Approximately 150 feet farther – at the second switchback from the valley floor – lies a twenty-five foot section of asphalt berms. These are failed attempts to install steps within the asphalt rather than using stone riprap. The trail here is elevated about five feet off the forest floor, and depressions and ruts have been gouged in the asphalt in many areas. This is not unusual given the impact of horses; in the first week of stock-only use in 2003, the trail

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[12] Completion Report #520, "Reconstruct Nevada Falls Horse Trail," Work Order No. 8800-7047-503 (February 1978); and Jim Snyder, personal interview, May 6, 2003.

[13] Jim Snyder, personal interview, May 6, 2003.

already showed much soil displacement from horses. [14] Waterbars and soil retainers were installed in this section, with some functioning well and in good condition **(Figure C3.14).** Some trail sections are edged with stone borders that are also in good condition.

About fifty feet beyond the second switchback, a small historic retaining wall props up a large boulder on the east side of the trail **(Figure** C3.15). The wall is ten feet long by two feet high and appears to predate the 1961 construction. The trail here at the 4,700-foot mark – begins to parallel rapids that boil down the Merced with a roar. A stone border runs much of the length of the rapids, and the vegetation is primarily oak, providing a filtered canopy. A significant talus section extends through the next switchback, and the asphalt deteriorates markedly **(Figure C3,16).** Elevated sections bring the trail six feet above the forest floor in the midst of very large talus in this upper region. The tread narrows here, with the asphalt condition ranging from poor to fair.

Figure C3.15 A small, original wall props up two large boulders on a section of trail beside a stretch of whitewater.

More switchbacks and causeways advance the trail up through the talus, past informal junctions with small traits leading, near the 5,500-foot mark, to the comfort

[14] The trail is signed in *late* spring through fall for stock use only, to make travel more pleasurable for both hikers and equestrians. Hikers who choose to use this trail in stock season have to contend with a dustier *trail as well as* horse droppings and the accompanying flies,

station at Vernal Fall Bridge. One section of broad, flat stone steps leads up to a curve at one such junction, followed by a well-constructed length of large riprap tread. The trail suddenly narrows soon after this to a two-foot width of soil, deeply rutted, for seventy-five feet, before resuming a *mix* of eroded asphalt and erratic natural stone tread. The trail ends at approximately the 6,500-foot mark, at a three-way junction with the John Muir Trail heading either to Register Rock or Clark Point **(Figure C3.17).** A set of stone steps in good condition marks this junction.

Landscape Characteristics

Figure C3.16 – In some areas of the trail, the asphalt has become rutted from stock use.

Natural Systems and Features. This segment begins at Happy Isles on the south side of the Merced River and parallels the river's course, only briefly shifting beyond eyesight of the water. This section also crosses lllilouette Creek, which fans out into tributaries the trail spans with causeways and bridges. As the elevation increases, the trail encounters steep areas subject to washouts; to simplify maintenance, a concrete surface was installed at one location (the "chute" described above) prone to storm damage in order to funnel debris into one area for cleanup. Maintenance was also the foremost consideration when the trail changed to stock use and was surfaced with asphalt meant to minimize dust and erosion. In some higher sections, where steeper, rocky terrain predominates, the trail includes riprappod sections to better withstand impact from horse hooves.

Park developers in the early 1900s recognized the benefits of Yosemite's water sources and tapped into the Merced and Illilouette for their ability to power the park's electrical needs. This caused some realignment of trail sections below the comfort station to accommodate pipelines.

Spatial Organization. This section begins on the valley floor at Happy Isles and slowly gains elevation in the first half-mile. Initially the trail feels open as it travels through a canopy of mostly deciduous vegetation along the Merced River. After a quarter-mile it begins to climb, traveling occasionally on causeways averaging ten feet high. The canopy here becomes more coniferous and encloses the trail, offering only filtered views of the river. At the half-mile point, the trail turns east and crosses the two Bailey bridges over Illilouette Creek. The creek spreads wide here and is interspersed with islands, so the forest canopy covers much of the streambed and bridges. This sense

Figure C3.17 – Steps at the junction with the John Muir Trail lead travelers toward either Register Rock or Clark Point.

of enclosure continues *as* the trail moves along the edge of the valley floor and gradually gains elevation. When the trail enters the switchbacks and climbs, the sense of enclosure diminishes as the deciduous forest is left behind and conifers predominate. As the trail climbs, it passes alongside a series of rapids in the Merced that opens up the view to the northwest, then switches back and leaves the river behind. The remainder of the trail is through a semi-open canopy of conifers, rising via switchbacks edged with low stone borders and traveling atop occasional short causeways.

Land Use. Native Americans were the first to use this frail but it was later adapted for recreational use by Euro-Americans. At the beginning of the 20th century, when the water resources of this section were recognized for their potential to generate power, the use shifted to accommodate work crews and equipment. Recreationally, this was a shared-use corridor until 1961, when it was designated for use *as a* bridle path, however a number of pedestrians still use it *as* an alternative to the crowded footpath to Vernal Fall Bridge.

Circulation. This trail begins at Happy Isles and connects with the John Muir Trail to Clark Point and the foot trail to Vernal Fall. The trail width averages six feet and the shoulder treatment includes low stone borders of native material. The surface is primarily eroded asphalt, while steeper sections through the switchbacks include stretches of riprap tread and steps. The surface of one Bailey bridge is asphalt over wood; the other is wood planking. Aprons of eroded asphalt and concrete lead up to and from both of these bridges. The two wooden horse bridges are decked with wood planking and a combination of concrete, asphalt, and riprap serve as aprons.

The most intact historic remnant of this section leads north off a spur trail and terminates at the abandoned intake dam. This segment crosses over the original retaining wall (see Figure C3.7) and winds around a small outcrop before descending to the river on stone steps. The remnant paths at the fish hatchery site are not linked to the current trail but lie approximately seventy-five feet due east and parallel the Merced in short lengths. These do not form a distinct single trail but reveal themselves by stone borders that fade and reappear farther away. The surface treatment on all the abandoned stretches is soil with occasional native stone steps; these remnant trails are edged with deteriorated stone borders.

Vegetation of this section includes dogwoods, currant, and California bay laurel along the river at the lowest elevations, giving way to cedar, fir, and pine as the trail climbs. Where deciduous trees predominate, the canopy occasionally falls within the trail prism but does not impede passage.

Buildings and Structures. The major structures in this section are the two Bailey bridges, the two wooden horse bridges, the intake dam, the original causeway near Horse Bridge #1, and the original causeway/retaining wall en route to the intake dam (see Figure C3.7). The Bailey bridges date to 1961. Horse Bridge #1 was probably built in the 1970s-80s, while Horse Bridge #2 was rebuilt in 2003. The original causeway and the causeway/retaining wall may date to the 1800s or could be associated with the pipeline work in the early 1900s. The dam is from the 1910 water system. Typical minor structures associated with this section include segments of remnant walls and elements such as stone borders, waterbars, and soil retainers too numerous to **list.15**

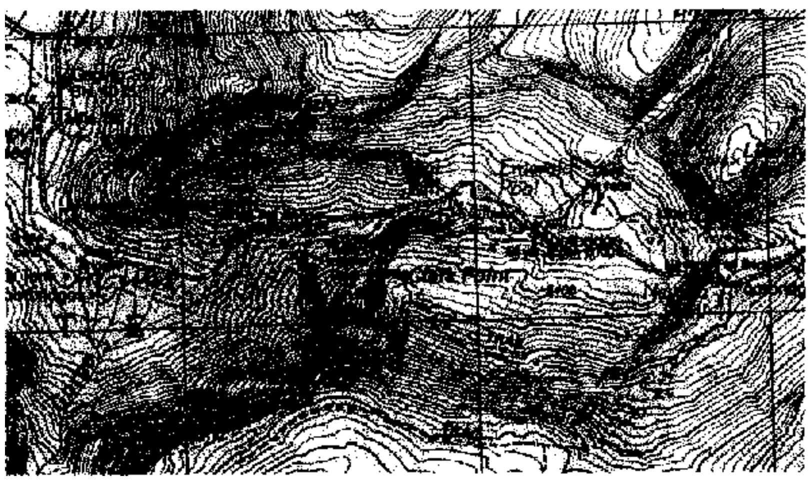
Views and Vistas. The views in this section tend to be discrete because of the forest canopy, however portions of the trail closer to the river provide good perspectives of the water, especially near rapids. The prospect from the Bailey bridges and causeways at the edge of the valley floor offer fine views of the creek and adjacent riparian areas despite the short viewing distance.

[15] A detailed inventory and evaluation - which was beyond the scope of this report - should be completed and added to the List of Classified Structures and evaluated fur eligibility.

Existing Conditions Section 4

Overview

Section 4 begins at the junction of the bridle path with the John Muir Trail (200 feet above Register Rock) and travels to Clark Point, a total distance of 3,500 linear feet **(Figure C4.1).** This section leads off on a southeasterly bearing, with a series of switchbacks beginning almost immediately after leaving the John Muir Trail junction. A tighter series of switchbacks commences at the 2,000-foot mark and bears north for about 750 feet. The final leg to Clark Point is a straight but gentle climb briefly north but finishing on a due-east heading.'



USGS Half Dome Quadrangle (Denver U.S. Geological Survey, 1997), **and site visit May 17,** 2003.

An important element of Section 4 is the presence of original trail segments alongside, and often crossing over, the current alignment. The original trail, probably built by the Mann brothers in 1856 and improved upon by Albert Snow in 1870 or 1871, [2] weaves alongside and occasionally merges with the current trail, which was built in 1931 to ease the grade.

Figure C4.2 — This overlook marks a point above the original trail alignment from which the route can be traced.

Most notable on this section, however, are the thousands of linear and vertical feet of stone retaining walls that buttress the upper switchbacks climbing toward Clark Point. Much original work remains, and the bulk of the contemporary work was done with masonry skills similar to the original craftsmanship.

[2] The only primary citation found as to who built this section of trail originally is a passing reference in the 1884 *Report of the Commissioners* (page 19) noting that a bridge at Register Rock would connect Anderson's 1882 trail "with the Snow trail, on the south side." Hank Johnston's *Yosemite Grant* (page 44) states that Yosemite settler Stephen Cunningham and hotelier Albert Snow built the trail from the Register Rock to the base of Nevada Fall in 1869-70, but does not say whether they went up Fern Gorge and over the top of Vernal Fall to Nevada Fall, or from Register Rock to Clark Point and then to Nevada Fall. Linda Greene's *Historic Resource Study* (pages 87-88) states that in 1870-1871, Snow built the trail from the valley floor to Register Rock, then from Register Rock climbing via switchbacks to Clark Point and down to the Silver Apron above Emerald Pool. John Bingaman's *Pathways: A Story of Trails and Men* (page 25) also states that Snow built the trail in 1870 but also does not cite a source. None of these three cites sources for this information so may rely on conjecture, which could explain the lack of details and slightly conflicting dates.

Description of Existing Conditions

Section 4 leads off from a relatively flat section but soon begins a climb that increases in steepness as it gains elevation. When built in 1931, the trail was reportedly six to seven feet wide with a grade below fifteen percent, except for a few short stretches under 100 feet long where it approaches eighteen percent;[3] today the trail measures four to six feet wide. The original 19th

thirty

and forty percent,[4] and switchbacks "hung sometimes precariously" off the cliff in the chute section just below Clark Point (described below)s. The alignment today, which has not changed since 1931, zigzags as it climbs through a forest of firs, cedars, oaks, and California bay laurels. The **trail is** edged in some sections with stone borders that appear original to the 1931 work. Many of these are in good condition.6

Figure C4.3 The original trail goes up a hill beside the current trail (at right). This shows the grade difference between the two alignments.

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[3] Completion Report #61, "Final Report Job. No. 506.6 Vernal Bridge to Rock Cut Trail Construction" (April 1931).

[4] Ibid.

Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 7

About 150 feet beyond where Section 4 begins, the first set of stone steps occurs – wide soil retainers, essentially, that extend over sixty feet before becoming rubble with vestiges of bituminous "islands" overlaying the original riprap tread. The trail is somewhat open to the west with a view of Washburn Point, but the density of tall firs dominates the scattered oak. Talus flanks the trail much of the way. The first switchback occurs seventy feet from the bridle path, where a large fir blocks the view. The next 480 feet before the subsequent switchback includes mossy, original retaining walls on both sides of the trail, with a tread of eroded bitumen plus occasionally a well-crafted set of stone steps. The next switchback, 540 feet beyond the first, has a better view but is still blocked by vegetation.

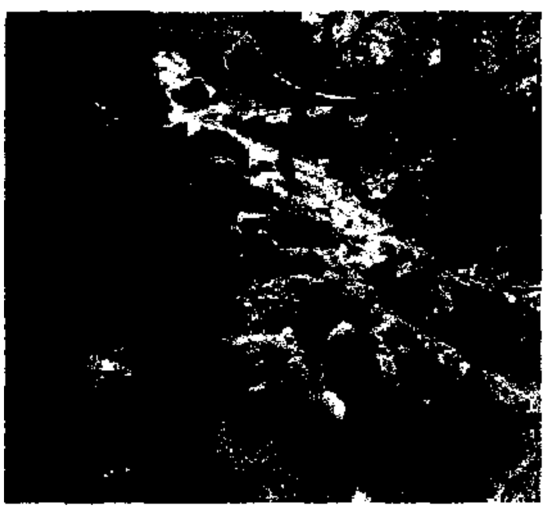

Figure C4.4 – A relic wall (foreground) from the original trail shows deterioration. The current trail is directly behind.

Midway up the next section, a good view north of Sierra PointlCirizzly Peak emerges, then more switchbacks occur over the next approximate 1,000 feet. The tread through here initially is solid bitumen, but it soon deteriorates to mostly eroded bitumen. The density of the tree canopy increases to block views at switchbacks. Roughly 1,500 linear feet from the junction with Section 3, the trail switches back and turns south at a large boulder **(Figure C4.2).** Immediately below, the original 1870 trail is visible

[6] This inventory is not exhaustive; a detailed inventory - beyond the scope of this report - should be undertaken of the stonewalls and borders in this section, *as* well *as* the abandoned trail segments, and added to the List of Classified Structures and evaluated for eligibility.

(and north of) the current route. This trail is easily navigated, being in good condition much of its length. Following this trail, it descends approximately 600 linear feet then crosses the new trail before making a sharp switchback **(Figure C4.3),** a pattern it continues all the way down to where it ends just above the junction with Section 3.

Figure C45. Another low retaining wall stands below the current trail.

Along its way, this abandoned segment features numerous retaining walls and stone borders, some in remarkably good condition given natural weathering and lack of maintenance since 1931. Some sections have been damaged by rockslides and washouts, but many remain intact. In some locations, the original low retaining walls stand less than twenty or thirty feet away from the current trail's edge walls **(Figures C4.4 and C4.5).** In other areas the old trail is visible leading up or down to the new one. Some of the original work has severely deteriorated but still displays traces of the original intent. Notably, the trail tread — which was never oiled or otherwise hardened with bituminous products — is intact in areas not damaged by rock slides, and appears to drain well. The tread ranges from two feet to six feet in width, and is riprapped at some of the switchbacks. The tops of retaining walls sometime serve as the edge, but occasional stone borders also fulfill this purpose.

Figure C4.6 — Illegible signatures dating to at least 1913 are visible on an overhanging rock on the abandoned trail.

Near the bottom of the abandoned trail, illegible signatures dating to at least 1913 are visible on an overhanging rock **(Figures C4.6).** These are in poor condition, being very faint. This site is at a switchback corner marked by a large boulder; the switchback has been damaged by rock slides and windfallen trees, however one section of retaining wall remains intact and in good condition, and displays durable masonry workmanship dating to the original construction **(Figure C4.7).** Descending below this switchback, the abandoned segment ends at a drop off just above the current trail where a "Trail Shortcuts" sign discourages hikers from straying off the beaten path. This is located seventy feet above the junction with the bridle path to Happy Isles.

Figure C4.7 — An original section of retaining wall remains in good condition on the abandoned trail.

Returning to the current trail overlook at the 1,500-linear-foot mark, the route climbs through a stretch completely shaded by the massive outcrop above and south of Clark Point, giving a sense of enclosure to the trail. The southernmost switchback corner along Section 4 occurs at the 1,950-linear-foot mark at an overlook called Valley View. Water drips down a rock face here, and firs

Figure C4.8 — The perspective from Valley View Is partially blocked now by large firs.

and oaks predominate, largely occluding the historic view of Yosemite Falls far down in the valley **(Figure C4.8).**

Valley View is the site of the first section of major retaining walls constructed in 1931. Much of the original stonework has been rebuilt due to landslides, but a significant amount of the original work remains — and much of the reconstructed work is very well crafted (Figure C4.9). The switchback at Valley View comprises solid stonewalls, with a stairway section built into the switchback itself, a practice throughout this section of trail. The s within the switchback extend forty-five feet to the top and are two feet wide. The second half of these contemporary steps are roughly constructed, evidence of two masons with different training or skill levels.

Figure C4.9 — A contemporary masonry repair tucked small stones into this vertical gap.

An adjacent, contemporary wall was constructed with newer, clean rock, accompanying beautifully crafted riprap tread reminiscent of John Conway's work. Some of the original masonry wall construction, on the other hand, does not exhibit best-quality standards, with straight lines rather than broken joints for increased strength. However, many of these walls appear stable and remain in good condition. The southernmost wall appears original at its base; it measures sixty feet in length, and four to seven feet in height. Additional wall lengths existed here originally but were washed out in a slide.

Figure C4.10 – *New* repairs, evident by the drill marks, fit tightly beside original work.

Several more switchbacks pass numerous lengths of original and contemporary retaining walls, the original work sometimes a complete wall and sometimes only a fragment, and often butted up to a new section. The trail advances through large boulders and rocky terrain, with long stretches of dry-laid masonry retaining walls buttressing the switchbacks. Some sections of the treadway are pure riprap and in good condition; most of these sections are contemporary, while others appear original, evident from the well-polished stones. In between the riprap, high-aggregate concrete stretches periodically serve as the treadway.

Many of the walls through this higher section are also clearly rebuilt, which is indicated by the presence of drill marks, clean white stone, with either scant moss or moss that sneaks out from the underside of the stone. One section shows an old wall side-by-side with a rebuilt section, the newer work employing stone with drill marks while the original fragment, ten feet away, is mossier, shows no drill marks, and the stones are smaller, a hallmark of much of the early work in the corridor **(Figure C4.10).** This portion of trail also includes an excellent example of two different eras of work, one original and one later (but not especially recent, judging by the moss): One section of wall exhibits a rocky, uneven face, while the rest is flush. The feeling throughout the switchbacks is often open, as the absence of trees in many areas opens up the corridor to full light and sun.

Faure C4.11 – The S-curve wall has been partially rebuilt but lower portions are original.

The topmost switchback below Clark Point is marked by runoff from the outcrop looming above. The stream flow is accommodated within the wall structure itself at the switchback, which comprises some of the most concentrated section of stonewalls not only in Section 4 but in all of Yosemite. The walls here are all in good condition. At one corner in this highest section of walls, the slope between adjacent switchbacks forms a narrow chute that was riprapped completely in 1931[7] into an S-curve retaining wall **(Figure C4.11).** A rockslide in 1986 damaged the

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[7] Completion Report #61, "Final Report J . No. 506.6 Vernal Bridge to Rock Cut Trail Construction" (April 1931).

Figure C4.12 – A small basin collects water at Porcupine Spring.

walls in the chute including part of the 5-curve wall, but all were rebuilt.[8] The base courses of the S-curve and other walls appear to be original and are in good condition. The wall itself shows consistent workmanship even on the higher, newer work, with effort made to maintain a dressed surface.

About 160 feet above the final switchback, an abandoned trail climbs steeply east from the main trail. Stone steps lead through overgrown bay laurel – the ambient fragrance here – and dead-end at a natural spring that seeps from an overhang. At one time the park "improved" the spring with a concrete liner (Figure C4.12),[9] much of which has eroded. Known as Porcupine Spring for its frequent visitors, its access has not been maintained by the park since the late 1950s due to parkwide water-purity concerns."[) The steps to the spring have been repaired at least twice after rockslides, including once in the late 1980s,[11] but some sections may be original. The trail and steps are in fair to good condition.

Linda Greene and James B. Snyder, *Natiqval Register Nomination,* 1989, section 7, page 7.

[9] Ibid.

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[11] *Tim* Ludington telephone interview, January 29, 2004.

Returning to the main trail, the route more gradually ascends the final 1,000 feet to Clark Point, midway passing a flat, easy curve with wide, open views west and full solar exposure. Just past this curve, an abandoned trail leads west off the edge of the trail. The original stone retaining wall is clearly visible from the main trail **(Figure C4.13);** the wall is fashioned from unusually large-dimensioned stone and the tread is narrow with a sandy soil surface. The trail leads steeply up a runoff channel, winding around until it meets the current alignment, passing along the way a small, original retaining wall bolstering a large boulder **(Figure C4.14).**

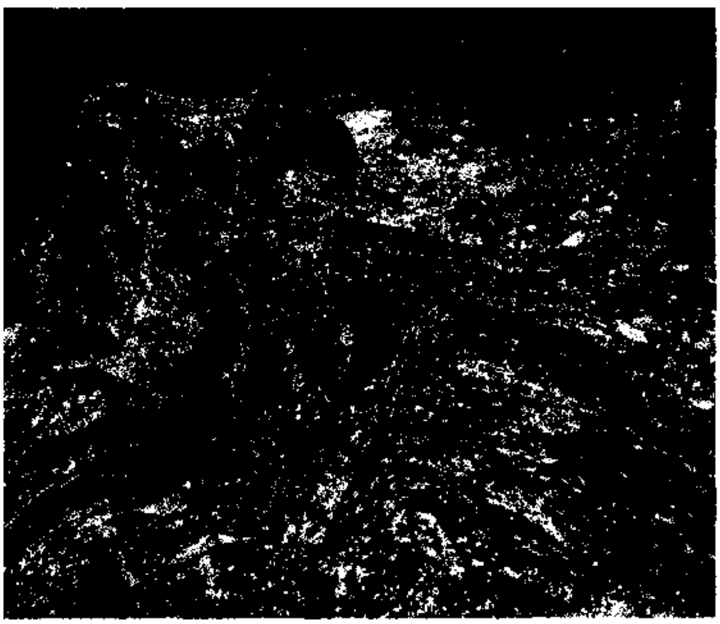

Figure C4.13 – The dry-laid retaining wall on an original trail section is clearly visible from the main trail near Clark Point.

Back on the main trail, the route passes another original retaining wall also in good condition **(Figure C4.15),** and the tread becomes a solid high-aggregate-content concrete surface. This blends well with the surrounding stone color and natural soil. This surface alternates with sections of bituminous surfacing, with the concrete usually serving as a secondary application atop eroded bitumen **(Figure C4.16).** Beneath both overlays, the original riprap emerges periodically and appears in goods condition. This pattern of surfacing continues to Clark Point.

Clark Point is a natural stopping point for hikers and riders because of its view and its location — the junction far the trail down to Emerald Pool and Vernal Fall, or continuing up the John Muir Trail. Signs display maps here so travelers can get their bearings. The view at Clad(Point includes part of Emerald Pool, Nevada Fall, Liberty Cap, Half Dome, and Mount Broderick. The western view is blocked by Grizzly Peak, and the ambient sound is Nevada Fall plummeting to the rocks below; when the breeze blows from the west, however, the sound from Vernal Fall (which is not visible) predominates.

Figure C4.14 — A small but stout original wall bolsters a boulder on the abandoned trail fragment just below Clark Point.

Landscape Characteristics

Natural Systems and Features. This segment begins in steep, rocky terrain where the John Muir Trail is cut into the hillside en route to Clark Point. The original 1870 trail included grades up to thirty and forty percent, prompting the 1931 reconstruction to ease the grade. The reconstruction used explosives to excavate foundations for retaining walls[12] required to support the switchbacks, which are subject to severe runoff and storm damage. Near the top of the switchbacks, a spur off the main trail originally accessed Porcupine Spring but the Clean Water Act of 1972 discouraged its use. It remains accessible by the spur trail, which is unmarked. An intermittent spring runs over the upper retaining wall, which was built to accommodate its flow.

Figure 04.15 — This original wall is part of the current trail.

Spatial Organization. This segment begins at a cut that forms the John Muir Trail in a hillside forest of conifers, oaks, and laurel. The section remains in forest until the top, when it reaches wide views at Clark Point. As it climbs, the trail remains closed in with mostly discrete views, including glimpses of the abandoned 1870 trail above and below the current path. Occasionally the old trail crosses the new; these junctions briefly open the canopy. The upper switchbacks on the current trail through the talus zone open the trail on the sides and overhead as they form a space in the canopy.

Circulation. Section 4 connects with the other segments in the corridor to form a loop to the top of Nevada Fall via Clark Point Designed for stock as *well* as hiker use,

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[12] Completion Report #61, "Final Report Job. No. 506.6 Vernal Bridge to Rock Cut Trail Construction" (April 1931).

" Ibid.

this section averages four to six feet in width and is edged with dry-laid stonewalls or stone borders much of the way. Much of the surface is eroded bitumen or high-aggregate content concrete, installed to minimize dust and erosion. Decomposed-granite debris covers many portions of the tread, however, nullifying much of the intent to minimize dust and posing a serious slipping hazard. A stone border edges much of the trail, often provided by the tops of retaining walls below. A few soil retainers with three-foot landings break up some sections.

Figure C4.16 – The tread includes several lengths of concrete atop eroded bitumen. Beneath both overlays, the original riprap emerges periodically and appears in good condition.

The abandoned trail built in 1870 is visible as it crisscrosses the current trail; it is possible to follow this remnant path much of the way between Register Rock and Clark Point. The surface on the abandoned portion is soil primarily, though some switchbacks are reinforced with riprap tread. Portions of this 1870 trail are wider than the 1931 construction.

Vegetation. Vegetation along this section includes incense cedar, fir, oak, and California bay laurel. The vegetation does not encroach on the current trail prism, however some areas of the abandoned path are blocked by fallen trees and overgrown trees and scrub oak. Trees shade much of the route, with the exception of the walled sections and switchbacks.

Buildings and Structures. The major structures along Section 4 are the retaining walls at the switchbacks below Clark Point. Typical minor structures associated with this segment include stone borders, wall fragments, and waterbars.I3

Views and Vistas. Section 4 views are primarily discrete until Valley View and the upper switchbacks, where the canopy was opened to accommodate trail structures. Trees now block most of Valley View's prospect, however many of the switchbacks along the trail provide expansive overlooks. Clark Point provides wide views in all directions except due south.

Constructed Water Features. The sole constructed water feature on this segment is the enhancement of Porcupine Spring, a natural spring, where cement work in 1931 reinforced the collection basin. This work has mostly deteriorated, exposing the natural stone beneath.

Archeological Sites here include the signatures carved into the rock on the 1870 section just above the junction with Section 3.

[13] A detailed inventory - which was beyond the scope of this report - should be completed and added to the List of Classified Structuress and evaluated for eligibility.

Existing Conditions Section 5

Overview

Section 5 begins at Clark Point and crosses what is known as the Rock Cut to end at Nevada Fall Bridge. It is approximately 6,500 linear feet, or about a mile and a quarter in length. From Clark Point, this section bears southeasterly via a brief series of switchbacks, reaching the beginning of the Rock Cut at the 4,000-foot mark. The Rock Cut section – so named because it was dynamited through solid granite – niPs 750 feet in length, with the most exposed section protected by a mortared-rubble parapet wall.

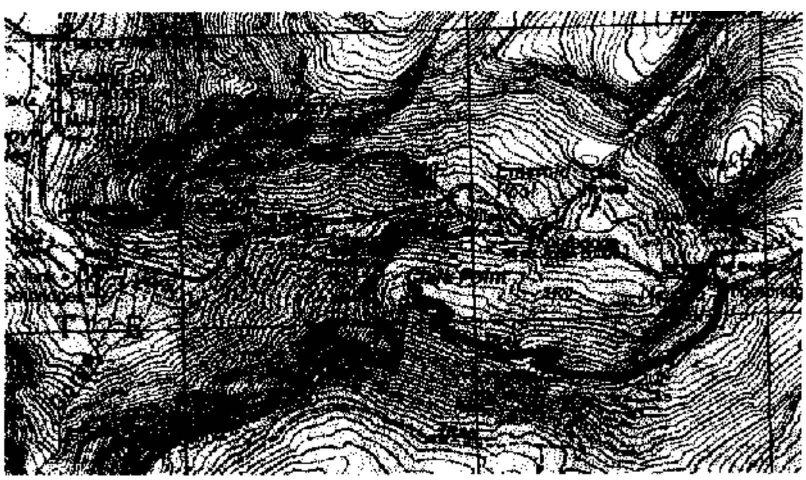

Figure C5.1 — Section 5. (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey, 1997).

After the Rock Cut, the *final* 1,600 feet of Section 5 includes a short, forested section then several hundred feet of treeless slickrock before ending at the Nevada Fall Bridge over the Merced River' **(Figure C5.1).**

USGS Half Dome Quadrangle (Denver. U.S. Geological Survey, 1997), and site visit May 17, 2003.

Description of Existing Conditions

Figure C5.2 - A massive riprap water bar directs water off trail.

Figure C5.3 - A bitumen overlay has worn away leaving "islands" of bitumen patches atop riprap tread.

From Clark Point, Section 5 climbs gradually over a ridge offering broad views for the first 1,000 linear feet before reaching a switchback, after which the trail stays on a moderate grade for approximately 1,500 feet. The tread initially is riprap and occasionally slickrock, with some bituminous sections interspersed with decomposed granite and soil. Infrequently, riprap waterbars direct water to drainage structures **(Figure C5.2),** but most of the riprap is confined to use as tread material. Much of this stonework is covered with a bitumen overlay, most of which has worn away leaving "islands" of bitumen patches atop riprap tread **(Figure** C5.3). As the trail climbs, the view occasionally opens to the north while trees and the granite outcrop (from which the 1931 Rock Cut was carved) block southern prospects. The trail primarily is shaded, however, by large cedars, firs, and oaks, except where the talus increases in size, opening up the trail.

Figure C5.4 – Riprap predominates as the surface material the higher the trail climbs.

Riprap predominates as the surface material the higher the trail climbs, much of it well-crafted and durable **(Figure** C5.4). The trail maintains an average six-foot width. For one long stretch – approximately 1,750 feet – the trail proceeds on a straightway with no switchbacks until the 2,500-foot mark, where the trail turns and approaches the Rock Cut.

The Rock Cut was constructed for a more direct, and more moderately graded, route to the top of Nevada Fall. Its construction required extensive use of explosives and jackhammer work to establish a flat travel surf-ace on the sloping granite face through which it was cut. A parapet wall fringes the north edge of the treadway **(Figure C5.5),** which averages seven feet in width and is surfaced with a mix of eroded bitumen and high-aggregate-content concrete. The parapet wall rises three-and-a-half-feet high above the tread surface; a retaining wall extends several feet below to rest on boulders laid on the lip of the cut after blasting. [2] The parapet wall is mortared rubble masonry 390 feet in length and averaging eighteen inches in width, with occasional scuppers to aid drainage. At the westernmost scupper, a concrete ramp five feet long has

[2] Completion Report #63, "Through Rock Cut to Nevada Falls," Job. No. 506.7 (July 1931): 3.

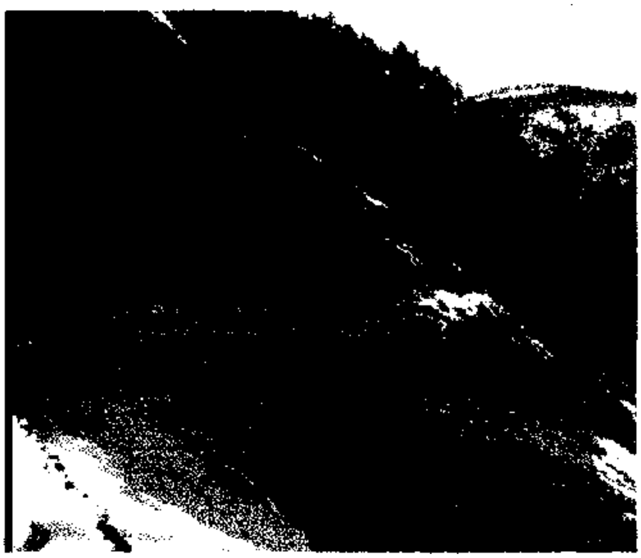

Figure C5.5 - A parapet wall fringes the north edge of the treadway.

been built up approximately four inches high to direct runoff toward the scupper **(Figure C5.6,** page 112). The scuppers and the wall itself are in good condition. The contemporary repainting is clearly distinguishable from the original mortar color and texture.

The parapet wall is a crucial safety feature because of the sheer drop below its north side. The wall is ineffective for safety in winter, however, because snow and ice buildup exceeds wall height, forcing intrepid visitors to travel atop the wall beside the precipitous drop-off; through spring, massive icicles crash down onto the trail along with occasional showers of ice chunks. Due to this, the trail is closed in winter and has an alternative name – the Ice Cut **(Figure CS.7,** page 113). Warnings to keep off the trail in winter are not always heeded, however, resulting in occasional deaths and injuries.3

The first half of the Rock Cut is a gentle but continual incline, leveling off about midway. The trail reaches an elevation above the top of Nevada Falls, providing excellent views of Half Dome, Liberty Cap, and Mount Broderick, as well as the length and breadth of Nevada Fall immediately below and Vernal Fall beyond.

[3] Jim Snyder, telephone interview, February 9, 2004.

At the east end of the parapet wall, the trail gently descends past a gate that is closed seasonally, and which also marks the end of the major outcrop that necessitated the Rock Cut. The trail then passes through large talus before entering a coniferous forest and passing two junctions to Little Yosemite Valley destinations and a former telephone call box. Intermittent springs then cross the trail, occasionally pooling in the middle so that at one location, rim%) steps literally lead travelers into a creek during spring thaw **(Figure C5.8,** page 113). This riprap is in good condition and is of contemporary construction, with large-dimension stones serving as a border and as stepping stones during peak flows.

Figure C5.6 – A concrete ramp directs runoff **into a scupper at the parapet wail.**

The path gradually descends and levels off on the granite plateau that forms Nevada Fall. The final 1,500 feet between the Rock Cut and Nevada Fall Bridge is relatively flat, with the last 300 feet nearly treeless as it crosses slickrock **(Figure C5.9,** page 114).

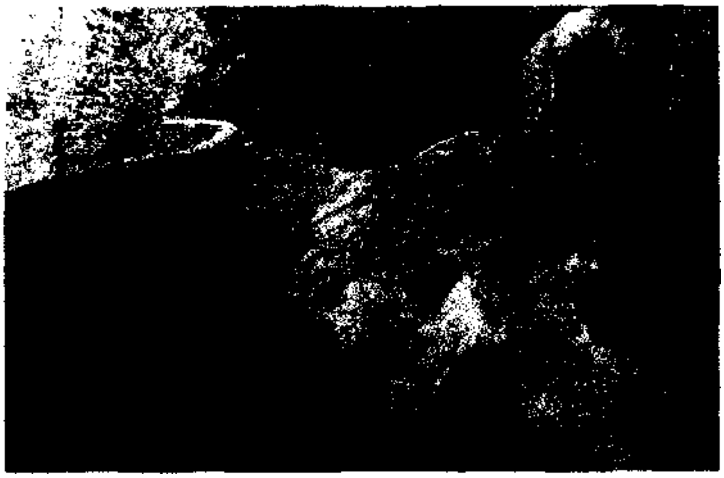

Figure C5.7 Snow buildup blocks the trail along the Rock Cut.

Some brief sections of this exposed granite shelf show remnants of a previously bituminous surface laid directly atop the slickrock. This could date to as early as 1931,[4] and is in poor condition (**Figure C5.10,** page 115).

Landscape Characteristics

Figure C5.8 - A section of trail leads directly into an intermittent creek.

Natural Systems and Features. Section 5 is notable for the Rock Cut, one the park's most sig cant construction projects. The route was built in 1931 as an alternative to the "particularly discouraging" route to Nevada Fait[s] that route (Section 7) led travelers down 235 *vertical feet* then back up 664 vertical feet to the top of Nevada Fa11.[6]

[4] Completion Report # 59, "Final Report Job No. 506-9" (April 1931).

[5] Completion Report #63, "Through Rock Cut to Nevada Falls," Job. No. 506.7 (July 1931): 1.

Its location was intended to minimize construction scars as the cut is mainly hidden by contours running northeast and northwest on both sides.' The Rock Cut is prone to severe climate and hydrologic effects, especially in winter. Because it is a constructed ledge with a parapet wall, snow and ice builds up in winter and renders travel exceedingly risky at minimum and usually impossible. East of the Rock Cut, intermittent streams flow onto the trail, in one location creating a pool in the middle of the trail.

Figure C5.9 – The last 500 feet before Nevada Fall Bridge is nearly treeless as it crosses slickrock.

Spatial Organization. The Rock Cut sets Section 5 apart from all other segments of the Nevada Fall Corridor. Of all elements in this trail system, this project required the most extreme labor and left the greatest impact on the natural surroundings, in particular to the spatial organization. The section begins at Clark Point and quickly reaches switchbacks through a relatively closed canopy en route to the Rock Cut. The spatial enclosure changes dramatically upon entering the Rock Cut zone, which was dynamited into the side of a massive granite outcrop that looms overhead and completely closes off the trail to the south. To the north, an unimpeded view opens of Yosemite Valley, Nevada Fall, and points beyond. This conflicting sense of

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[6] Ibid.

[7] Completion Report #63, "Through Rock Cut to Nevada Falls," Job. No. 506.7 (July 1931): 1-2.

enclosure/openness continues to the end of the Rock Cut, where the trail re-enters the forest and the canopy closes in. The forest continues for several hundred feet before emerging at the plateau atop Nevada Fall, where few trees obstruct the open space overhead and on all sides.

Circulation. The Rock Cut greatly simplified the connection to Nevada and Vernal falls, removing much traffic from the connector trail between Clark Point and Silver Apron. The surface tread through Section 5 is primarily bituminous in nature and averages six to seven feet in width, with stone borders or walls along the shoulders. Just before Nevada Fall Bridge, the tread surface is slickrock. Section 5 meets Section 6 at the bridge to continue the loop back to Vernal Fall and Yosemite Valley.

Figure C5.10 – The bituminous overlay has mostly eroded from atop the slickrock near Nevada Fall.

Vegetation. Vegetation in this section is primarily composed of cedar and fir trees, with oak in the lower and more exposed stretches. Vegetation does not encroach on the trail prism.

Views and Vistas. Section 5 presents broad views from the Rock Cut, stretching toward Yosemite Valley on the north and west, and toward the Sierra Nevada to the east.

Especially stunning viewpoints are found in the Rock Cut, with views of Nevada Fall, Liberty Cap, and the south side of Half Dome, but some locations also offer vantage points of Yosemite Falls in the distance.

Buildings and Structures. Through much of the Rock Cut, a parapet wall provides a safety barrier and, along with the retaining wall immediately below, forms the main structural features of Section 5. Elsewhere, low stone walls and borders edge the trail and some waterbars direct rain and meltwater off the trail.

Existing Conditions Section 6

Overview

Section 6 begins at Nevada Fall Bridge and descends via Liberty Cap Gully to the former site of Casa Nevada. It is approximately 5,000 linear feet, or just under a mile in length **(Figure C6.1).** It begins at a reconstructed bridge over the Merced River then advances northeast along the plateau at the summit of Nevada Fall before beginning its descent. At the first switchback, roughly at the 1,000-foot mark, it descends sharply in a westerly direction through a series of stone steps until reaching the 4,000-foot mark. From there it begins a gentler decline that ends at the site of Casa Nevada. Section 6 also includes a vestigial length of Conway and Snow's trail behind Casa Nevada.[1]

Figure C6.1 - Section 6 (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey. 1997).

[1] USGS Half Dome Quadrangle (Denver. U.S. Geological Survey, 1997), and site visit May 17, 2003.

Description of Existing Conditions

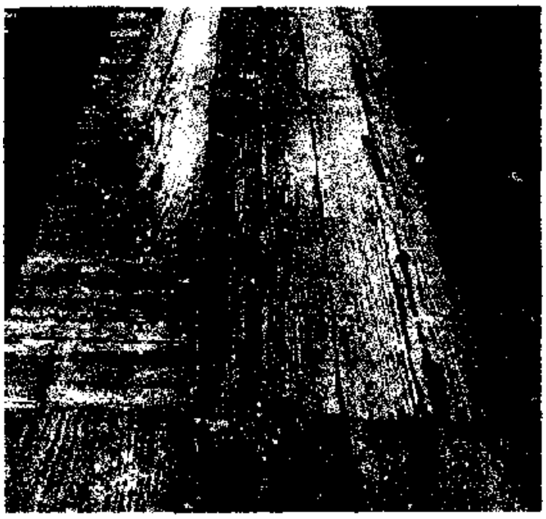

Figure C6.2 - One-by-twelve planks through the center of Nevada Fall Bridge show need for replacement.

The current Nevada Fall Bridge is a simple post-and-rail design with mortared-rubble abutments on either side of the river, which it spans by steel stringers overlaid with two-by-fours. The posts are seven-and-a-quarter inch by nine inches. Two rails run the length of the bridge, each measuring five-and-a-quarter inch by five-and-a-quarter inch, and both **are** turned diagonally. The topmost rail is forty-one inches from the deck. The bottom rail is eighteen inches from the deck; the second rail is twelve inches above the first. Three center planks run the length of the bridge; each is one-by-twelve so form a thirty-six inch tread on the most heavily traveled section of the bridge. They have been damaged by hooves, feet, and weather **(Figure C6.2)** and are in poor to fair condition. All the wood is treated lumber. This bridge has been rebuilt numerous times, most recently in 1997[2] when a severe flood damaged the railing,

[2] Tim Ludington, email correspondence, March 17, 2004.

upstream wing wall, and approach ramp.[3] With the exception of the center plank overlay, the bridge's wooden elements all appear in good condition **(Figure C6,3).**

In 1997, repairs to the mortared-rubble abutments were attempted that were not completely successful, resulting in loose and missing stones. A high percentage of the top course stones are gone while others lie loose, in both cases due to **inappropriate mortar repairs (Figure C6.4, page** 125). The concrete apron from the slickrock onto the bridge was also finished with limited attention to blending the work into the natural-rock environment. Score marks detract from the appearance and recent repainting appears awkward and obtrusive. In the shoulder where the bridge is designed to blend into the slickrock, excess cement was poured and raked rather than being hauled out for disposal, again with no concern for aesthetics or historic appearance (Figure C6.5, page 126). As a result, the stonework here is in poor condition.

Figure C6.3 - Nevada Fall Bridge is a simple post-and-rail design supported by steel stringers on rubble abutments.

Leaving the bridge, the path advances northwest, traveling 200 feet to a set of riprap steps and a gradual, easy climb to the junction of trails to Half Dome or down to Vernal Fall. The tread here is a mix of riprap and stone soil retainers with landings. From the bridge, the trail runs alongside the Merced River until the trail turns to meet the junction to Vernal Fall. This first riprap segment extends 525 feet to a second set of

[3] **in** 1992, the bridge had been rerailed and redecked (Tim Ludington, email correspondence, March 17, 2004).

riprap, this time of round stones evidently taken from the river. This section continues about forty-five feet and is followed by 130 feet of soil tread before reading a fifty-foot length of slickrock trail. It is another 400 feet to the solar toilets and the junction to Vernal Fall.

Figure C6.4 – The top course of stones on the bridge apron lie loose or are missing after inexpert mortar repairs.

Just east of this junction, a dam along the edge of the Merced River blocks openings in the natural stone riverbank that would otherwise seep down Liberty Cap Gully. Albeit Snow first established a dam here in the 1870s to prevent further damage of his trail down to Casa Nevada. Between 1906 and 1931, however, the trail was flooded three times and eventually was destroyed in 1955. It was rebuilt soon after, into the mortared rubble masonry version of today, which is in good condition. [4] **(Figure C6.6,** page 127).

The trail then begins its descent down Liberty Cap Gully, also known as "the zigzags" for its series of tight switchbacks. This section of trail between Nevada Fall and Casa Nevada – was originally built by Albert Snow and Stephen Cunningham in 1870-1871 so hotel guests could access higher-elevation

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[4] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 6.

destinations from Casa Nevada? The stone steps and walls here comprise some of the oldest constructed trail elements still in use in the park.6

The zigzags comprise roughly three sections – upper, middle, and lower. These sections also represent approximately three eras of construction projects still extant: (1) the original stonework of 1870, of which a small amount remains in a straightaway section just below the upper switchbacks; (2) the 1974-1975 construction, which occurs midway in the zigzags'; and (3) the mid-1990s and 1997 projects, which include the uppermost switchback walls and steps and a section of stairs at the bottom of the gully (previously been rebuilt in 19741975).8

Figure 06.5– Excess cement was poured and ineffectively raked around rather than being hauled away.

The upper section of zigzags ***retains*** 1870-1871 stonework by John Conway[9] but, due to the frequent

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[5] Hank Johnston, *The Yosemite Grant 1864-1906* (Yosemite: Yosemite Association, 1995, page 86) states *that in* 1869, Guardian Galen Clark granted Stephen Cunningham permission to build a toll trail from Register Rock upriver, staying south of the river then up to the base of Nevada Falls. Cunningham built most of the lower portion while his partner, Albert Snow, completed the section above Vernal Fall. Their trail used the 1866 bridge at Diamond Cascades to cross the river to the hotel. The National Register Nomination for the corridor states that John Conway aided Snow in the upper section construction, or the area through the zigzags (Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 4); the source for this data is not stated so could not be verified.

[6] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 5. However, the trail between Snow's and Clark Point — Section 7 — includes stonework at least as old as that in Liberty Cap Gully, according to the 1865 Gardner map (1870 revised edition).

[7] Limited repairs were also done here in 1989 (Tim Ludington, email correspondence, March 17, 2004).

Tim Ludington, email correspondence, March 17-18, 2004.

[9] *Report to the Commissioners* (1884): 19.

washouts, much of the trail here has been rebuilt at least once, most recently in 1997, and is in good condition. From the rim top, the zigzags commence their descent using stone stairways laid between natural rock outcrops and built retaining walls that buttress the slope. These steps, rebuilt between 1994 and 1996,[10] exhibit skilled masonry craftsmanship and blend seamlessly into their rocky surroundings despite visible drill marks on some stones. This work remains in good condition. Because they are dry laid, the steps drain well, with water flowing through the cracks between stones and percolating down through the soil below. Although the masonry work in this top set of switchbacks was redone in 1994-1996, sections of some walls and riprap tread remain original, sometimes appearing side by side **(Figure C6.7).** In particular, the straightaway just below the top switchbacks includes "very old work"[11] in good condition **(Figure C6.8,** page 129).

Figure C6.6 – A mortared dam holds water back from Liberty Cap Gully.

One section of wall in this upper switchback area includes a mature Douglas fir growing from the base of the wall; the area to the right of this *tree* was patched in 1994-

[10] Tim Ludington, email correspondence, March 17, 2004.

[11] Tim Ludington, email correspondence, March 18, 2004.

1996, along with much of the lower section of wall to the left of the tree. [12] The 1870 construction here included very small rocks for the base of the wall – not a recommended masonry construction method, but the overall wall has survived 135 years **(Figure C6.9, page** 130). [13] The 1990s work replaced rocks that had worked loose at the bottom and top of the section left of the tree; the middle section was intact. It is a tribute to the original workmanship that the wall remained standing with lower-tier stones missing and joints broken.14

Figure C6.7 – New repair work on the right contrasts in color and drill marks, but otherwise **blends in well** with older work.

Most storm damage occurs below this top set of switchbacks; as a result, the lower sections are primarily newer construction. This recent work is in good condition and demonstrates skilled masonry practices, with overlapping stones, tight construction, and appropriate choice of stone dimension, resulting in strong steps and walls that blend into the setting and convey the historic character of this trail. These steps occur midway down Liberty Cap Gully and were completed in 1974-1975

[12] Tim Ludington, email correspondence, March 17, 2004.

[11] The builders at the time used what rocks were at hand, not having benefit of the "highline" technology used in remote rock construction today (the mid-1990s work on the zigzags highlined material off the rim down to the zigzags).

[14] Tim Ludington, email correspondences, March 19, 2004.

and 1989. The section harmonizes nicely with its surroundings and has weathered well despite subsequent storms over the years.

Near the bottom of the gully, another excellent example of recent workmanship falls in a stretch of stone steps that hugs the contour of the land and fits tightly into adjacent boulders **(Figure C6.10,** page 131). This work was completed in 1997 by an NPS trail crew and is in good condition. The bottom section of zigzags is almost treeless so provides good views of Nevada Fall and points north, and receives ample sunshine. Historically, the gzags received nearly unimpeded solar exposure but enough vegetation has taken hold in the upper regions that the uppermost zigzags today are shaded.

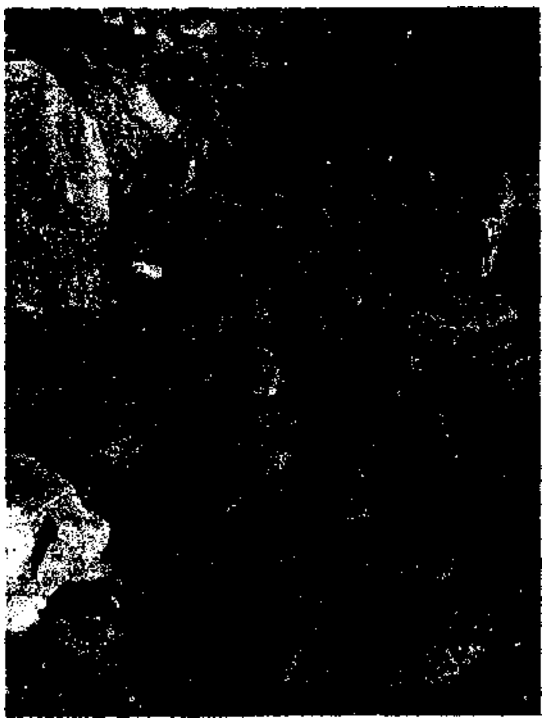

Figure C6.8 – Original riprap tread surfaces the trail near the bottom of Liberty Cap Gully.

At the bottom of Liberty Cap Gully just before the trail levels off, a short stretch of original riprap exhibits the use of smaller stones common in early masonry work in the corridor, and the burnished sheen from over a century of use. Soon after, the trail enters a shaded area where several large firs grow beside the trail, their massive roots becoming part of the step system **(Figure C6.11,** page 132). This region is more sylvan, cooler and greener than above, with Douglas fir and incense cedar predominating briefly. Original riprap steps advance the **trail as it descends before reaching a 100-foot-long, three- to** five-foot wide causeway overgrown with cedars that serves as the trail **(Figure C6.12,** page 133). This was part of a project Snow undertook in the 1870s to create a reflecting pool near the hotel; the causeway, an average of three feet in height, held back water diverted by a ditch system from the Merced River. [15] As part of the project, a watering trough stood nearby and was extant through the 1980s, [16] but no trace was found in 2004. Beyond the causeway, the trail returns to the more arid, open zone of manzanita and oaks at the site of the former Casa Nevada, or Snow's Hotel.

Casa Nevada was a popular stopping point for park visitors between 1870-1897.

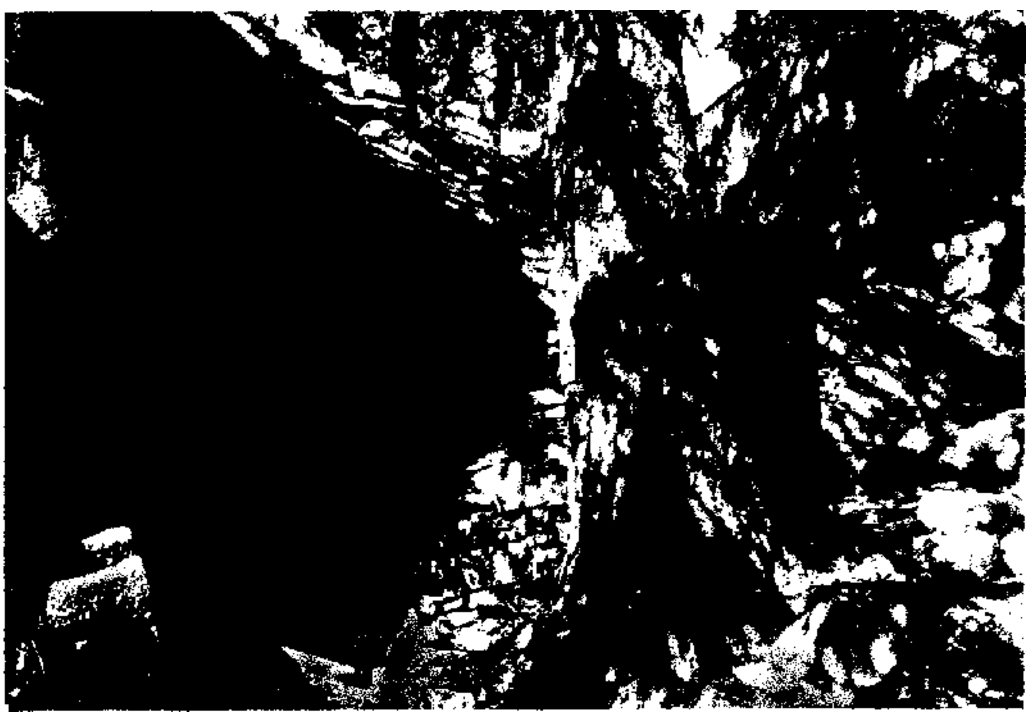

Figure C6.9 - Elements of this wall in Liberty Cap Gully retain original craftsmanship, with new work sandwiched between or above. The section of small stones left of the tree is original, as is some of the work at the top (Photo by Tim Ludington).

[15] Archeological site record CA-MRP-1652H on file at the Yosemite Archeology Office, El Portal, Calif.

[16] Linda Greene and James B. Snyder, *National Register Nomination* (Yosemite National Park: U.S. Department of the Interior, 1989), section 7, page 7.

The site lies on a broad, exposed granite outcrop midway between the base of Liberty Cap Gully and the top of Vernal Fall. Rocks and boulders lie scattered atop the slickrock, while Ponderosa pine and scrub oak fringe the edges. Nevada Fall was visible clearly from here when Snow built the hotel starting in 1870, offering guests a comfortable place to sit and reflect on the view southeast to Nevada Fall. Today, trees partially screen the waterfall view, but the panorama in other directions remains unimpeded, The site for Casa Nevada is used occasionally as a helipad for backcountry rescue.

Figure C6.10 — Near the bottom of the gully, recent work hugs the contour of the land and fits tightly into adjacent boulders.

On the western edge of Casa Nevada, a trail departs leading south then turns and meanders westerly down the ridge toward Silver Apron Bridge, en route to Emerald Pool and Vernal Fall. This is the remains of Snow's original 1870 trail to his hotel, and includes some very old riprap.[17] The trail is wide as it begins in a shaded area, then quickly narrows as it weaves through rocky terrain alongside the Merced River. Its condition is good at its inception at Casa Nevada, but deteriorates as it moves down slope and other trails crisscross it. At a junction 300 feet from Casa Nevada, one trail leads to tent sites above the river; this narrows further and becomes an erosion

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Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 5.

channel that joins the main trail 700 feet from Casa Nevada. The other trail from the junction descends more directly to the current trail, meeting it approximately 500 linear feet below Casa Nevada at a slickrock section. George Anderson routed his 1882 trail above Vernal Fall to this slickrock site (discussed in Section 7).

Landscape Characteristics

Natural Systems and Features. Hydrology determined much of how designers shaped the alignment of Section 6. The Merced River flows through the beginning of this segment and led to the building of Nevada Fall Bridge. At the bridge, the river rushes from the south through a cut in the exposed bedrock that forms the summit of Nevada Fall. This granite outcrop also shapes the geologic "staircase" of massive benches that step their way up Yosemite Valley over Vernal and Nevada falls. Hydrologic systems also contribute to the frequent destruction of the zigzags in Liberty Cap Gully, which funnels water and debris down the gully during severe storms. At the former site of Casa Nevada, another exposed granite outcrop provided the solid foundation Albert Snow sought for his hotel buildings in the 1870s.

Figure 06.11 — Fir tree roots spread onto the trail and are sometimes used as steps.

Anderson's 1882 trail accommodated similar natural forces, paralleling the Merced much of the way en route to Casa Nevada, then turning southeast when confronted with the outcrop that forms Diamond Cascades above Silver Apron. Another massive granite boulder stopped Anderson on the northwestern end of his trail.

Spatial Organization. Section 6 begins in the open area atop Nevada Fall in an area with unobstructed views on all sides and overhead. This changes as the trail turns northwest and begins to descend through Liberty Cap Gully, where the zigzags enclose the space through which hikers and horses move. This space is formed primarily by the natural stone ledges and outcrops that shaped Liberty Cap Gully, but the mature trees and retaining walls also create a sense of verticality and enclosure not found in other parts of the Nevada Fall Corridor. At the base of the switchbacks, the trail opens up almost completely as it descends through a big-talus zone with limited vegetation. Mother forested section encloses the trail briefly before it emerges at the Casa Nevada plateau, which offers a wide panorama to the west and overhead.

Figure C6.12 – Cedars encroach on the causeway.

Land Use. Visitors traveling to the Casa Nevada hotel in the 1870s established the use of this segment of trail as recreational, which continues to be its primary use. It is also used *as a* winter rescue route when the Rock Cut is closed, and it serves as a connector to the greater trail corridor. The site of the historic hotel is used for a helipad for backcountry rescue.

Circulation. This section of trail connects the top of Nevada Fall to Casa Nevada most immediately, but it also helps complete the loop to the valley floor. Its width averages six feet; the tread is a mix of naturally decomposed granite, riprap, and some deteriorated bitumen. The edge through Liberty Cap Gully is bounded by retaining walls until the lower reaches, which are bordered by talus both randomly occurring and in an intentional order near sections of steps.

The remnant of George Anderson's 1882 trail departs from the main trail just above Casa Nevada. This fragment no longer connects on either end with any extant trail, but it is accessible from the current path at the slickrock crossing described earlier.

Vegetation along this section of trail includes manzanita, scrub oak, and Ponderosa pine at the summit of Nevada Fall and the site of Casa Nevada, and mixed conifers including Douglas fir and incense cedar through and below Liberty Cap Gully. Vegetation intrudes into the trail prism near the bottom of Liberty Cap Gully, where the roots of several large Douglas firs cross the trail and serve as both steps and obstacles, and along the causeway, which is fringed by incense cedars. Elsewhere, vegetation provides shade in areas noted above.

Buildings and Structures. The main structures in this section include Nevada Fall Bridge, the retaining walls through Liberty Cap Gully, and the causeway near the site of Casa Nevada. Nevada Fall Bridge has undergone numerous reconstructions, most recently in 1997, because *its* location bears the brunt of severe storms. Its original log design was replaced in 1962 with a *steel* Bailey Bridge that lasted thirty-five years before being lost to a storm in 1997. The current bridge features steel stringers and is modular enough that sections such as rails and decks can be replaced individually. The **retaining** walls through the zigzags include some of the park's oldest stonework, but many elements of these walls have been rebuilt after destructive washouts. As the trail nears the base of the waterfall, the riprap steps through the talus zone are contemporary work based on masonry methods used by the original trail builders. At Casa Nevada, the causeway built *by* Albert Snow in the 1870s serves as part of the current trail.

Views and Vistas of Section 6 include the expansive panoramas from.thetop of Nevada Fall and from Casa Nevada, as well as-more•discrete perspectives along the trail, Vegetation growth lias-thanged the viewshed through the zigzags and from Casa Nevada, but the outlook otherwise is very similar to that in 1870 when Albert Snow first enticed tourists-to visit his-hotel. The view of Liberty-Cap remains the same, arid the waterfall is still visible from,Casa Nevada's site though is now filtered through conifers. The top section of the zigzags is SignificantlY more concealed by trees, however, than when first constructed.

Archeologieal Sites. Park archeologists sUrve'yed the former site of Casa-Nevada in 2002. The resulting site record notes it significance as a key pioneer hotel in the park and its-role in western frontier expansion. The record also details the history of the causeway as well as features rio longer extant.[18] A small tag identifying the site hangs from a Ponderosa pine beside the main rubble pile. Just north of this pile is a flat, sandy spot that was a foundation site for Snow's inn.

[18] Archeological site record CA-MRP-1652H on file at the Yosemite Archeology Office, El Portal, Calif

Existing Conditions Section 7

Overview

This section is especially distinctive in the Nevada Fall Corridor because it retains the most original stonework, alignment, and utility of all seven sections. [1] This is where in 1870-1871, Albert Snow oversaw construction of a trail from the floor of Yosemite Valley to Register Rock and beyond to Clark Point, then down to Silver Apron above Vernal Fall. This latter section contains the corridor's most remarkable riprap, believed to have been crafted by John Conway in 1870-1871.[2]

Figure C7.1 – Section 7 (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey. 1997).

Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 7.

[2] Greene, *Historic Resource Study,* 87-88. Also, park historian Jim Snyder states there is no documentation available to show definitively who installed the older riprap sections in Liberty Cap Gully and up to Clark Point from Silver Apron. It is much older than any installed during Sovulewski's era and is probably John Conway's work given its similarity to other work known as his in the park, and by the era in which it was constructed (Jim Snyder, personal interview, April 2003).

Section 7 begins immediately west of Casa Nevada and descends southwest, crossing Silver Apron Bridge and ending at Clark Point 2,250 linear feet from Casa Nevada **(Figure C7.1).** As it leaves Casa Nevada, the trail turns south for 500 feet before bearing southeast. About 500 feet beyond Silver Apron Bridge, it reaches the junction above Silver Apron for the footpath down to Vernal Fall. Section 7 continues uphill on a series of gentle switchbacks over the park's oldest riprap Conway's work — passing as it climbs a spectacular viewpoint overlooking Vernal Fall. Section 7 also includes the remnant of George Anderson's 1882 frail between Casa Nevada and the top of Vernal Fall. [3]

The length between Silver Apron and Clark Point today serves as a connector from the John Muir Trail to Vernal Fall, but has been in use since at least 1870 (and probably 1856) by both pedestrians and saddle trains wishing to reach Nevada Fall from Yosemite Valley. Before the Rock Cut of 1931, travelers were compelled to descend from Clark Point to Silver Apron Bridge, a vertical drop of 235 feet, then climb back up another 664 feet to reach the top of Nevada Fall. [4] (The Rock Cut, in Section 5, enabled a continual climb from Clark Point to Nevada Fall without the added descent and additional climb.) Section 7 is still used today by hikers wishing to loop back to the Valley from the top of Vernal Fall without retracing their steps, and it is used as a winter rescue route to reach the top of Nevada Fall when the Rock Cut is snowed in.

[3] USGS Half Dome Quadrangle (Denver: U.S. Geological Survey, 1997), and site visit May 17, 2003.

[4] Completion Report #63, 'Through Rock Cut to Nevada Falls" (Job. No. 506.7, July 1931): 1.

Description of Existing Conditions

From Casa Nevada, the trail immediately enters a Ponderosa pine, incense cedar, and laurel forest on its descent to Silver Apron Bridge. This length of trail - between Casa Nevada and the 1882 George Anderson trail (described below) - was built in the 1920s to establish a more level grade between Silver Apron Bridge (also described below) and Casa Nevada. [5] After about 325 feet, a seasonal stream north of the trail is audible and the vegetation shifts to oak and manzanita dense enough to shade the trail. Another 150 feet brings hikers to a slickrock section that extends for 100 feet. Here the trail is flat, with a low stone border comprised of some original but primarily reconstructed work in fair condition. By the 750-foot mark, deteriorated riprap surfaces the trail in short sections; this contemporary work is in poor condition.

Figure C7.2 - Anderson's 1882 trail is distinct though abandoned off the current alignment.

About 1,000 linear feet from Casa Nevada, a slickrock section marks the intersection with the 1882 Anderson trail. Anderson's branch lies approximately fifteen vertical feet below and parallels the main trail in a westerly direction for a short distance before bearing north alongside the Merced River. Anderson's extant work includes several lengths of retaining walls and stone borders ranging from poor to good condition. This trail fragment makes clear his intent to fashion this into a wagon road, given its wide

[5] Jim Snyder, personal interview, April 2003.

width and fortress-quality roadbed **(Figure** C7.2). The route follows the river in short sections; Anderson built in short pitches, thirty feet or so in length depending on the ease of construction, with the intent to do the more difficult work later; he never completed this project, which explains why the sections were never linked and some work never finished.[6] In one area, Anderson wove the road around a large boulder. At another location, the route is broken by a mound shrouded in pine needles; digging down reveals a decayed, fallen tree that Anderson probably intended to remove. The route extends roughly 300 feet before apparently heading inland (the roadway is faint, but unquestionably was cleared and flattened), where trees occasionally grow in the middle of the track. This remnant trace dead-ends at a massive stone outcrop beyond a grove of young giant sequoias, about 600 feet from the current trail.

Figure C7.3 - The Silver Apron Bridge was rebuilt in 1997 after flood damage.

Returning to the current trail, the path reaches Silver Apron Bridge roughly 200 feet from the junction with the Anderson branch. The bridge, rebuilt in 1997 following severe winter flooding, is forty-two feet long and similar to Vernal Fall and Nevada Fall bridges in design, with two nine-and-a-quarter inch by five-and-a-half inch rails that rise

[6] Ibid.

forty inches above the deck, and steel stringers on random rubble abutments. The bridge is in good condition (Figure C7.3).

Riprap tread begins in earnest south of the bridge **(Figure C7.4),** which the trail leaves on a southwest bearing for about 200 feet before turning west. It then begins climbing the switchbacks that lead down initially then up again toward Clark Point. The surface through here is the original work installed by John Conway in 1870-1871.[7] The tread is composed of native stone cobbles tucked tightly side-by-side deep into the soil for a firm hold that has lasted 135

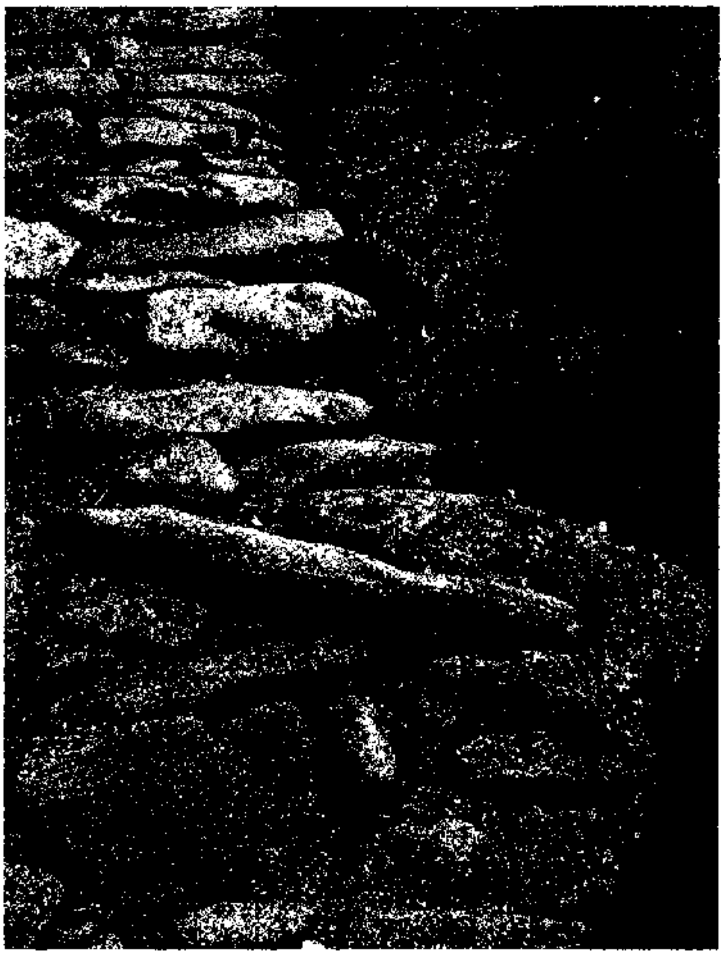

Figure C7.4 - Original riprap by John Conway includes this section. The diagonal cobble directs water off the trail.

7 Linda Greene and James B. Snyder, *National Register Nomination* (Yosemite National Park: U.S. Department of the Interior, 1989), section 7, page 5.

years. A well-engineered drain on the inside bank of one segment keeps moisture from sitting on the trail bed **(Figure** C7.5, page 136). This stonework is in good condition, is burnished to a rosy gold tone, and blends magnificently into the surroundings.

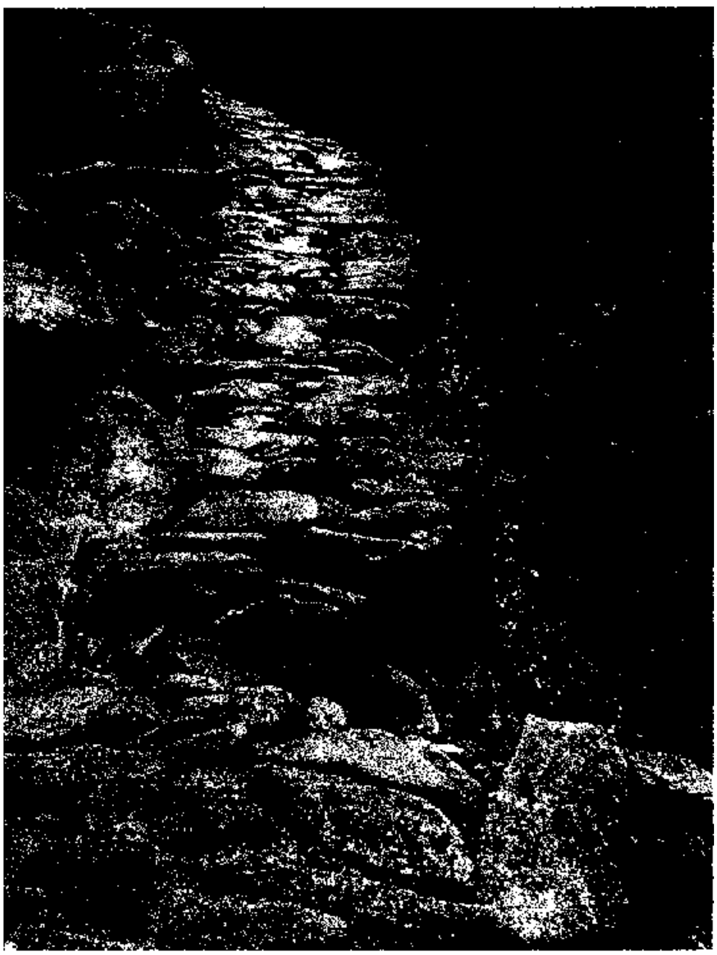
Figure C1.5 - A well-engineered drain on the inside bank keeps moisture from sitting on the trail bed.

The junction for Clark Point appears about 100 feet later. During runoff, a large puddle forms at the foot of the junction's steps, causing difficulties for children and other short-legged people to cross and maintain dry feet. A metal directional sign stands at this junction but is obscured by vegetation so is easily missed by those climbing up from Vernal Fall. At the junction, one fork leads to Silver Apron, descending via a sweeping switchback on original riprap **(Figure C7.6,** page 142). This riprap ends near the sign for a contemporary privy as the trail enters the forested plateau above Vernal Fall. The other fork proceeds up to Clark Point, also traveling over original riprap before arriving at a sixty-foot slickrock section that leads to an overlook popular with photographers for its perspective of Vernal Fall below and Liberty Cap beyond **(Figures** C7.7, page 143). Approximately forty feet above the overlook lies a short connecting trail. Its surface is soil and duff with a few scattered small rocks; it drains well, with no puddling or even saturated sections during seasonal runoff. Notably, no pooling occurs anywhere in this area where no bitumen is present, except where incorrect waterbar design has trapped water or at the foot of bituminous sections where water has been channeled into puddles.

Figure C7.6 — A switchback of solid riprap sweeps around a corner near Emerald Pool.

From the overlook, the trail switches back numerous times as it travels toward Clark Point. The tread is nearly continuous riprap, often of small dimension and sometimes capped with eroded bitumen from a previous overlay **(Figure** C7.8, page 144). A few sections of larger riprap occur, as well as lengths of steep, large steps; nearly all appear to date to the original construction. The trail leads through small talus with oaks and manzanita, providing filtered shade and habitat for the numerous birds audible over the roar of the waterfalls. The riprap sections wind around the switchbacks, offering master-crafted, curving designs that gleam with a golden tint in full sun. As the path reaches the top, the tread becomes mostly sandy soil and the prism opens up as the talus increases in size and the canopy thins. Clark Point offers wide views and full solar exposure.

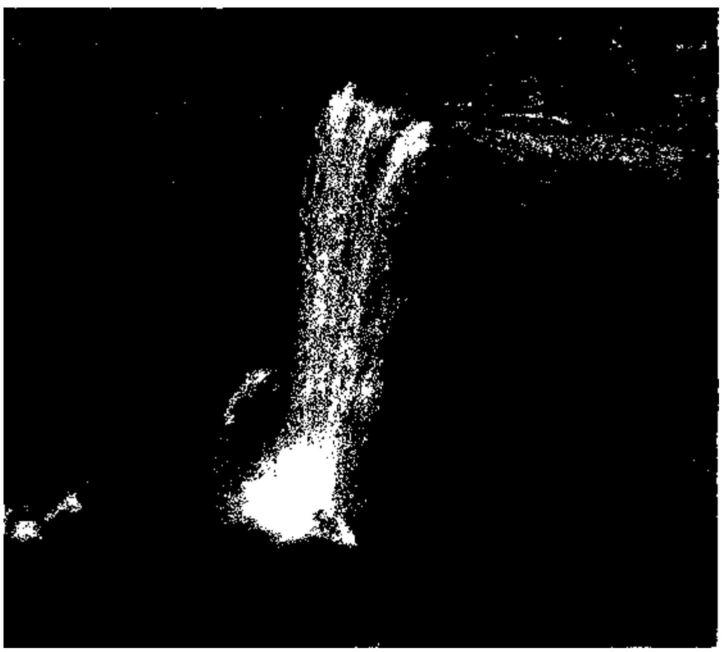

Figure C7.7 – En route to Clark Point, the trail passes by an overlook with a spectacular view of Vernal Fall.

Landscape Characteristics

Natural Systems and Features. Section 7 includes the granite outcrop where Casa Nevada was located; the Merced River; and the granite shelf serving as the overlook for views en route to Clark Point from Silver Apron. The exposed granite bench at Casa Nevada provided the base for Albert Snow's building foundations; this outcrop extends to the slickrock crossed by the trail east of the Silver Apron Bridge. The Merced River also played a major role in the alignment and maintenance of this section, compelling the construction of Silver Apron Bridge and its frequent repair or replacement after storm damage. The river also contributed to the trail's route, which parallels the river until reaching the bridge. Between the bridge and Clark Point, trail designers chose to climb the ridge using switchbacks where needed to ease the grade rising to the John Muir trail junction. En route, other geologic forms are manifested in the ledge on which the overlook was established

Spatial Organization. This segment's spatial organization begins with the wide expanse of Casa Nevada, then narrows *as* it enters the forest on the way to Silver Apron Bridge. The path hangs along the edge of the granite bench and looks down on the George Anderson trail remnant momentarily, then turns and crosses the bridge, opening up for views down the chute toward Emerald Pool. From the bridge, the route runs directly atop the slielcrock, then descends toward the junction with the trail to either Clark Point or Vernal Fall. There is limited forest cover here. The path then advances through a talus area with even less vegetation, finally reaching the junction where the trail to Clark Point begins its climb.

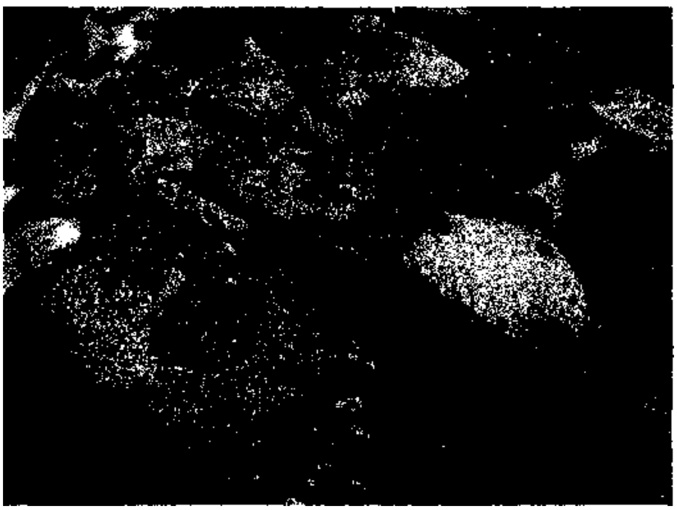

Figure C7.8 - A bitumen overlay has deteriorated while the riprap remains solidly in place.

Land Use for Section 7 is tourism and, in some cases, rescue operations related to tourist use.

Circulation. This segment of trail links with other paths that form the greater Nevada Fall Corridor. It also meets the junction with George Anderson's 1882 trail north of the river. Between Casa Nevada and Silver Apron Bridge, the trail averages six feet in width with frequent stone borders or low retaining walls edging the trail. The flat treadway east of the bridge is primarily eroded bitumen with some lengths of slickrock or soil. The oldest extant riprap on the entire corridor is found on the sloped section between Silver Apron Bridge and the main overlook en route to Clark Point.

Vegetation through this corridor includes California bay laurel, man7nnita, oak, Ponderosa pine, incense cedar, and giant sequoia, along with seasonal wildflowers and grasses.

Buildings and Structures. Major buildings and structures in Section 7 include the Silver Apron Bridge and walls on the George Anderson remnant trail. Typical minor structures associated with this section include wall fragments, stone border fragments, and waterbars too numerous to list [s] This section also includes structures of contemporary construction that were not evaluated.

Views and Vistas of Section *7 are* some of the most memorable of the corridor. From Casa Nevada, the perspective ranges across the Valley and back to Liberty Cap. From Silver Apron Bridge, visitors get a clear prospect of the water funneling at a high rate of speed through the chute above the bridge and down onto Silver Apron. This segment offers two stunning viewpoints as it climbs, one approximately a quarter-mile beyond the junction above Silver Apron and the other at Clark Point. The lower view overlooks Vernal Fall in its entirety, while Clark Point commands a 270-degree panorama of sights incbiding Vernal Falls and peaks and domes in and above Yosemite Valley.

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[g] A detailed inventory should be completed and added to the List of Classified Structures, and evaluated for eligibility.

IV. BITUMINOUS SURFACES OF 11-1E NEVADA FALL CORRIDOR

History of Use at Yosemite

Yosemite's front country trail system undergoes extreme impact every year from the thousands of visitors who use the trails. Along with the effects from the sheer numbers of feet (and hooves) on the treadway, the trail system is also subject to severe freeze/thaw conditions in winter and extraordinary summer downpours that can deposit an inch of rain an hour, scouring insufficiently drained or improperly surfaced trails in a single day. Between the intense human use and the extreme weather impacts, the Nevada Fall Corridor poses unique challenges for trail managers.

To limit erosion and provide a less dusty walking surface, the corridor has, since at least 1929, included long stretches of treadway treated by spraying "oil," or asphalt emulsion, directly onto the trail's soil surface. This surface treatment is not conventional asphalt (i.e. the standard hot-mix process rolled by paving machinery) but over time and through usage, the surface has hardened to an asphalt-like consistency.

By the 1970s, segments of the corridor were being resurfaced by hand-mixing asphalt emulsion on site with aggregate, a process known as cold-mix asphalt.' Existing conditions indicate that these surfaces have not functioned as intended in many places. The surface has broken down, leaving large potholes and abrupt drop-offs, and rather

[1] Tim Ludington, telephone interview, January 27, 2004. The Trails division at the park refers to it as bitumen or bitumul, the derivation of which is explained starting on page 148.

than controlling erosion the hardened surface has furthered it by not allowing natural percolation of water through soil. This is evident at sites along the trail where bituminous sections have channeled water to create puddling, compared with sections where the surface is soil/duff and no pooling occurs. Elsewhere on the trail, dry-laid stone tread (riprap) and stone steps have encouraged effective drainage in conditions similar to that where bituminous sections have funneled moisture off trail to erode banks and scatter debris,

A few short sections of the trail have been surfaced with concrete, also mixed on site. In 1971, a length of trail between Register Rock and the top of Vernal Fall was reconstructed using six-inch "concrete pavement."[2] A section of similar construction was installed at the same time in the Rock Cut, the ledge above Clark Point and west of the Nevada Fall Bridge. In the 1980s, concrete was used on the bridle path between Happy Isles and Register Rock to reinforce a gully frequently washed out by storms. There is no written evidence that a drainage system or permeable sub-grade was installed as part of these projects.[3] These sections of trail are in poor condition. Additionally, some areas between Register Rock and Clark Point have a high-aggregate concrete tread atop the bitumen; these are generally in better condition than the above mentioned lengths, however they also do not allow water to percolate.

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[2] Completion Report No. 491, "Reconstruction Mist Trail" (1974).

3Completion Report #491, "Reconstruction Mist Trail" (Work Order No. 8800-00804, November 1971).

Early Treatment Methods

At Yosemite, mitigating dust problems became an important goal early in the park's tourist years, when visitors would return to their valley hotels after a day's ride on the park's trails so encrusted with dust they were nearly unrecognizable!' Given this challenge, park managers eagerly embraced the idea of oiling the most popular trails. The earliest recorded methods began by 1928; the process involved spraying the footpaths with a light fuel oil **called bitumul or bitumen, then compacting the surface.** [5] (Bitumuls was a trade name – patented by the Bitumuls Corporation – in the late 1920s-30s for a process of treating heavy asphaltic oils so they remained fluid and could be mixed without heating. They did not harden until exposed to the air in a thin coating. [6] The generic name is bitumen.) The bitumen was sprayed atop the treadway, most likely a washed, two-and-a-half-inch-minus crushed stone. This surface was then "sprayed with 150 Bitumuls at rate of 0.45 gal. per sq. yd, screened ... and rolled." [1] The reference to "screened" material probably means quarter-inch-minus crushed stone spread atop the bitumen layer,[8] Within a few years the process was refined to "50-60% asphaltic content light fuel oil," which resulted in "attractive dustless trails with pleasurable travel" [9]

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[4] Donald Tresidder to Horace Albright, letter June 7, 1928, Trails Box 83.

[5] Report of Construction Activities 1929 Season (1929).

[6] A.B. Lewellen, "On Oiling of Bridle Paths and Construction of Footpaths" (Yosemite, 1928): 7.

[7] Report of Construction Activities 1929 Season (1929).

Michael Pieper, email correspondence, February 3, 2004.

[9] *Report of Construction Activities,* 1929 Season (1929).

Significantly, the reference that the wails were "rolled" after oiling suggests this type of work did not include the Nevada Fall Corridor, which current park staff believe too steep to accommodate pavement machinery. [Io] Mechanized equipment such as small tractors and compressors were used on the trail as early as 1929, but project reports indicate they were for blasting, leveling, and oiling, but not for applying hot-mix asphalt **(Figure BA).** A 1931 project report describes the oiling method on the bridle paths, which most Rely included what is now the footpath up to Vernal Fall Bridge: "The tractor spreads a load of 200 gallons as fast as a man can walk... from one-quarter to one full gallon per sq. yd.; width of spread from one to five feet. ... The average depth was about two inches." [/1] The oiling evidently stopped at Register Rock (about a half mile above Vernal Fall Bridge), because a project report covering work from 1928-1931 states that a little over half a mile of the trail between Register Rock and the top of Vernal

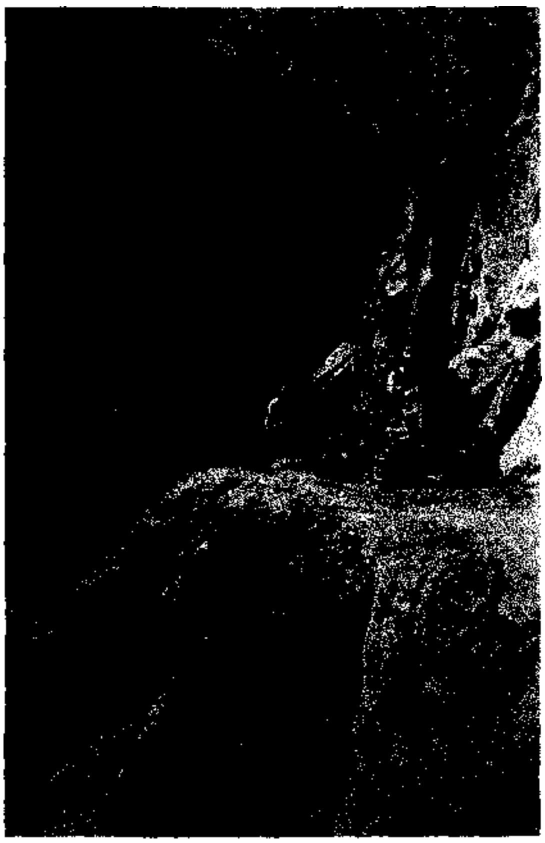

Figure B.1 - Workers bring materials up the trail en route to Vernal Fall in 1929. Note stone retaining wall in foreground (Neg. .SRL-7550, Courtesy Yosemite Research Library).

[11] Completion Report No. 52, Final Report Job. No. 506.8 (1931).

Fall was "reconstructed" in 1928. It goes on to explain: "This is a very steep trail necessitating the setting of stepping stones most of the distance," thus establishing the precedence of riprapping the section through the inist./2

Construction projects also focused on sections below the bridge. In 1929, "the old bridle tail" – now the footpath from the Happy Isles trailhead to Vernal Fall Bridge – was also "reconstructed" and widened, with retaining walls built "and all completed with the exception of surfacing in sections where local material was not available."[13] This suggests the work comprised widening and leveling but not installing a bitumen top-coat. The report elsewhere states that between Vernal Fall Bridge and Register Rock, the trail was "smoothed out and surfaced?' Although the narrative doesn't say how it was surfaced, a photo caption in the report notes "this steep section (was) oiled with bitumuls to lay the dust and to form a compact surface that will stick on such a steep trail," so one can extrapolate the surface was oil. The same report shows a photo of a small tractor being driven on the trail, with Illilouette Gorge in the background; the caption states it is "experimental oiling."

Beginning in 1932, the project reports begin mentioning "Destitution Relief monies." It is probable that expensive construction such as an asphalt installation on a *steep* tourist trail would not take place during the Depression or the war years that followed soon after. The list of extant completion reports on file at Yosemite's El Portal offices makes no reference after 1931 to any work on the Nevada Fall Corridor that could

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[12] **"Final Report on Reconstruction of the Mist Trail Job No. 506.2" (January** 31, 1931).

[13] Ibid.

comprise asphalt installation. This throws into question the belief by a retired Yosemite animal packer that the trail was asphalted from the trailhead at Happy Isles up to Vernal Bridge by the early 1950s. It is probable that the trail had by then received sufficient bitumen treatments, followed by compaction through heavy use, so that it became asphalt-like in hardness and appearance, and thus was thought to be an asphalt installation. Longtime trail crew members and foremen with personal knowledge of the corridor back to the late 1950s agree the trail has only been surfaced with oil and aggregate, noting that the rollers required for a true pavement operation would not function on a trail of this grade.

Early trail hardening at Yosemite used little in the way of coarse aggregate – sometimes workers used only soil or, with luck, fine decomposed granite found on site – combined with the bituminous emulsion, resulting in a weak surface with little durability.[14] By the 1970s, crews still hauled warm asphalt emulsion up the trail – 20 gallons per mule – and still mixed it by hand, but now used aggregate road base (also packed in by mule) rather than on-site materia1.[15] This practice of trail surfacing has continued. In many places, the trail was refreshed annually with an application of oil as a dust palliative.[16] Over the years, these practices hardened the tread but also added toxins to the environment. In the last 30 years, the trail's bituminous surfaces have not been maintained and have deteriorated dramatically.

[14] Tim Ludington, email correspondence, March 11, 2003.

[15] Ibid.

[16] Steve Wight, telephone interview, January 31, 2004.

Overview of Asphalt History

The term "asphalt" encompasses a wide range of products. According to the *Environmental Contaminants Encyclopedia* issued by the National Park Service's Water Resources Division, "asphalts" are "bituminous materials that occur naturally or are derived from nondestructive separation of petroleum fractions." [17] Asphalt paving materials typically are composed of aggregate and/or sand (ninety to ninety-five percent by weight) and asphalt *(five* to ten percent by weight). The aggregate and/or sand provides the primary load-bearing properties, while the asphalt serves *as* the binder and a protective coating."

The history of asphalt dates back to the Romans in 625 B.C. It was also used by Mesopotamians to waterproof temple baths, and Phoenicians adapted it for use in caulking ships. The basket that baby Moses floated down river in was even said to be waterproofed with an early asphalt. [19] In the United States, 1870 finds the first recorded asphalt pavement (in New Jersey),[2°] and in 1876 President Ulysses S. Grant enlisted U.S. Army engineers to study asphalt for roads, which led to refined petroleum asphalt products. Further experimentation led to mixing asphalt, or "road oils," with different

[1717] **R.J.** Irwin, M. VanMouwerik, L. **Stevens, M.D. Seese, and W. Basbam.** *Environmental Contaminants Encyclopedia* (Fort Collins: National Park Service, 1997).

18Ibid.

[19] www.asphaltinstitute.com

[2∘] "From Liquid Lake Asphalt To Superpave: The Evolution of Hot Mix Asphalt," *Asphalt Contractor* (February 1999).

sized stones; a stone-asphalt mix known as "tarmacadam" was patented in 1910 in Massachusetts, but it wasn't until 1916 that asphalt plants and paving machinery were developed, revolutionizing the asphalt industry. This push was precipitated by the advent of the automobile and the need for rugged roadways and methods to minimize dust and mud. The U.S. Army Corps of Engineers later developed asphalt for heavy-duty runways needed by newer, heavier aircraf1.21

As automobile traffic increased, so did the variety of crude oils, and asphalt manufacturers subsequently developed new asphalt mixes to meet particular road conditions.[22] In 1955, the National Bituminous Concrete Association (forerunner of the National Asphalt Pavement Association) was founded and began sponsoring asphalt testing at universities and private labs. In 1956, Congress passed the Interstate Highways Act, allotting $51 billion for road construction nationwide. Because contractors needed more sophisticated equipment to complete this new task, more innovations developed including machines to pave two lanes simultaneously, and vibrating steel-wheel rollers.23

Road construction forged ahead over the following decades, but it wasn't until new technology brought to the U.S. from Europe in 1990 and perfected for the 1996 Olympics prompted significant changes.[24] The changes affected aggregate components in hot-asphalt mix, such as size, shape, texture, and gradation. The result was

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[21] Ibid.

[22] Ibid.

[23] www.beyondroads.com

[24] From Liquid Lake Asphalt To Superpave: The evolution of hot mix asphalt," *Asphalt Contractor* (February 1999).

inexpensive, quick installations, low-cost maintenance, good friction, and improved skid resistance. The new asphalt mixes use larger stones to deter rutting and increase strength, while high-grade binders and stone-matrix blends increase stability in extreme temperatures.25

Environmental concerns

As use of asphalt has increased, so has research into its efficacy and safety. The website for the Asphalt Institute states that "questions occasionally arise concerning the environmental safety involved with using asphalt in applications where water is directly contacting the asphalt material, or whether asphalt leaches hazardous compounds into the groundwater.... No scientific data exists on which to base claims concerning asphalt leaching hazardous compounds into water ... (according to) procedures governed and approved by the Environmental Protection Agency." The institute's website also notes that "more than 30 *fish* hatchery ponds are operated by Oregon and Washington and many of them are lined with hot-mix asphalt (HMA). The states' fish and wildlife officials say the ponds are durable and produce good-quality fish."26

While asphalt used on roads and in water pipes theoretically binds most of the harmful compounds together into a cement-like solid, concern remains that some of these harmful compounds may not always be as firmly and *as* universally locked in place as

[23] Ibid.

[26] **wvvw.aspbalt institute.org**

some have assumed[27] Asphalt's main hazard derives from polycyclic aromatic hydrocarbons (PAHs), which can move into the ecosystem when asphalt breaks down. Asphalt stabilization products are designed to lower contaminant leaching rates, however the amount the leaching decreases depends on the physical and chemical characteristics of its environment. Chemical and physical impacts as diverse as cattle urine and molten lava have been known to break down asphalt roadways, and greases can soften asphalt. Road dust and other erosion originating from degrading asphalt roadways are considered potential sources of PAHs in waterway sediments. The *Environmental Contaminants Encyclopedia* states: "Since asphalt contains so many toxic *and* carcinogenic compounds and since leaching of harmful PAH compounds has been documented even in water pipe use, asphalt should be kept out of rivers, streams, and other natural waters to the extent possible."[28] The encyclopedia's authors also call attention to possible hazards that asphalt can create in the atmosphere. "Air concentrations of PAHs have been shown to increase to potentially dangerous levels in National Parks in response to forest fires and asphalt roads burned by lava flows."

Asphalt is generally utilized as either a hot-mix or a cold-mix process. Applications using asphalt cements are typically hot-mix, while applications using liquid asphalts are cold-mix. In the hot-mix technologies, asphalt cement comprises the heaviest "fraction," with a consistency ranging from solid to semi-liquid. Hot-mix asphalt is a mixture of asphalt binder (the cement) with an aggregate, and produces a more durable

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[27] R.J. *Irwin,* M. VanMouwerik, L. Stevens, M.D. Seese, and W. Bohm. *Environmental Contaminants Encyclopedia* (Fort Collins: National Park Service, 1997).

[is] Ibid.

surface. Cold-mix technologies produce a lower-grade pavement than hot-mix processes and have a lower PAH content, are relatively nonvolatile, and emit fewer hydrocarbons. Cold-mix processes are generally used for patching.

Cold-mix technology can be broken down into four basic types – rapid curing, medium curing, slow curing, and asphalt emulsions – that are relatively liquid compared to hot-mix asphalt. Liquid asphalts are made in three ways – from lighter elements of residual asphalt, by dissolving asphalt cements in solvent, or by emulsifying asphalt cements in water. Liquid asphalts include *rapid curing* (RC) asphalt, produced by dissolving relatively hard asphalt cements in a kerosene or naphtha solvent. These materials are characterized by a high volatile organic compound (VOC) content due to the solvent. *Medium curing* (MC) asphalts are made by dissolving softer asphalt cements in a kerosene solvent. These materials may also contain PAH compounds, but in lower concentration than the RC asphalts, and may also contain a high VOC content due to the solvent. The asphalt installed in the 1970s on the Nevada Fall Corridor was a medium cure asphalt, specifically MC-8006, a product no longer available in California due to its toxicity.[29] *Slow curing* (SC, or "road oil") asphalts are made through distillation or by fusing the lightest asphalt cements with lighter oils. Trace concentrations of PAHs may be present in SC **asphalts.** *Asphalt emulsions are* asphalt cements in water. These materials may contain PAHs and are relatively nonvolatile. Each of the above is available

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[29] **Tim Ludington telephone interview, January 29, 2004.**

in several grades. The farther one progresses from lighter towards heavier oils, the greater the percentage of PAHs and other semi-volatile compounds."

Given the age of the asphalt in the Nevada Fall Corridor, it is doubtful that toxic runoff from that installation is an issue now: Because it was primarily an emulsion-soil mix installed several decades ago, and because cattle do not graze the region, few possible adverse effects are cause for concern for the existing surface. The possibility of adverse airshed and watershed impacts from forest fire effects on the asphalt should, however, be factored in as a possible source of toxins for the corridor's environment.

Should new asphalt be installed along the Nevada Fall Corridor, concerns exist about the impact on the adjacent landscape and riparian areas – particularly if a hot-mix process is chosen. While cold-mix asphalts do pose some measure of toxic emissions and runoff far more environmental risk is associated with work using hot-mix asphalt processes, particularly because all drainages in the corridor terminate eventually in the Merced River, which gained Wild and Scenic River status in 1987.31

Drainage Considerations

Adequate drainage is key to managing a trail system's longevity, with sufficient permeability of surfaces playing a major role. Pervious surfaces allow water to infiltrate down into the soil more easily; soil, sand, and porous pavement installations (such as

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" *CHRIS* - ***Hazardous Chemical Data Vol. II (Washington:*** **Government Printing Office, 1984-5): 102.**

[31] vvwwmps.gov/yoseiplanningisfbridge/ch5.htm

natural stonework, brick pavers, and high-tech porous asphalt or concrete mixes) allow moisture to flow below the surface and gradually percolate down. Impervious surface treatments prevent water infiltration into the soil, resulting in water sheeting off at a rapid rate and causing erosion. Impervious surfaces include conventional asphalt and concrete, compacted soil (from construction activities or other heavy use), or bedrock outcrops (of which Yosemite has many). With increased impervious surface area, the velocity and volume of runoff increases, with a concurrent decrease in soil infiltration and corresponding erosive effects.32

Engineering a quality drainage system is the first step in maintaining any site's natural hydrologic function, retaining as many natural contours and vegetation as feasible. The second step is restoring infiltration where it has been interrupted by the built environment.[33] Methods that emphasize infiltration and restoration, however, "often come into conflict with established development practices."[34] Yosemite National Park's decades-old practice of using bituminous materials on the Nevada Fall Corridor – which includes a section of the historic John Muir Trail has set a standard for trail construction and repair that may require rethinking and a new look at alternative approaches.35

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[32] *APA Journal* (Spring 1996): 244-253.

[33] Ibid., 253.

[34] Ibid.

[33] Ibid., 245.

Erosion Control

Yosemite's weather — cold, wet winters and hot, dry summers interspersed with intense rainstorms — plays a prominent role in the park's maintenance and resource management strategies. The Nevada Fall Corridor endures extreme temperatures in winter along with significant snowfall and subsequent ice buildup. As ice thaws and snowmelt increases, problems associated with erosion can become serious concerns for trails.

Parks throughout the country wrestle with this maintenance challenge on an ongoing basis. For example, at Valley Forge National Historical Park in Pennsylvania, water sheeting off pavement greatly exacerbated erosion on the Mt. Joy G trail, a steep, paved connector trail between an earthen trail below and a road directly above. The trail's original design proved unsuccessful because drainage concerns were not properly addressed in the overall trail construction, specifically at the upper end of the trail.56 Asphalt provided a hard surface for water to sheet down, building up speed and scouring soft surfaces along the way. Because drainage concerns *were* not fully addressed in the initial design of the trail, water flowed onto and down the trail, carving a deep gully where the runoff left the road and scouring another trail at its lower end. Water also filtered under the tread through cracks, creating frost heaves and drastically breaking up the asphalt and eroding tread.

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[36] Margie Coffin Brown, email correspondence, January 16, 2004.

To stabilize the gully, trail crews were advised to install checks and raise the grade to its previous level, approximately two feet higher.[37] The assessment also advised crews to divert the water flow from the road to a separate swale and, if asphalt was retained as the tread material, to build asphalt berms to direct water off the trail; pin logs to the asphalt; and add more asphalt above the logs to prevent water from flowing underneath. The assessment also recommended installation of drainage swales at the trail's lower end to redirect water that now flows onto another path below.[38] This repair work has not been completed.

Valley Forge is not unique in its experimenting with asphalt berms for redirecting water off trails. This was tried — without the pinned logs and additional asphalt suggested for the Mt. Joy G trail — on one section of the bridle path below Register Rock. These bitumen berm/steps do not show long-term success, with the berms sliding and buckling, resulting in an ineffective remedy and a marred appearance. Riprap steps and checks have proven more successful nearby on the trail, even where the route is directly up the fall-line.

These examples show that drainage infrastructure must be as thoroughly addressed with asphalt as it needs to be with gravel or dry-laid stone.[39] Due to its nature, asphalt is not as easily recontoured as gravel or dry-laid masonry surfaces, which *can* be sculpted by cutting in waterbars or creating swales to redirect water; these measures are

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37 Trails Assessment Mt. Joy G (Valley Forge National Historical Park, September 2003).

38 Ibid.

39 Margie Coffin Brown, email correspondence, January 16, 2004.

cumbersome when asphalt is the surface tread. Adding a rubble or crushed stone layer beneath the asphalt would encourage better drainage and help to reduce frost heave, lengthening the life of the treadway.40

Careful engineering is key to getting the best performance from any trail surface treatment. The USDA's San Dimas Technology and Development Center stressed the importance of this in reporting the results of a study on soil stabilization alternatives. The study noted that water can damage trails in many ways, including creating erosion across or down trails – a frequent problem on the Nevada Fall Corridor – and by penetrating voids in the surface that then cause freeze/thaw damage, also a problem on the corridor. Furthermore, the study recommended removal of several inches of native material in order to properly compact new sub-base, and to assure that enough aggregate is imported so that the finished, compacted surface is above the surrounding ground profile.41

Study author Roger Bergman emphasized the importance of not relying solely on the surfacing for a trail's long-term integrity, noting:

> Do not think that the use of soil stabilizers will relieve the responsibility of doing a thorough engineering design (and) following good construction practices. The necessity of this cannot be over emphasized! A properly designed trail is essential, and is especially important regarding issues of water.42

[40] Ibid.

[41] Ibid.

[42] Roger Bergmann, "Soil Stabilizers on Universally Accessible Trails" (USDA Forest Service San Dimas Technology and Development Center, September 2000): 8.

IV. ANALYSIS AND EVALUATION

Introduction

The Nevada Fall Corridor is a microcosm of all things finest in Yosemite — exquisitely crafted historic stonework, grand panoramas of waterfalls and domes, and the sound of gentle winds through towering cedars and firs. This is a place where walkers and horseback riders become time travelers, a place where one can still sense the "sublime" that drew John Muir, Frederick Law Olmsted, Theodore Roosevelt, Albert Bierstadt and others to assure Yosemite was preserved. Traveling along the corridor, visitors walk in the footsteps of the Sierra Miwok Indians, who knew the valley before anyone else; the young brothers Milton and Houston Mann, who realized the value of Nevada and Vernal falls so chose to improve the Indian path leading there; and the Army troops who patrolled and later mapped the park. Despite millions of visitors since its discovery, the Nevada Fall Corridor retains the enchantment and grandeur that leave visitors as spellbound as young Carrie LeConte was in 1878, when she wrote how Vernal Fall "frothed, boiled, and lashed itself with snowy fury like some angry lion."[1] That magic remains.

Carrie E. LeConte, *Yo Semite 1878 Adventures of N&C* (San Francisco: Book Club of California, 1964), 43.

Spiritually, then, the Nevada Fall Corridor is much the same now as it was in the 19th century. As a cultural landscape, however, it is constantly under threat – not only by the prodigious rainstorms that sweep away boulders and trees and walls and steps, but also by insensitive repairs to historic elements. Because this trail system contains some of the last pieces of the park's oldest intact masonry, it is crucial that these elements are recognized and cared for as one would for any national treasure – which is what they are. Their rarity is also why this report was undertaken. Nowhere else in the park do John Conway's 1870 stone steps gently curve around switchbacks with artfully engineered drainage systems. No other place in the park can boast of the view Albert Snow's hotel commanded from its site at the base of Nevada Fall. No other place in the park has long, intact remnants of George Anderson's remarkable trail design skills. This cultural landscape represents all of Yosemite's best qualities, natural and man-made, in a concentrated area accessible to most travelers.

Summary Statement of Significance as a Cultural Landscape

Within the national parks, the definition for "cultural landscape" comprises four general landscape types: historic designed, historic vernacular, historic site, and ethnographic.[2] The Nevada Fall Corridor is a historic vernacular landscape because its construction and physical layout reflect the methods, values, and social behavior of the eras in which it was built. These include landscape characteristics such as spatial

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[2] Robert R.. Page, Cathy Gilbert and Susan **A. Dolan,** *A Guide to Cultural Landscape **Reports*** **(Washington; U.S. Department of the Interior, 1998), 9**

organization, circulation, and structures, for both extant systems and abandoned remnants.

The Nevada Fall Corridor is significant as a cultural landscape for its association with the Romantic movement in American landscape history, which embraced visits to "sublime" landscapes *as a* cultural activity (criterion A); for the late 19a`-century stonework by masons John Conway and George Anderson (criterion C); and for the improvements made to this transportation corridor by indigenous peoples and under U.S. Army and pre-Depression U.S. Department of Interior supervision (criterion C).

The period of significance is defined by the time in which the corridor's core alignment was conceived, constructed, and completed – between 1856 and 1934. In 1856, the first Euro-American trail was forged up to Nevada Fall by the Mann Brothers. [3] In 1934, the comfort station was built at Vernal Fall Bridge, completing the main construction drives on t corridor. [4] Further distinctions can be made within this overall period of significance: an initial he period from 1856 to 1871 when the stonework tradition was established and much trail construction was undertaken; from 1871 to 1913, when hotelier Albert Snow was adding to his "empire" in both buildings and access trails; from 1891 to 1913, when the Army patrolled and mapped the park; and from 1913 to 1934, the era of dynamite-driven construction that dovetailed with the era of building in the Rustic style. Because development efforts within these periods overlapped widely, the

[3] James H. Lawrence, "Discovery of the Nevada Fall," *Overland Monthly* (October 1884): 370.

[4] C.G. Thomson, Completion Report #63, "Final Report Job No. 506.8 Vernal Bridge to Rock Cut" (Yosemite National Park, 1931).

overall period of significance for the Nevada Fall Corridor is the combined years 1856-1934.

Related Studies

More than 100 trails are listed on the National Register of Historic Places. Those in national parks include:

- Glacier National Park – the "Tourist Trails Historic District."
- Bryce Canyon National Park – two trails built by the CCC in the 1930s.
- Mount Rainier National Park – the 93-mile Wonderland Trail that is a contributing resource to the park's National Historic Landmark District
- Acadia National Park – a historic trail system of 250 individual trails.
- Zion National Park – six trails built between 1917 and 1930.

Statement of Significance from National Register Nominations

The Nevada Fall Corridor has been evaluated for National Register of Historic Places eligibility based on the following (excerpted verbatim from the National Register nomination)6:

The Nevada Fall Corridor is considered significant in transportation as one of the earliest trail systems in the park. The canyon trail system here probably began as a

[5] Because there is an existing National Register nomination, this report on the Nevada Fall Corridor can be used to amend that nomination to include cultural landscape characteristics and other elements covered here.

[6] National Register nomination by Linda W. Greene and James B. Snyder, "Mist Trail (including Silver Apron and Vernal Fall Bridges and Vernal Fall Comfort Station) and Nevada Fall Corridor Trails," 1989: section 8, 1-2.

passageway for Indian travel from the Yosemite Valley floor connecting with the southern branch of the historic Mono Trail. Later developed by some of Yosemite's earliest trail builders and hotelkeepers, the Vernal-Nevada Fall Trail system became a significant tourist attraction and remains one of the most popular recreational areas in the park. The riverside portion of the Mist Trail, passing along the mist-shrouded banks of the Merced to the base of Vernal Fall, was an early tourist attraction, with ascension to the top of the fall made possible first via wooden ladders and steps and later by a beautiful stone stairway blasted and carved out of the cliffs. The Vernal Fall Bridge and comfort station are locally significant in architecture as examples of the NPS rustic log style of architecture popular in Western national parks in the 1930s. Although components of the Nevada Fall Trail Corridor have been rebuilt and realigned several times, the corridor nomination includes earlier remains of trails and associated sites and structures as well as later renovations that are also considered historically significant because they illustrate changes in trail building techniques. These property types are described in the Multiple Property Submission Form and are associated with the historic contexts, 'Early Trails, Roads, Railroads, and Bridges of Yosemite, 1870s-1915' and `Rustic Architecture in Yosemite, 1904-1940.

By 1864, when the state of California began to manage Yosemite Valley, a tourist trail to the top of Vernal Fall and a path continuing along the north side of the Merced River and on to Little Yosemite already existed. The Merced River trail system here probably began as an Indian route and may have been the one followed by members of the Mariposa Battalion as they searched for Chief Tenaya's band in the 1850s. During 1869 and 1870, Albert Snow rebuilt the old Vernal Fall trail for horse travel connected with his La Casa Nevada hotel operation and for driving stock that he grazed in Little Yosemite Valley.

The corridor nomination includes early sections of original trails that are visible but not in use today as well as newer realignments. It also includes associated historical objects such as ... signatures of early climbers on the Vernal Fall cliff face, Register Rock, Anderson's trail sections, dams, causeways, and bridges, and sites of early structures, such as the Register Rock tollhouse, the blacksmith shop, the possible tent camp below Register Rock, and the La Casa Nevada hotel site. The Vernal Fall Bridge across the Merced is one of the significant structures included in this nomination_ It is widely used because of its location on the trail leading to Merced Lake via Vernal and Nevada falls and to Glacier Point via the 11-Mile Trail that branches off the former. The comfort station was executed by local forces under the supervision and direction of the Yosemite National Park engineering office. Both structures were designed to be in harmony with the environment, blending in with the timber in the nearby forest and with the rocks in the Merced River banyon. They are aesthetically pleasing and fine examples of the 1930s NPS rustic log style of architecture.'

[7] Though written in 1989, this nomination has not yet been submitted to the Keeper for determination as to its eligibility for listing on the National Register. A group nomination for all the park's historic trails, however, is under way.

Landscape Characteristics of the Nevada Fall Corridor

Overview

Landscape characteristics are the tangible and intangible "processes and physical forms that characterize the appearance of a landscape and aid in understanding its cultural value."[1] This analysis and evaluation of landscape characteristics on the Nevada Fall Corridor compares the results of the historical research with findings from the existing conditions inventory and survey, to determine changes to the historic character of landscape elements, and to identify significant and contributing features. The goal is to determine whether landscape characteristics that shaped the site during the period of significance are still present, and if so to what extent.

Natural Systems and Features

> The Yosemite Valley is the cradle of mountain storms. In the winter the tempests rage, compressed in that profound fissure, and in their struggles wreak themselves upon trees, and rocks, and trails._
>
> – Report to the Commissioners, 1889-90

Hydrology and geology figure prominently in the development of the Nevada Fall Corridor. Trail designers and builders learned to actor in the effects of flow from the Merced River, Milouette Creek, and intermittent streams after washouts repeatedly damaged both built and natural landscape elements. The region's topography also helped

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[1] Page, *Guide to Cultural Landscape Reports,* 53.

direct the development of the trail over time, with features such as Fern Grotto and Liberty Cap Gully compelling difficult construction projects.

The influence of the watershed is reflected in bridges along the corridor – Vernal and Nevada fall bridges, the Bailey bridges and the wooden bridges on the bridle path, and Silver Apron Bridge. Storm runoff at predictable channels prompted installation of the concrete-floor chute on the bridle path near Happy Isles, the dam above Liberty Cap Gully, and the significant rock wall system below Clark Point and through Liberty Cap Gully. Runoff patterns also impelled development of the numerous riprap tread and steps. Intermittent springs along the trail led to construction of the watering trough a quarter-mile from the Happy Isles trailhead, the basin at Porcupine Spring, and the numerous causeways.

Geological features that spurred the desire to build this trail system include the summits of the two waterfalls, Clark Point, and the rock outcrop that was dynamited in the Rock Cut. These features were chosen to be part of the corridor because they provided stunning panoramas and glimpses of the "sublime" so crucial in the park's earliest development (in the case of the Rock Cut, desire for a shorter route was the motivation, but care was taken to maximize views) Finally, as landmarks, Register Rock and Lady Franklin Rock were notable features in the corridor from the first construction efforts, serving as meeting point and viewpoint respectively.

These natural systems and features continue to influence the historic character of the trail today. The alignment has changed in some places and repairs have been made, both due in large part to climate and hydrology, but the corridor still highlights the same systems and features as it did during the period of significance.

A major feature of the corridor is Fern Grotto, which contains one of the most intact historic elements of the Nevada Fall Corridor cultural landscape – signatures from 1860 etched into a granite crevice. Completely obscured from casual view so still undisturbed 140 years later, they remain in remarkably good condition. Fern Grotto is also where wooden ladders served visitors from 1858 to 1897, when stone steps were installed in place of ladders? The original ladders, built in 1858 by Stephen Cunningham, were in two sections, the first beginning beneath the verhang in Fern Grotto and leading to a ledge midway. From here, visitors took a short dogleg to the second ladder, which reached the cliff top just south of Vernal Fall's summit. This two-part system was replaced in 1871 when Albert Snow erected a wooden stairway (with safety railings) to the top of the overhang **(Figure L1.1).** At the top of the ladders/wooden stairway, travelers followed stone steps down from the top of the cliff to

Figure L1.1– A wooden staircase replaced the ladders, which remained. Both were in place for this photograph (George Fisice, YNPRL Neg.#RL-15,638).

[2] Hank Johnston, *The Yosemite Grant 1864-1906* (Yosemite National Park: Yosemite Association, 1995), 150.

the slick rock at the summit of Vernal Fa11.[3] Roughly thirty of these steps still exist and are in good condition because their location is unmarked and off the main tourist trail, and their location does not subject them to rockslides.

Another key feature is the outcrop dynamited to create the Rock Cut, one the park's most significant trail construction projects. The path was cut into the rock in 1931 as an alternative to the "particularly discouraging" route to Nevada Fall[4] that led travelers down 235 vertical feet then back up 664 vertical feet to the top of Nevada Fa11.[5] The Rock Cut enabled a continual, moderate incline across a formerly impassable rock face.

Figures L1.2 and L1.3 The top photo shows laborers working on the Rock Cut in 1930 (Completion Report #63; courtesy Yosemite National Park). Lower photo shows condition in April 2003.

The project began in 1929

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[3]Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, 3.

4Completion Report #63, "Through Rock Cut to Nevada Falls," Job. No. 506.7 (July 1931): 1.

5Ibid.

when the park engineer sent two engineering staff members out to devise a route up to Nevada Fall from Clark Point. The next year, the park superintendent, landscape architect, and chief engineer all made "a number" of investigative trips to the site to finalize the route that would provide the best views and result in the fewest visual intrusions onto the landscape.6

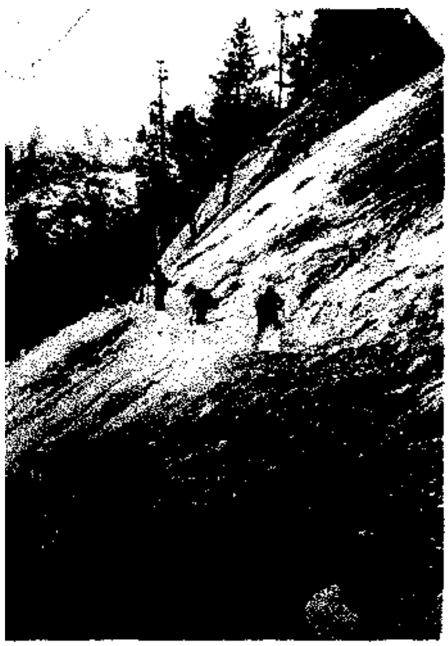

Figure L1.4 – "Jackhammermen" drill down to level grade in 1930 (Completion Report #63; courtesy Yosemite National Park).

The final location "minimized any possible construction scars from nearly all points of view as the cut is mainly hidden by contours running to the northeast and northwest on both sides"7 **(Figures L1.2** and L1.3). Originally a tunnel was planned in lieu of an exterior route, but this plan was abandoned due to persistent exfoliation of the granite face. Establishing the Rock Cut involved dynamiting a trail-width bench along 750 feet of granite. This construction was considered "the most difficult and dangerous ever accomplished in trail work in Yosemite National Park,"[8] with managers finding it "very difficult to obtain men who were used to construction at great heights and many of

[6] Ibid.

[7] Completion Report #63, "Through Rock Cut to Nevada Falls," Job. No. 506.7 (July 1931): 1-2.

8Completion Report #63, ""Through Rock Cut to Nevada Falls," Job. No. 506.7 (July 1931): final page (unnumbered).

the men refused to stay with the job."[9] Drilling and blasting work began thirty feet above grade **(Figures L1.4),** working down to the current trail bed and causing workers to be suspended — at the beginning of the project some forty feet above the final trail grade (one crewman, Mike Rhoades, was killed in this endeavor). As Gabriel Sovulewski wrote in his monthly supervisor's report:

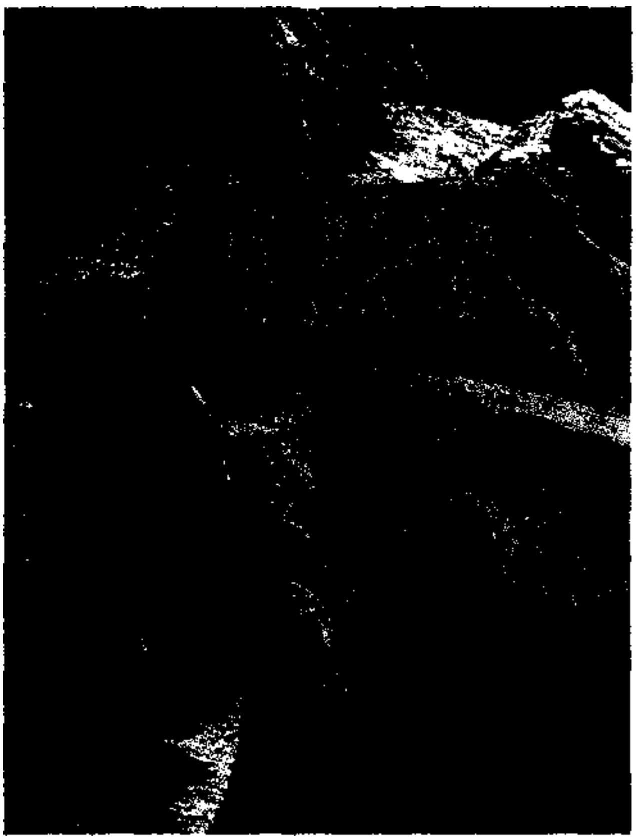

Figure L1.5 — The parapet wall provides safety and historic integrity In the Rock Cut. Note the water draining out of a scupper in the wall.

> Progress on the solid rock wall is rather slow, due to the fact that we are handicapped by loss of time on account of jackhammermea quitting frequently. It is difficult to get the right kind of man to work over the precipice.[10]

The Rock Cut still conveys its original intent and character, evoking the period of significance especially in the design of the parapet wall **(Figure L1.5).**

Liberty Cap Gully is another example of natural systems at work on the Nevada Fall Corridor. The zigzag route up the gully was described in 1884 as "both steep and sandy ... (and) is no sooner put in thorough repair than a thunder storm ...tears it to

[9] The main reason Liberty Cap Gully is maintained is for use as a winter **rescue route** to **the Rock Cut and other points above Nevada Fall (Jim Snyder, email correspondence, March** 17, 2004).
[10] Monthly supervisor's report file no. 207 ·02 (July 1930).

pieces." This was not the first, and would not be the last, comment from park officials about the gully's problems from inclement weather. In the 1870s, a frustrated Albert Snow built a dam near the top of Nevada Fall to protect Liberty Cap Gully from washouts. Between 1906 and 1931, the trail was nonetheless decimated by slides three times and park managers concluded it "would always be a dangerous passage."[11] A 1955 flood destroyed Snow's dam as well as the original trail; the dam was rebuilt and a footpath established around the head of the gully but a 1974 rockslide destroyed the path again. The lower section was rebuilt "more substantially" to better match the original construction method, and was realigned with the original route.[12] Other stonework reconstruction took place in 1995 and later. Washouts continue to pose threats to this site, but the repair work, most recently in 1997, has matched the quality and appearance of the original construction so conveys well the period of significance.

Figure L1.6 — The switchbacks up to Clark Point include this section of nearly solid riprap between switchbacks.

[11] **Linda Greene and James B.** Snyder, *National Register Nomination,* 1989, section 7, page 6.
[12] Ibid., 5.

Another vital section of the corridor much influenced by climate is the Porcupine Switchbacks, the region just below Clark Point on the John Muir Trail. This long, winding series of switchbacks was originally riprapped in 1931" and included numerous solid rock retaining walls **(Figure L1.6).** A rockslide in 1986 damaged some sections of these walls, but all were rebuilt.[14]

Building the original trail through the switchbacks below Clark Point was reportedly "of very difficult nature," requiring excavation and blasting to establish foundations for the walls, which were intended to "prevent obliteration of trail from the upper sides and to support foundations of retaining walls."" The trail designers also kept views in mind, noting in the project report that in this section, "No pains are spared to bring all views and natural features to add to the interest."[16]

Above the switchbacks lies Clark Point, originally named Point Clark in 1891-2 by the Yosemite Board of Commissioners in honor of then-Guardian Galen Clark, "the greatest of the Guardians of this indescribable scenely."[17] The name came at the same time as "a change in the Nevada Falls trail was made by which parties without dismounting get a thrilling view of the full face of Vernal Falls...." (No description of

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[13] Completion Report #61, "Final Report Job. No. 506.6 Vernal Bridge to Rock Cut Trail Construction" (April 1931).

[14] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 7.

[15] Supervisor's Monthly Report, File No. 207-2 (August 1930): 3.

[16] Completion Report #61, "Final Report Job. No. 506.6 Vernal Bridge to Rock Cut Trail Construction" (April 1931).

17Report of the Commissioners, 1891-2, 6.

this new route was included in the source, however.) No record was found stating when the name changed to Clark Point.

The Porcupine Switchbacks and Clark Point still underscore the same natural systems and features as during the period of significance. The stonework, though substantially rebuilt, still evokes the character of the historic period, and the alignment remains as when originally designed and built in 1931.

Register Rock also still conveys the period of significance, despite the loss of the 19th-century signatures that were considered an eyesore by park superintendent Harry Benson, who had them removed in 1907. [18] Nearby, the view from Lady Franklin Rock is the same as in the late 1800s, when visitors first began making the short detour from Register Rock to Lady Franklin Rock for a view of Vernal Fall. Those who didn't want to continue the climb through the mist would then return to their horses at Register Rock and take the bridle path around Clark Point to the top of Nevada Fall then down to Snow's Hotel. [19] The trail near Lady Franklin Rock was shifted slightly uphill from the riverbank during the period of significance, but the route and views remain essentially the same today as in the late 1800s, so contribute to the corridor's significance.

Despite success in taming portions of the corridor with constructed elements, natural systems still often take the upper hand, resulting in frequent repairs and reconstruction. This repair-damage-repair cycle has been the pattern since the trail was first built, and will likely persist as long as weather patterns remain as they have historically. Fortunately, trail crews have taken care in many places to retain historic

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[18] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 2.

[19] Lewis Stornoway, *Yosemite: Where to Go and What to Do* (San Francisco: C.A. Murdock & Co.), 84.

aspects that reflect the natural systems and features so that, individually and overall, they contribute to the period of significance.

Spatial Organization

The siting, alignment, and development of the Nevada Fall Corridor depended on spatial patterns influenced by natural systems, features, and topography, as well as the design intent for circulation and views. These decisions resulted in the loops that shape the corridor, allow alternate routing, and provide connections to backcountry trails. These design choices were made during the period of significance and remain defining factors.

The Nevada Fall Corridor was planned and built in stages, beginning with the initial trail up Vernal Fall. The next step was to reach Nevada Fall; once that was accomplished, other improvements were undertaken gradually. The first was the trail from Silver Apron up to Clark Point and the switchback route from Register Rock to Clark Point. Decades later, the Rock Cut work capped the main construction accomplishments during the period of significance.

The corridor's original vertical arrangement was an unbroken ascent to the top of Nevada Fall and an uninterrupted descent back to Happy Isles. An exception to this was the connector trail between Clark Point and Silver Apron. This route foiled climbers' desire for a direct ascent (i.e. without dipping down mid-route), however until the Rock Cut there was no other alternative – for stock trains and walkers unwilling to climb the precarious ladders – to reach the top of Nevada Fall.

The spatial patterns of the corridor also include access to the spectacular views that influenced early development. When Albert Snow established his hotel complex in 1870, he was drawn by the panorama as well as the ambience of the foot of a waterfall, so he situated his lodge to overlook the valley and Nevada Fall from between two of the park's most impressive waterfalls. Alignment elsewhere on the corridor also was designed to capitalize on the views. Broad, open outlooks along the corridor during the period of significance included those at Casa Nevada, the Rock Cut, Clark Point, the two waterfalls, the S-curve parapet wall, Nevada Fall Bridge, Valley View, the overlook above Silver Apron, and just above the watering trough a quarter-mile from the trailhead at Happy Isles. Less expansive views were from the former Register Rock Bridge, Verna/ Fall Bridge, Emerald Pool, and Silver Apron Bridge.

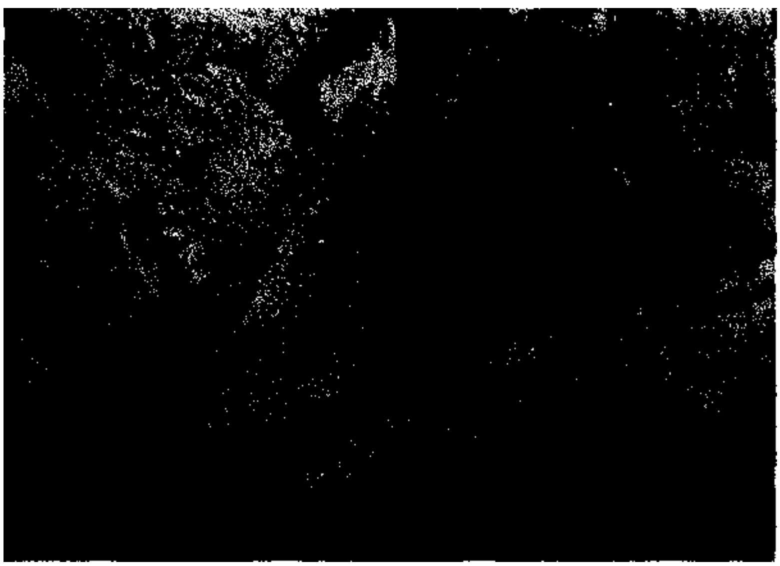

Figure L2.1 –The view just below Clark's Point during the 1930-1931 construction of new alignment, which decreased the grades (Completion Report it01, courtesy Yosemite National Park).

At Casa Nevada, while vegetation has filled in portions of the outlook toward the waterfall, the panoramas looking west and north from the site are still wide and expansive. Long-range views from the Rock Cut also remain unobstructed, as do the perspectives from the summits of the waterfalls, Clark Point, and the overlook between Silver Apron and Clark Point. The prospects from these today are the same as or very similar to those historically, so they continue to contribute significance. The view from Valley View is partially blocked by trees now, and above the watering trough – where Yosemite Falls originally was visible – the prospect is almost completely occluded today.

Sections of the corridor now abandoned also provide glimpses into the original intent for spatial design. The 1870 route from Register Rock to Clark Point had Nevada Fall as its final goal, as did the trail that supplanted it in 1931. The 1870 route was steep, with thirty and forty percent grades not uncommon **(Figure L21);** these were eased in the subsequent construction. Elsewhere, two 1882 Anderson trail branches split off from the current alignment – one near the S-curve parapet wall below Vernal Fall Bridge, the other above Silver Apron Bridge. Neither completes the direct link he envisioned between Happy Isles and Casa Nevada, so have resulted in "floating" segments that go nowhere. They do, however, evoke the period of significance because of their frozen-in-time quality, having been unused since at least 1929 in the case of the 1882 lengths, and since 1931 for the 1870 zigzags up to Clark Point. These abandoned sections provide some of the best examples of historic character along the entire corridor.

Circulation

Circulation regards not just the trail network but also consideration of where people historically went on these trails, why, and how well the design functioned. The corridor extends to the top of Nevada Fall and back, but along the route other paths depart for points outside this corridor. These more far-flung destinations were (and remain) less popular than the trails comprising the Nevada Fall Corridor, which can be traveled in a day or less. The corridor was designed primarily for visitors who were interested in a less rigorous experience with perhaps one overnight but not multiple nights. The corridor's main intent, then, was to showcase two waterfalls and accompanying viewpoints, providing access for both walkers and horseback riders. From 1870-1897, Snow operated his inn at the foot of Nevada Fall and offered further enticement to travelers in Yosemite who wished to stop for lunch or stay overnight in a remote, but comfortably appointed, setting.

The earliest circulation route was fairly limited, initially traveling only to Vernal Fall in the late 1850s but later adding extensions to Nevada Fall by way of Liberty Cap Gully. In 1870-1871, Albert Snow added the horse trail from the valley floor to Clark Point[y] by way of Register Rock. In 1931, the Rock Cut completed the loop system.

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[1] 1-lank Johnston, *The Yosemite Grant: 1864-1906* (Yosemite National Park: Yosemite Association, 1995), 44, 102.

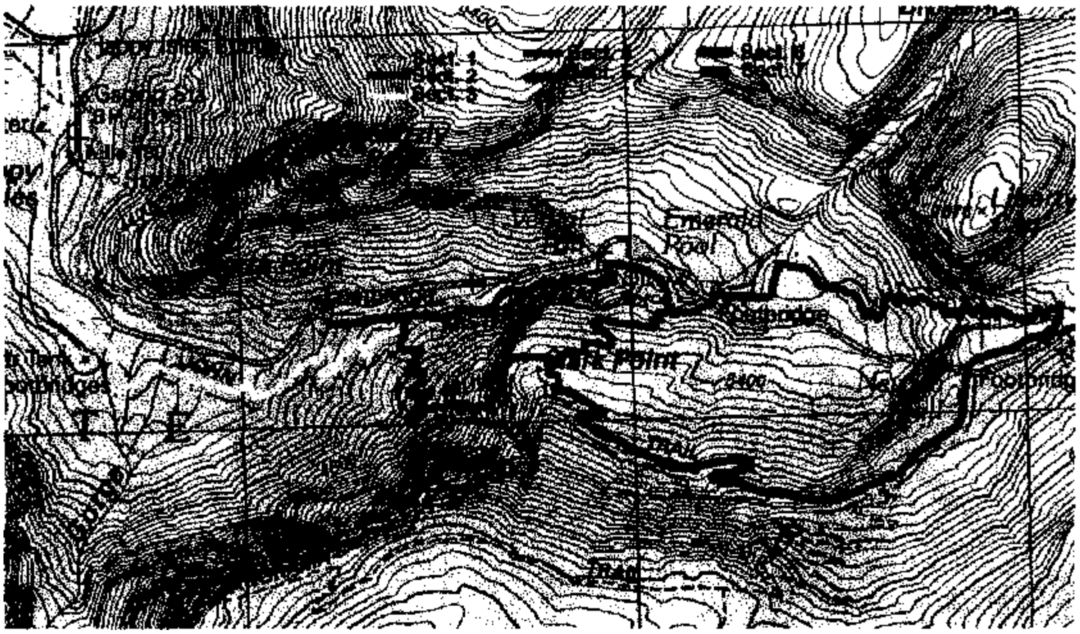


Figure L3.1 – The seven sections of the corridor, as delineated for purposes of analysis. Loops are possible on the corridor, however most visitors turn around at the end of Section 2 and return to Happy Isles. The more adventurous day-trekkers often continue to the top of Nevada Fall and come back via the John Muir Trail (USGS Half Dome Quadrangle. Denver: U.S. Geological Survey. 1997).

Since 1931, hikers have had several circuits to choose from to travel the corridor **(Figure L3.1).** They include: (1) to Vernal Fall Bridge on the footpath and back the same route to Happy Isles (north of the Merced River); (2) to Vernal Fall Bridge and back on the bridle path (south of the Merced); (3) continuing past Vernal Fall Bridge to the top of Vernal Fall and back to Happy Isles; (4) to the top of Vernal Fall, up to Clark Point and back down the John Muir Trail to Happy Isles; (5) to the top of Vernal Fall, up through Liberty Cap Gully to the top of Nevada Fall, and back down the John Muir Trail. Most casual day hikers end their climb either at Vernal Fall Bridge or the top of Vernal Fall, returning the way they went up.

Equestrians use the bridle path from Happy Isles to Clark Point, and can then drop to Silver Apron and climb up Liberty Cap Gully to Nevada Fall, or continue from Clark Point through the Rock Cut to the top of Nevada Fall. Connecting trails for both hikers and riders lead to Little Yosemite Valley, Half Dome, and other points beyond.

Figure L3.2 — The tread on Anderson's 1882 route was wide enough for wagons.

On both bridle and foot paths, trail width and surfitce treatment have changed dramatically in some areas since the inception of the trail system. The original trail was less than two feet wide,[2] with people traveling single file. By the 1870 Conway riprap work and George Anderson's 1882 extensions, trail widths had increased significantly **(Figure** L3.2). Anderson's intent *was* to establish a road for carriages; this is clearly evident in remnants of his work that are twelve feet wide. Widths during subsequent construction, however, ranged from four to seven feet, with six feet the average during the 1929-1931 construction period and remaining today. This width allows people to walk side by side comfortably or easily allow hikers to pass without having to detour off trail and possibly damage vegetation or trail edging. The six-foot

[2] The *very* first paths - established first by game and later by indigenous people - would have been about a foot wide.

width also is a more appropriate scale for hikers than was Anderson's caniage width, which by its commodious breadth feels uncomfortable and exposed.

Surface treatment also has changed significantly over the years. Riprap tread, introduced by Conway in the 1870s, has been extended. [3] With the introduction of "experimental oiling" and applications of bitumen beginning in the early 1930s, much of the riprap was covered by the bitumen — or asphalt emulsion — overlays, a trend that continues today. This has proved detrimental both in performance and aesthetics, with the bitumen eroding severely and creating tripping hazards, runoff channels, and puddling, as well as detracting from the historic character of the trail and being visually intrusive in a forest environment.

Other surface treatments used on the corridor include a high-aggregate-content concrete, used in many places on Section 4 as the trail ascends along the switchbacks, as well as in several areas of Section 5 en route and through the Rock Cut. While this high-aggregate mix creates runoff problems due to lack of infiltration — as does the bitumen — this concrete surface, when weathered, blends better visually than the bituminous surfaces and appears more durable.

An important factor in considering use of bitumen and concrete surfacing on the corridor is the continual washing of debris onto many portions of the tread. These surfaces were installed to reduce dust, but after debris washes onto the trail — which it invariably does because most of the trail is cut through hillsides — it forms yet another

[3] Riprap could have been laid as early as the 1856 Mann brothers' work., but no documentation is available for this. It is possible, for example, that some of the switchbacks between Register Rock and Clark Point, many of which are riprapped, could have been initially built by the Mann brothers and enhanced by Snow's 1870 construction.

dusty layer atop the bitumen or concrete, minimizing the intent to mitigate dust. Further, the grit on steeper reaches of the bitumen, such as the Porcupine Switchbacks, actually *increases* risk to trail users because sand atop the smooth, hardened bitumen proves treacherously slippery.

Critically, neither the bitumen nor high-aggregate concrete perform as well as riprap tread in allowing water to percolate through soil for better drainage. Furthermore, the riprap blends far better visually with the surrounding environment and, being the original surface treatment, enhances the corridor's historic character.

Topography

Topography in cultural landscapes refers primarily to built three-dimensional elements such as earthworks, terraces, and drainage ditches. A previous section on natural systems and features discussed topographical elements as they relate to geomorphology.1

In the Nevada Fall Corridor, the main built topographical changes include the:

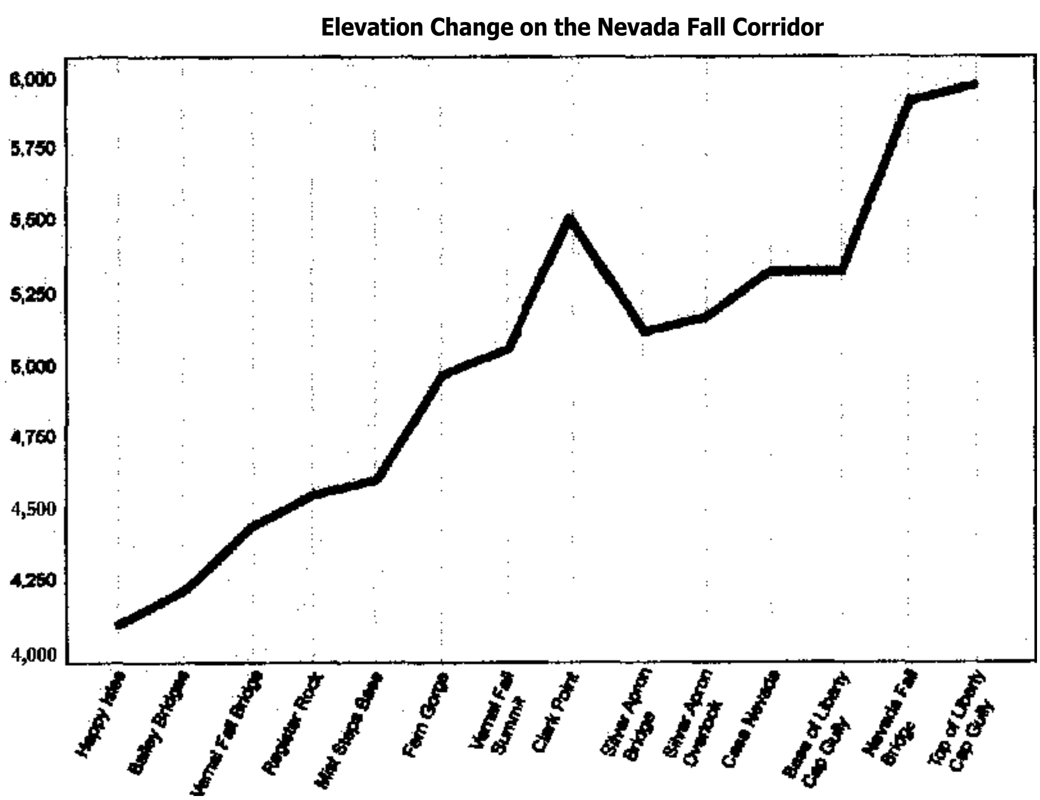
- Causeway at Casa Nevada
- Switchbacks
    - below Clark Point
    - through the Vernal Fall mist area
    - through Liberty Cap Gully
    - between Silver Apron and Clark Point
- Mortared-rubble dam above Liberty Cap Gully
- Causeways on the valley floor west of the Bailey bridges
- Original causeway remnant beside Horse Bridge #1
- Original causeway/retaining wall remnant near 1910 concrete dam
- Numerous elevated sections of the bridle path below Register Rock.

The causeways and elevated sections seldom rise more than three or four feet above the forest floor where they are situated. The switchbacks vary widely in the distance between corners, some being as short as eighteen feet and others well over 400 feet. Likewise the dams are distinctly different, one being concrete and fourteen feet long, the other compri ing mortared rubble appearing in several short sections between naturally occurring boulders along the bank of the Merced River.

Other considerations in discussing topography include trail alignment and relationship to bodies of water. The corridor in general takes an organic form, following natural contours in the land or the waterways, rarely proceeding in a straight line for long

1**Susan Dolan, email correspondence, March 2, 2004.**

distances. This quality helps the trail merge more seamlessly into its surroundings, subtly establishing a stronger link between traveler and landscape. The main exception to this organically driven route-finding is the nearly quarter-mile straightaway along the Rock Cut, which follows the contour of the rock face through which the trail was dynamited. Elsewhere, the trail passes over several water features, including lllilouette Creek, the Merced River, and several intermittent streams. It is not obviously clear why most of these bridges and causeways are located where they are, with the exception of Nevada



Rgure L4.1 – The corridor's elevation change by location (Graphic by Marti Gerdes. Source: Kent van Wagtendon, Yosemite National Park GIS division; USGS Half Dome Quadrangle 1997; Completion Report #63, July 1931).

Fall Bridge, which uses the narrowest passage available on a flat stretch. The Vernal Fall Bridge was originally located farther upstream near Register Rock; this location can be estimated – there are at least two logical sites – but is not distinct.

In respect to orientation, the corridor primarily follows an east-west alignment, although both the bridle and footpaths begin on a north-south configuration and the first half of Section 4 tends to run north-south. Once it leaves the valley floor the trail maintains a general ascent, except for the drop from Clark Point down to Silver Apron and back up toward Nevada Fall **(Figure IA.1).** The trail bed itself is cut into hillsides along most of its length after it leaves the valley floor, except for where it levels off atop Venial Fall, Casa Nevada, and Nevada Fall.

Views

Views were central to the creation of the Nevada Fall Corridor and continue to contribute to its integrity. Trail designers diligently captured panoramas from the old Casa Nevada hotel, Clark Point, the Rock Cut, and Nevada Fall, as well as more discrete outlooks from other bridges, overlooks, and switchback clearings. Even the overlook from Lady Franklin Rock toward Vernal Fall was considered important enough to guide travelers off trail for its view.

The 1885-6 Report of the Commissioners remarked:

> The views at various points on the Vernal Canon trail – embracing within their scope Yosemite Falls, Glacier Point, Too-loot-a-we-ack Falls [now Illilouefte Fall] and the tumultuous dash of its waters down the gorge of the South Cation, together with Echo Wall and Vernal Falls ... there is a presence of sublime beauty ... hardly equaled elsewhere in the valley.2

The views today mostly still encompass the breadth and horizon the commissioners described nearly 120 years ago. The westernmost part of Casa Nevada, for example, still offers an outlook similar to that in 1870 when the Snows first lured tourists with the creature comforts of their hotel. As a visitor in the late 1880s wrote:

> near the foot of Nevada Fall is the hotel known as the Casa Nevada (Snow House). From this place is an unsurpassed view of the fall and of the surrounding landscape, of which the enormous granite dome known as the Cap of Liberty forms the boldest feature?

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[2] Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove, 1885-86 (Sacramento: State of California, 1886).

[3] Lewis Stornoway, *Yosemite: Where to Go and What to Do, A Plain Guide* (San Francisco: CA. Murdock & Co., 1888), 37.

Figure L5.1 - The Alpine House stood on the western edge of this outcrop (E. & H.T. Anthony, Neg. #RL-16,458.Courtesy Yosemite Research Library).

While the views west and north from Casa Nevada remain the same, the perspective toward the waterfall itself is much changed due to dense tree growth. **Figures L5.1 and L5.2** were both photographed looking west from the top of the slickrock at Casa Nevada. Figure L5.1 shows the original "Alpine House" built in 1870; Figure L5.2 was taken in 2003 from a slightly higher position *and* shows more of the outcrop and a wider panorama, but the view is the same. Figure L5.1 shows how the Alpine House sat below the top of the slickrock. Taken together, the images show how little the view, at this location, has changed over the years.

Figure L5.2 – The current view where the Alpine House once stood.

However, immediately northeast is a site where the view has changed dramatically. **Figure L5.3** portrays the scene in the 1870s-1880s after Snow built the causeway to hold water for a reflecting pool. This photo was probably taken from the causeway itself **Figure** L5.4 was taken in 2004 from the middle of the causeway to show the scene today - completely blocked by a dense band of young conifers that separates the causeway from the slickrock where the structures in Figure L5.3 stood. Young cedars have also taken root on the fringes of the causeway itself and could eventually block that passageway if not thinned.

Figure L5.3 – Snow's buildings circa 1880 (George Fiske, Neg. #1667. Courtesy Yosemite Research Library).

No tree cutting is needed at Clark Point, however, which offers the same view as it did historically due to limited vegetation and its location in a large-talus and slickrock zone. **Figure L5.5** shows the scene in 1941 while **Figure L5.6** was taken in 2004. While a few more cedars have sprouted on the slickrock to the south, the views remain

Figure L5.4 – The view today, where Snow's reflection pool once stood as shown in Flom L5.3.

Figure L5.5 - **Young women relax at Clark Point in 1941 (Neg #RL-309. Courtesy Yosemite Research Library).**

the same sixty-three years apart – as do visitors' lunch spots and sign locations. However, a young cedar is growing on the north edge of the trail and will eventually obscure part of the Nevada Fall view if not removed.

As the trail climbs from Clark Point toward the Rock Cut, it passes through a large-talus zone that has changed minimally since at least 1943, judging by **Figure L5.7,** showing U.S. troops training during WWII. Little contrast is seen in either vegetation or long-range view in a photo taken in April 2004 from the same approximate site **Figure L5.8.**

Figure L5.6 – Hikers take a break at Clark Point in 2004.

Two other historic views have been lost in the corridor, the first just above the watering trough on Section 1, the second at Valley View on Section 4 near where the heavily walled switchbacks commence. Valley View was so named for its once-panoramic perspective, but trees today block much of the overlook.

In summary, losses of views on the corridor are located at:

- Casa Nevada; the band of trees separating the slickrock plateau from the former causeway-area view west
- Valley View
- Just above the watering trough, at the slickrock on the tail's east side, toward Yosemite Fall and Washburn Point.

These losses do not seriously impact visitors' experience, given the numerous other vantage points offering similar and sometimes superior views. However, restoration of the views would increase the corridor's integrity.

Figure L5.7 - Army troops train in 1943 above Clark Point (Neg.#RL-13,350, by Ralph H. Anderson. Courtesy Yosemite Research Library).

Figure L5.8 — The same view as Figure L5.7, but in 2004.

Vegetation

Appreciation for the native trees and other flora within Yosemite National Park has long been on the minds and agendas of park managers. Efforts were made in developing the Nevada Fall Corridor to include access to scenery ranging from towering trees to small herbaceous materials. In recent years, this appreciation has extended to include clearing forest debris with controlled burns and thinning trees to better preserve the park's native plants and trees.

Park managers learned early on the value in removing vegetation when necessary, to enhance the growth of neighboring plant life as well as to create and perpetuate key views to significant features. As early as 1891, the Yosemite Board of Commissioners was aware of the detrimental effects of vegetation encroachment, noting:

> ... the valley originally was a forest park, dotted with open meadows. Its Indian owners kept the floor clear of underbrush. It is known that besides the careful use of fire for this purpose they annually pulled up unnecessary shrubs and trees as soon as they sprouted. This protected the large trees from destruction by fire and left a free view of the walls, waterfalls, and beauties of the valley. Letting nature have her way in choking every vista with underbrush has obscured many of the finest views, has hastened the destruction of many fine old trees, especially the oaks ... and has increased the risk from fire .[4]

Apparently, this call to action was heeded, because the 1899 report to the commissioners noted, "another favorable result of the brush removal has been the opening of the grand views of the wonderful waterfalls and cliffs of the Yosemite."[5]

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[4] **Report of the Commissioners, 1891-2, 6-7.**

[5] **Report of the Commissioners, 1899, 6.**

Managers also have recognized the value in tree thinning to prevent destructive forest fires such as the A-Rock blaze that decimated a nearby area in 1990.[6] Forest fires had been suppressed to a great degree in the park beginning in the 1920s and in some areas since the 1860s.[7] The Sierra Nevada's high incidence of lightning-sparked fires – an average of fifty-five each year plus American Indians' practice of burning acreage annually had kept forest fuel accumulation to a minimum prior to the arrival of Euro-Americans.[8] The devastating effects of some lightning-caused fires in modern times helped persuade the park to institute a controlled-bum plan in 1970 to reduce the "dog-hair thickets" aptly described by Aldo Leopold in 1963 in an essay encouraging restoration of primitive open forest.[9] In 1972, the park also commenced a practice of allowing most naturally ignited fires to burn.[10] A park-wide fire management plan is being developed.

Although ihe desire for broad views from the valley floor provided early impetus to clear dense vegetation and develop contemporary fire management practices, the allure of simply strolling along a verdant pathway also proved **compelling.**[11] In 1921, just five

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[6] "Lightning-caused Fires Restore the Health of Yosemite's Forests" (Yosemite National Park News Release, July 30, 2002).

[7] Draft Yosemite Fire Management Plan Environmental Impact Statement, www.nps.gov/yose/planning/firellpurposehtm (April 20, 2004).

[8] Ibid.

[9] Ibid.

[10] Ibid.

[11] "The woods are lovely, dark, and deep," from Robert Frost's "Stopping By Woods on a Snowy Evening" likewise called attention to this impulse.

years after the inception of the National Park Service, a report to the Secretary of the Interior served as a clarion call for the establishment of trails through "nature, unspoiled":

> The effort this season to stimulate foot travel in the parks – hiking it is popularly called – by the establishment of walking trips ... was met by a ready and gratifying response. ... We have yet to learn a lot from foreign countries where well-developed hiking trips are among the most popular forms of outdoor recreation. ... The eventual larger enjoyment of our parks will depend upon the extension of footpaths and trails away from the beaten paths of travel. (To areas of) undisturbed primeval wilderness ... then, will lead the footpaths and trails, opening up the innermost secrets of nature, unspoiled ... 12

The trails within the Nevada Fall Corridor provide access to such "innermost secrets of nature," beginning with pathways through groves of dogwoods, currant, live oak, and California bay laurel in the lower elevations. As elevation increases, Ponderosa pine, white fir, Douglas fir, and incense cedar grow prominently along the trail. In summer, Indian paintbrush, penstemon, and other wildflowers abound along with various grasses. Within the spray zone of Vernal and Nevada falls, a variety of ferns and wildflowers flourish in the moist environment.

Yosemite continues to increase its vegetation management practices to protect such resources, most recently to include tree thinning at the base of Yosemite Falls in 2003 as well as frequent prescribed burns elsewhere on the valley floor in spring 2003 and 2004.

[12] Report of the Director of the National Park Service to the Secretary of the Interior for the fiscal year ended June 30, 1921 and the travel season 1921: 28-9.

Buildings and Structures

Bridges, retaining walls, hotel buildings, stone staircases, dams, and a Rustic style comfort station were built along the Nevada Fall Corridor during the historic period to link trails and otherwise enhance visitor experience. Many of these structures have been replaced, some numerous times, with care taken to retain their historic character. The corridor also includes intact examples of original craftsmanship dating at least to 1870.

The Rustic style of architecture popular in American parks in the 1930s shows clearly in the extant buildings and structures on this corridor. Two significant bridges – above Silver Apron and below Vernal Fall – display hallmarks of the Rustic style through use of indigenous materials that blend into the environment. The most pristine example of the Rustic style is the comfort station, with its battered random-rubble walls, low profile, and location tucked in among boulders and trees near a whitewater stretch of the Merced River. Other historic stone structures on the corridor include prominent retaining walls and riprap tread.

Bridges

Early bridges on the trail were established for the convenience of visitors, with construction encouraged by innkeepers and toll-trail builders hoping to profit from tourism. Yosemite settlers Stephen Cunningham and Albert Snow built the trail from Register Rock to the base of Nevada Fall in 1869-1870[1] to create access to Snow's future

1Hank Johnston, The *Yosemite Grant: 1864-1906* (Yosemite National Park: Yosemite Association, 1995), 44.

hotel.[2] In order to reach the hotel, the Cunningham-Snow trail crossed the Merced River via a bridge built in 1866 near the current Silver Apron Bridge (most recently replaced in 1997).[3]

Today, the Silver Apron Bridge exhibits a modernized Rustic design, with chamfered posts and wooden rails of dimensioned lumber rather than logs as built originally. As do all but one of the bridges in the corridor today,[4] it features steel stringers for increased longevity. It is unclear when the first Silver Apron Bridge was built at its current location? but a version in 1914 replaced "a former structure" at the same site.[6] The 1914 bridge included pine stringers and dry-laid rubble abutments. The next version, built in 1931, featured log girders with plank flooring, log rails, and mortared abutments **(Figure L7.1).**[7]

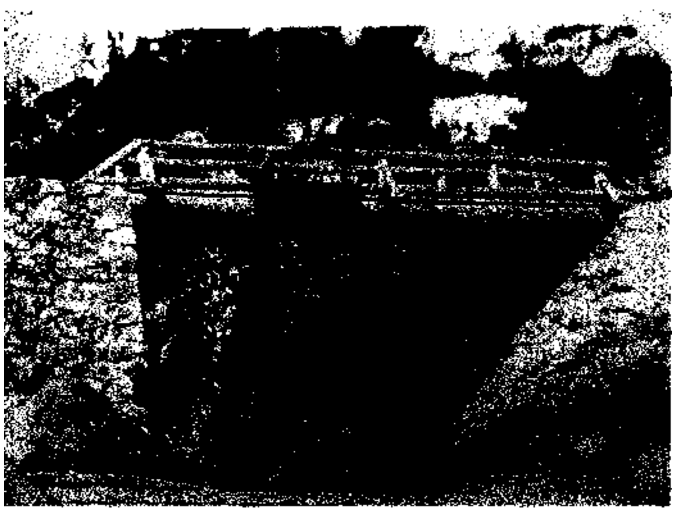

Figure L7.1 - The Silver Apron Bridge in 1931 featured two-foot diameter pine stringers and dry-laid abutments (Unnumbered. Courtesy Yosemite Research Library).

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[2] 1bid., 102. Cunningham previously built a trail in 1858 from the valley floor to the top of Vernal Fall, as well as the first ladders up through the mist section beside Vernal Fall.

[3] Report of the Commissioners (1866-67): 2.

[4] Horse Bridge #1.

[5] No data about the bridge between the 1866 reference and the 1931 completion report narrative was found.

[6] Completion Report #59, "Final Report Job No. 506-9 Silver Apron Bridge" (April 1931).

In 1939, the bridge was again replaced, with the logs on this version treated with a "10% solution of copper sulphate" to forestall insect damage and dry rot.[8] The next recorded Silver Apron Bridge was a Bailey bridge installed in 1962. Severe flooding in winter 1997 undermined the south abutment of this structure, leaving the bridge suspended in air. The current bridge was built later that year **(Figure L7.2).**

Figure L7.2 — Silver Apron bridge ca. 2000 (Courtesy Tim Ludington).

Silver Apron Bridge is not unique in having a history of replacement and relocation. The first bridge across **the Merced** below Vernal Fall was known as Register Rock Bridge[9] *because* it was built near that landmark in 1885-1886 to connect George Anderson's 1882 north-side trail with Snow's trail on the south side.[10] In 1908, Register Rock Bridge was replaced by Vernal Fall Bridge at its current location, then rebuilt in 1914.[11] It was reconstructed again in 1928; a report describes it as a log bridge

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[7] Ibid.

[8] Superintendent Lawrence C. Merriam memo to regional directors, December 29, 1939, Trails Box 83.

[9] Report of the Commissioners (1866-67): 2.

10 Report to the Commissioners (1885-1886); 9; and Lewis Stornoway, *Yosemite: Where to Go and What to Do, A Plain Guide* (San Francisco: Murdock & Co., 1888), 35-36. Stornoway comments that a bridge was situated "about a quarter of a mile from the bottom of the fall."

[11] Final Report, Job. No. 506-9, Silver Apron Bridge, April 1931.

with stone piers and abutments. [12] Its deck was divided by a log rail in the middle into an upper section for pedestrians and a lower portion for horses, and included a steel safety rail. In 1939, a reconstructed version using steel rails and trusses with a log facade was built **(Figure L7.3**). [13] The steel railings were replaced in a later reconstruction that reverted back to a Rustic design but with contemporary (i.e. dimensioned) lumber.14

Figure L7.3 – Vernal Fall Bridge in 1939 included steel stringers with a log facade (Ralph H. Anderson, Neg. #P-3167. Courtesy Yosemite Research Library).

Nevada Fall Bridge also has been replaced numerous times, with the earliest version built by 1870 at a location a half-mile upstream from the current site. [15] This bridge remained at least through 1879; the next reference to a bridge above Nevada Fall was in 1897-98, when a bridge at the site was "renovated and strengthened by trusses." [16] The next evolution of bridge came under acting superintendent Gabriel Sovulewski in

[12] Report of Construction Activities 1929 Season.

[13] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 7.

[14] No records were found for this work.

[15] The 1865 Gardner map shows the trail above Liberty Cap Gully continuing east another half mile then looping back over a bridge and becoming the Glacier Point trail; the original bridge spanned the river here. Because this map also shows Snow's Hotel — which wasn't built until 1870 —this must be the 1870 revised edition of the 1865 Gardner map. Regardless, the original bridge above Nevada Fall was at least established by 1870.

[16] Report of the Commissioners (1899): 7. Also, the 1878-9 Wheeler Survey map shows the "Old Br" at the same site. No other design details were given, including location.

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1908, but no details were offered.[17] In 1913, a report noted construction of a "horse and foot bridge" above Nevada Fall that was sixty feet long and six feet wide.[18] This was replaced in 1930 by a modern, wider bridge of a queen truss log design.[19] Due to decay, this bridge was replaced twice between 1930 and 1941, so in 1941 a more permanent design was established, this time using a steel girder system with log trim.[20] This structure was built immediately adjacent and upstream from the previous bridge so visitors could still cross the river during construction.[21] In 1962, this log bridge was replaced with a steel Bailey Bridge that lasted thirty-five years before being lost to the same 1997 storm that destroyed Silver Apron Bridge.

The current Nevada Fall Bridge differs distinctively from the current Vernal Fall and Silver Apron bridges. Though the current Nevada Fall Bridge features two rails, they are mounted straight to the posts (without the 45-degree diagonal turn on the other bridges), and the posts are not chamfered as on both the Silver Apron and Vernal Fall bridges. In fact, except for its larger mass and use of treated lumber, Nevada Fall Bridge is most similar to Horse Bridge #1, the oldest wooden bridge on the corridor, and the one with the least historic character.

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[17] Completion Report #59, "Final Report Job No. 506-9 Silver Apron Bridge" (April 1931).

[18] Acting Superintendent's Monthly Report (1913). No other details were noted.

[19] Completion Report #59; and Lawrence C. Merriam, "Trails in the High Sierras" (Sierra Club Bulletin XXVI, No. 1, February 1941): 123.

[20] Lawrence C. Merriam, "Trails in the High Sierras" (Sierra Club Bulletin XXVI, No. 1, February 1941): 123.

[21] Completion Report #221, "Nevada Fall Trail Bridge Account No. 506,24" (May 1942).

In summary, the wooden bridges in the corridor have the following distinctions and similarities:

Horse Bridge #1– one rail, not mounted diagonally, thirty-two inch rail height, the only bridge with untreated lumber (the paint on which was peeling badly in April 2004).
Horse Bridge #2 – one rail, mounted diagonally, single rail, chamfered posts, thirty-inch rail height, treated lumber.
Vernal Fall Bridge – two rails mounted with diagonal turn, chamfered posts that rise above the top rail, forty-two inch rail height, treated lumber.
Silver Apron Bridge – two rails mounted with diagonal turn, chamfered posts that rise above the top rail, forty inch rail height, treated limber.
Nevada Fall Bridge two rails mounted straight to the posts (without a diagonal turn), posts not chamfered, forty-one inch rail height, treated lumber.

Bridges requiring attention on the corridor include the Bailey bridges, Nevada Fall Bridge, and Horse Bridge #1. The Bailey bridges have proven longevity but lack historic significance and do not blend with the surrounding environment. Additionally, they make no attempt to harmonize with the styles of the other bridge designs, all of which are of the Rustic school (although not all are ideal representatives of the style).

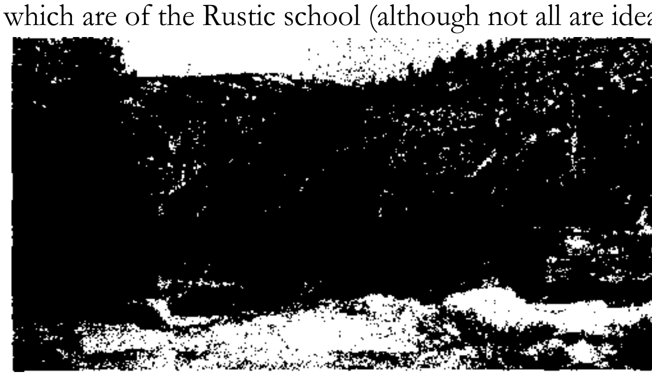

Figure L7.4 – Nevada Fall Bridge in 1941, with log trim over steel stringers (Hilton, Neg. #RL-18,808. Courtesy Yosemite Research Library).

Nevada Fall Bridge causes concern for the inappropriate repairs to its masonry abutments and aprons, and because it is not consistent in design with the two other major wooden bridges. Horse Bridge #1 draws concern because it is not consistent with the other wooden bridges and because of its lack of maintenance, evident in its peeling paint.

Buildings

The largest complex of buildings on the corridor was Casa Nevada, which stood at the base of Nevada Fall in the 1870s-1890s. Today, the site is bare except for scattered foundation stones, broken glass and crockery, and a few nails. The site where Casa Nevada stood is a significant historic site because it was one of the handful of pioneer hotels in the park in the late 1800s, a key period in western expansion that included the development of the hospitality industry within national parks.[22]

Figure L7.5 – Snow's hotels circa 1880 included the Chalet on the left and Alpine House on the right (George Fiske, Neg. #1667, Courtesy Yosemite Research Library).

Snow erected two main buildings Casa Nevada to accommodate guests. The

Figure L7.6 –The Chalet, circa 1880 (J.J. Reilly, **Neg.# RL-16,481. YNPRL).**

[22] Archeological site record CA-MRP-1652H (Yosemite Archeology Office, El Portal, Calif, 2002).

first was a one-story, rectangular building known as Alpine House, which he built in 1870. He doubled its size and added porches by 1871 **(Figure L7.5),** providing twelve rooms. By 1875 he had added the one-and-a-half story Chalet **(Figure** L7. 6), which had ten bedrooms and a parlor, increasing his overnight guest capacity to about forty. His other structures included a woodshed, an icehouse, a log cabin, and stables.[23] Once Snow abandoned the site, the buildings began to decay and in 1900, the hotel itself burned. In 1972, the Sierra Club cleared the site and placed historic artifacts – including the hotel register, which was signed by John Muir in the Yosemite Museum.

Figure L7.7 – The comfort station under construction in 1934 (Completion Report #141. Courtesy Yosemite National Park).

The only historic, extant building on the corridor is the comfort station at Vernal Fall Bridge. This building gives visitors an accurate impression of Rustic architecture in a pristine, backwoods setting, with the building tucked in behind large boulders and trees; many visitors are surprised to find flush toilets and washbasins within (a sewer line installed in 1971 from Happy Isles runs unobtrusively beneath the bridle path).[24] Built in

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[23] Hank Johnson, *The Yosemite Grant: 1864-1906: A Pictorial History* (Yosemite National Park: Yosemite Association, 1995), 87-89.
[24] www.den.nps.gov/ainoebaffIC/TIC.NSF (March 13, 2003).

1934 **(Figure** L7.7), this well-maintained building clearly reflects the period of significance. It is a contributing resource.

The Nevada Fall Corridor also includes two composting toilets of contemporary design. The solar-powered unit at Nevada Fall is prominently located at a trail junction but, with its wood siding and roof, harmonizes with its surroundings. The privy on the plateau atop Vernal Fall is concealed off trail but accessed by well-crafted, contemporary stone steps.

Retaining walls

The numerous retaining walls in the corridor – especially on the Porcupine and Liberty Cap Gully switchbacks – convey historic character despite many having been repaired or rebuilt, often more than once. The switchbacks below Clark Point's western edge – the upper stretch of which is known as the Porcupine Switchbacks – comprise a prominent series of dry-laid rubble masonry structures totaling a half-mile of linear footage.[25] Building the trail trough here in 1931 was reportedly "of very difficult nature," requiring excavation and blasting to establish foundations for the walls, which were intended to "prevent obliteration of trail from the upper sides and to support foundations of **retaining walls.**"[26] This section includes a complex S-curve wall, steps cut into the switchback walls themselves, and walls that top twelve feet in height Despite frequent .mage by major rockslides – the most recent in 1986 – and subsequent repairs,

[25] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 7.

[26] Supervisor's Monthly Report, File No. 207-2 (August 1930): 3.

these walls still contain many sections of original work dating to 1931. Contemporary construction is often distinguishable by whiter, less mossy stones and the presence of drill marks in the stones from use of explosives. This work usually blends well with the historic construction, with tight joints linking new and old sections. A few historic sections, however, were built more loosely than some contemporary lengths, resulting in a stark contrast.

The switchbacks through Liberty Cap Gully offer another section of significant dry-laid masonry The majority of these walls and steps have been rebuilt but remnants of original workmanship remain, including an extant section built in 1870-1871 on a straightaway just below the topmost switchbacks.[27] The 1870s work used very small rocks for the base of one wall (at the straightaway) and at the bottom of the gully on a short stretch of original riprap. This use of smaller stones is not uncommon in early masonry found in the corridor. Contemporary repairs to this section harmonize with the original work, with the main distinction being drill marks on the stone, cleaner stone, and absence of moss in joints.

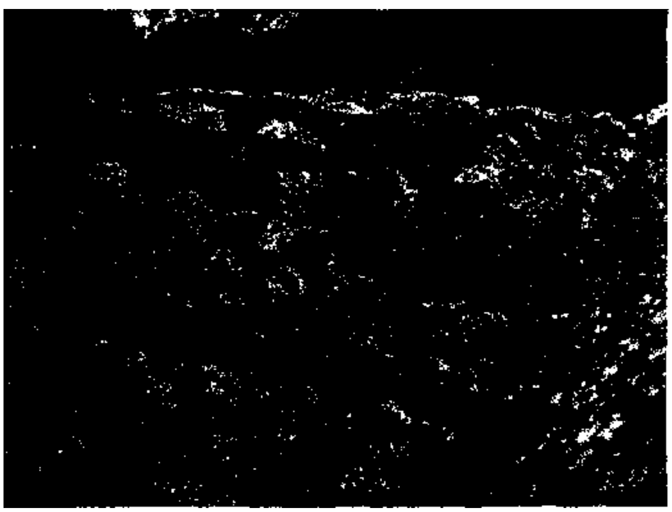

Figure L7.8 – **A remnant of Anderson's 1882 retaining wall structures built for a wagon road. This lies north of the Merced River en route to Vernal Fall Bridge..**

[27] **Johnston,** *The Yosemite Grant,* 86.

The corridor also contains abandoned trails with distinctive, original thy-laid walls, often fully intact **(Figure L7.8).** These include (and are described in detail in Existing Conditions):

- The wall/causeway leading from the bridle path to the 1910 dam [28] (Section 3)
- The ten-foot wall beneath a boulder on the bridle path by the cascades (Section 3)
- The wall in the abandoned trail visible near Clark Point (Section 4)
- The wall bolstering a large boulder on the concealed length of abandoned trail near Clark Point (Section 4)
- George Anderson's retaining wall above the talus zone (Section 1)
- Lengths of Anderson's walls supporting his road north of Silver Apron Bridge (Section 7)

Each of these is a wonderfully intact example of the nature of masonry work during the period of significance, and each conveys the historic character of the Nevada Fall Corridor.

Parapet walls

The corridor includes two mortared-rubble parapet walls – the S-curve wall (Section 1) built by National Park Service crews in 1929, and the parapet wall at the Rock Cut (Section 5). The S-curve wall sits atop a retaining wall built in 1882 by George Anderson;' his original walls are visible at the base of the parapet, [30] which exhibits contemporary repointing. The Rock Cut parapet wall, built in 1931, also shows fairly

n This abandoned wall — and the trail associated with it — may be part of the original south-side path, so the stonework could date to work by Snow in 1870 or possibly back to the Mann brothers' trail blazing in 1856 (Report of the Commissioners, 1884,19). But because it travels to the 1910 dam for the valley water system, it clearly dates at least to 1910.

[29] Ibid.

" Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 6.

recent repointing. Despite the contemporary work, both walls convey the period of significance.

Other stonework

Other historic stone resources on the corridor include the staircases that climb alongside Vernal Fall, and the original riprap tread sections on Sections 1, 5, 6, and 7. The staircases, though rebuilt most recently in 1997-1998, incorporate historic design and craftsmanship that make them appear much older than they are. The original riprap tread gives visitors the sense of travel in an earlier era, the rough surface drawing attention to its unique character and providing the best-drained hardened surface in the corridor.

John Conway is believed to have built most if not all of the original riprap tread remaining in the corridor, with the stretch near Silver Apron Bridge a prime example of his masonry expertise.[31] There is conflicting information about where Conway learned this skill; the National Register nomination for the corridor states that the Silver Apron section shows masonry proficiency that "came over from England and Scotland with the Conways." Information about Conway is scarce, but an obituary in the Yosemite library notes that he was born in Indiana and his only overseas travel was to the gold mines of Australia. Conway did make his name as the master dry-laid stonemason at Yosemite, however, among his best-known work being the trail up Yosemite Falls.32

[31] Ibid., 5.

[32] Johnston, *The Yosemite Grant,* 130, 188.

Small Scale and Constructed Water Features, and Archeological Sites

Small-scale features, constructed water features, and archeological sites influenced the Nevada Fall Corridor's construction and purpose, and help contribute to its character and significance. They include the:

- Watering trough at the spring below Vernal Fall Bridge
- Water fountain at Vernal Fall Bridge
- Dam above Liberty Cap Gully
- Basin at Porcupine Spring
- Hatchery remains
- Signatures in the cleft at Fern Gorge
- Metal directional signs
- Railings along the mist section
- Culverts beneath causeways

Watering trough

The U-shaped watering trough (Section 1) was built in 1929 at a spring beside the trail as part of a larger improvement project **(Figure L8.1).** Other than the photograph in Figure L8.1 and a description as an "artistic stone water trough," no details about the design are available, but the photograph shows the trough was done in the

Figure L8.1 - The **"artistic stone water trough" was built in 1929 during major improvement work to the trail (Lloyd, Completion Report #50, #5196. Courtesy Yosemite National Park).**

Rustic style popular at the time. [33] The project also included a water fountain at the site, but this no longer exists. Use of the trough today for human water consumption is discouraged, and because stock are prohibited from this trail the basin is generally used as a rest stop and a place for children to play.

Water fountains

In addition to the fountain at the watering trough, a (kinking fountain for hikers was built at Vernal Fall Bridge in the 1920s, and rebuilt in a compatible style in the early 1980s using approximately three- to four-inch river rock. [34] A water fountain was installed at the top of Nevada Fall in 1956 but removed in the 1970s after the Clean Water Act made small water systems difficult to maintain. [35] No trace of this latter fountain exists.

Dam

In the 1870s, Albert Snow built a dam at the crest of Liberty Cap Gully. Snow, who wanted to prevent further washouts of his trail to the top of Nevada Fall, established this dam at a natural breach – which had created the gully – at the edge of the Merced River just above Nevada Fall. Between 1906 and 1931, the trail nonetheless was severely damaged by floods three times and the dam eventually destroyed in 1955. It was rebuilt soon after, into the current mortared random-rubble masonry version.36

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[33] Report of Construction Activities 1929 Season.

[34]Jim Snyder, email correspondence, March 10, 2004. Trail crewinember Abe Subia was the mason.3535

35 Ibid.

[36] Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 6.

Porcupine Spring

Located at the Porcupine Switchbacks, this spring plummets from an outcrop high above into a natural basin used by early travelers for a water stop. Porcupine Spring was officially established by the 1931 trail improvement that eased the grade up to Clark Point and included a spur off the main trail up to the spring.[37] The 1931 work included a concrete liner in the catchment basin; this work has mostly eroded, but the spring itself is considered the historic resource because travelers have used it since 1870. The setting is amid large, angular stones and scattered laurel in the shadow of a sheer cliff that has long offered a cool resting place.[38] Access to the spring not been maintained since the late 1950s due to parkwide concerns about water purity.39

Hatchery

In 1918, the California Fish and Game Commission located an experimental hatchery at Happy Isles,[40] but because of a state policy opposing permanent buildings on leased land, this was dismantled in 1920.[41] In 1926, the state and the National Park

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37 Completion Report #11, "Final Report on Reconstruction of *Mist* Trail, Job #506.2" (Yosemite National Park. January 1931).38

38 Ibid.39

39Linda Greene and James B. Snyder, *National Register Nomination,* 1989, section 7, page 6,40

40Linda Wedel Greene, *Historic Resource Study Yosemite: The Park and Its Resources* (1987): 722.

41 Stephen T. Mather, *Second Annual Report of the National Park Service* (Washington: Government Printing Office, 1918), 244.

Service agreed to build a permanent hatchery here:* Construction was complete in 1927 and the hatchery remained in operation until 1957, when the state donated it to the park. The park subsequently shut down the hatchery and converted the main building into what today is the Happy Isles Nature Center.[43] Remnants of the hatchery are visible near the beginning of the bridle path (see Section 3) and are contributing resources.

Historic graffiti

The corridor includes at least two sites with extant signatures dating from the period of significance that are etched onto boulders. The most notable are those in Fern Grotto; they date to 1860 and are visible in a cleft in the granite outcrop. Also, illegible signatures and dates are scratched into an overhanging rock on the abandoned 1870 trail that leads to Clark Point from Register Rock. Both convey the period of significance.

Other historic signatures dating from 1860-1865 may be on a boulder near the flat tent sites between Vernal Fall Bridge and Register Rock Although they were evident in the 1980s, [94]s they were not located in either 2003 or 2004.

A known, irreclaimable resource was the assortment of 19th-century signatures carved onto Register Rock by some of the park's earliest and most notable visitors,

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[42] Greene, 722.

[43] Carl P. Russell, *100 Years in Yosemite: The Story of a Great National Park* (Yosemite: Yosemite Natural History Association, 1968), 197.

" Linda Greene and James B. Snyder, *National Register Nomination, Mist Trail* (Yosemite: National Park Service,1989), section 7, 6.

including painter Albert Bierstadt. These were lost when park superintendent Col. Harry Benson ordered them removed in 1907.45

Metal directional signs

The stamped-metal directional signs on the corridor are uniform throughout the park and have been used for many decades. [46] Designed to rust to a historic patina, the age of each individual sign is difficult to discern. They are contributing resources.

Railings

The handrails alongside the trail through the exposed areas of the mist section of Vernal Fall were installed in 1929. They run alongside the river below the waterfall, along the cliff face, and at the apron atop the fall. Intended for safety and longevity, they convey the practical side of the later historic period, in materials and workmanship, and are contributing resources 47

Culvert pipes

At least two original culvert pipes are still in use on the corridor. The first runs through the abandoned causeway beside Horse Bridge #1. This riveted pipe may date to the 1902 hydroelectric plant but more likely belongs to the 1910 water intake dam

[45] Ibid., 2.

[46] Jim Snyder, personal interview, April 8, 2003.

[47] The National Park Service List of Classified Structures for "Mist Trail" states that metal railings were installed in 1892; no source for this was listed. It is probable that research noting the addition of *wooden* railings to the new wooden staircase - which replaced the ladders in 1892 - was confused with the metal railings installed in 1929.

construction, because another pipe like it is found in a gap in the path leading to the dam (which bears a "1910" date stamp). The three-quarter inch rivets, which form a regular pattern not used in "very early" pipelines," are spaced every half-inch around the thirty-inch diameter pipe. Because of the unusual rivets and the thickness of the pipe itself, these resources reflect the period of significance and are contributing resources.

Rock Cut dam

A feature that may remain, but which was not located during field investigation for this study, is a low dam built in 1932 above the Rock Cut. That year, a small but troublesome waterfall midway along the Rock Cut was "stopping horses and making it unpleasant for pedestrians."" An overflowing intermittent stream was found as the cause, so a "small rubble masonry cut-off wall" was built on a slicicrock area 300 feet south of and above the Rock Cut to divert the flow. The wall was 600 feet long, one foot wide and two feet high, and "well bonded to the bare granite rock."[50] This wall was not sought out in the 2003 and 2004 field investigations due to time, weather, and safety constrictions. It quite likely remains, however, and warrants investigation.

48 Jim Snyder, personal interview, April 2003.

49 Completion Report #121, Final Report Job No. 507-1" (November 1932).

50 Ibid.

Historic Integrity

Definitions

Historic integrity in a cultural landscape is the ability of the combined systems and features to convey significance. Integrity is assessed to determine whether the characteristics and features that shaped the landscape are present "in much the same way" as they were historically, and whether incompatibly altered aspects can be reversed.[1] Integrity is *a* prime consideration in treatment recommendations.

The National Register outlines seven factors of integrity. A cultural landscape with historic integrity will reflect several, if not most, of the following:[2]

Location – the specific place where the cultural landscape was established. The relationship between a landscape and its location can help explain why it developed. For historic trails, integrity includes the continued use or presence of a historic route; realignment does not necessarily imply a loss of integrity because re-routing occurs frequently in vernacular trails.

Design – elements that create the form, structure, and style of a cultural landscape. Design illustrates decisions made in shaping a landscape, factoring in how

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1 Robert R. Page, Cathy Gilbert, and Susan A. Dolan, *A Guide to Cultural Landscape Reports* (Washington: U.S. Department of the Interior, 1998), 71.

2 Ibid., and *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (Washington: National Register of Historic Places, 1990, revised for the Internet 2002, pages not sequential); and Margie Coffin Brown, *Landscape Line 15: Historic Trails* (Draft, March 2004).

space and materials are used as well as aesthetics. For historic trails, integrity includes evidence of the design style or standards from the period of significance.

Setting — a landscape's physical environment in terms of historic character. Setting involves the relationship of a landscape to its milieu, often reflecting how it was constructed and *its* intended purpose. For historic trails, integrity includes the presence of the setting, destinations, or views during the period of significance.

Materials — building elements from a particular time in a particular pattern. For historic trails, factors of integrity in materials include tread, trail crossings, and drainage structures in the same style as the period of significance; loss of integrity can come from inappropriate repair or replacement of materials.

Workmanship — physical evidence of craftsmanship during a given period, in technology and aesthetics. For historic trails, integrity includes the presence of features such *as* walls and steps that date to the period of significance.

Feeling — the expression of the landscape's aesthetic or historic sense of a period of time, derived from physical features. For historic trails, integrity of feeling includes the presence of a trail corridor or of setting, views, and materials from the period of significance.

Association — an intact link between a key historic event or person and a cultural landscape. As with feeling, association requires the presence of physical features to convey historic character. For historic trails, integrity includes evidence of associated sites, uses, or traditions.

Evaluation of Integrity on the Nevada Fall Corridor

Various sections of the Nevada Fall Corridor, often those at higher elevations, reflect the period of significance with more integrity than other sections. The trail from Silver Apron up to Clark Point retains its original alignment and features the oldest riprap tread in the park; sections of original riprap are also found above Clark Point and just below the top of Liberty Cap Gully. The most compromised lengths of trail are those with bitumen overlays, which mostly occur in the lower elevations of the corridor, and in the immediate surroundings of the Bailey bridges. The presence of intact, abandoned trails and walls dating to the earliest years of the period of significance serve to increase the overall integrity of the corridor. The following discussion of the seven qualities of integrity delineates these factors in more detail.

Location

The Nevada Fall Corridor retains integrity of location on those sections that are abandoned but not obliterated, and where the trail has seen continued use. For example, the abandoned George Anderson sections that have not been obliterated retain integrity of location, as do the current alignments up to Vernal and Nevada falls, because they have been in continual use since first constructed.

Although the 1961 bridle path was an addition to the system and changed some of the alignment, its route roughly follows the original path. Some original portions of this trail were abandoned; these retain integrity of location, including the alignment on the south of the Merced River from Happy Isles to Register Rock. Importantly, the routes up to Vernal Fall and to Nevada Fall, and from Silver Apron to Clark Point remain virtually intact and retain integrity of location. The 1931 Rock Cut occurred within the period of significance and its alignment has not changed — therefore, it retains integrity of location.

The presence of several abandoned lengths of trail dating to 1870 and 1882 also retain integrity of location and contribute to the corridor's overall integrity; they enhance the sense of history at the site by offering an unblemished experience of the original tread, stonework, and grade. The routes that replaced them were all constructed within the period of significance and also maintain integrity of location.

Design

The Nevada Fall Corridor retains overall integrity of design, but in some locations the integrity has diminished. Factors in assessing integrity of design on the corridor include the change in building method and materials that came with the frequent reconstructions after storm damage, and the use of bituminous materials that have covered historic stonework and otherwise compromised aspects of the original design standards. Those original standards, which the extant sections convey, illustrate the vision of the state engineer in 1882, who wrote, in regard to trails in Yosemite,

> Walks, good clean walks there must be. The main ones should, where possible, be removed from the roads far enough to escape the flying dust. On the level lands, the walks should be laid with their surfaces just high enough above the general elevation of the turf to insure good drainage, but not so high as to be conspicuous objects in the landscape. Walks (on) the hillsides or up the slopes ... should be paved with stone, to prevent washing (out) in Winter and to insure freedom from dust in Summer.

The vertical pattern of the Nevada Fall Corridor remains intact and reflects the original form and structure, which was intended to aid visitors wishing to climb to Vernal and Nevada falls, therefore this vertical pattern retains integrity of design. The challenge of going vertical gradually was pointed out in the 1909 Report of the Acting Superintendent, which remarked that the trails from the valley floor to the rim were "steep and short" because of lack of funds during construction. The report urged widening and easing of their grades.[3] This was heeded in subsequent construction ventures, with the 1931 project up to Clark Point intended primarily to lessen the grade.

The corridor's form also remains the same as in 1931, when the final loop was closed with the Rock Cut tie. The main travel circuits — to Vernal and Nevada falls north of the Merced; to Nevada Fall south of the Merced; and the Clark Point connector that links the two — retain integrity of design, being compatible with the design dating to the period of significance. Much of the 1870 route up to Clark Point, while abandoned, also retains integrity of design as it zigzags steeply up the slope. George Anderson's unfinished sections also exhibit integrity of design, with intact stonewalls, tread, and overall design intent.

Setting and Feeling

The original purpose of the corridor was to direct travelers to Casa Nevada and, for some adventurers, to destinations beyond. This intent, and the setting and feeling in which it occurs, remain integral to the corridor's existence, with most visitors climbing to

[3] Report of the Acting Superintendent of the Yosemite National Park to the Secretary of the Interior, 1909, **18**

the top of Vernal Fall and many continuing on to Nevada Fall and points beyond. For this, the corridor retains overall integrity of setting and feeling.

Integrity of setting and feeling is diminished, however, where incompatible, contemporary materials have been used – such as the bitumen sections. Another area where integrity of setting and feeling is lost is at Nevada Fall Bridge, due to the incompatible mortar repair work. Both of these diminished areas are reversible, however.

The corridor also retains overall integrity of setting in terms of views, with compromised views only at the overlook at Valley View, near the watering trough, and between Snow's causeway and the former Alpine House and Chalet at Casa Nevada_ These diminished conditions can be reversed by tree thinning. All other overlooks retain the views from the period of significance, and therefore their integrity of setting and feeling. Travelers lingering at Lady Franklin Rock and Porcupine Spring experience the same feeling and setting as did Gilded Age tourists, and the prospect from Casa Nevada is the same as when Snow's hotel stood there.

The Rock Cut also provides the same feeling it has since 1931, although the experience is somewhat diminished by concrete surface treatments and the presence of a now-vacated emergency telephone call box – all of which are reversible. Elsewhere, the stamped-metal signage and small stonework features such as the watering trough retain integrity of feeling and setting. Integrity of setting has been lost at Casa Nevada where the buildings once stood. Integrity of feeling has been lost at Register Rock where the signatures were removed.

Materials and Workmanship

The corridor retains integrity of materials and workmanship in many locations throughout the Nevada Fall Corridor – such as those sections of John Conway's work, and on many walls in the Porcupine Switchbacks – but has lost integrity on sections covered with bitumen or asphalt. Much evidence of original construction remains, including Conway's riprap tread above Silver Apron and brief sections in Liberty Cap Gully, and numerous lengths of dry-laid stonewalls in the Porcupine Switchbacks, Liberty Cap Gully, and on all abandoned sections. These all retain integrity of materials and workmanship. Many sections of rehabilitated stonework, also in the switchback areas mentioned above, also retain integrity of materials and workmanship for their compatibility to similar, extant structures from the period of significance.

The tradition of high-quality masonry in the corridor had an early precedent; the 1895-1896 commissioners report recommended that: "Wherever stone has been used we find that care and skill have been exercised in the workmanship and commend an extension of this class of work whenever temporary structures are replaced."[4] The distinctive tradition of stonework by John Conway and George Anderson has been passed down over the years to masons in the park, and is evidenced in structures today at the Porcupine Switchbacks, Liberty Cap Gully, through the mist section at Vernal Fall, and above Clark Point (where the bitumen overlay has eroded to reveal the riprap, and in the few places never overlaid with bitumen).

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[4] *Report of the Commissioners,* 1895-6, 8.

Much, but not all, of the reconstructed stone work has been done with the same "care and skill" praised in the 1895-1896 report, and these sections retain integrity. Less careful work includes a small amount of newer masonry work on the Vernal Fall steps that was mortared, and the landings in this section – the masonry of which is too uniform and where drill marks are too evident; and the abutments and aprons at Nevada Fall Bridge that have been compromised by inappropriate mortar work (which is reversible).

The riprap sections in the corridor retain integrity overall. They represent the design intent of the original trail builders; are in a setting that retains integrity by conveying the period of significance; and make use of in-kind materials and, usually, workmanship. Some contemporary work is more uniformly coursed than the original, so appears obtrusive, while other contemporary work *was* not executed with high masonry standards so may be short-lived.

Regarding bridges on the corridor, no individual element of the extant bridges dates to the period of significance, all having been washed out numerous times, but three of the bridges do reflect the 1930s Rustic style of architecture – the Silver Apron and Vernal Fall bridges, and Horse Bridge #2. These *all retain* integrity of materials and workmanship. All use large timbers; the new Vernal Fall Bridge posts (installed 2003) are full twelve-by-twelves. To be compatible with the logs used in earlier versions of these bridges, the posts on the contemporary structures are chamfered to soften the edges. An 1882 report by the state engineer outlines the preferred building method originally:

> ... of all places in the world the Yosemite Valley is that one where light or cheap structures look out of place. All architectural works in this region should ultimately be of the most solid and massive character. ... For these works, as a general thing, stone is to be preferred, more especially if the span be across a

> stream with rocky bed and banks; yet timber – in the rough and massive in detail – is suitable...5

Nevada Fall Bridge falls short of "rough and massive" in appearance, however, being trimmed with lighter timbers than the three bridges mentioned above, and with no attempt to invite comparisons to Rustic design. The other bridges outside the "rough and massive" criteria are the Bailey bridges, forty-two years old in 2004. Though they are approaching historic status, they are not compatible in either design or materials, and do not contribute to the integrity of this landscape. This situation is reversible – by removing the Bailey bridges and replacing them with structures compatible with the period of significance.

Association

The corridor retains integrity of association where the work of Snow, Conway, Anderson, and Sovulewski remains extant. Integrity of association has been lost where buildings were once present at Casa Nevada but are now gone; this situation is not reversible, with the loss of integrity of association permanent at this site. However, the nearby causeway retains integrity of association for its construction by Albert Snow. Conway and Anderson's remaining work also reflect the period of significance, with Anderson's carriage-road-width "trail" evoking images of rickety wagons, and Snow's steep switchbacks up to Clark Point conveying the rush to finish the project and the

[5] *Report of the State Engineer,* 1882, no page listed.

unavailability of the explosives used later to reduce trail grades and provide building stones.

Perhaps the greatest overall influence on the corridor by one man was its association with Gabriel Sovulewski. From 1908 to 1936, Sovulewski's achievements in the park's mountain trail system – culminating in the Rock Cut – set a standard recognized for years **after** his forced retirement at age 71. His expertise was so well regarded that he was asked by the director of the Department of the Interior to make an inspection trip of the national parks in 1936 to advise on trail improvements. As Yosemite National Park Superintendent C.G. Thomson wrote to other superintendents prior to Sovulewski's arrival at their parks:

> Mr. Sovulewski has come up through the lean years in the Service. He had a faculty of stretching the usefulness of an appropriated dollar to its utmost limit; he accomplished wonders during a period when there were practically no funds, few men, and the most primitive and meager equipment.

Contributing Features on the Nevada Fall Corridor

Features and characteristics that contribute to *a trail's* integrity are defined as those that were present historically and remain extant, and those that are in-kind replacements of historic features. The chart on pages 227 and 228, **Figure L9.2,** lists all the contributing and non-contributing physical characteristics and features on the corridor. The chart identifies which features contribute to the historic character of the trail and should be preserved, and which are not contributing and should be removed or mitigated. The map in **Figure L9.1** and the list below detail the major features that contribute to the corridor's integrity. The following numbered features correspond with the map:

Stonewalls

1 - Liberty Cap Gully switchbacks
2 - Porcupine switchbacks
3 - Small wall on abandoned trail below Clark Point
4 - S-curve parapet wall
5 - Rock Cut parapet wall
6 - Small wall/causeway to 1910 dam
7 - Small wall at rapids along bridle path

Riprap tread

8 - Above Silver Apron
9 - Below top of Liberty Cap Gully
10 - Near base of Liberty Cap Gully
11 - Below Clark Point
12 - Above Clark Point
13 - Riprap steps through mist section

Abandoned trail lengths

Anderson

14 - North of Silver Apron
15 - Above talus past S-curve wall

Snow

16 – Below Clark Point

17 - From Lady Franklin Rock toward Vernal Fall
18 - From top of Fern Grotto to lip of Vernal Fall
19 - From bridle path to 1910 dam

Natural features

20 - Lady Franklin Rock
21 - Register Rock

Figure L9.1 – shows the key contributing historic features on the Nevada Fall Corridor (USGS Half Dome Quadrangle, 1997).

Topographic features
- 22 - Casa Nevada causeway
- 23 - Abandoned causeway at Horse Bridge #1

Structures
- 24 - Hatchery
- 25 - 1910 water intake dam
- 26 - 1956 Liberty Cap Gully dam
- 27 - Comfort station
- 28 - Watering trough

Original, current-use lengths
- 29 - Above Silver Apron

Miscellaneous
- 30 – Signatures at Fern Grotto
- 31 – Signatures on abandoned trail above "Short Cuts" sign
- 32 - Talus tunnel
- 33 - Steps in cliff face to summit of Vernal from Fern Grotto
- 34 – Railings
- 35 - Overlook above Silver Apron
- 36 - Casa Nevada site

Chute with concrete floor			
wall frafinient supporting boulder near rapids			
%Pm			
g, retaining oog.			
Signatures overhimgmg g.			
Porcupine Sptsng			
Trail to Porcupine Spring			Kocp vegetation from enaoachmit
Porcupine Swit aclrs stone walls and head			
Original rat tiaatl near top of Clark Point (west side)			Clear debris
Wall (two) art oria			
SECCIONS			
Rock Cut parapet wall			Repaint with appropriate
Nevada Fall Bridge capstones and repointing			using compatible
Riprap find			R estorc sections with lam to integrity
			Causeway
			Monitor cedars and thin as needed m ain passageway
Anderson trint north of Silver Apron			Clear trees, ides, and debits
'belly Cap Gully steps			
On A,			
at t+ bertY			
Nevada Fall			
Silver Bridge			
MISCELLANEOUS			
Stamped metal directional signs			
Biiumiuous sections		X	Replace with permeable surface treatment with compatible drainage structures

Figure L9.2 – A section-by-section **list (page two** of **two) of contributing** and **non-contributing resources on the Nevada** Fall **Corridor. Contributing resources are** needed **for a landscape to** have **historic integrity.**

VI. TREATMENT RECOMMENDATIONS

Treatment Approach

As a linear resource with contributing features ranging in condition from pristine to derelict, the Nevada Fall Corridor offers unique challenges in determining a treatment strategy. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* guides the policies and standards for treatment of cultural resources, with four types of treatments identified:'

- *Preservation* provides for measures to sustain the existing form, integrity, and materials of a trail. Treatment under this would include stabilization, maintenance, and repair of historic fabric. Preservation prescribes maintenance of trail features as they exist, so this approach may not be feasible for trails constructed originally with native materials no longer available, such as old-growth redwood.

- *Rehabilitation* meets changing uses through repairs, alterations, or additions while retaining the historic character. This treatment accommodates compatible yet distinguishable materials and processes, using non-local materials if required by site

From Margie Coffin Brown, *Landscape Line 15: Historic Trails* (draft), National Park Service: Olmsted Center for Landscape Preservation (March 2004), *unnumbered; and* Robert R. Page, Cathy Gilbert, and Susan A. Dolan, *A Guide to Cultural Landscape Reports,* Washington: U.S. Department of the Interior (1998), 82.

restrictions. This treatment strategy allows for new surface materials and drainage systems, with all modifications meeting specifications to protect historic materials, features, and spatial relationships.

• *Restoration* depicts the form, features, and character of a trail at a particular historic time, removes features from other periods, and reconstructs missing elements from the restoration period. Restoration may be difficult on heavily used, soft-surface trails because of needed modifications to tread material, retaining walls, or drainage structures.

• *Reconstruction* depicts in new construction the form, features, and detailing of a non-surviving site, structure, or landscape for the purpose of replicating its appearance at a specific period and in its historic location. This treatment is rarely used with historic trails.

The degree of intervention in these four levels of treatment increases on the continuum between preservation to reconstruction. Preservation intends to maintain the landscape in its current form and condition. Rehabilitation accommodates limited change to facilitate contemporary use. Restoration removes later "improvements" or rebuilds missing features to return the landscape to its state in an earlier, defined time (the period of significance). Reconstruction rebuilds missing features, sometimes entire buildings, to depict those of an earlier time.

As the level of intervention increases, so does the requirement for documenting and justifying treatment decisions. Treatment decisions may factor in items such as legislation, park management objectives, historical integrity, existing conditions, threats to the resource, safety, and estimated costs.

Primary Treatment Recommendations and Justification

The treatment recommendations for the Nevada Fall Corridor vary by location on the trail system, and include preservation and rehabilitation. These are detailed in the Treatment Plan below. Elements considered in these guidelines include stonewalls, riprap tread and steps, abandoned trail lengths, structures, and natural and built topographical features, among others. A property common to nearly all of these elements is stone masonry, much of it dry-laid. Because of this, these guidelines center on appropriate measures for preserving, restoring, or rehabilitating the dry-laid stone features of the corridor.

Preservation is recommended for the remaining original stonework sections installed during the period of significance (1856-1934) as well as other masonry known to be at least fifty years old. Preservation is also prescribed for abandoned trail lengths and for individual features detailed in the Treatment Plan below.

Rehabilitation is recommended for: (I) areas subject to rockslides or other recurring natural events that require frequent rebuilding; (2) for those sections of the corridor where original riprap has been covered by bitumen, and where bitumen has been laid over soil or other naturally draining tread surfaces; and (3) the Bailey bridges and Nevada Fall bridge.

The slide-prone areas include the Liberty Cap Gully and Porcupine switchbacks, and the riprap steps through the mist section of Vernal Fall. As of April 2004 these sections were in good condition, therefore this recommendation applies to future needs.

The sections of tread surfaced with bitumen that need rehabilitation with compatible materials are detailed below. Lastly, the Bailey bridges and the current Nevada Fall Bridge are not compatible and replacements should be considered.

Design Intent

The name "Yosemite" for most Americans evokes images of Half Dome or El Capitan towering over waterfalls and forests in a Neolithic valley. This image fits the reality today despite the millions of visitors who tour the park each year. It is precisely because of Yosemite's iconic status on *a national,* and even global, scale that careful attention is warranted in treatment of its historic features; the tens of thousands of people who walk to the top of Vernal and Nevada falls each year emphasize the need to assure that the Nevada Fall Corridor successfully represents the best possible in cultural landscape preservation.

Those involved with the park's early design realized this instinctively. Frederick Law Olmsted, in his 1865 report to the Yosemite Valley Board of Commissioners, remarked that the reason Yosemite was "treated differently from other parts of the public domain ... consists wholly in its natural scenery" and that the "first point to be kept in mind (was) the preservation and maintenance as exactly as is possible of the natural scenery."[2] In its 1891-1892 report, the Board of Commissioners acknowledged the

[2] Ethan Carr, *Wilderness By Design: Landscape Architecture & the National Park Service* (Lincoln and London: University of Nebraska Press, 1998), 29.

constant maintenance needed to keep higher-elevation trails in the park in good repair, and they stressed the emotional value of retaining access to "these heights":

> They are marvels of skill and safety and rank first among the mountain trails of the world. The variety of scenery in sight from these lofty zigzags excels any upon the alpine trails of Switzerland. To traverse them is an exhilarating experience. ... By reason of their location they need and have constant oversight and attention, and in many places are so exposed to storms and slides as to make permanent structures impossible, since no artificial work, no matter how massive, can resist the destructive forces of nature which sport on these heights. To permit them to fall out of repair and be disused would be to take away one of the great charms of a visit to the valley.3

Part of that charm lay in the nature of the construction technology and craftsmanship tradition established by Conway, Snow, and Anderson's stonework. The character of their work – both the tangible stone and the intangible feeling it evokes – retains its significance where the work itself remains. Early trail designers in the park realized the value of using stone tread, taking inspiration from that laid down by Conway and his colleagues. The 1882 Report of the State Engineer noted that:

> ... the walks ... located on the hillsides or up the slopes ... should be paved with stone, to prevent washing away in Winter and to insure freedom from dust in Summer.'

That directive, issued 122 years ago, remains pertinent to the Nevada Fall Corridor's ongoing maintenance and preservation.

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[3] Report of the Commissioners, 1891-2, 11

[4] Report of the State Engineer, 1882 (Sacramento: State of California, 1882).

Treatment Plan

The guidelines for treatment of this historic landscape are based on the significance and integrity of the specific features that define the corridor's historic character. It is vital, however, that these individual elements are also considered cumulatively – from the holistic perspective of the corridor as a greater system. This is to ensure that the unified system overall retains the features, materials, and feeling that define its historic significance.

As noted earlier, these treatment guidelines center on appropriate measures for preserving and rehabilitating the dry-laid stone features of the corridor.

Figure T.,1 – A contemporary wall in Liberty Cap Gully illustrates the ability of crews at Yosemite to build structures compatible with the original materials and workmanship.

Those areas earmarked for *preservation* need to be carefully inspected at least annually and needed repairs or other mitigation made expeditiously, to prevent further damage or erosion. These areas include abandoned lengths of original trail, original riprap tread, original stonewalls, original causeways, and the comfort station, among others.

Those sections recommended for *rehabilitation* – areas prone to frequent washouts; and sections of bituminous surfacing that detract from the historic integrity –

can benefit by referring to much of the rebuilt stonework in Liberty Cap Gully and the Porcupine Switchbacks as models for compatibility in workmanship and materials. This level of craftsmanship shows that Yosemite's contemporary masonry crews can build structures that are compatible with that of the original construction **(Figure T.1).**

Sufficient quantities of suitable building stone may prove a limiting factor in rebuilding some areas of riprap along the corridor. The repeated rockslides have carried material down slope often to sites difficult to access. In other areas, dynamite used in the 1920s and later is believed to have fractured much of the remaining available stone so it is compromised for construction use.[5] Stone could be hauled in, either from elsewhere along the trail or from other locations in the park, with care that the process does not harm nearby features or associated areas.

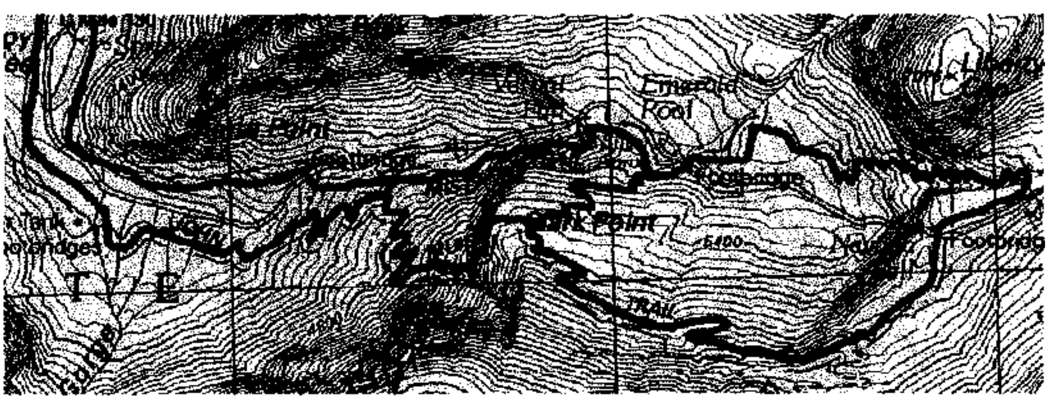

Figure T.2 - All **current locations of bituminous surfaces** are shown on the corridor (USGS **Half Dome Quadrangle, 1997).**

[5] Jim Snyder, telephone interview, February 9, 2004.

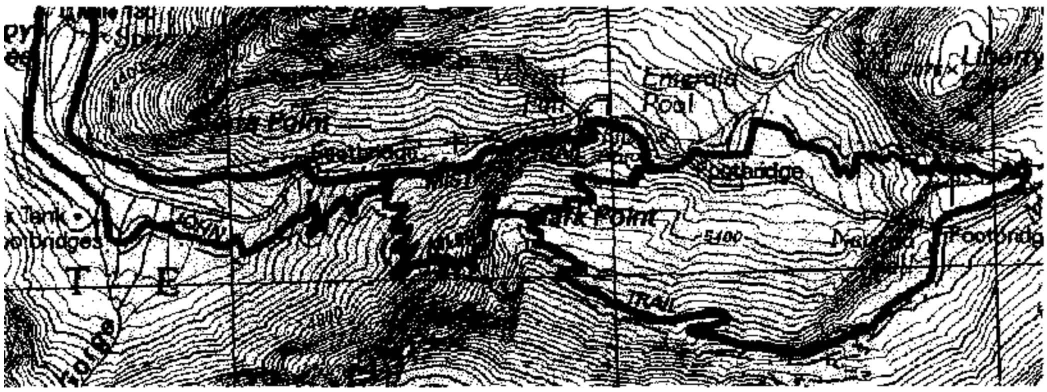

Figure T.3 – Recommended locations for installation of riprap treadway are outlined in black (USGS Half Dome Quadrangle, 1997).

Those sections of the corridor recommended for *rehabilitation* where the original riprap has been covered by bitumen, and where bitumen has been laid over soil or other naturally draining tread surfaces, need particular attention. Given the longevity and beauty of the original stonework, the promise of the reconstruction work done by recent masonry crews, and the fact that this trail's popularity gives it an iconic status for Yosemite, the park could benefit by rehabilitating the corridor using dry-laid stone methods and practices. **Figure T.2** illustrates all current locations of bituminous surfacing on the Nevada Fall Corridor. **Figure T.3** shows recommended locations for removal of bitumen and re-installation of riprap treadway.

Where re-installation of riprap is not feasible due to lack of available native stone and where hauling stone would damage the underlying natural tread or corridor prism, or where the cost of such rehabilitation is prohibitive, an alternative surface treatment such as Stoneyerete^{m} (see "Comparison Surface Treatments" in the Appendix) – could be substituted.

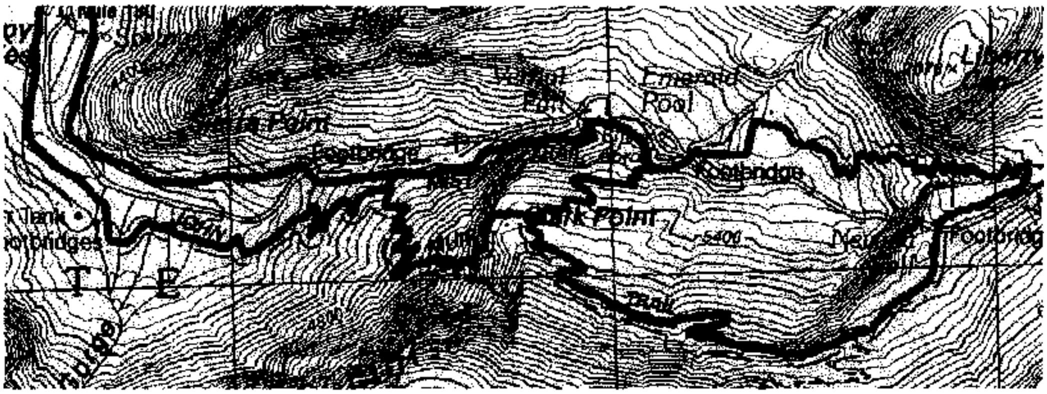

Figure T.4 – This map shows locations of trail that have been so heavily used and frequently repaired that all original surfacing has been replaced, leaving little if any historic integrity of surface tread (USGS Half Dome Quadrangle, 1997).

Figure T. 4 designates locations of trail lengths that have been so heavily used that all original surfacing has been replaced, leaving little if any historic integrity of surface tread. If riprap cannot feasibly be installed on these sections for the above reasons, a surface treatment such as StoneyCrete [m] is preferable to bitumen or asphalt for fulfilling environmental and integrity requirements.

Treatment Actions

The following specific measures should be taken to preserve the Nevada Fall Corridor:

• Replacement of all current bitumen/cold-mix asphalt sections with riprap is recommended where feasible and appropriate. Most of the bituminous sections, as built, cannot be repaired without reconstruction of the sub-grade to encourage water to percolate through rather than running over treadway.

• Drainage systems **(Figure T.5)** should be designed and installed in areas now prone to holding or channeling water. These include surface structures such as waterbars and ditches, and, where appropriate, subsurface systems such *as* high-aggregate sub-grade material and culverts or trenches. Many of the currently paved sections do not adequately shed water, resulting in puddles and debris at the foot of bitumen sections. The investment in added labor and materials for suitable drainage systems would be recouped from reduced long-term maintenance effort and expense

Figure 1.5 – This waterbar is an effective and compatible method to channel water off the trail. This lies above Clark Point.

• To prevent water from traveling down the **trail,** consider sloping trail edges to the outer edge. Inside ditches, although recommended by certain trail construction manuals, can fill with debris and become maintenance intensive so are not recommended.

• Abandoned trail lengths should be annually inspected and debris cleared where feasible to control further erosion and degradation. Photos could be taken of trail features periodically for reference

[6] Recalling Gabriel Sovulewski in 1915: "A trail without proper ditching and drainage will cost more in maintenance and repairs in places than if originally constructed in the proper manner." From "Proceedings of the National Park Conference, Held at Berkeley, California, March 11, 12, and 13, 1915" (Washington: Government Printing Office, 1915), 54.

over lime and for use in the field for comparison to the previous year's condition.

• Irregular step size and tread-to riser ratio should be maintained, to blend more organically with the surrounding environment.

• When new structures are required, they should be compatible in design, materials, workmanship, and scale to the character of the historic structures. **Figure T.6** shows Vernal Fall Bridge in 1939, a model more compatible than some current bridges on the corridor.

• If the condition of a feature precludes repair, the feature should be replaced with in-kind materials (in-kind being defined as the same form, detail, character, and material as the original)? If in-kind replacement is not feasible for technical, environmental, or economic reasons, a compatible substitute material may be considered.

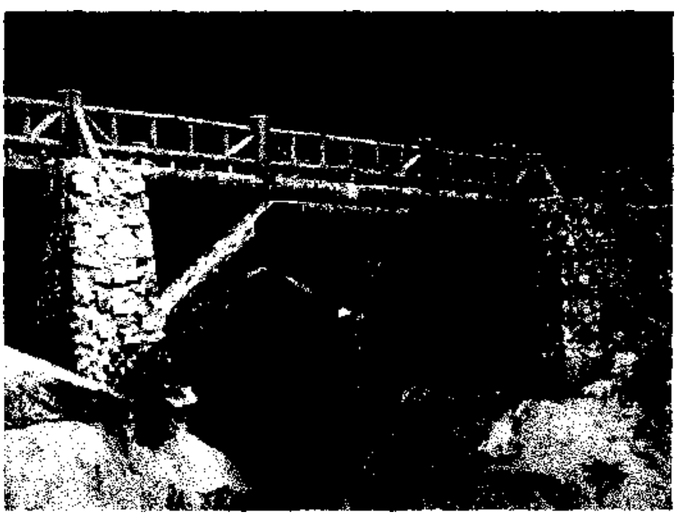

Figure T.6 – Vernal Fall Bridge in 1939 featured steel stringers with log facades, deck, posts, and rails, for a true Rustic architecture design. It is recommended that the next replacement bridge follow this approach (Photo courtesy Yosemite Research Library).

• New construction should be distinguishable from the historic fabric yet compatible with the character of the landscape to protect its integrity.

• Consistency in masonry crews, both in training

[7] **Page et al,** *Guide to Cultural Landscape Reports,* 90.

and personnel, could benefit the trail's integrity. The National Center for Preservation Technology and Training (NCPTT) trains journeymen masons and volunteers, and could provide assistance for work on the Nevada Fall Corridor. Other sources for skilled masons and volunteers include the Dry Stone Conservancy in Kentucky and the Dry Stone Walling Association in England (see Appendix).8

The chart on pages 227-228 (Figure L9.2) lists other mitigation measures needed for contributing and non-contributing historic resources on the corridor.

Other Recommendations

- Provide trail interpretation (e.g., trailhead brochures at minimum and, possibly, non-intrusive markers along the trail) to educate the public about the corridor's history. This could include maps and information about: Casa Nevada, Snow's causeway, Liberty Cap Gully dam, Anderson and Conway's craftsmanship, the ladders at Fern Gorge, Lady Franklin Rock, Gabriel Sovulewski and the Rock Cut, the water and hydroelectric plants, the hatchery, the comfort station, and the main bridges.
- Create a "Nevada Fall Corridor Loop" map showing the corridor tying into the John Muir Trail and the bridle path, to better illustrate alternatives for navigating the system. For example, many people do not understand that they can hike back from Silver

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The Yosemite Association and the park concessionaire may also prove helpful partners, from publicizing the need for workers to helping accommodate skilled volunteers by providing lodging, meal, and other discounts during their stay.

Apron via Clark Point and the John Muir Trail; congestion through the mist section might decrease if this alternative route were better known and used.

- Reinstate a record-keeping system such as the Completion Reports (now on file in the Facilities Management office) from the early decades of the 20th century. These have been crucial in documenting and directing efforts to maintain the park's historic trails. Contemporary reports could cover all projects, small and large, to track damage and repair history. Each file could include photographs and a brief narrative of the problem and repair measures. A materials list and description of method of repair could be included, along with the names of the project supervisor and crewmembers.

- Create a database to chart trail repairs. The gap of historical knowledge about the park's trails is vast since the Completion Reports ceased being written. Current staff with extensive knowledge of trail repair history could be record their recollections of trail work as the basis for a new database.

- Establish a formal dialogue system with other National Park Service and various state parks trails star to encourage sharing of information among trail maintenance personnel. There appears to be no official information-sharing method that trails people as a group can use to collaborate in an ongoing, efficient fashion. A website for input/feedback and/or a quarterly memo circulated among trail crews could benefit staff and enhance future projects.

Summary of Recommendations

Taking a long-term perspective – considering past examples and estimating future maintenance effort – is crucial in evaluating the appropriate treatment for park trails. The Nevada Fall Corridor is unique in that it tells the story of Yosemite's earliest tourist days; the corridor's higher reaches even feature the park's oldest stonework, still intact and functioning more than 130 years after the masons laid down their tools. In the late 1880s, visitors traveled long distances to revel in this renowned scenery and stay a night or more in Snow's Hotel at the foot of Nevada Fall. On the way up they would take water for their horses at the trough a half-mile from Happy Isles, stop for the view at Illilouette Gorge, lunch beside Emerald Pool, and pause atop the switchbacks at Liberty Cap Gully – the same scenic sites and views visitors appreciate today. While Snow's Hotel is gone, the Nevada Fall Corridor and its history persist, with more than 3,000 hikers a day traveling its paths on summer days. With so many people exposed to the complex history this trail presents, the corridor's treatment plan assumes more importance than it would for a trail of less significance.

A valuable aspect of the corridor is the sense of history conveyed by its individual features – including the tread surface. Because riprap has been used successfully for scores of years on many sections of the trail system, its maintenance is essential to preserving the trail's character and historic integrity. These sections provide excellent drainage, solid footing even when wet, blend seamlessly into the environment, need little maintenance, and are beautiful works of art and craftsmanship. Given this stonework's performance and historic connection, the park should install riprap on trail sections now surfaced by eroded bitumen.

Original stonework remains intact and with good integrity on the trail corridor. The stone switchbacks at Liberty Cap Gully and the Porcupine Switchbacks have been damaged regularly by landslides over the years and subsequently rebuilt (the last time in 1995), however portions of this stonework are original. The park has employees skilled in restoring the masonry to match the character of these original fragments (Figure T.8); reconstruction at Liberty Cap Gully and the Porcupine Switchbacks was completed by park staff trained in dry-laid masonry techniques passed down by longtime employees over the years.[9] The resulting dry-laid sections are handsome and flame water effectively, in some places channeling heavy rain into small channels over and through the stonework yet with no adverse affect to the integrity of the craftsmanship. The work retains structural and historic integrity, blends magnificently into its environment, and has withstood harsh weather and heavy use.

Figure T.8 – A contemporary wall in the Porcupine Switchbacks shows appropriate repair, with most drill marks concealed, joints broken, and a tight fit between stones.

By contrast, the bituminous surfaces installed on the lower portions of the corridor have deteriorated severely. Crews have patched these sections, sometimes with

[9] Tim Ludington, telephone interview, January 29, 2004.

cold-mix asphalt and sometimes with stone mortared in place. The mortared stone sections have weathered better and blend more appropriately with their surroundings than the trail's asphalt patches. However, higher-quality, thy-laid stonework would perform better and be more compatible.

The long-term success of the trail's original riprap sections prompts recommendation for a dry-laid stone treadway throughout the corridor, with a permeable surface treatment such as StoneyCrete [m] on sections where riprap isn't feasible or historically accurate. This surface combination would outperform conventional asphalt in drainage, tread longevity, ease of maintenance and repair. A stone/pervious pavement installation would provide better drainage than asphalt and allow for more effective routine maintenance – with such a system, trail crews could more easily dig drainage swales and reset or regrade low areas as needed to redirect water. Asphalt cannot be similarly manipulated, instead cracking, buckling, and breaking up under the extreme climatic stress of Yosemite's environment. As a result, asphalt requires repeated installations.[1o] The recommendation for a porous mix rather than an impermeable pavement is also indicated by the need to reduce water sheeting down asphalt trails, creating gullies and spreading debris, and to prevent damage at the base of paved slopes where water has tended to puddle."

Another key factor is the impact on the trail itself from transporting construction materials. Riprap treadway may be difficult to install on some sections of the trail

[m] Margie Coffin Brown, email correspondence, January 15, 2004.

Cahill, Thomas H., Michele Adams and Courtney Mann. "Porous Asphalt: The Right Choice for Porous," *Hot Mix Asphalt Technology* (September/October 2003): 26-28.

because of blasting done in the 1920s and later that left limited stone beside the trail that is suitable for masonry work. Stone could, however, be hauled to the site. An appropriate sub-grade aggregate will also need to be transported to the site, as will any other surface treatment material.

Regardless of what surface method is chosen, the park should ensure that proper sub-grade material and effective drainage structures are installed when resurfacing the bitumen sections. The San Dimas Technology and Development Center's advice is worth repeating: "Do not think that the use of soil stabilizers will relieve the responsibility of doing a thorough engineering design" for a site-specific drainage.

Conclusion

The Nevada Fall Corridor in the 21st century poses questions of how and why its historic resources warrant good stewardship. It has the oldest dry-laid masonry in all of Yosemite National Park, the second-oldest national park and the site of national icons such as Half Dome and El Capitan. The masonry here dates to 1870 – and people still walk on it every day. Examples of the vernacular construction techniques used in this work are not common in the western United States, therefore preserving them fosters an ongoing connection with this part of our past.

That past includes notable individuals including John Muir, Teddy Roosevelt, and Ansel Adams, as well as less famous figures such as innkeepers (Albert Snow), trail builders (John Conway and George Anderson), and cavalry troops (Gabriel Sovulewski). The dynamic landscape they helped shape is constantly in flux. With roiling floods and lightning strikes, ice falls and rockslides, it is always trying to take back what it gave before. These are just some of the elements that factor into preserving the Nevada Fall Corridor's wooden bridges, riprap tread, and stonewalls — all of which have their own stories to tell about this rich cultural landscape.

Author Susan Allport writes of stonewalls in New England, most of which were built in farm country, but her words apply to the stonewalls and riprap craftsmanship on the Nevada Fall Corridor:

> Walls, then, are not *as mute as* one might think, They speak to us through these tool marks, the lichens on their stones, the artifacts buried in the earth around them, and the size of the rocks that they incorporate. They also speak in one other way: through the trees, shrubs, and vines growing on the land that they enclose and define.
>
> Walls, as some naturalists and geographers have recently come to recognize, can tell us much more than the simple fact that the land on which they stand was at one time cleared and farmed. These objects are primary historical sources that can also help us understand (the pas0.1

[12] Susan Allport, *Sermons in Stone* (New York: W.W. Norton & Co, 1990), 185.

APPENDICES

Comparison Surface Treatment Products

A variety of surface treatment products are being marketed currently, each touting its superior ability to bind soil and/or aggregate for a durable installation. The products listed below, in alphabetical order, were determined the most appropriate for possible use on the Nevada Fall Corridor, factoring in drainage, suitability for use on steep grades and in inclement weather (extreme freeze/thaw and intense downpours), and heavy use.

• *Concrete* provides a durable surface and ability to better blend in with surrounding terrain. At Zion National Park, the Angel's Rest Trail is a concrete tail that climbs a steep grade with numerous switchbacks. The trail surface has performed well and, with added color from the nearby red rocks, blends into its environment. Concrete was used on segments of the Nevada Fall Corridor to harden a chronically washed-out section of the horse trail below Register Rock and a section of the Rock Cut subject to ice build-up. Conventional concrete is not suitable, however, for elsewhere on the Nevada Fall Corridor because surrounding vegetation would eventually crack concrete tread. Unlike Zion and other sites where concrete has proven an ideal trail surface, the Nevada Fall Corridor is flanked by trees whose roots would eventually encroach upon and buckle concrete pavement. More pliable products, ranging from rip rap to asphalt, provide some "give" for root encroachment that conventional concrete cannot.

• *Enviroseal* manufactures a product, M-10+506, said by the manufacturer to solidify soils to the strength of concrete yet remain aesthetically appealing. The product mixes directly with native soil, is graded to the desired slope, then compacted. The manufacturer states that it costs less than concrete or asphalt. Installed in 1997 in Central Park on a jogging trail, it has since required "little or no maintenance." It was also used in the Seattle area on an equine trail, where no visible horse prints have been visible even after extensive galloping, evidence that it hardens like cement but retains some elasticity. The manufacturer states that freeze-thaw issues are essentially eliminated because the cured surface will not adsorb water. [1] No information was available on its performance in a forest environment.

• *Hot-mix asphalt* has a long history for use on walking trails, bicycle paths, and for universal access purposes, in addition to its ubiquitous use for roadways. Hot-mix asphalt is exactly that — an asphalt blend applied hot for superior hardening and durability, excellent for cementing and waterproofing. [2] On forest trails, *a* disadvantage of impermeable asphalt pavement is that it can greatly exacerbate erosion at trail footings because it provides a hard surface for water to sheet down, building up speed and scouring soft surfaces along the way. [3] The surface currently on the Nevada Fall Corridor is at best cold-mix, which is less durable hence its extensive deterioration. Grade plays a key role in asphalt performance; the National Asphalt Pavement Association advises that

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[1] Andy Stevens, email correspondence, January 26, 2004.

[2] "Asphalt in Hydraulic Structures" (College Park, Md: The Asphalt Institute, 1961): 1.

[3] Margie Coffin Brown, email correspondence, January 16, 2004.

asphalt pavement never be applied on longitudinal grades above five percent;[4] the Nevada Fall Corridor includes sections up to twenty percent and greater.5

• *Klingstone 400®,* formerly known as Mountain Grout Soil Stabilizer, is a moisture-curing polyurethane reputed by the manufacturer to bind most soils or aggregates together. Klingstone 400's high viscosity restricts it to use only with coarse aggregate; Klingstone F1000® is a more flexible version of Klingstone 400. The manufacturer believes Klingstone could stabilize the Nevada Fall Corridor, but that it would take more than one application.6

• *"Macadam stabilization"* comprises a layer of geotextile beneath a half-inch to one-inch layer of pea gravel lightly compacted then coated with a hot-mix asphalt to bond the aggregate and adhere to the geotextile. A thin layer of blotter sand is then spread over the surface to soften the blackness of the asphalt. Structurally this surface was rated firm and stable by the San Dimas Technology and Development Center in a test of various products for universal access trails?

• *Natural stone* treadway or cobbles, referred to in the park *as rip rap,* has been installed with superior success on sections of the corridor for many decades. Riprap comprises both steps and on-the-ground tread on climbing grades. Its advantages are durability, permeability, and relative ease of reworking (compared with asphalt and

[4] National Asphalt Pavement Association, "HMA Pavements for Trails and Paths" (Lanham, **MD:** NAPA, 2002): 6.

[5] Jerry Morrison, telephone interview, February 2, 2004.

[6] Dennis Galbreath, email correspondence, January 22, 2004.

[7] Roger Bergmann, "Soil Stabilizers on Universally Accessible Trails" (USDA Forest Service San Dimas Technology and Development Center, September 2000): 8.

concrete) should damage occur due to rock lides or root encroachment. Riprap sections are found above Emerald Pool en route to Clark Point; in the Liberty Cap gully (the talus-loaded switchbacks between Liberty Cap and Nevada Fall climbing from the base to the top of the falls); and through the Mist Trail to the top of Venial Fall. Brief rip rap sections, primarily to fashion steps but also to form some treadway, are also found on the horse trail. The trail segment above Emerald Pool en route to Clark Point is reported to be the oldest riprap in the park, having been installed in 1870-1871 by mason John Conway and his crew, who also did other stonework at Yosemite. [8] The remainder of the wail's stonework has been rebuilt following rock slides over the years, particularly in Liberty Cap Gully and on the Porcupine Switchbacks along the John Muir Trail between Register Rock and Clark Point.

• *PolyPavement* is a liquid soil solidifies that uses ninety-eight percent on-site material, binding soil particles to form a durable surface that, according to the manufacturer, is more supportive than asphalt, resists erosion, and blends into the surroundings. The manufacturer states it is effective for dust prevention, erosion control, and slope protection; and is suitable for freeze/thaw problem areas, stronger than asphalt, non-toxic, low maintenance, and less expensive than conventional asphalt. It may not function well on slopes above six percent, however. [9]

• *Porous pavement* is offered by a variety of manufacturers. These formulations allow moisture to drain through the product, relying on a high-quality sub-base and

[6] Jim Snyder, telephone interview, January 16, 2004.

[9] www.polypavement.com

keeping the surface clean. Porous pavement has been shown to perform well where freezing is commonplace, preventing frost heave and other cold-weather damage because moisture drains through rather than being trapped and expanding when frozen. Also, less snow accumulates on porous pavement because of percolation, adding extra days of use for hikers in cold months, and the surface provides better traction than conventional pavement The cost for porous pavement is said by the manufacturer to be the same as conventional pavement; the underlying stone bed is where some added expense will incur (but this reportedly is offset by lowered maintenance costs). The installation process needs careful and ongoing oversight to prevent compaction of the sub-grade or other practices that would compromise the trail's performance.[10] Polymers and/or other fibers may be added to the porous asphalt mix for a more durable surface. Porous pavement mixtures have been in use by Oregon's Department of Transportation since the 1970s with good success, handling heavy truck traffic with no adverse effects."

• *Road Oyl* is an emulsion made from pine tree resin and contains no petroleum products. It is applied cold and mixed with dense graded aggregate. It hardens to an asphalt-like surface except for the color, which is slightly darker than the aggregate used for mixing. A study done by the San Dimas Technology and Development Center found Road Oyl the most difficult to apply of seven products tested, however, after five winters on the test site, Road Oyl performed extremely well and was rated by a wheelchair user as the best surface tested. Despite the manufacturer's assurance of its suitability, no *trail*

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[10] Ibid.

[11] Dan Brown, "Thinking Green with Porous Asphalt," *Hot Mix Asphalt Technology* (May/June 2003).

managers consulted for this report found Road Oyl advisable for uses and conditions similar to the Nevada Fall Corridor, primarily due to the trail's steep grade.12

• *Soiltac* soil stabilizer is said to work well on steep grades and cost approximately one-tenth the expense of asphalt, but even the manufacturer states that asphalt is a superior product for long-term applications. Soiltac is, however, more environmentally friendly and more aesthetically pleasing, and "will reduce freeze-thaw heaving, however it will not solve it."13

• *StoneyCrete* is a pervious concrete that passes an average of four to inches of rainfall per minute and, even if the surface becomes ninety percent clogged, will allow a quarter-inch of rainfall per minute (equaling fifteen inches per hour) to drain through. With StoneyCrete, the trail acts as a water conduit rather than sheeting water as asphalt does. Its appearance resembles gravel without any fines, and its advantages – according to the manufacturer – include greater strength than asphalt (it supports 4,000 psi), absence of puddling because water drains through, less slipperiness than asphalt when wet, and the ability to blend in to the surrounding landscape. Voids between its larger gravel pieces give the product a nubby appearance more in harmony with a trail environment, and a less shiny, less noticeable surface with solid traction. Because StoneyCrete is permeable, water that filters through it will flow from the bottom of the treadway, so the product requires proper water diversion channels." It can be placed by

[12] Roy Irwin, email correspondence, January 23, 2004; Tim Ludington, telephone interview, January 29, 2004; and Roger Bergmann, "Soil Stabilizers on Universally Accessible Trails" (San Dimas: USDA, September 2000).

[13] Chad Falkenberg, email correspondence, January 26, 2004.

[14] www/stoneycreekmaterials.com

hand or machine. It can even be laid over other surfaces, depending on the design function of the finished surface. A concern with pervious concretes such as StoneyCrete — and with conventional concrete — is that tree root invasion could crack or buckle the treadway. The manufacturer states, however, that trail designers can create "cells" for tree root balls while encouraging a less intrusive root zone below the aggregate bed.[15]

[15] Jeffrey Gremaud, email correspondence, February 4-5, 2004.

Basic Dry-laid Masonry Recommendations'

• Before beginning, separate the stones into five basic uses – foundation, coping (or capstones), tie-stones, face stones, and packing stones.

• Try to choose stones weighing at least fifty pounds for better placement longevity and stability. Size contributes to strength.

• Work up from the bottom of the slope.

• Establish a solid footing for each stone, digging out adequate space to accommodate the rock's widest and flattest surface.

• Set each stone so the bulk of its weight is closest to the bank.

• Conceal or obliterate drill marks where possible.

• Cover the spaces between stones with stones in the course above – also known as "breaking" the joint.

• Make solid contact with adjoining stones on all sides including underneath.

• Extend face stones at least eight inches into the wall. Fill the void behind the face stones with packing stones back to the bank, filling in course by course.

Building & Repairing Dry Stone Fences and Retaining Walls (Lexington: Dry Stone Conservancy, 2001); Lawrence Garner, *Dry Stone Walls* (Haverfordwest, Pembrokeshire: Shire Publications Ltd., 2001); and Stephen A. Griswold, *Handbook on Trail Building and Maintenance* (Three Rivers, Calif.: Sequoia Natural History Association, 1996).

• Be sure the wall has sufficient spaces in the face to drain. Weep holes may be advisable in walls prone to lateral water pressure.

• Use frequent header rocks to anchor the wall for maximum strength. As many as one in four stones may be a header (or "through" stone) in steeper locations.

• Do not use smaller rocks as shims. Instead, dig out areas as needed for a tight fit. No point of the wall should move.

• Consider doubling — building two connecting walls and filling the center with packing stones — for areas more subject to frequent washouts and rockslides.

• For riprap steps on steep slopes, space rocks closely, overlapping lower steps by more than half.

• On the ground, embed waterbars ten to fourteen inches, leaving six to twelve inches above the surface. Lay riprap tread from ten to twenty feet on the lower side of each waterbar.2

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[2] ' Proceedings of the National Park Conference, Held at Berkeley, California, March 11, 12, and 13, 1915" (Washington: Government Printing Office, 1915), 54.

• The angle of a self-maintaining waterbar typically is fifteen to forty degrees perpendicular to the trail. Use fifteen degrees for a starting point and add one point for each percent of grade (i.e., a fifteen percent grade waterbar would lie at a thirty degree angle to the trail).[3]

Figure T.7 – The Rock Cut parapet wall has been repointed using a mortar with a much lower aggregate content than the original. This inhibits proper drainage and is incompatible In appearance.

• Rehabilitate holes or scars that result after taking stones from an area for use in a **wall.** masonry with appropriate mortar mix for better functioning and aesthetic appearance **(Figure T.7).**

• For more detailed dry-laid masonry techniques (the discussion of which is beyond the purview of this report), consult the resources listed on page 285.

[3] Stephen A. Griswold, *Handbook on Trail Building and Maintenance* (Three Rivers, Calif.: Sequoia Natural History Association, 1996), 77.

Figure A.1 — The 1865 map by C. King and J.T. Gardner developed for the Yosemite Valley Board of Commissioners. Nevada and Vernal falls are highlighted (Courtesy Yosemite Research Library).

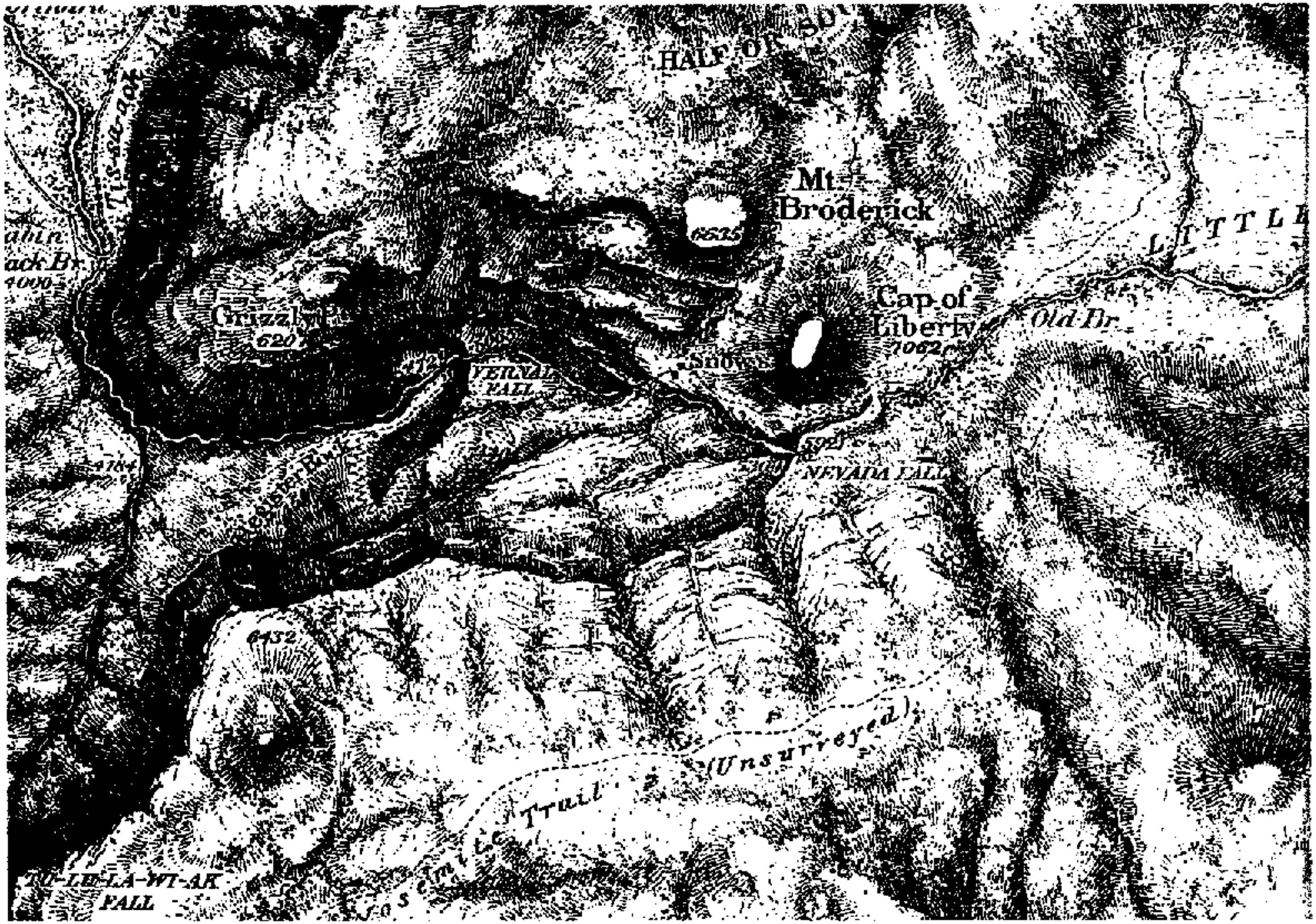

Figure A.2 – The Wheeler Survey of 1878-1879 produced this map. Highlighted areas show the Nevada Fall Corridor trails during this period (Courtesy Yosemite Research Library).

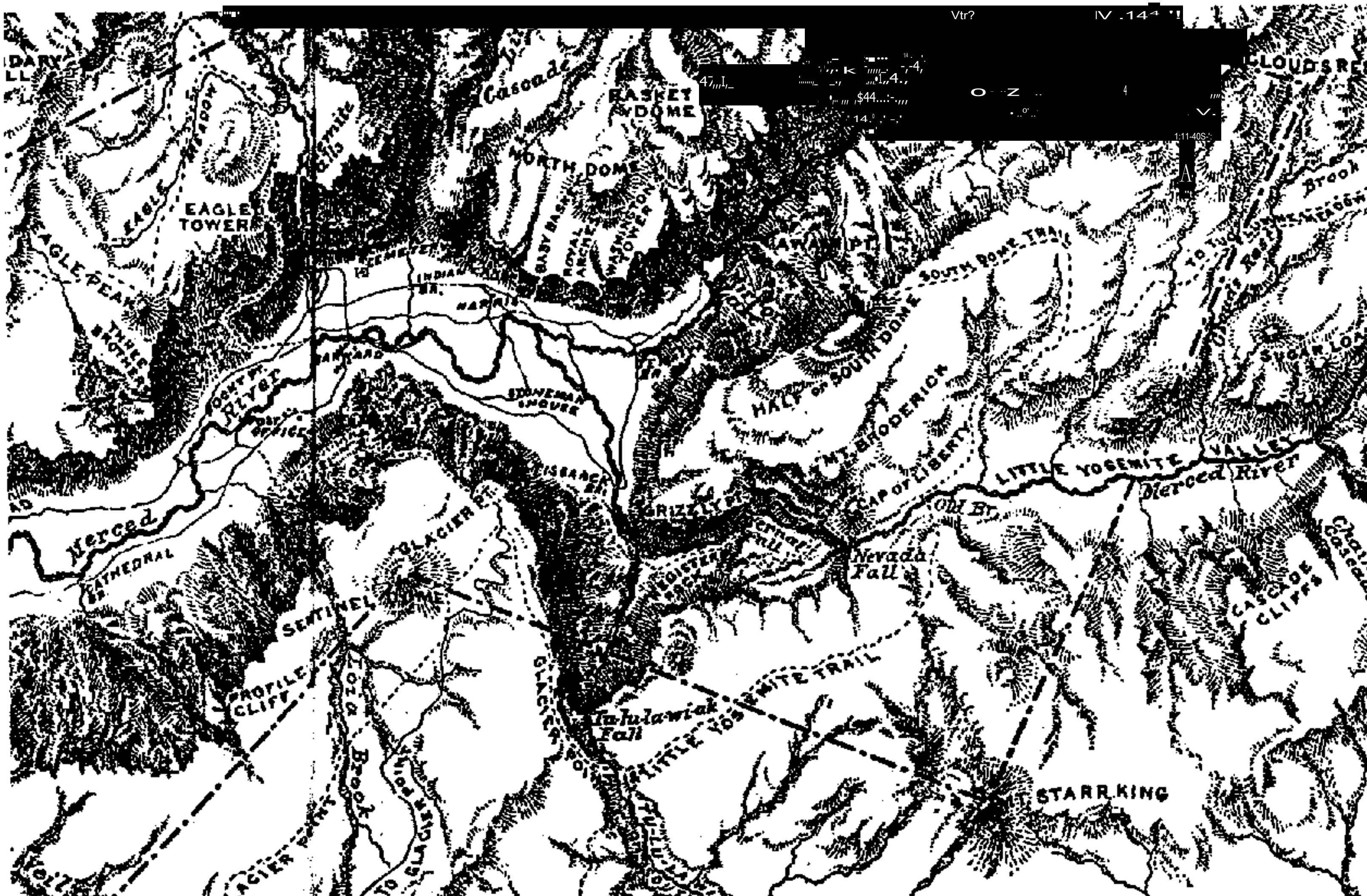

Figure A.3 -- Yosemite Valley in 1890. The highlighted area shows Vernal Fall (Courtesy Yosemite Research Library).

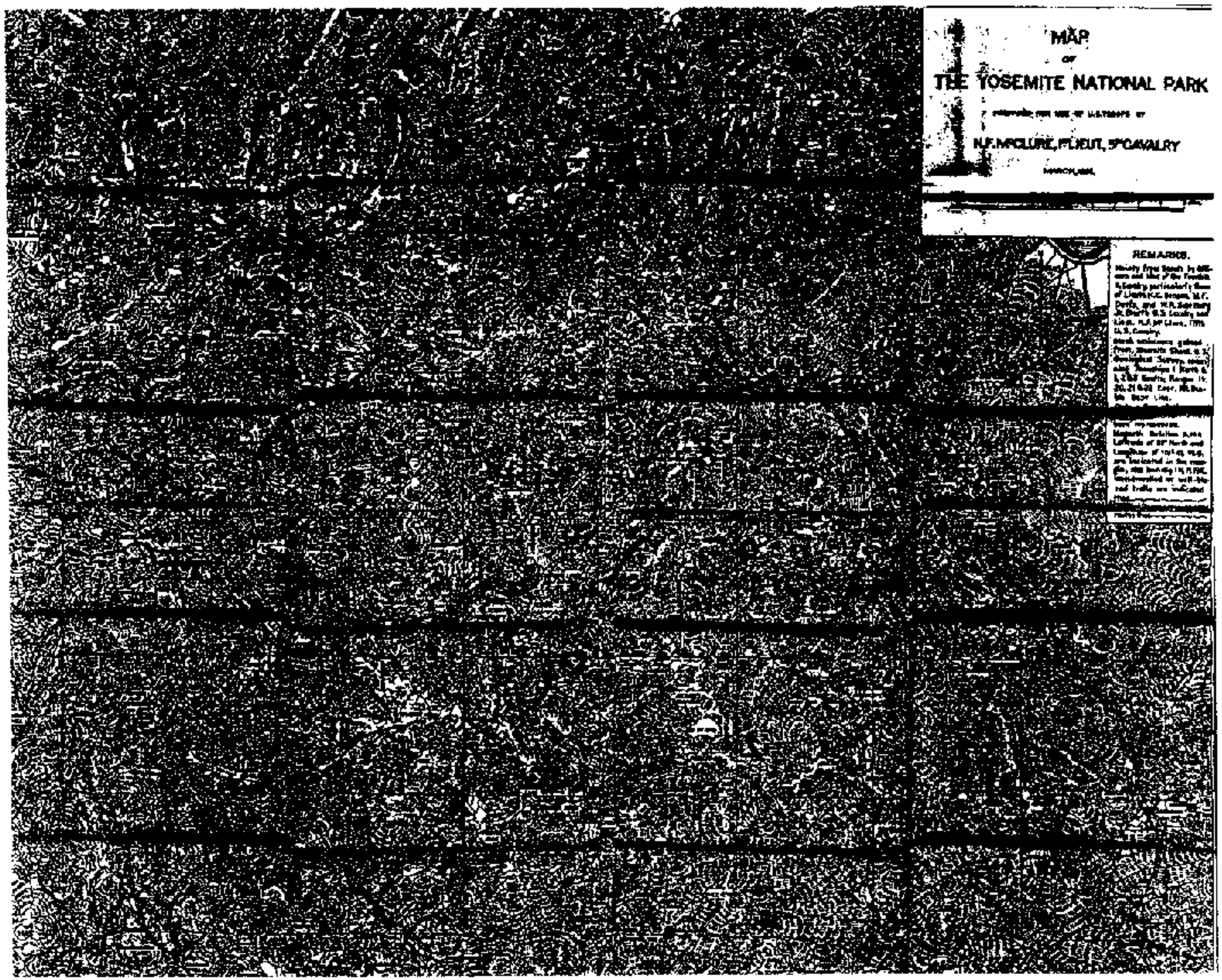

Figure A.4 – The 1896 map of Yosemite by Lt. N.F. McClure, 5th Cavalry, U.S. Army. The highlighted area is Vernal Fall (Courtesy Yosemite Research Library).

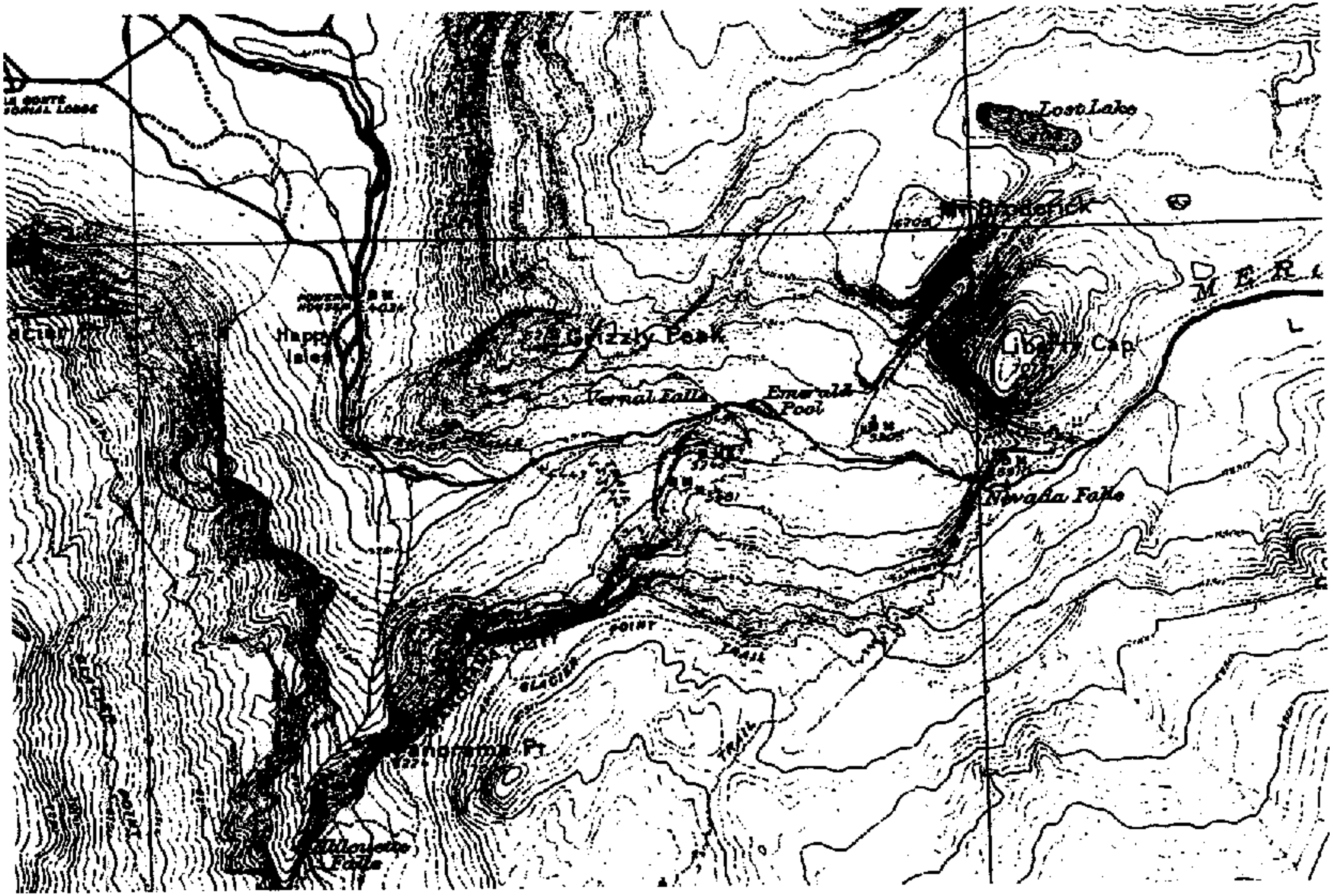

Figure A.5 - The 1907 U.S.G.S. map of Yosemite Valley. The highlighted area shows Vernal Fail (Courtesy Yosemite Research Library).

Figure &6 An air photo of the Nevada Fall Corridor, with the trail highlighted in yellow (Prepared by the GIS Division, Yosemite National Park).

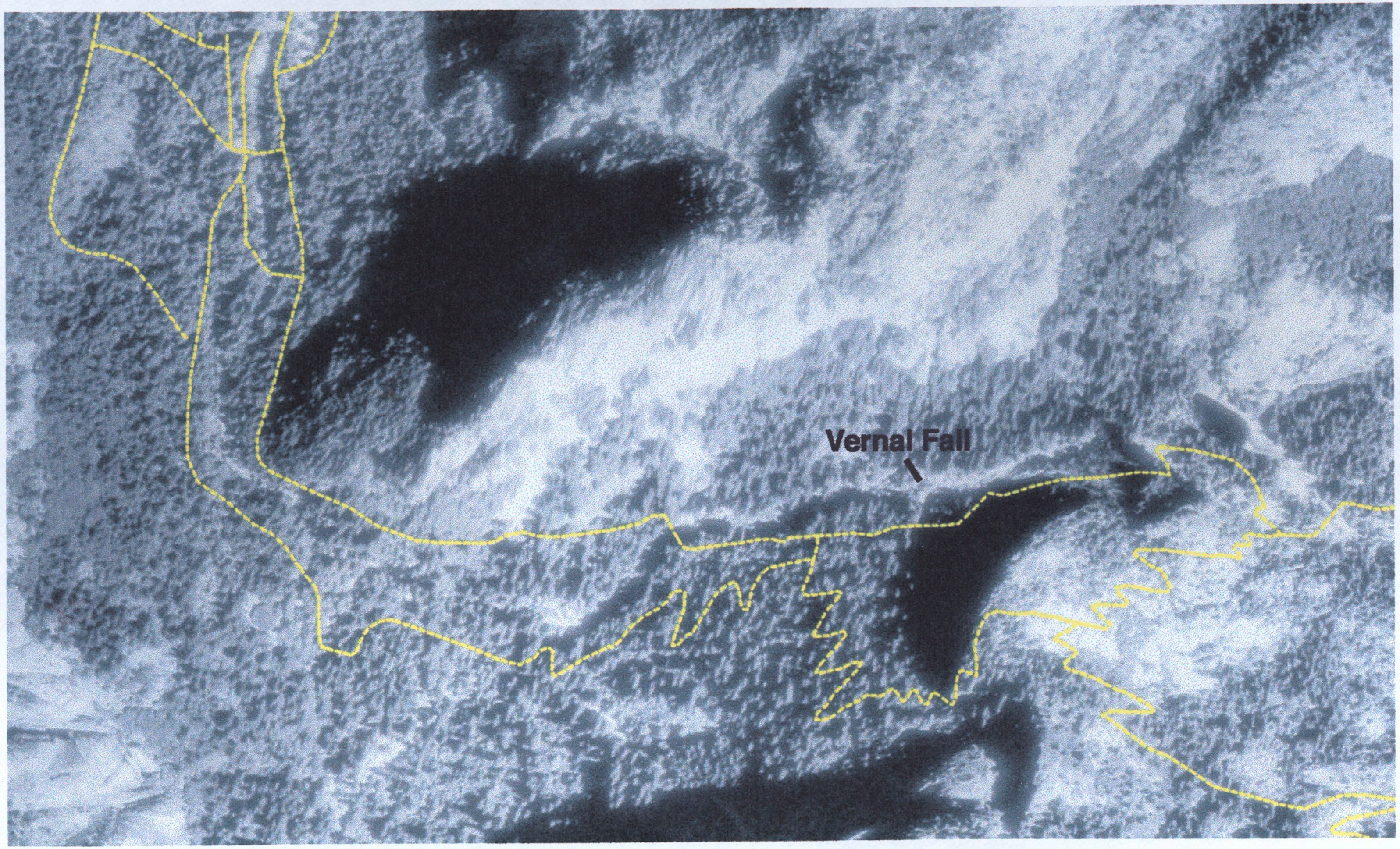

Figure A.6 – An air photo of the Nevada Fall Corridor, with the trail highlighted in yellow (Prepared by the GIS Division, Yosemite National Park).

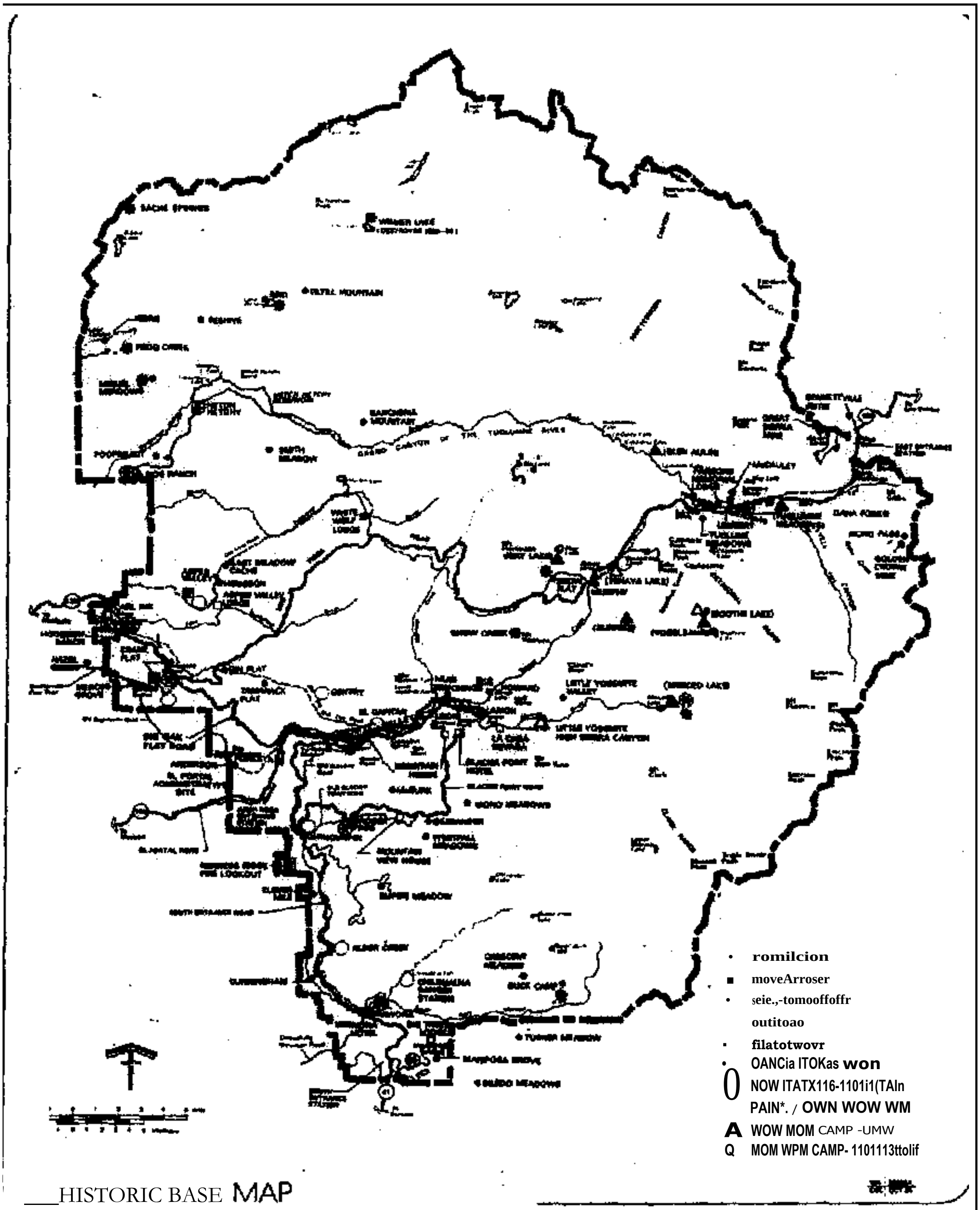

Figure A.7 — A historic base map of the park in 1979 (Courtesy Yosemite Research Library).

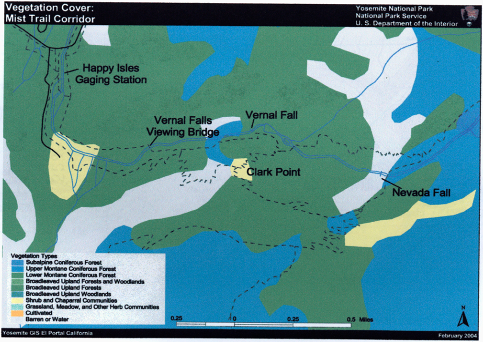

Figure A.8 – The vegetation types along the Nevada Fall Corridor (Courtesy Yosemite GIS division).

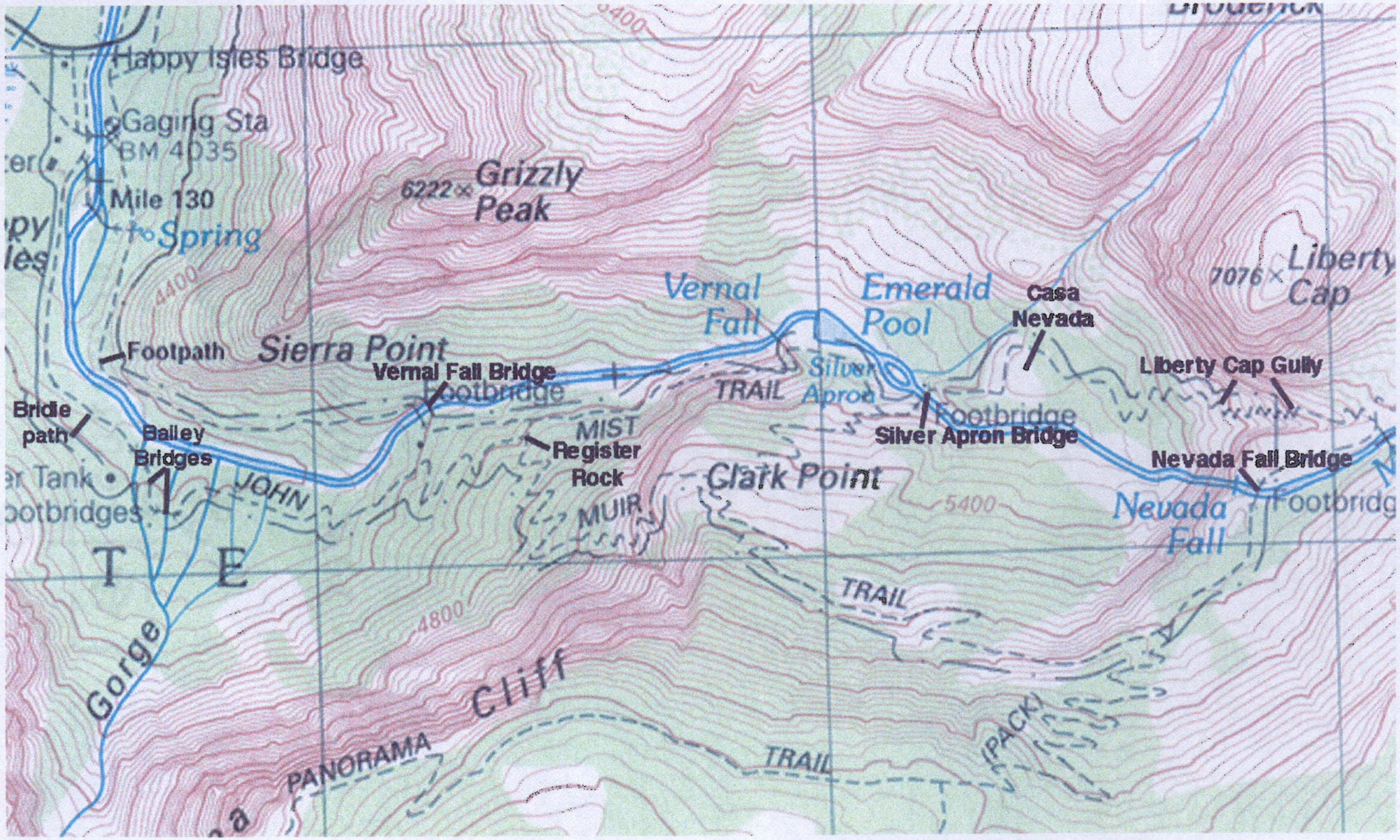

Figure A.9 – Major landmarks of the Nevada Fall Corridor are indicated (USGS Half Dome Quadrangle, 1997).

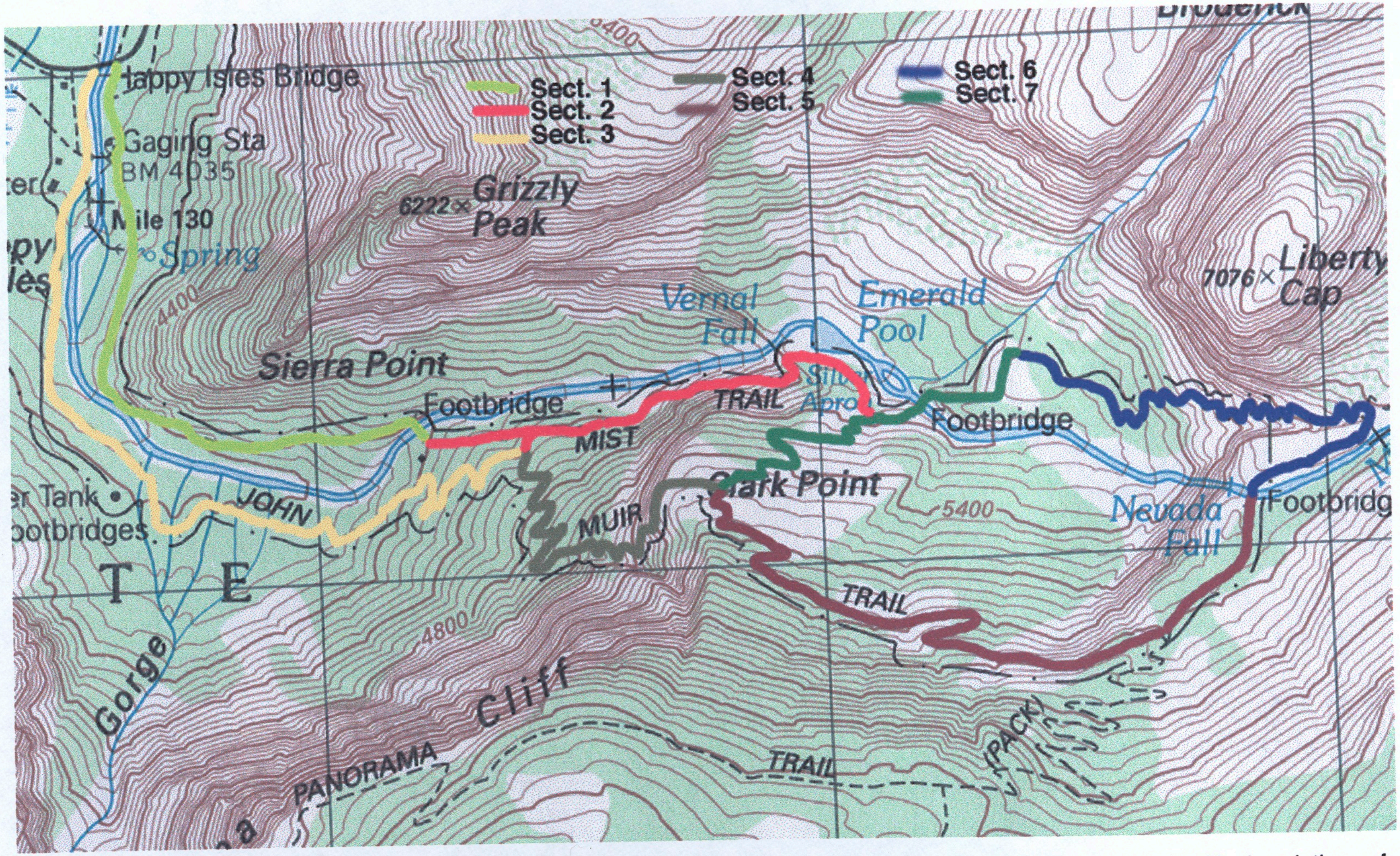

Figure A.10 – For the purposes of this Cultural Landscape Report, the corridor is split into seven sections to simplify descriptions of existing conditions and location of elements (USGS Half Dome Quadrangle, 1997).

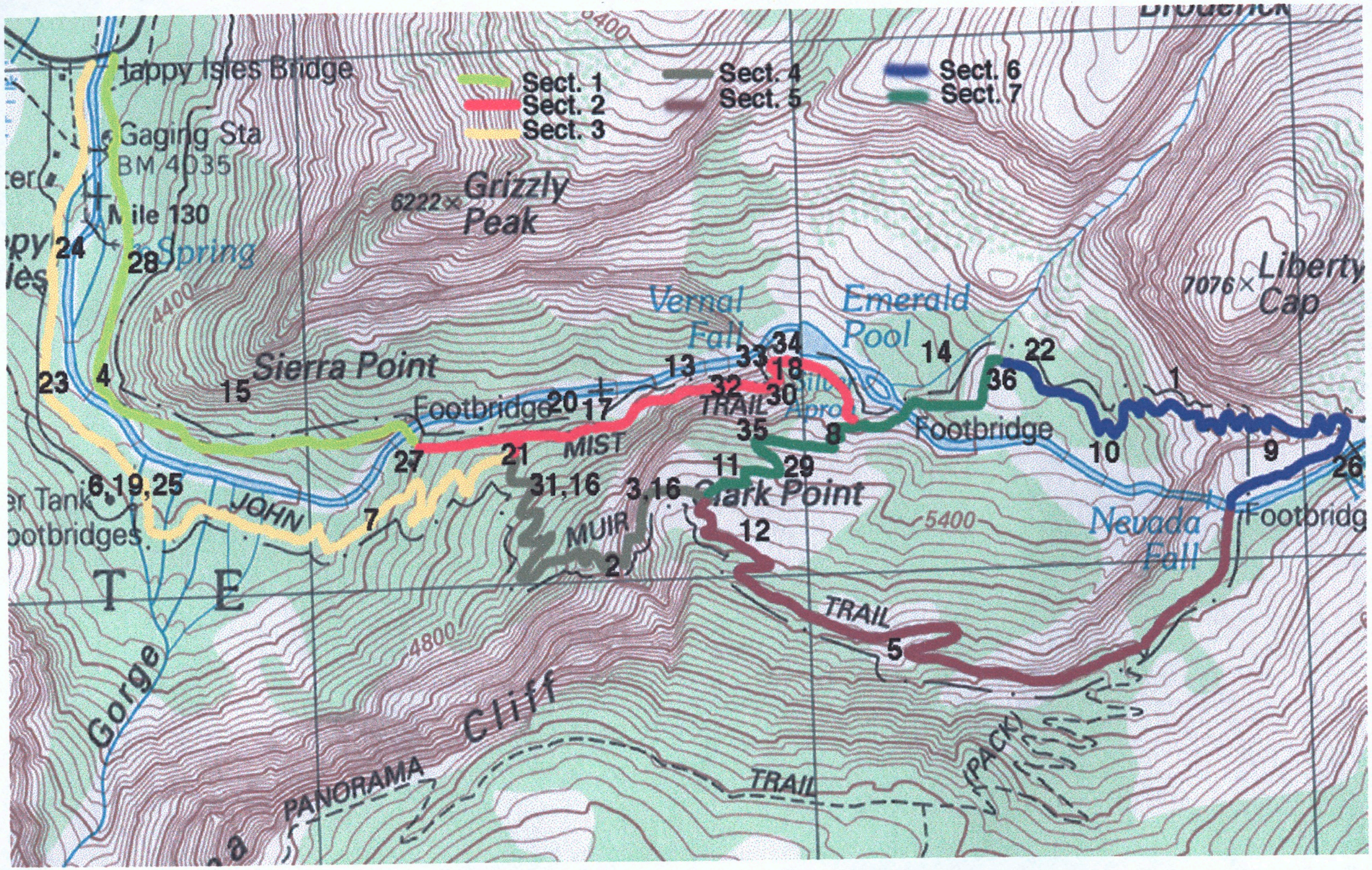

Figure A.11 – Major features to preserve are numbered, and correspond to the list on pages 225-226 (USGS Half Dome Quadrangle, 1997).

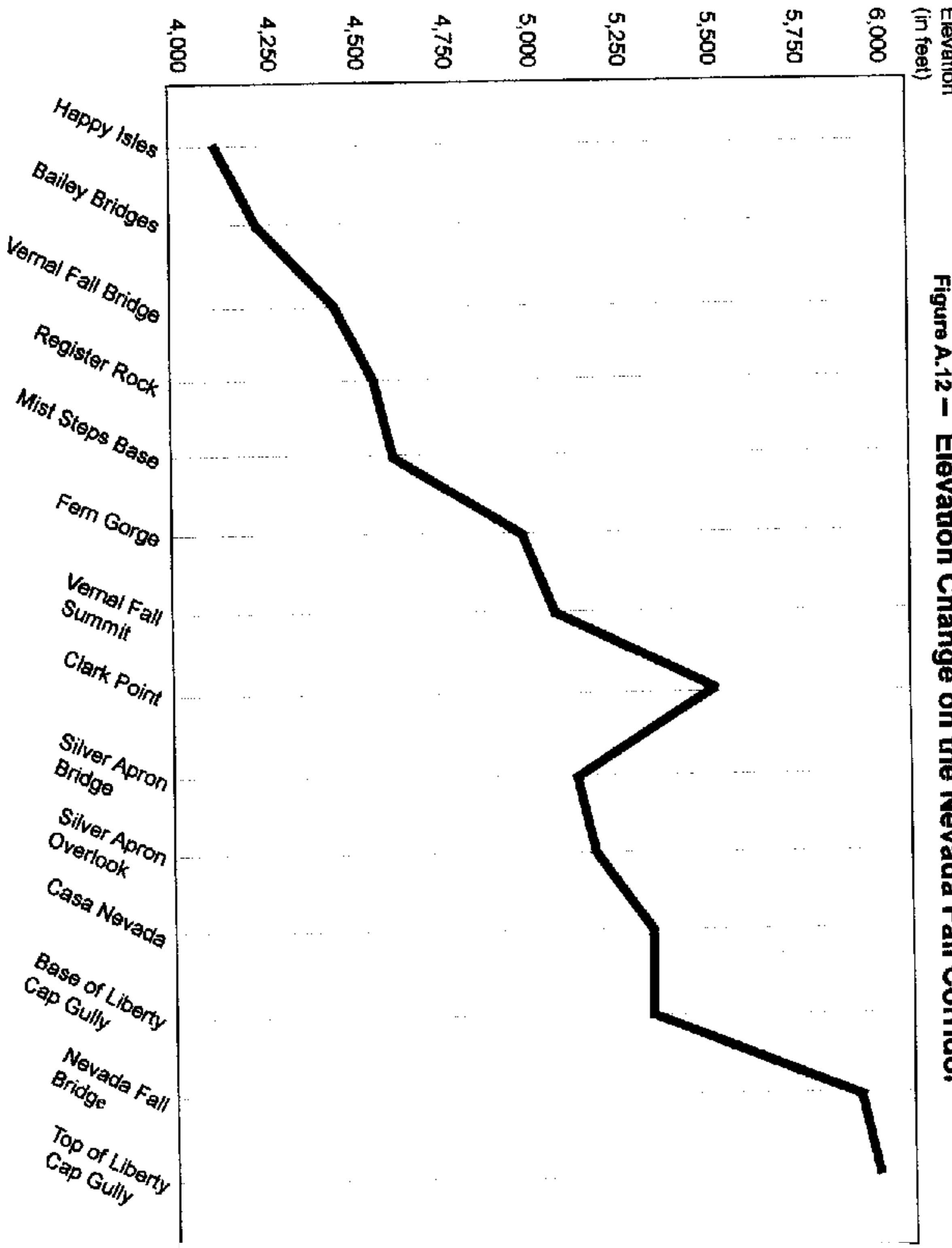

Figure A.12 — Elevation Change on the Nevada Fall Corridor

Graphic by Marti Gerdes. Source: Kent van Wagtendon, Yosemite National Park GIS division; USGS Half Dome Quadrangle 1997; Completion Report #63, July 1931.

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CHRONOLOGY PERTINENT TO NEVADA FALL CORRIDOR

1772 – Father Pedro Font looks across the great valley and sees "una gran sierra nevada," noting such on his map (George E. Gruell, *Fire in Sierra Nevada Forests* (Missoula: Mountain Press Publishing Company, 2001, 5).

1827 – Fur trapper Jedediah Smith and two companions cross the Sierra Nevada north of Yosemite, the first successful crossing of the Sierra by Euro-Americans *(Yosemite: A Visitor's Companion,* 13).

1833 – Joseph R. Walker's party of trappers look into, but do not enter, Yosemite while crossing the Sierra from the east *(Illustrated Guide to Yosemite,* 112).

1849 – Mining begins along Tuolumne and Merced Rivers. While chasing a grizzly bear, millwright William Penn Abrams and colleague U.N. Reamer become lost in the mountains and follow an Indian trail that leads past Yosemite Valley ("The Abrams Diary," *Sierra Club Bulletin, May* 1947, 126, and *Historic Resource Study Vol. 1,* by Linda Greene, xxv).

1850 – California admitted to Union. Joseph Screen discovers Hetch Hetchy *(Illustrated Guide to Yosemite,* 112).

1851– First recorded visit of white men to Yosemite Valley, when Army troops ascend Merced Canyon beyond Vernal and Nevada falls in search of intransigent Indians (Bunnell, *Discovery of the Yosemite,* 81).

1851 – Mariposa Battalion "discovers" Nevada Fall (Francis P. Farquhar, *History of the Sierra Nevada* (Berkeley: University of California Press, 1969, chap. ix, 11).

1852 – Two prospectors killed in Indian attack near Bridalveil Meadow. U.S. Infantry kills several Indians in retribution. *(Illustrated Guide to Yosemite,* 113).

1853 – Chief Tenaya and his band return to Yosemite and are killed by Paiutes following a horse-stealing incident *(Historic Resource Study Vol. 1,* by Linda Greene, *xxv).*

1853 – Article in San Francisco *Herald* extols virtues of Yosemite Valley. *(Illustrated Guide to Yosemite,* 113).

1855 – "The Sherlock crowd" "discovers" Nevada Fall ("Discovery of the Nevada Fall," James H. Lawrence, *Overland Monthly* Oct 1884).

1855 – James Hutchings organizes first party of sightseers to enter Yosemite Valley. First lithographs, by Thomas A. Ayers, are published giving first visuals of the region to the world *(Illustrated Guide to Yosemite,* 113).

1855-6 – Brothers Milton and Houston Mann build a trail to Nevada Fall; route uncertain ("Discovery of the Nevada Fall," James H. Lawrence, *Overland Monthly* Oct. 1884).

1857 – Ladders built at Vernal Fall, possibly by Stephen Cunningham (Peter Browning, *Yosemite Place Names* (Lafayette, *Calif: Great* West Books, 1988, 96).

1859 – Charles L. Weed produces the first photographs of Yosemite Valley *(Historic Resource Study Vol. 1,* by Linda Greene, xxvi).

1861 – Carleton E. Watkins photographs sites in Yosemite *(Illustrated Guide to Yosemite,* 114).

1863 – California State Geological Survey begins survey of Yosemite region, with Josiah Dwight Whitney and William H. Brewer in charge of field work *(Illustrated Guide to Yosemite,* 114).

1864 – Yosemite Grant: Congress deeds 48.6 square miles of Yosemite Valley and Mariposa Grove of Big Trees to State of California; eight commissioners, led by Frederick Law Olmsted, appointed to oversee *(Historic Resource Study Vol. 1,* by Linda Greene, xxvi).

1864 – Yosemite Valley Commissioners take over Yosemite Valley and Big Trees. At this time, only two improved trails exist in the park, the Vernal Falls Trail and the Mirror Lake Trail (Bingaman, *Pathways,* 21).

1865 – Whitney Survey publishes first volume.

1866-7 – Bridge built across river above Vernal Fall, enabling easy access to summit of Nevada Fall *(Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove,* 1866-67, 2).

1868 – John Muir first visits Yosemite *(Illustrated Guide to Yosemite,* 114).

1869 – Guardian Galen Clark grants Stephen Cunningham permission to build toll trail from Register Rock upriver, staying south of Vernal Falls (i.e. the river) and up to Nevada Falls. Cunningham and Snow's trail uses the 1866 bridge to cross the river to Snow's. Cunningham built most of lower portion while Snow completed the section above Vernal Fall (Commissioners' minutes).

1870s – Yosemite Valley Commissioners contract for construction of toll trails.

1870 – Stephen Cunningham and Albert Snow sign agreement to jointly build toll trail up to site between Vernal and Nevada Falls (i.e. site for Snow's hotel). Snow finances, Cunningham oversees construction. Route goes from Register Rock at start of Mist Trail, over rugged shoulder of Clark Point, to flat between Vernal and Nevada falls.

1870 – Snow's Hotel constructed above Vernal Fall *(100 Years in Yosemite,* 184).

1870 –Diamond Cascade bridge built, with 35-foot span, split cedar planking and timber stringers (1884 *Report of the Commissioners to Manage the Yosemite Valley and the Mariposa Big Tree Grove).*

1870 – Snow builds "Alpine House," a long, one-story building with uninterrupted view of Nevada Fall. It becomes a popular lunch stop for day-trippers, while others bound for Little Yosemite Valley and points beyond stay overnight

1871 –Snow doubles size of Alpine House (Johnston, 88).

1871 – John Conway builds trail from La Casa Nevada to top of Nevada Falls and Little Yosemite Valley, and attempts Half Dome climb (Bingaman, *Pathways,* p. 21, and *100 Years* in *Yosemite,* 184)

1871 – John Conway starts work on Four Mile Trail to Glacier Point (ibid).

1873 – Trails built from Little Yosemite to base of Nevada Fall and to the Merced River. *(Report to Commissioners for 1873,* 4).

1875 – Snow builds two-story chalet (Johnston, 89).

1875 – First ascent of Half Dome, by George C. Anderson *(Illustrated Guide to Yosemite,* 115).

1879 – Wheeler Survey party surveys and maps Yosemite Valley. *(Illustrated Guide to Yosemite,* 116).

1880 – State legislature creates new Board of Yosemite Commissioners.

1881 – Guardian's Report to Board of Commissioners refers to "the excellent and workmanlike manner" in which the Anderson work on "a new trail to Vernal and Nevada Falls" is progression. Also, "... the route from (Glacier Point trail) to Snow's ... could without doubt be made the grandest horseback ride yet known to man" (18).

1882 - Snow's toll trail lease expires and it becomes state property (Johnston, p. 150). State also purchases Vernal Fall stairway, for $300 from Snow.

1882 - The state (Yosemite Valley Commission) buys Mist Trail for $300.

1882 - George Anderson builds trail from Happy Isles to bridge below Venial Fall *(Illustrated Guide to Yosemite,* 116).

1884 - mention is made to use of dynamite already commonplace for trails in the park ("Discovery of the Nevada Fall," James H. Lawrence, *Overland Monthly* Oct. 1884).

1884 - George Fiske opens photographic studio in Yosemite *(Historic Resource Study Vol. 1,* by Linda Greenee, xxviii).

1885 - Yosemite Valley Board of Commissioners replaces Diamond Cascade Bridge with "a new, well-approved and substantial structure" (1885-6 *Commissioners Report).*

1885 - Commission builds "massive bridge spanning the Merced at Register Rock," thereby connecting the Vernal and Nevada falls trails (1885-6 *Commissioners Report).*

1885 - Commission builds trail from Casa Nevada to Glacier Point, the "Echo Wall Trail," which crossed Merced at a bridge "a few yards above the Nevada Fall" (1885-6 *Commissioners Report)* [Also once known as the Eleven Mile Trail and the Panorama Cliff Trail, this is now called the Glacier Point Trail].

1889 - Snows cease operating La Casa Nevada due to ill health. D.F. Baxter leases the property from the state 1890-1, after which it closed never to formally reopen.

1890 - Yosemite National Park established by Act of Congress.

1891 - War Department dispatches cavalry to patrol Yosemite, a practice that continues until 1913. Army assumes administration of entire park, including trail-building responsibilities (Russell, *100 Years of Yosemite,* 187).

1891-92 - Nevada Falls trail realigned to include "Point Clark" view point of Vernal Falls *(Report to Commissioners for 1891-92,* p. *6).*

1892 - Sierra Club organized.

1893-4 - Trail from top of Nevada Falls to Glacier Point repaired and Illillouette Bridge reconstructed *(Report to Commissioners for 1893-4,* 10).

1897 - Wooden steps at Vernal Falls replaced by rock stairway *(100 Years in Yosemite,* 188).

1897 – Trail route in Mist area changed to its current location.

1897-98 – Brush removal opens up views of waterfalls and cliffs. Nevada Fall bridge renovated and trusses added. *(Report to Commissioners for 1897-8,* 6).

1900 – Fire destroys La Casa Nevada (Johnston, 152) .

1900 – First automobile enters Yosemite Valley *(Illustrated Guide to Yosemite,* 117).

1901 – Electric light plant installed at Happy Isles power plant *(Illustrated Guide to Yosemite,* 118). Pipeline extends up southern portion of canyon, taking water at junction of Merced River and illillouette Creek, giving a 150-foot head.

1901 – Happy Isles bridge over Merced removed and rebuilt ("Report to Commissioners for 1902," 4).

1903 – President Theodore Roosevelt visits Yosemite.

1905 – California State legislature recedes Yosemite Grant to United States. *(Illustrated Guide to Yosemite,* 118).

1905 – Boundary adjustment of park reduces size by 430 square miles *(Historic Resource Study Vol. 1,* by Linda Greene, xi).

1908 – Rock slide destroys "practically the whole hillside" of the Nevada Fall zigzags (Sovulewski to Thomson, August 2, 1919 letter) (Letter notes trail there rebuilt three times before 1929 under Sovulewski, Trails Box 83).

1908 – Gabriel Sovulewski named acting superintendent (Russell, 189).

1910-1911 – Acting Superintendent Sovulewski hires Italian stonemasons in the area to work on the Tenaya Zig-Zags. ("Wilderness Historic Resources Survey, 1989 Season Report," by James B. Snyder., 1990, 72.)

ca. 1911 – Happy Isles foot bridge built ("Development of Happy Isles Picnic Grounds and Three Log Foot Bridges," Acct. No. 501.39, Completion Report).

1911 – Nine saddle animals killed by same bolt of lightning on trail between Ilhouette Creek and Glacier Point ("Acting Superintendent's Report," 1911).

1913 – Two 3-foot-wide foot bridges built on trail to Happy Isles ("Acting Superintendent's Report," 1913).

1914 – Department of Interior civilian employees replace Army administration and protection. Park Supervisor Gabriel Sovulewski in actual charge of park *(Illustrated Guide to Yosemite,* 118).

1914 John Muir dies.

1915 – Stephen T. Mather becomes Assistant to the Secretary of the Interior and, with Horace Albright, oversees all national parks *(Historic Resource Study Vol. 1,* by Linda Greene,)di).

1915 – Appropriation made for John Muir Trail *(100 Years in Yosemite,* 190)

1916 – National Park Service Act approved.

1916 – Corral built on north side of river at foot of Vernal and Nevada Falls Trail, 132 X 75 ("Construction Reports of Gabriel Sovulewski," 1916-1920)

1917 – Park "supervisors" renamed "superintendents."

1917 – John Conway dies.

1917 – Auxiliary park water supply installed, consisting of collection reservoir (20X6X12 deep) 30' below the spring *(1918 Second Annual Report of the National Park Service,* 134-5).

1919 – Park makes use of surplus Army TNT for trail work, with "splendid results" *(1919 Department of the Interior Report,* 25).

1919 – California cedes jurisdiction of park rules and regulations to federal government *(1919 Department of the Interior Report,* 25).

1919 – Happy Isles powerhouse removed *(Historic Resource Study Vol. 1,* by Linda Greene, xlii).

1920 – State abandons fish hatchery *(1920 Department of the Interior Report,* 244).

1921 – Water system developed in valley; prior to this, water supplied from spring box at Happy Isles or directly from Merced *(Historic Resource Study Vol. 1,* by Linda Greene,

1923 – Hetch Hetchy Reservoir completed.

1924 – Woodstave pipeline from intake at Illilouette Creek to settling tank installed (Completion Report, "Replacement of 14" Woodstave Line with 18" Cast Iron, Happy Isles to Illilouette Creek," Acct. 332.1, December 1951)

1926 – Woodstave pipe installed from Happy Isles to settling tank (Completion Report, "Replacement of 14" Woodstave Line with 18" Cast Iron, Happy Isles to Illilouette Creek," Acct, 332.1, December 1951)

1926 – All-Year Highway from Merced to Yosemite opens.

1926 – Fish hatchery site dedicated.

1927 – Awahnee Hotel opens.

1927 – Happy Isles fish hatchery opened by California State Fish and Game Commission.

1928 – Five stone-faced concrete arch bridges constructed *(Historic Resource Study Vol. I,* by Linda Greene, xliv).

1929 – Proposal to build horse trail from Happy Isles to Vernal Bridge

1929 – Water settling tank built near the intake of the Merced River and Illilouette Creek, adjacent to the pipe lines from each of these sources of water (Preliminary Report of Job 4482-Water Settling Tank, Sept. 23, 1929)

1929 – July, electric storm damages Nevada Fall Trail from Happy Isles to top of Nevada Fall, washing out "all of the surface material" that had just been newly applied in a reconstruction/repair project.

1928 – January, first documented use of asphaltic products in the park (Jan. 1929 "Construction Report for 1929 covering the Oiling of Bridle Paths and the Construction and Surfacing of Footpath and Parking areas in Yosemite National Park California," File no. 640-01 in Trails Box 83).

ca. 1928-31 – "Construction and oiling of the highest standard trails every built in Yosemite" include the Vernal-Nevada falls trails (Final Report, "Nevada Falls-Glacier Point Trail," Acct. No. 506.19)

1930 – Oiling on Vernal Fall Trail applied to penetration of 2 at rate of approximately 1.6 gallons per square yard (Sovulewski to Jennings, August 28, 1931 letter, Central Files, Acc. 5121, Trails Box 83, Trails 1916-1940).

1930 – Trail constructed between Venial Falls Bridge and Clark's Point and from Nevada Falls toward Clark's Point. Required supporting rock walls 10-12 feet tall, requiring excavation and blasting for foundation. Trail 6-7 feet wide, grades under 15 percent (with short spaces periodically 18 percent). "No pains are spared to bring all views and natural features to add to the interest." ("Supervisor's Monthly Reports 1930," 3).

1930 - Vernal and Nevada Falls Trail added 2,000 feet "of very difficult trail," including 2,596 square feet of retaining walls. Ten- and twelve-foot retaining walls, averaged four feet high, were built over the 2,000 *feet* of construction ." ("Supervisor's Monthly Reports 1930," last page (not numbered).

1931 - Oiling on Vernal Falls Trail between Happy Isles and Nevada Falls applied at rate of slightly more than one gallon per square yard (Sovulewski to Jennings, August 28, 1931 letter)

1931 - Trail near Nevada Falls Bridge "over slick granite is reconstructed, surfaced and partially relocated" (Final Report, "Completion Nevada Falls to Merced Lake Trail," Acct. No. 506.13).

1931 - Nevada Fall trail from Clark's Point completed (Final Report "Job No. 506.6, Vernal Bridge to Rock Cut Trail Construction," 1931).

1931 - Trail built to connect 1928 bridle paths with new Happy Isles Bridge underpasses. Stone masonry retaining wall built at south approach to right underpass. (Final Report, "Bridle Path Construction," Acct. No. 505.1).

1932 - Happy Isles foot bridge rebuilt (Final Report, "Development of Happy Isles Picnic Grounds and Three Log Foot Bridges," Acct. No. 501.39).

1932 - Telephone line replaced from Happy Isles to Little Yosemite (Final Report, "Trail Telephone, Happy Isles to Little Yosemite," Acct. No. 506.14

1932 - Superintendent Thomson inaugurates policy assigning district rangers crews and equipment to improve trails in their area (Final Report, "Reconditioned Mountain Trails, Acct. No. 506.18).

1932 - Repair made to new rock cut section to divert small water fall that developed (Final Report, "Nevada Falls-Glacier Point Trail Bettemient," Acct. No. 507.1).

1932 - Traffic counts between valley and Vernal Fall May 29, 1932: 4,013 people up, 4,074 down between 5 a.m. and 8 p.m. (Final Report, "Nevada Falls-Glacier Point Trail," Acct. No. 506.19).

1933 - Five CCC camps set up in Yosemite, primarily for training in forest fire control and techniques. *(Guardians of the Yosemite,* John W. Bingaman, 1961). There is no record of any CCC work on the Mist Trail corridor, just on the Four Mile Trail.

1934 - Comfort station built at Vernal Falls Bridge.

1934 - CCC crews replace cables on back side of Half Dome.

1938 - Gabriel Sovulewski dies.

1939 - Easternmost of the three Happy Isles footbridges replaced after flood carries it away. One stringer was salvaged and new abutments raised two feet; additional height added to wing walls, and stone approach steps added. CCC assisted with stringer work (*new* dimensions: one span 334', two 20" log strings, log handrail, rubble masonry abutments). The Center Bridge at Happy Isles completely replaced (new dimensions: 2 spans with total length of 64').

1939 - Vegetation map of the park prepared (*100 Years in Yosemite,* 194)

1942 - Tables removed from Vernal Fall Bridge and Happy Isles on advice of Superintendent Kittredge.

1942 - Hikers/equestrians still sharing trail up to Vernal Fall Bridge ("Trails Construction and Maintenance, 1941-2," File no. 640).

1943 - Happy Isles-Vernal Bridge horse trail proposal revived.

1947 - Meadow and vista restoration begins (*Historic Resource Study Vol. 1,* by Linda Greene, p. xlvi).

1951 - Woodstave pipe at Happy Isles/Milouette intake replaced with cast iron (Completion Report, "Replacement of 14" Woodstave Line with 18" Cast Iron, Happy Isles to Illilouette Creek," Acct. 332.1)

1953 Vista clearing commences in 11 of 13 designated sites (after park visit and review by F.L. Olmsted Jr.). A total of 700 trees were removed - 258 incense cedar, 245 ponderosa pines, 103 white firs and 94 others.

1957 - Fish hatchery building at Happy Isles converted to Nature Center.

1958 - First climb of face of El Capitan (*100 Years in Yosemite,* 196).

1960 - By November, majority of horse trail between Happy Isles and Vernal Bridge rough graded and portions of bridge abutments poured. Contract awarded for prefab bridge materials.

1961 - Horse trail construction completed, covering 1.5 miles and including two Bailey brides and culvert stream crossings (Completion report, "Work Order No. R-16, PCP R-65-6").

1965 - Stoneboat (pulled by draft horses) used in moving rock and rubble for wall at Nevada Falls (Snyder, *Draft Horse Journal,* summer 1978).

1968 – Firefall abolished.

1970 – Prescribed burning *begins* (Wuerthner, *Yosemite: A Visitor's Companion,* 46).

1970-1 – Reconstruction of portion of Mist Trail from junction of bridle path below Vernal Fall to the top of Vernal Fall. Included 1,486 feet of 6" mesh-reinforced concrete pavement; 893' of mesh-reinforced concrete steps (with grades up to 60%); 714 feet of 15"X12" above grade masonry guard wall surmounted by two horizontal 1 1/2" pipe rails with uprights at 6' centers, with top rail 30" above grade (42" at dangerous locations). (Completion Report, "Work Order No. 8800-00804").

1974 – Rockslide from 1973 prompts repair of old trail up Liberty Cap gully and removal of drinking fountain. This route probably follows the earlier trail (Snyder to Greenee, 7).

1974 – Emergency reconstruction of Mist Trail comprising complete rebuilding of 2,700 feet of trail, including walls, tread and waterbreaks, after rockslide demolished trail section (Completion Report, "Work order No. 8800-7045-503").

1975 – Build and reroute 737 feet of new trail on bridle path, including rock-and-concrete ford; clearing 200' of wash to control water flow, and obliterating 330' of original trail (Completion Report "Work order No. 8800-7047-503").

1980 – General Management Plan released

1984 – Yosemite named World Heritage Site. Ninety-four percent of park designated wilderness.

1987 – Rockfall plugs Liberty Cap gully.

1990 – Forest fires burn across the park.

1997 – Floodwaters divert *across* plugged Liberty Cap gully, destroying retaining walls on trail.

CONSTRUCTION CHANGES ON THE NEVADA FALL CORRIDOR

1850 – Mist Trail located on south side of Merced River.'

1855-6 – Mann brothers build a trail, using the Indian's Mono Trail, from Wawona to Nevada Fall.

1858 – Stephen Cunningham builds toll route from Valley to top of Vernal Fall, using the old Indian trail on the south side of the Merced to the base of Vernal Fall.

1858 – Cunningham builds the first ladders at Fern Grotto.2

1865 – Gardner map shows the ladders. (It also shows Snow's Hotel, which wasn't built until 1870, implying that this edition of the map is a revision.)

1866 – State builds bridge above Vernal Fa11.3

1870 – Bridle path built to foot of Nevada Fall.[4] The trail segment from Clark Point to Silver Apron Bridge and up to Nevada Fall had been in use since 18705.

1870 – Albert Snow, probably with help from Stephen Cunningham, builds the original trail between Register Rock and Clark Point.6

1871 – Albert Snow builds new stairway with railings to the top of Vernal Fa11.7

1882 – George Anderson builds trail to Vernal Fall Bridge on north side of the Merced.8

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1 National Park Service, List of Classified Structures, *"Mist Trail."*

2 *Hank Johnston, The Yosemite Gram',* 1995, 102.

3 [bid., 86.

4 *Illustrated Guide to Yosemite,* p. 115.

5 "Final Report Through Rock Cut to Nevada Falls, Portion of Merced Lake Trunk Trail" (July 1931).

6 Report to the Commissioners, 1884, 19.

7 Johnston, *The Yosemite Grant,* 105.

1890 – Map[9] shows no route yet north of the Merced. At Nevada Fail it crosses to the north (doesn't necessarily show a bridge) then shows "Old Br." slightly east of the fall then crossing over south onto the Glacier Point/ Little Yosemite Trail.

1892 – Wooden staircase and railings replace ladders up through mist.I°

1897 – Stone steps are installed in place of ladders."

1898-9 The bridge at Nevada Fall is renovated and strengthened by trusses.12

1900 – Snow's Hotel burns.'3

1907 – USGS map shows trail on north side of Merced, as well as two trails on south side, both dead-ending, one at the Cascades below the S-curve wall on the current trail.

1908 – Vernal Fall and Nevada Falls bridges built."

1914 New Silver Apron bridge replaces original structure; design and construction under Gabriel Sovulewski.15

1914 – Sixty-foot span foot and horse bridge of wood and steel trusses is built over the Merced below Vernal Falls, and named the Register Rock Bridge.'6

1916 – Unspecified repairs done to the trail between Vernal and Nevada Falls.17

Illustrated Guide to Yosemite, 116.

[9] John Muir, "The Treasures of the Yosemite" *(Century).*

[1°] National Park Service, List of Classified Structures, "Mist Trail"

11 *The Yosemite Grant,* 150.

[12] Report of the Commissioners, 1899, 7.

[13] Johnson, *The Yosemite Grant,* 152.

[14] "Final Report, Job. No. 506-9, Silver Apron Bridge" (April 1931).

[15] Ibid.

16 Ibid.

[12] Construction Reports of Gabriel Sovulewski, 1916-1920, YNPRL, Sovulewski file.

1926 – 2,100 feet of "very bad trail" between Nevada and Venial Falls "relocated and built, an 250 feet of old trail improved, rocks blasted out and safety provided along the retaining walls."Ig

1928 – "The Old Vernal bridge" is replaced at same location with log bridge on stone masonry piers and abutments.

1929 – Nevada Fall bridge replaced with wider design developed by the Landscape Division, same *as* 1928 Vernal Fall bridge.19

1929 – Trail from Happy Isles to Register Rock reconstructed and widened? Also, 825 feet of steel hand rail installed on exposed sections of the Mist Trail.

1929-30 – Construction of the Rock Cut to Nevada Fall on the "Merced Lake Trunk Trail."21

1930 – Trail built from new Vernal Falls Bridge to Rock Cut.22

1930 – New Silver Apron bridge replaces that built in 1914.

1931 – "50-60% asphaltic content light fuel" used to re-oil all bridle paths, presumably also that along the Mist Trail corridor.

1934 – Comfort station built at Vernal Falls Bridge.23

1939 – Trail bridge at Nevada Fall reconstructed.24

1939 New Silver Apron Bridge constructed, the second such replacement since 1930.

1940 – Nevada Fall bridge replacement under way, with steel plate girder bridge featuring log trim replacing the old truss bridge?'

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[13] Construction Reports of Gabriel Sovulewski, 1921-27; October 1926, YNPRL, Sovulewski file.

[19] Final Report, Job. No. 506-9, Silver Apron Bridge, April 1931.

[20] Report of Construction Activities 1929 Season.

[21] 1931 Final Report Through Rock Cut to Nevada Fall.

[22] Final Report Job N. 506.6, Vernal Bridge to Rock Cut, April 1931.

www.den.nps.gov/amoebafrICMC.NSF 3113/03, and "Superintendent's Monthly Report, April 1934," 6-7; "Glacier Point Comfort Station" file, box 59, YNPRL.

[24] www.den.nps.gov/amoeba/TIC/17CNSF 3/13/03.

1947 – Safety improvements in the form of signs and guardrails installed on Nevada Fall trail.26

1956 – Liberty Cap Gully switchbacks rebuilt after winter flood destruction 27

1960 – Horse trail built between Happy Isles and Vernal Fa11.28

1971 Mist Trail "reconstructed" from junction of bridle path below Vernal Fall to the top of Vernal Fall. It involved 1,486 feet of 6" concrete pavement, 714 feet of masonry guard wall and two 1 1/2" pipe rails.29

1971 – Sewer line installed from Happy Isles to Vernal Falls comfort station3°

1974 – Trail rebuilt for 2,700 feet at the Liberty Cap Gully after a rockslide. Work included walls, tread, and waterbars.31

1976 – Upper end of the Nevada Fall horse trail reconstructed/relocated over approximately a quarter-mile, including clearing 200 feet of a wash and building a rock and concrete ford "to correct drainage problems"; and obliterating 330 feet of the original trail to ease the steep grade.32

1987 – "Major sections" of Liberty Cap gully reconstructed."

1987 – Porcupine Switchbacks (below Clark Point) rebuilt.34

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[25] Sierra Club Bulletin, XXVI, No. 1, Feb. 1941, p. 123.

[26] www.den.nps.gov/amoebarrIC/11C.NSF 3/13/03.

[27] Jim Snyder, email, February 2, 2004.

[28] Completion Report #380, "Happy Isles to Vernal Fall"

[29] Completion Report #491, "Reconstruction Mist Trail"

3o3o www.den.npssoviamoeballi MIC.NSF, March 13, 2003.

[31] Completion Report #513, -Emergency Reconstruction Mist Trail."

[32] Completion Report #520, "Reconstruct Nevada Falls Home Trail"

[33] Tim Ludington telephone interview, January 29, 2004.

[34] Ibid.

Ca. 1991 – Talus section near the Anderson Trail cutoff (about 2/3 way up to the Vernal Bridge from Happy Isles) terraced after rock slide destroys grade.35

1991 – S-curve wall below Vernal Fall Bridge repaired.36

1995 – Topmost switchbacks (just before restrooms) of Liberty Cap Gully rebuilt.37 Redecking and re-railing of Nevada Fall Bridge.

1997-8 – Lower switchback and corner of Liberty Cap Gully reconstructed from Casa Nevada through the forested area.38

1997 – Nevada Fall Bridge reconstructed following 1996 flood damage, to include redecking and rail repair.39

Ca. 2002 – Talus section near Anderston Trail cutoff restored to even grade for approximately 200 feet.°

2003 – Horse Bridge 42 rebuilt.

2003 – Vernal Fall Bridge posts and rails replaced.

[35] Tim Ludington telephone interview, January 27, 2004.

[36] Tim Ludington, interview, April 10, 2003.

[37] Tim Ludington telephone interview, January 29, 2004.

[38] Ibid.

[39] Ibid.

4o[40] Tim Ludington telephone interview, January 27, 2004.

DRY-LAID MASONRY RESOURCES

Training

• National Center for Preservation Training and Technology
645 College Avenue, Natchitoches, LA 71457. Telephone (318) 356-7444.
www.ncptt.nps.gov or email ncptt@nps.gov

• Dry Stone Conservancy, 1065 Dove Run Road, Suite 6, Lexington KY 40502
www.dzystoneusa.org or email DrystoneUS@aol.corn

• Dry Stone Walling Association, Westmorland County Showground, Lane Farm, Crooklands, Milnthorpe, Cumbria, LA7 7NH, England. Telephone 01539 567953.
www.dswa.org.uk or email information@dswa.org.uk

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NEVADA FALL CORRIDOR STATISTICS[1]

Vernal Fall height – 317 feet
Nevada Fall height – 594 feet
Happy Isles elevation – 4,035 feet
Vernal Fall elevation – 5.044 feet
Nevada Fall elevation – 5,970 feet
Clark Point elevation – 5,481 feet
Casa Nevada elevation – 5,305 feet
Liberty Cap elevation – 7,076 feet
Half Dome elevation – 8,842 feet
Mt. Lyell elevation (highest point in glut) – 13,114 feet

Average precipitation, Yosemite Valley – 36.51 inches
Average snowfall – 29 inches

Average length of stay for day-use auto passengers – 4.2 hours[2]

[1] "Fact Sheet," Statement for Management, Yosemite National Park, 1994; and Yosemite Official Map and Guide, distributed 2003.
[2] James H. Gramann, "Visitors, Alternative Raines, and Recreational Displacement at Yosemite National Park," College Station, TX: Texas A&M University (1992).

RIPRAP[3]

Lay down these words
Before your mind like rocks.
                placed solid, by hands
In choice of place, set
Before the body of the mind
                in space and time:
Solidity of bark, leaf or wall
                riprap of things:
Cobble of milky way,
                straying planets,
These poems, people,
                lost ponies with
Dragging saddles
                and rocky sure-foot trails.
The worlds like an endless
                four-dimensional
Game of *Go.*
                ants and pebbles
In the thin loam, each rock a word
                a creek-washed stone
Granite: ingrained
                with torment of fire and weight
Crystal and sediment linked hot
                all change, in thoughts,
As well as things.

– Gary Snyder

[3] Snyder worked on a Yosemite riprap crew in the late 1950s; he published this in 1959. Used with permission of the publisher, Shoemaker & Hoard.

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