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**National Park Service  
Cultural Landscape Inventory  
2006**



**Crater Rim Historic District  
Hawaii Volcanoes National Park**

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# Executive Summary

## General Introduction to the CLI

The Cultural Landscapes Inventory (CLI) is a comprehensive inventory of all historically significant landscapes within the National Park System. This evaluated inventory identifies and documents each landscape's location, physical development, significance, National Register of Historic Places eligibility, condition, as well as other valuable information for park management. Inventoried landscapes are listed on, or eligible for, the National Register of Historic Places, or otherwise treated as cultural resources. To automate the inventory, the Cultural Landscapes Automated Inventory Management System (CLAIMS) database was created in 1996. CLAIMS provides an analytical tool for querying information associated with the CLI.

The CLI, like the List of Classified Structures (LCS), assists the National Park Service (NPS) in its efforts to fulfill the identification and management requirements associated with Section 110(a) of the National Historic Preservation Act, NPS Management Policies (2001), and Director's Order #28: Cultural Resource Management (1998). Since launching the CLI nationwide, the NPS, in response to the Government Performance and Results Act (GPRA), is required to report on an annual performance plan that is tied to 6-year strategic plan. The NPS strategic plan has two goals related to cultural landscapes: condition (1a7) and progress on the CLI (1b2b). Because the CLI is the baseline of cultural landscapes in the National Park System, it serves as the vehicle for tracking these goals.

For these reasons, the Park Cultural Landscapes Program considers the completion of the CLI to be a service-wide priority. The information in the CLI is useful at all levels of the park service. At the national and regional levels it is used to inform planning efforts and budget decisions. At the park level, the CLI assists managers to plan, program, and prioritize funds. It is a record of cultural landscape treatment and management decisions and the physical narrative may be used to enhance interpretation programs.

Implementation of the CLI is coordinated on the Region/Support Office level. Each Region/Support Office creates a priority list for CLI work based on park planning needs, proposed development projects, lack of landscape documentation (which adversely affects the preservation or management of the resource), baseline information needs and Region/Support office priorities. This list is updated annually to respond to changing needs and priorities. Completed CLI records are uploaded at the end of the fiscal year to the National Center for Cultural Resources, Park Cultural Landscapes Program in Washington, DC. Only data officially entered into the National Center's CLI database is considered "certified data" for GPRA reporting.

A number of steps are involved in completing a CLI inventory record. The process begins when the CLI team meets with park management and staff to clarify the purpose of the CLI and is followed by historical research, documentation, and fieldwork. Information is derived from two efforts: secondary sources that are usually available in the park's or regions' files, libraries, and archives and on-site landscape investigation(s). This information is entered into CLI database as text or graphics. A park report is generated from the database and becomes the vehicle for consultation with the park and the SHPO/TPO.

The ultimate goal of the Park Cultural Landscapes Program is a complete inventory of landscapes, component landscapes, and where appropriate, associated landscape features in the National Park System. The end result, when combined with the LCS, will be an inventory of all physical aspects of any given property.

## Relationship between the CLI and a CLR

While there are some similarities, the CLI is not the same as a Cultural Landscape Report (CLR). Using secondary sources, the CLI provides information to establish historic significance by determining whether there are sufficient extant features to convey the property's historic appearance and function. The CLI includes the preliminary identification and analysis to define contributing features, but does not provide the more definitive detail contained within a CLR, which involves more in-depth research, using primary rather than secondary source material.

The CLR is a treatment document and presents recommendations on how to preserve, restore, or rehabilitate the significant landscape and its contributing features based on historical documentation, analysis of existing conditions, and the Secretary of the Interior's standards and guidelines as they apply to the treatment of historic landscapes. The CLI, on the other hand, records impacts to the landscape and condition (good, fair, poor) in consultation with park management. Stabilization costs associated with mitigating impacts may be recorded in the CLI and therefore the CLI may advise on simple and appropriate stabilization measures associated with these costs if that information is not provided elsewhere.

When the park decides to manage and treat an identified cultural landscape, a CLR may be necessary to work through the treatment options and set priorities. A historical landscape architect can assist the park in deciding the appropriate scope of work and an approach for accomplishing the CLR. When minor actions are necessary, a CLI park report may provide sufficient documentation to support the Section 106 compliance process.

## Park Information

<b>Park Name:</b>	Hawaii Volcanoes National Park
<b>Administrative Unit:</b>	Hawaii Volcanoes National Park
<b>Park Organization Code:</b>	8300
<b>Park Alpha Code:</b>	HAVO

## Property Level and CLI Number

<b>Property Level:</b>	Landscape
<b>Name:</b>	Crater Rim Historic District
<b>CLI Identification Number:</b>	975082
<b>Parent Landscape CLI ID Number:</b>	975082

## Completion Status

<b>Date Data Collected:</b>	06/21/2005
<b>Data Recorder:</b>	John Hammond, Gretchen Stromberg, Erica Owens
<b>Date Entered:</b>	03/01/2006
<b>Data Entry Recorder:</b>	John Hammond
<b>Site Visit Conducted:</b>	Yes
<b>Completed:</b>	No

## Landscape Description

Crater Rim Historic District is an approximately 5,000-acre historic district in and around Kilauea Caldera in Hawaii Volcanoes National Park. The district is significant for its association with early park planning at Hawaii National Park (HNP), for its association with the Civilian Conservation Corps (CCC) program, and for its distinctive design style, which exemplifies the “Park Service Rustic” style and naturalistic landscape architecture perpetuated by the NPS in the period between the First and Second World Wars. The period of significance spans the years 1916 to 1942, covering the period of primary park development and CCC involvement.

Crater Rim Historic District encompasses Crater Rim Drive, a 10.6-mile scenic loop road that takes visitors around the caldera rim and onto the caldera floor. The district also includes the road’s associated features, parking lots, and overlooks; the buildings and developed areas on the caldera rim, including the Volcano House, Jaggar Museum, and Thurston Lava Tube; and the scenic trails that lie within the district.

Crater Rim Drive begins on the high bluff in the northeast corner of the caldera in the headquarters area. The most developed part of the caldera rim, the headquarters area includes the Volcano House hotel, visitor center, the Volcano Arts Center housed in the 1877 Volcano House structure, and park offices, residences, and maintenance facilities. From here, the road follows the north bluff of Kilauea Caldera, past Kilauea Military Camp and the Jaggar Museum and Volcano Observatory on Uwekahuna Bluff. The road then descends the bluff through the fractured Southwest Rift Zone onto the floor of the caldera. Here, visitors are given the opportunity to park and view Halemaumau, the large crater within the Kilauea caldera that, up until the 1930s, was quite active. From the Halemaumau parking lot, Crater Rim Drive climbs back out of the caldera and past the smaller craters of Keanakakoi and Kilauea Iki, through the tree fern forest, and past Thurston Lava Tube. The loop road rejoins itself in the headquarters area. Along its route, Crater Rim Drive passes through a variety of contrasting natural settings, exhibiting for visitors lush forests of ohia lehua trees and hapuu tree ferns, high scrub desert, and barren, smoking lava fields. The sheer cliffs of the caldera and the open vegetation of much of the district offer spectacular views of the volcanic landscape.

The boundary of the Crater Rim Historic District includes the caldera and its rim, following the roads, trails, and park boundary that encompass the contributing features. Within this district boundary are at least two other separate and distinct historic districts: the Kilauea Administration and Employee Housing Historic District and Kilauea Military Camp. These are individual districts in their own right and are not component landscapes of the Crater Rim Historic District. The Kilauea Administration and Employee Housing Historic District includes the visitor center and headquarters building, the Ohia Wing, and the employee housing and maintenance village. The features and landscape characteristics of this district are being assessed in a separate Cultural Landscapes Inventory. The eligibility of Kilauea Military Camp and its associated features have not yet been assessed. The features within these two districts do not contribute to the Crater Rim Historic District and are not being addressed in this document.

The Hawaii Volcanoes Crater Rim Historic District retains sufficient overall physical integrity to convey its historical significance. The district’s location around the edge of Kilauea Caldera, its setting as a relatively developed section of the park, its feeling as a coherent group of similar resources, and its associations with the park’s development history are intact. Despite some changes to individual contributors, the district’s overall design, materials, and workmanship have not been compromised.

## Cultural Landscape Inventory Hierarchy Description

Crater Rim Historic District is a landscape with no component landscapes. Kilauea Administration and Employee Housing Historic District and Kilauea Military Camp are individual landscapes within the boundary of Crater Rim Historic District.

## Location Map



Map of the island of Hawaii showing the location of Hawaii Volcanoes National Park and Kilauea Caldera.

## Boundary Description

From a point of beginning where the park boundary intersects the Mamalahoa Highway on the northeast side of Kilauea Caldera, the district boundary follows the park boundary to the east and south to a point due east of the intersection of Crater Rim Trail and Old Keauhou Road southeast of Kilauea Iki. The district boundary then travels east to the intersection of Crater Rim Trail and Old Keauhou Road. From this intersection, the district boundary follows Crater Rim Trail around the south side of Kilauea Caldera for 5.4 miles to the junction with Crater Rim Drive on the northwest side of Kilauea Caldera. The district boundary then follows Crater Rim Drive 30 feet from its center line on the side of the road opposite the caldera for 0.75 miles to the junction of Crater Rim Drive and the Uwekahuna-Bird Park Road trace. The district boundary follows the road trace, 15 feet west of its center line, for 0.4 miles to its junction with Mamalahoa Highway. The district boundary then follows Mamalahoa Highway, 30 feet south of its center line, for 3.5 miles to the point of beginning.

This district boundary follows historic and geographic features and encompasses all contributing features of the historic district (see Site Plan #1).

## Regional Context

### Physiographic Context

The Crater Rim Historic District is located around Kilauea Caldera—a 2.5-mile long, 2-mile wide, 400-foot deep summit caldera. This caldera was created around 1500 years ago when the roof of the underground magma chamber caved in after the lava drained out, causing the unsupported volcano summit to collapse. The caldera is much quieter than it was in centuries past, with the most recent lava flows in 1974 and 1982. The 5000-acre district is located between 3,600 and 4,000 feet in elevation, and straddles native ohia forest consisting of ohia lehua trees, hapuu tree fern, and various native trees, shrubs, and ferns; open forest and scrub consisting of dwarfed ohia lehua, ohelo, and various other shrubs and grasses; and barren lava flows. The park averages approximately 100 inches of rain each year, with average high temperatures around 69 degrees and average annual lows around 52 degrees.

### Cultural Context

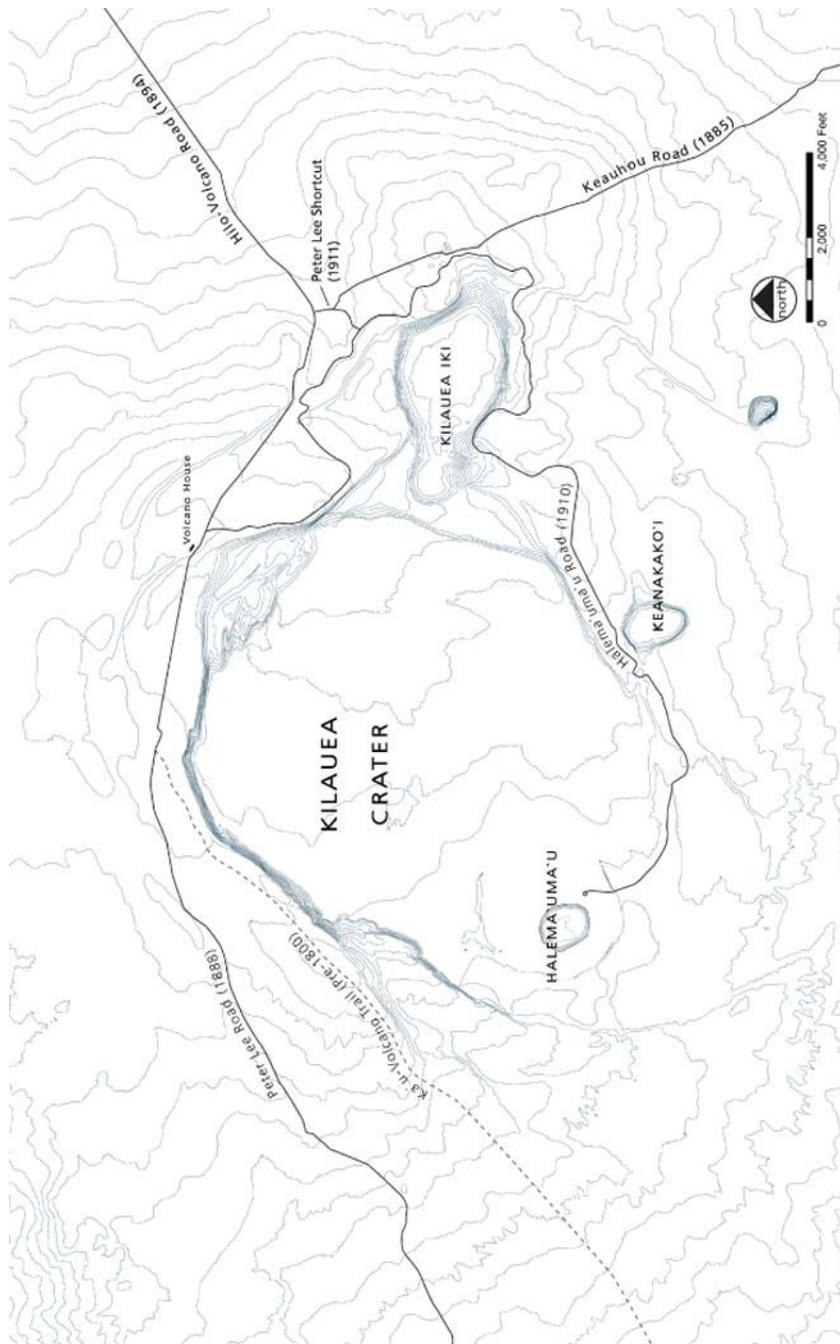
Considered the home of Pele by the native Hawaiians, the spectacular eruptions at Kilauea first drew non-Hawaiian visitors to the volcano in the nineteenth century. Since then, people have continued to come to Kilauea for the unique opportunity to safely approach an active volcano to witness ongoing eruptions and to see the exotic forms created in past eruptions. Today, approximately 2.5 millions visitors a year come to Hawaii Volcanoes National Park to see its sites. The island of Hawaii is currently home to around 150,000 people. Hilo, the county seat and the largest community on Hawaii, lies 35 miles to the northeast of Kilauea on Hawaii's northeast coast. Several smaller residential and agricultural towns dot the southwest coast and the slopes of Mauna Loa around Hawaii Volcanoes National Park.

### Political Context

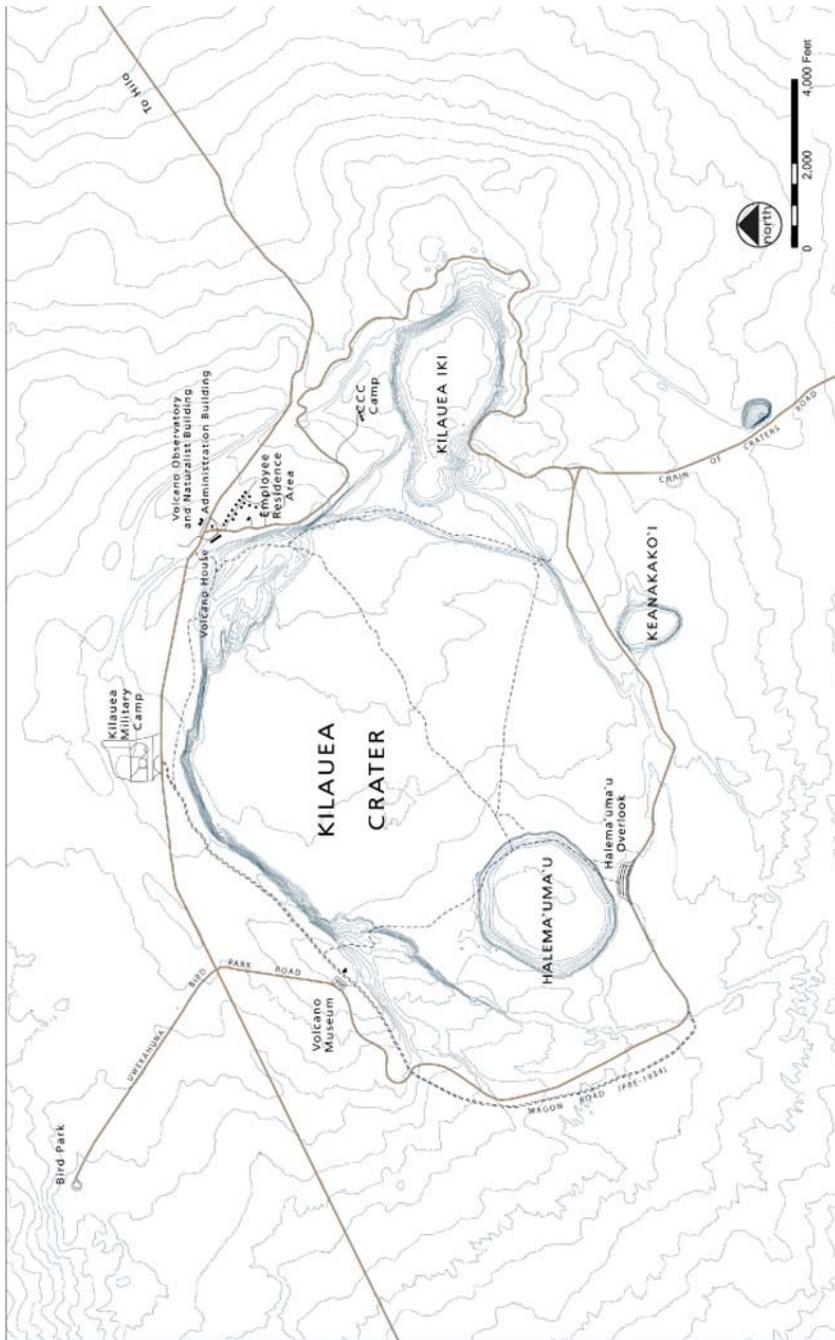
The Crater Rim Historic District is located in Hawaii Volcanoes National Park—a park that encompasses 377 square-miles from the coast to the tip of Mauna Loa. The historic district (as well as the entire national park) is located in the county, island, and state of Hawaii. It is in Hawaii's Second Congressional District, which is currently represented by democrat Congressman Ed Case (2005). Hawaii Volcanoes

National Park is located approximately 35 miles south-southwest of Hilo, the county seat of Hawaii County and the second largest city in the state of Hawaii.





Site Map #2. Site map showing the Kilauea Caldera rim area at the beginning of the period of significance in 1916. (See Appendix for larger map.)



Site Map #3. Site map showing the Kilauea Caldera rim area at the end of the period of significance in 1941. (See Appendix for larger map.)

## CHRONOLOGY

<b>Year</b>	<b>Event</b>	<b>Description</b>
19 <sup>th</sup> century	Built	A foot/horse trail was established from the Volcano House to Kilauea Caldera.
1846	Built	The first Volcano House (thatch structure) was built.
1860	Built	The Hilo Route, a 28-mile horse/foot trail from Hilo to the Volcano House, was completed.
1866	Built	The Volcano House thatch structure was replaced with a more substantial structure made of grass and ohia poles.
1877	Built	The Volcano House was again replaced, this time with a wooden structure.
1885	Built	A 14-mile bridle path, later referred to as the Old Keauhou Road, was built from Keauhou Landing on the west shore of the island to the Volcano House.
1888	Built	The Peter Lee Road, a 20-mile road from Punaluu to the volcano, was completed, joining the Hilo Road at the Volcano House.
1894	Built	A new Hilo Road was built by the Hawaiian government from Hilo to the Volcano House.
1896	Built	A new addition to the Volcano House was built in Victorian style.
1905	Built	The 22-mile Glenwood Rail line was built from Hilo to Glenwood Travelers then went the remaining 9 miles from Glenwood to Volcano House by stage. The rail line was discontinued in 1926.
1908-1910	Built	Halemaumau Road (later Crater Road) was built from the Volcano House to Halemaumau Crater along the east rim of Kilauea Caldera.
1910-1911	Built	Peter Lee built a shortcut from the Hilo road to the Halemaumau road, saving 5 miles of travel.
1912	Built	An auto trail was established around the northwest side of Kilauea Caldera to Halemaumau.
1916	Established	Hawaii National Park was established.
1916	Established	Kilauea Military Camp was established as a rest and relaxation camp for the U.S. military. It comprised 50 acres within the park's 217,000 acres.
1918	Destroyed	A section of the Crater Road was destroyed by an eruption.

1921	Built	Additional wings were built onto the 1896 Volcano House Structure. The original 1877 structure was detached and relocated to a site nearby.
1921-1922	Established	Hawaii National Park was dedicated and active administration of the park began.
1922	Improved	NPS improvements to Crater Road included lengthened curves, new lava guard walls, cinder infill, an oil surface, and drainage ditches.
1922	Built	Overlook at Waldron Ledge was constructed.
1922	Improved	Overlooks along Kilauea and Kilauea Iki were cleared and rustic wooden fences erected.
1922	Built	A parking lot at Halemaumau was constructed to accommodate 50 cars.
1925	Destroyed	The parking lot at Halemaumau was destroyed by a lava flow.
1925	Built	A new parking lot at Halemaumau was built 1000 feet further from the crater to accommodate 150 cars.
1925	Improved	Crater Road improvements were carried out to reduce grades, ease curves, improve the surface. The road was graded to a width of 16 to 18 feet.
1927	Built	Sulphur Bank Road was built to allow visitors to view the steam vents.
1927	Built	A volcano observatory and museum were built at Uwekahuna Bluff by the Hawaiian Volcano Research Association. The museum would later become the center of educational services in the park.
1929	Improved	The parking lot at Halemaumau was enlarged to accommodate 500 cars.
1930-1931	Built	A 3.5 mile road (Leavitt's Road) was graded from Halemaumau to Uwekahuna Bluff around the northwest side of Kilauea Caldera.
1932	Built	New headquarters building was built near the Volcano House.
1933	Acquired	The land around Thurston Lava Tube was acquired and became part of Hawaii National Park.
1933-1934	Built	Comfort Station at Thurston Lava Tube was built with Public Works Administration (PWA) money.
1933-1934	Built	Uwekahuna-Bird Park Road was constructed from Halemaumau past Uwekahuna to Bird Park, closing the loop road around the caldera.

1933-1934	Built	Stone parapet guard walls were built by the park at Waldron Ledge, Kilauea Iki, and Thurston Lava Tube, conforming to NPS standards of Type-2 guard walls. Parapet guard wall along Thurston Lava Tube trail were probably built at this time as well.
1933-1934	Established	The Civil Works Administration (CWA) established a crew in Hawaii National Park to perform such duties as road and parking lot construction and maintenance, vegetation management, and landscaping.
1934	Established	The Civilian Conservation Corps (CCC) was established in Hawaii National Park in January. The Kilauea Summer Camp was converted into a camp for the CCC crews. Crews worked on projects including fire and vegetation management, landscaping, road and trail maintenance, and general labor tasks.
1934	Damaged	Heavy rains damaged portions of the new Uwekahuna-Bird Park Road. CCC crews built stone drainage gutters and riprap embankments along the new road to protect against erosion.
1938	Built	The CCC camp was moved from the Summer Camp site to a site north of Kilauea Iki.
1940	Destroyed	Fire destroyed the Volcano House, including the 1896 structure and the 1921 wings. The 1877 structure was spared by virtue of having been moved in 1921.
1941	Built	A new Volcano House was built on a new site on the rim of Kilauea Caldera.
1941-1942	Built	A new Volcano Observatory and naturalist's office was built by the CCC in the headquarters area.
1941	Built	With the start of World War II, the military commandeered a number of park resources, including the nearly-finished volcano observatory. The military, with the help of the CCC, expedited the buildings completion.
1941	Damaged	Halemaumau parking lot was temporarily torn up to prevent aircraft landings.
1942	Altered	The CCC use of the CCC camp was discontinued.
1942-1949	Damaged	Heavy military trucks and equipment damaged park roads.
1953	Built	Guardrails were constructed of concrete posts and wood rails at Kilauea Iki overlook.
1959-1960	Destroyed	Eruptions of Kilauea Iki buried portions of Crater Rim Drive with several feet of ash and cinder.
1960-1961	Built	Mamalaho Highway bypass was built along the north side of

		<p>Kilauea Caldera. The project included the new bypass road, a new road connecting Uwekahuna and the crater loop road, a new bypass near Kilauea Iki, and a new park entrance. Uwekahuna-Bird Park road was decommissioned.</p>
1960-1962	Built	<p>The Cinder Cone pioneer road was built to reestablish the loop road around the segment that was destroyed in the Kilauea Iki eruption. A new parking lot was built at the cinder cone (Puu Puai) and a new trail (Devastation Trail) was built through the destroyed area.</p>
1962	Built	<p>New parking areas were built at Kilauea Iki and Thurston Lava Tube.</p>
1962	Built	<p>A new deluxe wing for the Volcano House (Volcano House Annex) was built.</p>
1963	Improved	<p>Headquarters parking area was reconstructed and enlarged.</p>
1971-1974	Destroyed	<p>Lava flows within Kilauea Caldera destroyed parts of Crater Rim Drive near Halemaumau and Kilauea Iki. The road segments were rebuilt in their original alignments.</p>
1975	Improved	<p>Parking areas at Waldron Ledge and Keanakakoi were improved and enlarged.</p>
1981	Damaged	<p>A large earthquake damaged Crater Rim Drive between Waldron Ledge and the park research center. The road was closed beyond Waldron Ledge, and traffic was routed over the bypass road constructed in 1961.</p>
1982	Damaged	<p>Kilauea Iki erupted again, damaging sections of Crater Rim Drive between Halemaumau and Keanakakoi.</p>
1982	Destroyed	<p>An earthquake destroyed sections of Crater Rim Drive between Waldron Ledge and the park research center. Portions of the road collapsed into the caldera. The road was repaired or routed around the damaged areas and reopened.</p>
1983	Destroyed	<p>Another earthquake destroyed more of Crater Rim Drive between headquarters area and Waldron Ledge. The road along Waldron Ledge was permanently closed and made accessible only to foot traffic as part of Crater Rim Trail.</p>

## Statement of Significance

Crater Rim Historic District was assessed in a draft National Register of Historic Places nomination form entitled “Hawaii Volcanoes National Park Crater Rim Historic District” prepared in 2005 by Carey & Co. Inc. of San Francisco. The district is included under a draft multiple property submission entitled “Hawaii National Park: Planning and Development through World War II,” also prepared by Carey and Co. in 2005. In addition to the resources identified in the draft nomination, this CLI identifies and assesses landscape features not included in the draft nomination and evaluates landscape characteristics that contribute to the integrity of the district.

According to the draft nomination, Crater Rim Historic District is significant at the state level under Criterion A, association with a historic event or pattern of events, for its association with early park planning at Hawaii National Park (HNP) and with the Civilian Conservation Corps (CCC) program, and under Criterion C, distinctive architectural design, because its features exemplify the “Park Service Rustic” style and naturalistic landscape architecture perpetuated by the NPS in the period between the First and Second World Wars. The period of significance spans the years 1916 to 1942, covering the years of primary park development and CCC involvement. Although some of the contributors have been slightly altered, the district overall retains sufficient integrity for listing.

Although the National Register draft nomination and this CLI recommend that the district is eligible for the Register at the state level, preliminary evaluation suggests that the district, particularly Crater Rim Drive itself, is eligible for inclusion in the National Historic Landmarks Survey. Further evaluation of district’s contribution to national contexts and a comparative analysis with similar properties may establish the significance of the district at the national level.

### Park Master Planning

In association with the events of the American Park Movement and early NPS master planning (Criterion A), the Crater Rim Historic District is significant as an integral part of the master plan of Hawaii National Park. By the mid 1920s, NPS landscape architects, architects, and engineers initiated a design philosophy for the development of parks that would provide for the enjoyment of the parks by the public without compromising the natural and scientific attributes. To ensure that the parks were developed according to these principles, comprehensive plans were established that determined the extent and manner of development. Small, concentrated nodes of visitor services were located throughout the parks, connected by scenic highways and surrounded by wilderness. These “master plans” consisted of many sheets of planning and design drawings as well as textual supplements. The master plans included designs for buildings, roads, parking areas, trails and trailheads, park service areas, residential areas, and utilities. Unified planning ensured that the development would meet visitor needs in the most efficient and least damaging way (Carr 1998).

When Hawaii National Park (HNP) opened in 1916, the primary attraction was the volcanic activity in Kilauea Caldera. Completing a vehicular road around the caldera’s edge and constructing administrative facilities and visitor amenities along this road became two of the park’s top priorities. Eventually called Crater Rim Drive, the Crater Road evolved during the park’s early decades into a full-circle loop around the caldera. Since the Volcano House had already established the northeast corner of the caldera rim as a major visitor-focused zone, those making park development decisions sited a number of the new buildings in this area. The remainder of Crater Rim Drive consisted of small, destination-specific nodes interspersed between long stretches of roadway. Taken as a group, the resources built around the caldera

rim represent early efforts to encourage visitorship to the park's most important volcanic features while limiting their experiences to the area most able to handle human encroachment.

The first development plan for the park was completed in 1931. Existing records indicate that after this, updates occurred in 1932, 1935, 1936, 1937, 1938, and 1939. The islands' remoteness limited park administrators' ability to meet with designers from the NPS Western Field Office in San Francisco, making the effort more difficult than for mainland parks. Nevertheless, the first set of drawings clearly articulate the major development themes that guided the entire planning process and resulted in the cultural landscape configuration experienced today.

### Civilian Conservation Corps

Crater Rim Historic District is significant for its association with the Civilian Conservation Corps (CCC) program (Criterion A). The Emergency Conservation Work (ECW) program began in the Territory of Hawaii in January 1934. This program was to be administered jointly by the governor of Hawaii and the superintendent of Hawaii National Park, Edward G. Wingate. Before the arrival of this much-needed federal program, the labor situation in the Hawaiian Islands was even more acute than on the American mainland. Throughout the early 1930s, critical projects at all sections of the park had to be continually delayed because of fiscal constraints in the congressional budget.

Projects set aside for the new workers initially concentrated on fire prevention, erosion control, trash and debris cleanup, insect control, tree disease control, reforestation, eradication of exotic species, trail construction and maintenance, and landscaping projects. As their training and supervision increased, CCC work crews at all sections of the park were gradually given more construction responsibilities. By the termination of the program in 1942, they had constructed all types of buildings at the park, including comfort stations, employee housing, garages, barracks, trailside shelters, and a visitor center and museum.

In 1940, when President Roosevelt declared a limited national emergency because of the escalating war in Europe, the focus of CCC efforts turned towards national security and military preparedness. While this restructuring of the CCC program was a great benefit to the national defense movement, it became increasingly difficult for the NPS to find recruits for conservation work. Gradually, the CCC camps at national parks either closed down or transferred to the Department of War. With America's declaration of war after the Pearl Harbor attack in December 1941, the NPS was forced to terminate all CCC projects that were not associated with the war effort. The closing of this program nationally was officially complete by June 30, 1943.

### Rustic Architecture and Naturalistic Landscape Architecture

In association with significant design and construction (Criterion C), the Crater Rim Historic District is an outstanding example of park landscape design, embodying the complimentary styles of rustic architecture and naturalistic landscape architecture. Based on eighteenth-century picturesque and nineteenth-century naturalistic design theories, the rustic and naturalistic styles were used extensively in NPS architecture and landscape architecture of the 1920s and 1930s. Designers in these styles aimed to harmonize artifice and nature by minimizing the visual impact of constructed developments, while accentuating the picturesque qualities of nature. Indigenous rock, lumber, and native plants were the basic materials for these styles, so that park architecture and landscape architecture would appear to have evolved naturally within the landscape. Forms of the rustic and naturalistic styles were intended to be subordinate to the

natural environment and were to appear to be hand-crafted or primitive. This design era coincides with the most significant period of development within NPS history, a time when the NPS created what is now recognized as the hallmark style for developments within natural areas, in order to preserve their scenic beauty.

Because Hawaii's emerging regionalism emphasized climate, landscape, and culture, it provided park officials with a local style already conforming to the Park Service Rustic ideology. Moreover, the park needed a considerable amount of employee housing, for which the Hawaiian style was highly relevant. As a result, pre-WWII buildings at the park share characteristics with mainstream Hawaiian design of the period. Typical features of Park Service Rustic buildings in Hawaii include widespread use of stone or lava rock for walls, columns, chimneys, or planters; prominent metal-clad hip or gable-on-hip roofs with wide eaves; a large number of windows, usually casement or double-hung; horizontal wood clapboards in a pattern of alternating sizes; and varying styles of porches.

Many features of the Crater Rim Historic District are a blend of this Hawaiian regional style and a more typical NPS rustic style. The comfort station at Thurston Lava Tube was built of native stone with a substantial foundation and battered corners, typical of many NPS rustic structures built during the 1920s and 1930s. The building's proportions and the corrugated metal gable-on-hip roof, however, reveal the Hawaiian influences. Other structures within the district, such as the type-2 crenulated guard walls along Crater Rim Drive, are standard NPS designs.

The design of Crater Rim Drive exhibits many characteristics of the naturalistic and rustic design styles, including the minimization of cut and fill, the "naturalization" of road shoulders, rock cuts and fill slopes, the construction details for naturalistic guard walls, and the careful alignment of the road to maximize views and minimize the road's intrusion on the landscape. Notable structures and features within the district include the Volcano Observatory and Jaggar Museum; the Thurston Lava Tube Comfort Station, walls, and steps; Crater Rim Drive retaining walls; and the Volcano House.

#### Mission 66

Changes made to Crater Rim Historic District relating to Mission 66, begun and completed in the early 1960s, were not determined to be of exceptional importance to meet criteria consideration G for properties that have achieved significance within the past 50 years. Features and changes within the district associated with Mission 66, particularly changes made to Crater Rim Drive, overlooks, and guard walls in 1961 and 1962, have not been assessed for their contribution to the district with respect to a potential Mission 66 period of significance. The district should be assessed again in the future to determine if it is significant for its association with Mission 66.

#### Integrity

Crater Rim Historic District retains sufficient overall physical integrity to convey its historical significance. According to the draft multiple property submission document, resources significant primarily for their role within Hawaii National Park's early planning and development history (Criterion A) should retain a particularly high level of integrity in location, setting, feeling, and association. The district's location around the edge of Kilauea Caldera, its setting as a relatively developed section of the park, its feeling as a coherent group of similar resources, and its associations with the park's development history are intact. Similarly, the multiple property submission registration requires that resources that are

significant primarily for their exemplary Park Service Rustic architecture (Criterion C) should retain a particularly high level of integrity in design, materials, and workmanship. Despite alterations to individual contributors, such as additions and some facade changes, the district's overall design, materials, and workmanship have not been compromised.

## Physical History

### Introduction

Portions of this history section were pulled from the Historic American Engineering Record (HAER) report for Hawaii Volcanoes National Park Roads (HAER No. HI-47) completed in 1999. Additional historical information was gathered from secondary sources, including a draft Historic Resource Study prepared by Carey and Co., as well as primary sources, including historic maps, photographs, park superintendent reports, and landscape architect reports.

### 1823-1916: Pre-NPS

Hawaii's volcanoes have long attracted visitors with their striking scenery and romantic allure. In August 1823, English missionary William Ellis was the first non-Hawaiian to document his journey to Kilauea, writing that the volcano, "until visited by us, [was] unknown to the civilized parts of the world" (Ellis 1917). Ellis' response to the landscape was typical of the Romantic Era. His description of the journey exemplified the contemporary tendency to seek out spectacular scenery and interpret natural features as manifestations of the picturesque and the sublime.

Ellis and several American missionaries journeyed around the Island of Hawaii to survey potential locations for mission stations. The Ellis party traveled by foot from Kailua (Kona) and was guided by Makoa, a Hawaiian who had served for many years as the king's messenger. The travelers made their way through native forests, rough lava fields, deep chasms, and a sandy desert that Ellis describes as "extremely fatiguing." Conditions ranged from the dampness of the rain forest to the heat of the sun on the black lava fields. As the party approached the volcano, the smell of sulfur became more noticeable (Ellis 1917).

Arriving at Kilauea, Ellis described the crater rim region as "a great precipice, with a vast plain... fifteen or sixteen miles in circumference, and sunk from 200 to 400 feet below its original level" (Ellis 1917). The party descended to the edge of the pit to view the lava lake, which roared from the volcanic crater like a vast furnace. Contemplating the scene, Ellis was filled with wonder at the "overwhelming manifestation of the dread Being who created the world" and would someday destroy it by fire." The travelers explored nearby areas and returned to view the volcano at night, describing the spectacle as "a sight terrible and sublime beyond all we had yet seen" (Ellis 1917). The party watched the volcano shoot up fountains of fire, making very loud detonations as it ejected bright, ignited stones.

At the time Ellis visited the volcano, there were no structures in the vicinity. Native Hawaiians believed that building structures close to Pele's home would anger the fire goddess and incur her wrath. The first structure near the volcano was a small grass shack built in 1824 by Chiefess Kapiolani, who had converted to Christianity, to denounce Pele and the Hawaiian pagan religion. In 1846, Benjamin Pitman built the first shelter to lodge visitors to the volcano – a small grass thatch house Pitman called Volcano House. In 1866, this house was replaced with a more substantial two-bedroom lodge made of grass and ohia poles (see photo History #1). It was there where Mark Twain stayed while visiting the volcano in 1866, describing the hotel as "neat, roomy, well furnished and a well kept hotel. The surprise of finding a good hotel at such an outlandish spot startled me, considerably more than the volcano did" (Twain 1866).

The location of the Volcano House was ideal for a visitor lodge so close to one of the world's most active volcanoes. The high ledge overlooking the caldera was stable and away from dangerous eruptions. Abundant rainfall provided drinking water, and steam vents provided heat and cooking facilities.

Walking and riding access to the caldera floor was relatively easy down a series of fault steps, and prevailing trade winds swept the area clear of volcanic fumes, providing optimal views of the caldera and eruptive events.

By the 1860s, the volcano had become an established tourist destination. The standard tourist approach to the volcano was made from the port town of Hilo, 28 miles northeast of the caldera on Hawaii's north shore. In 1865, tourist traffic was heavy enough that the Volcano House began keeping a guest book. In the early 1870s, several guests noted that travel time from Hilo was 7 hours, although bad weather or other obstacles could make for a longer trip (Bevens 1992). While greatly improved since the days of William Ellis, the trip could still be a challenge, as Sidney Sweet noted in 1880, when heavy rains stretched his journey from Hilo to nearly 11 hours. The rain "fell in torrents so great" that "the road [from Hilo] was completely submerged for miles" (Bevens 1992, 20-21). Despite such travel difficulties, visitors rarely left disappointed. Many praised the comfortable accommodations and excellent service afforded by the hotel operators, as well as the spectacular show that the volcano often provided. During his fifth visit to the volcano in 1874, F. A. Schaefer noted that the surrounding countryside proved "sufficiently interesting to induce daily excursions on tolerably good roads" (Bevens 1992, 16-17).

In 1877, the ohia pole and grass thatch Volcano House was replaced with a larger wooden hotel of Western architecture (see photo History #2). Mill work, such as doors and windows, hardware, and shingles, plus some other building materials and furniture, were landed at Keauhou Landing in Puna and transported via mule and horseback to Ainahou stables, part way between the ship landing and the hotel. At Ainahou, the materials were loaded onto two-wheel carts and hauled to the construction site. Rafters, studs, and posts were cut locally from ohia lehua trees. (Old Volcano House National Register Nomination)

The relative comfort of the Volcano House drew increasing numbers of visitors to Kilauea, demonstrating the commercial potential of tourism to the area. Speculation on this potential encouraged local entrepreneurs to invest private money in the development of the area. On June 1, 1885, a Honolulu newspaper featured an advertisement that announced the Wilder Steamship Company's new route to the volcano via Keauhou Landing. Keauhou was located on the coast approximately 10 miles south of Kilauea volcano. The Wilder Company built a landing at Keauhou and a 14-mile bridle path to carry tourists from the landing to the Volcano House. When the company inaugurated the service, the steamer Kinau brought tourists from Honolulu for \$50, which included a 24-hour stay at the Volcano House. The advertisement described the new approach as "only fourteen miles from the steamer to the Volcano, over a good road," and emphasized that the bridle path was "less than half the distance of any other route" (Wilder's Steamship Company 1885).

By 1888, there was a third approach route to the volcano. Hotel proprietor Peter Lee built a carriage road to take visitors to the volcano from his hotels in Pahala, a small community about 20 miles west. In 1888, H. S. Tregloan reported that he was the first visitor to travel by means of a wheeled conveyance the entire way from an ocean port to the volcano. He described Lee's new road:

"...a fine one, over which the carriage rolled with the greatest ease. The going was good, the grade low, and the landscapes grand. Failing to get an even grade by the zigzag course always thought necessary for that route, Mr. Lee had struck a line directly across the five miles of rugged lava. To effect this bold plan he had to do a good deal of rock cutting, filling in the frequent depressions with fine pumice stone from ancient eruptions. The result is an even thoroughfare of about twenty-five feet in width, as safe and easy for a carriage as the road through Kapiolani Park [in Honolulu]" (Bevens 1992).

The Honolulu newspaper printed the news of Tregloan's travels and praised Lee for his initiative, pointing out that he constructed the road on his own initiative with no promise of public compensation. Although Lee had built the road to increase the patronage at his Punaluu hotel, the paper maintained that the public was also the beneficiary of this successful enterprise.

The two new roads to the volcano – the Keauhou and Peter Lee routes – cast the original road from Hilo in sharp contrast. The arduous day-long journey from Hilo through mud and jungle had been shortened to as little as two to three hours. Many visitors to the Volcano House described their journeys as pleasant and scenic. One visitor described the trip from Keauhou:

“Nearly all the way a well graded road runs through a tropical forest, the beauties and rarities of which are a source of constant surprise and enjoyment. In fact the three or four hours occupied in the ride is only too brief for the pleasure offered, and we arrive at the Volcano House, not jaded and worn as is too often the case in seeking the rare and wonderful in nature, but actually refreshed by the ride. With the present arrangements for transporting passengers from the landing to the volcano no one need hesitate about undertaking the journey” (Bevens 1992).

After the construction of the Keauhou and Peter Lee routes, the Hawaii Legislature appropriated \$30,000 in 1888 to reconstruct the original approach road from Hilo (“The Approaches to the Volcano: What They Are and What They Should Be”). By 1890, the trip from Hilo could be made by stage over the government road for the first two hours, but visitors still had to travel by horse or mule for another four and a half hours. The experience was pleasant when the weather was fine, but one Canadian visitor noted that the Volcano Road could not be completed too soon “for the good of the country.” As Darcy Bevens explained in her compilation of entries from the Volcano House Register, “As more roads were built, expanded, and improved, visitors were delighted, but also wished for further improvements.” Work on the government road from Hilo continued in the early 1890s, usually with prison labor at an expenditure of about \$1,000 per month. By 1893, nearly twenty-two miles of the road from Hilo were completed, leaving only nine and one half miles of horseback riding. In August 1894, Volcano House visitor S.E. Bishop advised that the new Hilo road was “excellent” and reported that it was finished to within a quarter mile of the Volcano House. An anonymous entry in the Volcano House register noted that the carriage road from Hilo to Volcano was completed on September 13, 1894. Apparently by this time, the area was being referred to as “Volcano” (Bevens 1992).

In 1896, a two-story Victorian-style frame addition was built on the west end of the Volcano House, more than doubling its size. The addition added 10 to 12 guest rooms, a large office, a ladies parlor, dining hall and observation room, and a tower. Kilauea Caldera was becoming a true tourist attraction with the Volcano House offering all of the comforts and amenities expected at a resort of that era. The primary draw of the volcano at the time was the Halemaumau crater, which was in a period of activity during the nineteenth century. Located on the floor of the Kilauea caldera, Halemaumau was a 1,000-foot-wide lake of roiling lava. Mark Twain described his trip to Halemaumau thus:

It was like gazing at the sun at noon-day, except that the glare was not quite so white. At unequal distances all around the shores of the lake were nearly white-hot chimneys or hollow drums of lava, four or five feet high, and up through them were bursting gorgeous sprays of lava-gouts and gem spangles, some white, some red and some golden – a ceaseless bombardment, and one that fascinated the eye with its unapproachable splendor (Twain 1872).

A trip to the volcano would not be complete without a trip to the caldera floor to view Halemaumau. At the time, trips from the Volcano House to the Kilauea Caldera were made by horseback or foot. With the approach roads to the volcano area established, suggestions began to crop up about building a road into the caldera itself. In 1907, Acting Territorial Governor Jack Atkinson supported the construction of an automobile road to Halemaumau Crater. He recommended that the road enter Kilauea Caldera where the cliffs were low and suggested that prison labor do the work. Atkinson wanted a road that enabled older people to have an easier and more comfortable journey. He also believed that a new road would make the volcanic spectacle a regular trip rather than a once-in-a-lifetime experience.

Atkinson's proposed route approached the crater from the Kau (west) side. Within a month, however, a different route on the Hilo (east) side of the caldera was proposed. The latter route was more favorable as it could follow a better grade and would be easier to survey. Territorial Governor Frear added his support to the crater road project in September, endorsing the eastern route. Frear believed that this route would not only be easier to construct, but would bring travelers by the craters of Kilauea-Iki and Keanakakoi, adding interest along the way.

Territorial Surveyor W. E. Wall sent a survey team to the volcano in 1907. Engineer Charles E. Smith began surveying the road that would become the predecessor of Crater Rim Drive on September 2. He worked in rain, fog, and "other difficulties" (Bevens 1992). Smith located both routes and reported that the line by way of Kilauea Iki (the eastern route) was "incomparably better both from a scenic and an engineering standpoint." From the scenic standpoint, Smith asserted, there was "nothing to compare with it in the islands." The decision was made to follow the east edge of Kilauea Caldera.

The road around the caldera skirted the caldera's edge then passed through the thick fern forest near the "extinct" craters of Kilauea Iki and Keanakakoi, where two wide turnouts were provided (while Kilauea Iki was labeled "extinct" in many early-twentieth-century documents, it would erupt again in 1959). A newspaper article noted that one of the fine points of the road was the careful avoidance of any sharp curves or steep grades. Reflecting the automobile's growing influence, the reporter noted that the grades throughout the first six miles could easily be taken in high gear. Four-foot walls constructed of lava rock were strategically placed at dangerous points so motorists could make the entire trip with a feeling of safety.

Although the road, at the time called Halemaumau Road, was completed in 1910, road work in the area was not finished. By September, prisoners were already repairing the "upper end" of the dirt road, which had been badly washed in some places by heavy rains. Peter Lee began work on a shortcut to connect the Hilo-Volcano Road to the new Halemaumau Road. The 1,200-foot road shaved five miles off of the journey from one of Lee's hotel establishments to the caldera.

Other developments in the area during the early twentieth century include a trail from the Volcano House to Halemaumau directly across the caldera, called "the World's Weirdest Walk", and the Volcano Observatory. The World's Weirdest Walk was rebuilt in 1915 following the path of a much older trail. The Volcano Observatory, constructed with \$1,785 collected from locals in early 1912, was a modest wood "bungalow style" building that provided laboratories and administrative facilities for Dr. Thomas A. Jaggar, a Massachusetts Institute of Technology volcanologist, and his staff. Located on the cliff directly opposite the Volcano House, it had its own 5,000-gallon water tank and in the basement was the Whitney Laboratory of Seismology, consisting of special Japanese testing instruments mounted on a concrete floor.

The Volcano House continued to expand to accommodate the increase in visitor numbers. In 1921, the original 1877 structure was detached from its 1891 addition and moved further back from the caldera rim to its present location, a distance of about 90 feet (see photo History #3). Two large wings were added to the 1891 structure in place of the 1877 structure, significantly increasing the size of the Volcano House and giving it an up-to-date modern appearance. Part of the building materials for the 1921 wings to the 1891 structure came from the dismantled Crater Hotel, which had stood further east on the Hilo road.



History #1. The grass thatch and ohia pole Volcano House built in 1866. It was here that Mark Twain stayed during his visit to Kilauea the same year. (Olson 1941)



History #2. The Volcano House 1896-1921. The 1877 structure is visible on the right side of the photo; on the left is the two-story 1896 addition with the porte-cochere. (Olson 1941)



History #3. The 1877 Volcano House structure was moved approximately 90 feet from its original location when the 1921 additions were added. The 1877 Volcano House is seen here ca. 1945. (NPS Travelogue 1945)

### **1916-1930: Early National Park Development**

Hawaii National Park was established in 1916, the same year the National Park Service was founded. When it was created, the park included the Kilauea Caldera and Mauna Loa on the Island of Hawaii, and Haleakala on Maui (Hawaii National Park was split in 1961 into two separate parks: Hawaii Volcanoes National Park and Haleakala National Park). The areas around Mauna Loa and Haleakala were remote and undeveloped at the time, and with the existing roads, Volcano House, and established tourist traffic, Kilauea was the logical choice for the headquarters of the new park. For the first six years, however, it was headquarters only in name, as the park had no superintendent and no funding for physical improvements. It was not until 1922 that the first superintendent, Thomas Boles, arrived at Kilauea. He found that although Hawaii National Park now had some money, it continued to suffer from the same “general lack of Congressional appropriations” that was impacting many other parks at this time (Boles: “Superintendent’s Annual Report” 1922).

Boles’ first priority was improving the road network within the park. Nearly constant eruptions and frequent heavy rains had taken their toll on the roads and trails in and around Kilauea Caldera. In his 1922 annual report he noted that damage to the Halemaumau road sustained during a 1918 eruption had been repaired, allowing visitors to once again drive to the edge of the crater. He also noted that repairs had been started on the “Volcano House road to the pit trail” and also on the “road from the Volcano House around past Waldron’s Ledge and Kilauea Iki.” As the park’s first superintendent, Boles was dedicated to making Hawaii National Park a popular visitor attraction. Repairing and improving the road around Waldron’s Ledge would foster this goal by exposing visitors to impressive views of the caldera from the top of the 600-foot cliff. Three viewpoints were selected, cleared of brush, leveled, and provided with railings. One of the turnouts was finished by April of 1922 and, according to Boles, received “considerable favorable comment” (Boles 1922).

Improvements to the road around the east side of the caldera, by now being called Crater Road, were nearly completed by September 1922. Sharp curves were lengthened and widened and guard walls of

lava stone were built along the outside shoulder. Soft places were filled with cinders and packed by a 7-ton roller. This work was considered necessary both for safety purposes and to put the road in shape for the coming wet winter. After the packing, 200 gallons of crude oil were applied in order to make the surface shed water quickly and retard growth of weeds and grass. By mid-winter, road work included ditching along the roadsides to protect against anticipated rains and placing a row of whitewashed lava boulders at the road's end (Boles 1922).

Improvements to Crater Road continued throughout the 1920s. In 1925, the NPS released \$15,000 for roadwork in preparation for a 3-month U.S. Navy fleet visit to Hawaii. Bureau of Public Roads Engineer F. A. Kittredge commended the park for spending the money wisely to reduce grades, ease curves, and improve the surface, which was now graded to a width of 16 to 18 feet. Kittredge was considered one of the Bureau of Public Roads best locating engineers and had extensive experience in building park roads. Despite Boles' improvements, Kittredge noted that many curves were still too sharp and that there were still a few "excessive" grades. He recommended that this important road receive further improvements in alignment and grade prior to paving (Kittredge 1925). In keeping with NPS standards, no trees were cut to facilitate these road improvements unless absolutely necessary.

The parking lot near Halemaumau was to be expanded to accommodate 150 automobiles. In April 1927, the Sulphur Bank Road, northeast of Volcano House on the north rim of Kilauea Caldera, was finished. The road provided easy access to another park attraction: an area where gases and steam seeped from the ground and the land had been stained by sulfuric gases.

Volcanic eruptions influenced many aspects of road planning in Hawaii National Park. In 1929, plans were being made to expand the parking lot at Halemaumau to accommodate 250 cars. In July 1929, the spectacular eruption of Halemaumau drew huge crowds to the park, so that park crews rushed to clear parking space for an additional 250 cars, bringing the parking capacity to 500. The eruptions set records for park visitation; from July 25 through 28, 25,000 people visited the park.

The heavy traffic made for more road problems as the natural dirt surface on Crater Road was ruined, forcing the park to do a "thorough overhaul." The road problems were exacerbated by the frequent heavy rains that rutted and washed out the park's roads. A total of 74 inches of rain was recorded in 1929, of which, 20 inches fell in November. On one day, 7 inches of rain fell in only eight hours. The rainfall necessitated unusual amounts of road repairs and exhausted the annual budget for road maintenance (Allen 1929). In 1930, Crater Road was surveyed for improvements and reconstruction. The road was graded and surfaced with emulsified asphaltic macadam. The road length was 6.1 miles and the width was 16 feet, the 1929 NPS standard, with 3-foot shoulders.

In 1931, at the suggestion of the NPS landscape division, Superintendent Leavitt ordered that an auto trail of approximately 3.5 miles be graded between Halemaumau and Uwekahuna Bluff. The new trail ran from the eastern rim of Halemaumau, around the southern rim and up over the walls of the caldera to Uwekahuna Bluff where the observatory and museum were located. Leavitt's road was built at a cost of only \$500 and took only a week to complete. Thirty to forty visitors used the new road each day, many of whom were soldiers making the hike from Kilauea Military Camp on the northern rim of the caldera. This auto trail replaced a precarious foot trail that descended into the caldera from Uwekahuna which the soldiers had been using to reach Halemaumau. While the new route was longer, it provided easier walking and afforded fine views. Furthermore, the new auto trail, together with remnants of the old Kau trail, allowed visitors to approach the crater from two sides and completed a route that circled the caldera.



History #4. The museum (right) and comfort station (left) at Uwekahuna Bluff. These original buildings were built in 1927 by the Hawaii Volcano Research Association. (NPS Travelogue 1945)

### **1931-1942: Master Planning and the CCC**

#### National Park Master Planning

The new route to Halemaumau from the west proved popular with visitors, and as traffic along the make-shift road increased, Leavitt realized that it would be necessary to bring it up to standards. Leavitt felt that the construction of a formal loop road that completely circled the caldera and that met the engineering and aesthetic standards of the NPS was important for the development of the park. Such circuit roads had been built or proposed in parks like Mount Rainier National Park and were considered key contributors to visitor experience. A loop road at Kilauea would have the added benefit of providing multiple escape routes in the event of an eruption.

Planning for a loop road around Kilauea coincided with a service-wide initiative to develop master plans for all parks. During this era, NPS began to apply a new approach of master planning to park development to create a more cohesive vision. In addition, design philosophies were solidified in park village planning and rustic style architecture. The origin of master planning in the NPS dates to 1925, when Assistant Director Horace Albright initiated the “comprehensive planning program” for national parks at the superintendents’ conference in Mesa Verde. Master planning became a critical process at a time when parks were trying to balance the goals of accommodating increased visitor numbers while protecting park resources. The master plan allowed the park to be viewed as a single entity, in which all systems and facilities could be located and integrated. The master plan concentrated developed areas along a simple park road system, which served to limit development and physical intrusions into natural areas.

The design principles embodied in the NPS master planning movement fit Hawaii National Park well. Existing roads around Kilauea had been constructed and updated over the years under a philosophy of minimal impact on the natural landscape. While efforts had been made to reduce grades and sharp curves, this was not done at the expense of excessive grading and clearing of the native forest.

Furthermore, the structure of the existing road system and the locations of the developed areas and popular natural attractions conformed to the model of development nodes along a simple circulation system. Existing development around the caldera at the time master planning commenced included the Volcano House and the beginnings of a headquarters area at the park entrance, a new observatory and museum at Uwekahuna, Kilauea Military Camp, and the parking lot and overlook at Halemaumau. The master planning effort would incorporate and add to these developed areas to create a system of discrete nodes along a complete loop road.

The first master plan for the Kilauea area, developed in 1931, established the primary road system around the caldera and the main developed areas. The road system made use of many of the existing roads, including the main road between Hilo and Kau, which passed along the north side of the caldera and on which the Volcano House stood, and the Crater Road, which snaked along the east side of the caldera from the Volcano House down into the bottom of the caldera, ending at Halemaumau. The wagon trail from Halemaumau around the west side of the caldera to Uwekahuna was realigned to reduce the grades as it climbed the west wall of the caldera. This section of the road would be extended past Uwekahuna to Bird Park just north of the Hilo-Kau road. Bird Park, so called because of the abundance of birds in the area, was an isolated area of old, lush forest spared from repeated lava flows in the area by virtue of its topography.

The new road, referred to as the Uwekahuna-Bird Park Road, would extend from Halemaumau Crater, around the west side of Kilauea Caldera, past Uwekahuna, and continue on to Bird park. Bird Park had long been an attraction for visitors, who had been reaching the area via a wagon road over private land. The new road would formalize the approach to Bird Park and eliminate the need to cross private property. Since the new road would cross the main Hilo-Kau road, its construction would also achieve the important goal of completing the loop around the caldera. Visitors would be able to drive from the Volcano House down to Halemaumau and back out again without retracing their route. The Uwekahuna-Bird Park Road plans were approved in late 1932, but due to dwindling park funds and the growing national depression, construction was postponed until 1933. When the road was finally finished in 1934, it was 4.7 miles in length with a macadam surface 18 feet wide with 2-foot shoulders. The road included several 6 percent grades with the steepest grade being 7 percent. Hand-laid riprap was laid along the road's shoulders to protect it from erosion during the area's frequent rains, and several culverts with large stone headwalls allowed storm water to cross the road at low places. To prevent corrosion of metal culverts from the high concentrations of volcanic gasses, concrete culvert pipes were specified on much of the road.

The master plans also laid out the services and structures in the developed areas around the caldera. During the early years of the park, park headquarters developed in the area around the Volcano House. In 1931, services in the area consisted of the Volcano House and its related structures on the north side of the Hilo-Kau road; a volcano observatory, volcanologist's residence, and superintendent's residence on the south side of the road on the caldera rim; five employee residences; and a small number of maintenance buildings. The area also included a number of private residences that were leased from the NPS east of the Volcano House along the Hilo-Kau road. The first master plans sought to formalize the development in this area. Several of the existing structures were to be removed, including the volcanologist's and superintendent's residences, a hotel garage, and all of the privately-leased residences. The plans called for a new administration building prominently located at the junction of the Hilo-Kau road and the Crater Road. The employee residences would be consolidated into a village of several dozen such residences, including a new superintendent's residence. The volcano observatory building was retained in the first master plans, but by 1936 the plans suggested it be replaced by a new observatory and naturalist's office near the Volcano House.

Other developed areas around the Kilauea Caldera addressed in the master plans included Uwekahuna and Halemaumau. Uwekahuna was the site of a museum and auditorium, a naturalist's office, and restrooms, built by the Hawaii Volcano Research Association in 1927. For several years, volcanological functions were split between the museum, where a working seismograph had been installed, and the wooden observatory building on the caldera rim near the Volcano House, built in 1912. Early master plans indicated that the NPS wanted to demolish the naturalist's office and restrooms at Uwekahuna and consolidate these functions in an addition to the museum building. By 1936, these plans were scrapped in favor of a new observatory and naturalist's office near the Volcano House. This new facility was eventually built in 1941 and today houses the visitor center.

In 1933, the land around Thurston Lava Tube was acquired and incorporated into Hawaii National Park. The lava tube had been an attraction at the volcano since the early days of tourism, but before 1933, it was privately held. The historical record provides little information about the development of the area prior to its acquisition by the NPS. Some of the first mentions of the area in the landscape architect reports and superintendent reports of the time describe the construction of the comfort station and the paving of the trail in 1933.

#### The CCC and other New Deal programs

The master plans at Hawaii National Park organized existing and future development around Kilauea Caldera according to the prevailing design philosophies of the time. But as the first master plans were being finalized, the nation was spiraling into the Great Depression. There was no funding for new projects, and planned developments like the Uwekahuna-Bird Park road had to be postponed until money could be secured. Between 1931 and 1933, little was done to realize the master plans. In January 1933, Franklin D. Roosevelt took office as president with the promise of stabilizing the crumbling economy. During his first hundred days in office, he initiated a number of ambitious programs aimed at bringing relief to the one-third of Americans hardest hit by the Depression and jump-starting economic recovery. Many of these programs involved increased public spending on public works projects in an effort to provide jobs for the unemployed. The master plans developed by Hawaii National Park and other national parks across the nation in the late 1920s and early 1930s placed them in a strong position to demonstrate their ability to handle the work quickly and economically. Over the next eight years, the national parks would benefit significantly from Roosevelt's New Deal programs.

The first programs to affect Hawaii National Park's development progress included the Federal Emergency Relief Act (FERA), the Public Works Administration (PWA), the Civil Works Administration, and the Emergency Conservation Works (ECW) program. FERA and PWA both provided public funds for public works projects. The Civil Works Administration was a temporary program that provided jobs for unemployed over the winter of 1933-1934. And the Emergency Conservation Works program established the Civilian Conservation Corps (CCC), a military-like organization that performed conservation work and general labor in the country's national parks and national forests. Together, these programs sparked a boom in development in Hawaii National Park that would last until World War II.

In 1933, the park received word that they would be eligible for some of the \$500 million bond issue established by the FERA to complete roads in the park, including the Uwekahuna-Bird Park road. Once funding was secured, construction progressed quickly, with work being completed between November 1933 and April 1934. Projects that benefited from PWA money included the paving of the Thurston Lava Tube trail in the summer of 1933 and construction of the comfort station, which was also completed over

the winter of 1933-1934. These programs continued to be an important source of funds for park maintenance and improvements throughout the 1930s.

The programs that would have the most significant impact on the park development, however, were the programs that provided labor for a variety of projects at little cost to the park: the Civil Works Administration and the CCC. The Civil Works program was initiated in the fall of 1933 as a way to provide much-needed relief for unemployed men over the winter of 1933-1934. Men from local communities were hired on to crews that were housed in the park and that contributed to a number of construction and maintenance projects. The Civil Works projects in Hawaii National Park included widening the roads in the employee residential area, enlarging the parking lot at the Volcano House, eradication of exotics in the Bird Park area, and rounding road shoulders throughout the park. The Civil Works crews worked in Hawaii National Park from December 1933 until April 1934, when the program was dismantled.

During the same winter that the Civil Works crews were working in the park, the CCC was getting up and running. The CCC was to perform much the same type of work that the Civil Works crews did, but the structure of the program was quite different. The CCC was a quasi-military operation for unmarried, unemployed men age 18-25, whose fathers were receiving assistance. Recruits lived in camps in the park, adhering to strict rules of conduct. Franklin D. Roosevelt meticulously defined the scope of the program, specifying a wide range of work “for the prevention of forest fires and for soil erosion, flood control, removal of undesirable plants, insect control, and construction or maintenance of paths, tracks, and fire lanes on public lands.” As compensation, they received “appropriate clothing, daily subsistence, medical attention, hospitalization, and a cash allowance.” Recruits were allowed to keep a small portion of their pay, but were required to send most of it home to their families.

The CCC program in Hawaii National Park got under way in January 1934, when a camp was constructed at the site of the summer camp at Byron Ledge on the southeastern edge of Kilauea Caldera. The park began the initial construction of the camp, adding new structures and converting existing ones for use by the CCC. As CCC workers were recruited from the surrounding communities, the new enrollees assisted in the construction of the camp. Eventually, the camp consisted of 12 cottages with a 500 gallon water tank for each cottage, a central lodge, phones, latrines and a bathhouse, bunkhouses, a mess hall, an electric light plant, two garages, a dispensary, and a recreation hall. This camp remained until early 1938, when it relocated to a site north of Kilauea Iki, southeast of the Volcano House. This new camp offered facilities similar to its predecessor, such as a recreation hall, barracks buildings, a bath and laundry house, a mess hall, an employee dormitory, latrines, a garage, and water tanks. Additionally, it featured a range of new resources, including a hospital, an office, bachelor’s quarters, a gas and oil station, a warehouse, a woodshed, a paint storage shed, a pump house, and a switchboard.

In the early years of the CCC in Hawaii National Park, the work performed by the crews was restricted primarily to general labor such as landscaping, trail and road construction and maintenance, eradication of exotic vegetation, rounding road shoulders, and removal of fire hazard debris. As the experience and skill of the crews increased, however, so did the complexity and scale of the projects they accomplished. The CCC were responsible for much of the stone work constructed in the park in the mid 1930s, including stone drainage gutters on Crater Rim Drive, retaining walls on the Kilauea Iki Trail, and stone steps and other landscape features in the residential area. By 1938, the crews were assisting in the construction of employee quarters and other structures in the park, and by 1941, they had helped construct nine of the park employee residences, five carpports, an incinerator, trailside shelters, and the new volcano observatory, which later became the visitor center and museum.

In 1940, when President Roosevelt declared a limited national emergency because of the escalating war in Europe, the focus of CCC efforts turned towards national security and military preparedness. While this restructuring of the CCC program was a great benefit to the national defense movement, it became increasingly difficult for the NPS to find recruits for conservation work. Gradually, the CCC camps at national parks either closed down or transferred to the Department of War. With America's declaration of war after the Pearl Harbor attack in December 1941, the NPS was forced to terminate all CCC projects that were not associated with the war effort. The closing of this program within the NPS was officially complete by June 30, 1943. After the CCC left the park in 1942, their camp on the north edge of Kilauea Iki was converted into a research center, which it remains today.

### The Volcano House

In 1930, NPS Chief Landscape Architect Thomas Vint made a visit to Hawaii National Park to inspect the park as part of the master planning process. One of his top concerns on that trip was to devise a strategy for the role the Volcano House would continue to play in the park. According to Vint, the hotel was an unprofitable enterprise and had become a liability to the park. Despite having a substantial addition in 1921, the hotel building had become antiquated and the accommodations were not up to the standards of other island hotels. Visitors often complained about the lack of heat and hot water, and of poor service at the hotel. Vint also commented that the design of the hotel was not compatible with the rustic architectural style favored by the NPS at that time. While he recommended replacement of the hotel, either on a site nearer the caldera rim or out of the park altogether, he recognized that there was little financial incentive for the hotel company to build a new building. Writing in 1932, Assistant Landscape Architect John B. Wosky agreed with this assessment, noting that the hotel was well established and would not likely locate elsewhere. The hotel continued to struggle in its original location throughout the Great Depression in the 1930s, when the tourist industry was so poor.

In 1940, the issue was forced when a fire ignited in the hotel kitchen and the building burned to the ground. The hotel was a complete loss, with only a few of the cottages and the original 1877 hotel structure, which had been moved from its original site in the 1921 renovation, surviving. When the hotel company rebuilt, they chose a site on the other side of the highway near the rim of the caldera. The new site offered more room for expansion of the hotel and more spectacular views of the volcano. A number of structures, including the volcano observatory building and volcanologist's residence, were located here, but with the new observatory building being built nearby, the structures were no longer needed and could be replaced. The new Volcano House was built on this site in 1941, opening in November of that year.



History #5. The current Volcano House, built in 1941, is shown shortly after completion, ca. 1945. (NPS Travelogue 1945)



History #6. 1934 photo of the Kilauea Iki parapet guard wall. (HAVO Landscape Architect's Reports 1934)



History #7. 1934 photo of the parapet guard wall at Thurston Lava Tube parking lot. The earlier stone retaining wall on which the guard wall was built is visible on the outside of the wall. (HAVO Landscape Architect's Reports 1934)



History #8. Parapet guard wall under construction in 1934. All of the guard walls constructed along Crater Rim Drive conformed to the specifications for the Type 2 guard wall developed by the NPS landscape department. (HAVO Landscape Architect's Reports 1934)



History #9. This stone-lined ditch was built by the CCC after heavy rains damaged the newly-built Uwekahuna-Bird Park road. This ditch is located on the grade just west of Halemaumau. (HAVO Landscape Architect's Reports 1934)



History #10. CCC crews installing mortared stone embankment facing on a section of Crater Rim Road in the Southwest Rift Zone in 1934. (HAVO Landscape Architect's Reports 1934)



History #11. CCC crew laying stone embankment facing on a switchback of the Kilauea Iki trail in 1934. (HAVO Landscape Architect's Reports 1934)



History #12. The Thurston Lava Tube trail as it appeared in the 1930s. The lush fern forest contrasted sharply with other parts of the caldera rim area. (HAVO Landscape Architect's Reports 1934)



History #13. CCC crews rounded the slopes of road cuts and planted them with native vegetation to create a more naturalistic appearance and reduce erosion. The slopes are shown here in c. 1934, after they were rounded but before replanting. (HAVO Landscape Architect's Reports 1934)

## 1942-Present

### World War II

When Japanese planes attacked Pearl Harbor on December 7, 1941, the nation plunged into war and Hawaii into turmoil and uncertainty. Tourist travel to the Hawaiian Islands was halted and Hawaii National Park was temporarily closed. In early 1942, the Army commandeered the nearly-complete volcano observatory building for military use. The building, which was being built by the CCC, was quickly finished with the Army's help. The military used the park in other war-related capacities, often to the chagrin of Superintendent Edward G. Wingate. A landing strip within the park was used briefly by the Army Air Corps, and portions of the Kau desert area of the park were used for Army training and firing practice, often without informing Wingate or warning the park of potential dangers to visitors. A bombing range on the Kau coast within the park was established by Congress in 1940 as tensions in the region were escalating. Although the Army never used the range, the Navy used it briefly in 1943 and again in 1948. The range was finally closed and returned to the NPS in 1950 (Wingate: Superintendent's Monthly Reports 1941-1943).

The military activity in the park took its toll on the roads as well. Traffic on the roads drastically increased, and the military vehicles, which could weigh as much as 32 tons, caused the fill over fissures or lava tubes to give way, leaving holes up to 20 feet deep and 8 feet in diameter. Chuckholes developed in the road surface and the edges raveled faster than the small work force could keep up with (Wingate:

Superintendent's Monthly Report August 1943). Due to the wartime emergency, maintenance often had to be neglected due to inadequate manpower and funding. After the war, it took until November 1948 for most of the necessary repairs to be completed on the primary roads (Oberhansley: "Superintendent's Monthly Report," November 1948). In 1949, the park removed unsightly sheet metal comfort stations and resurfaced the parking area at Halemaumau, which had been torn up by the military to prevent enemy aircraft from landing (Oberhansley: "Superintendent's Monthly Report," April 1949).

### Park Bypass Road

After the war, through-park traffic along the main highway from Hilo steadily increased. By the early twentieth century, this road had actually become the "around the island road" and served as a major circulation route for island traffic. This brought all traffic traveling along the west side of the island through the headquarters area of the park. As traffic along this route increased, so did concerns about its impacts on park resources. An increase in commercial and agricultural development in the area exacerbated the problem. Sugar companies, for instance, used the road to transport tens of thousands of tons of sugar, molasses, and supplies every year. Furthermore, an increase in unsightly development along the road just outside of the park boundaries was quickly destroying the fern-ohia forest and detracting from the scenic value of the park. The Bureau of Public Roads (BPR) and the territory of Hawaii wanted the belt road widened and brought up to current standards, while the members of the public were calling for something to be done about the clutter around the park entrances.

Beginning in 1953, long overdue maintenance was completed on Crater Rim Drive. The road was resurfaced, and vegetation was cleared at viewpoints along Kilauea Iki. Two sections of guardrails constructed of concrete posts and wood rails were installed along Crater Rim Drive. The guardrails conformed to established standards used elsewhere by the NPS. These guardrails protected motorists in hazardous areas where only narrow sections of small trees separated the road and a 400-foot drop into Kilauea Caldera. Along Kilauea Iki, 384 feet of guardrails were installed as protection from a 640-foot drop. The park also extended the existing stone wall and planned to add pipe handrails to existing walls. In 1959, the roadway was realigned and adjacent parking space widened so visitors could get in and out of their vehicles without blocking the road.

By the early 1950s, the park had decided that a bypass road that took traffic around the crater road and other park development, and a complete realignment of the park entrance, was desired to alleviate the pressures of through-park traffic. Options that were considered included a bypass that ran along the coast, which would preserve the Kilauea area and limit development around the caldera. But Superintendent Oberhansley felt that the resources along the coast were no less important than those around the caldera, and that traffic should not run through that area any more than it should elsewhere in the park. He also pointed out that the coastal route would be too long and costly. The preferred route was one that would run just north of the existing road, bypassing it for the length of the caldera. Through the 1950s, the NPS, BPR and the territory negotiated the details of the plan, including alignment and width of the new road and who would construct and maintain it.

Plans for the new bypass road were not finalized until 1960. The new segment of road would begin at the east park boundary and travel along the north edge of the headquarters area and Kilauea Military Camp, rejoining the existing road just west of Kilauea Military Camp. New segments of road also included a connector from Uwekahuna to the loop road, a new connector from the bypass to the Bird Park road, a short segment near Kilauea Iki that would bypass the loop road along Waldron Ledge for emergency access, and a new park entrance. The middle section of the Uwekahuna-Bird Park Road, constructed in

1933, was discontinued in the new alignment, but the road bed was not obliterated. Traces of this road, along with several stone culvert headwalls, survive today.

The new road was completed in 1961. The result of the realignment was a fundamental shift in the circulation around the caldera. No longer did through-park traffic pass through the headquarters area or along the caldera rim. Entry to the park was controlled at the new park entrance gate. And, a true around-the-caldera loop road began and ended in the headquarters area at the visitor center and Volcano House.

#### Active Volcanism

In November 1959, Kilauea Iki erupted, covering the road along its south rim with ash and cinder and forcing an emergency closure of Crater Rim Drive. Travel for the month soared as 198,605 visitors came to witness the event. Although the park was prepared to handle such crowds at Halemaumau, Kilauea Iki had limited access and almost no parking. The December visitor numbers recorded an increase of 330 percent from the previous December. Seven park employees from mainland national parks were brought in to assist park staff. In addition, the park hired Hilo policemen and state park employees. Three additional parking lots were added to help handle the crowds. Superintendent reports indicate that the heavy traffic seriously deteriorated road shoulders in the area (Johnston: "Superintendent's Monthly Reports", November 1959-February 1960).

NPS Director Conrad Wirth visited the park in December to help formulate plans for a bypass that would re-establish the loop road around the section that was destroyed in the eruption. In January 1960, the Cinder Cone Pioneer Road was ready for emergency use and a field survey was completed for another new, half-mile route. Other sections of Crater Rim Drive were cleared of ash and the Byron Ledge Road was relocated.

By March 1960 approximately 8,000 cubic yards of jagged, rocky type of lava, known locally as aa, had been hauled and laid on the cinder cone connecting road. The road was surfaced in June and parking areas were completed at Puu Puai, Kilauea Iki, and Thurston Lava Tube. Portions of the destroyed section of Crater Rim Drive were turned into a footpath, known as Devastation Trail, which continues to provide an interpretive experience of the 1959 eruption.

Volcanic activity in and around Kilauea Caldera continued to destroy road sections throughout the 1970s and 1980s. Lava flows buried Crater Rim Drive in the vicinities of Halemaumau and Keanakakoi in 1971, 1974, and 1984. Each time the road was excavated and rebuilt in its original alignment. In April 1981, large earth cracks undermined a .1-mile section of Crater Rim Drive, forcing Superintendent David Ames to close the road south of Waldron Ledge, routing traffic around the closure via an emergency bypass road that had been constructed in 1961. Hawaiian Volcano Observatory scientists had been monitoring the cracks for a year and believed that the weight and vibration of traffic had enlarged the cracks and increased the likelihood that the roadbed would collapse into the caldera. Visitors were still allowed to drive the portion of the road from the Volcano House to the Waldron Ledge parking area.

The September 1982 Kilauea eruption destroyed 800 feet of Crater Rim Drive between Halemaumau and Keanakakoi Craters. The earthquake that accompanied the eruption forced the park to repair and realign the road at Keanakakoi. Another earthquake in November severely damaged roads throughout the park and forced another closure of Crater Rim Drive. One section near Kilauea Military Camp had cracks 8 feet wide and 200 feet deep. More sections of the old road between Waldron Ledge and the research

center slumped into the caldera and the road to park housing was closed and converted into an earthquake interpretive trail (Ames: "Superintendent's Annual Report" 1983).

In November 1983 an earthquake shook large sections of the road into the caldera below, forcing the complete closure of the road from the Volcano House past the research center, permanently diverting traffic to the bypass. The earthquake also destroyed part of the Crater Rim Trail. Today, pieces of the remaining road are used as part of the Crater Rim Trail. In August 1999, Waldron Ledge overlook was reopened and rededicated, and today, park visitors can hike to this scenic view from Volcano House.

## Analysis and Evaluation of Integrity

### Summary

The Crater Rim Historic District is significant for its association with national park master planning in the 1920s and 1930s (criterion A), for its characteristic design style, which reflects the Park Service Rustic architecture and naturalistic landscape architecture design principles (criterion C), and for its association with the CCC (criterion A). The period of significance is 1916 to 1942, covering the period of primary park development and CCC involvement. Today, the physical features of the district's buildings and structures, as well as the patterns of spatial organization, circulation, vegetation, land use, and topography present during the period of significance remain, contributing to the property's ability to convey its significant associations. This ability is enhanced by the site's natural setting and by its views, which help express the site's historic character. Together, the landscape characteristics of the district contribute to all seven aspects of the its integrity: location, design, setting, materials, workmanship, feeling, and association.

Evaluation of the integrity of the Crater Rim Historic District relies on the identification of the essential physical components, patterns, and relationships that must be intact in order for the property to convey its significance. To determine if these essential elements are still evident in the property, the associated landscape characteristics must be examined and compared to conditions during the period of significance. The district retains integrity if the essential qualities that convey the sites significance are still reflected in the spatial organization, physical features, and the natural setting of the property. Identification of the essential elements is reliant upon an evaluation of the site's significance and the period during which the site attained that significance.

For its association with park master planning, as well as its association with rustic and naturalistic design styles, Crater Rim Historic District retains the qualities that reflect the principles that guided these movements. During the 1920s and 1930s, the NPS formalized design philosophies that would guide development in national parks. According to these philosophies, human-built elements in parks should blend with the natural landscape, simultaneously facilitating easy access to the park's attractions while protecting the natural features that give the park its value. This was achieved through careful planning on different scales, from master plans that sensitively located development and circulation patterns to the specification of design standards and materials for buildings, roads, and other structures.

The decisions that guided the development of Kilauea are still evident in the contributing landscape characteristics. The overall spatial organization of the district, the location and arrangement of the developed areas, and the alignment of the circulation systems all reflect the desire to move people around the caldera while protecting the natural sites. The location of services throughout the district demonstrated a sensitive response to the unique natural systems and features of the volcano. Original alignments for the roads, chosen to reduce sharp curves and steep grades while providing access to the caldera's features and views from the caldera rim, are largely retained in the current circulation system. These characteristics contribute strongly to the cohesiveness of the district and relate to the integrity aspects of design and association, as well as location, feeling, and setting.

The individual contributing features, including the buildings and the numerous stone structures throughout the district, reflect the design principles of rustic architecture. Native lava stone was used almost exclusively in constructing elements such as guard walls, retaining walls, and stone-faced embankments and drainage ditches, and was used in many of the buildings, including the Thurston Lava Tube comfort station, the Jaggar Museum, and the Volcano House. The design of these buildings reflect

a melding of NPS rustic architecture and Hawaiian regional design styles. Furthermore, the topography and alignment of the road, the siting of the buildings, and the use and arrangement of native vegetation demonstrate the principles of naturalistic landscape architecture. Rounded road shoulders, naturalistic rock cuts, and the heavy reliance on natural plant communities all reflect a desire that the elements of the park blend with the natural landscape. These aspects of the district still reveal the desired aesthetic and contribute to the integrity aspects of design, materials, workmanship, and location.

Finally, for the district's association with the CCC program and the projects conducted by the crews, the district retains a significant number of features directly associated with the CCC, as well as the general character that defined the district during the period the crews were active. CCC crews worked in the park from January 1934 through 1942, contributing to a number of projects including fire prevention, erosion control, trash cleanup, insect control, reforestation, eradication of exotic species, trail construction and maintenance, and landscaping projects. By the end of their time in the park, the CCC were also involved in more substantial projects, including the construction several park buildings. Many features built by the CCC remain today in the Crater Rim Historic District, including stone-faced embankments and stone-lined drainage ditches along Crater Rim Drive and dry-stacked stone retaining walls on the Kilauea Iki Trail. Furthermore, the district retains in its patterns of vegetation, circulation, and natural setting qualities associated with less tangible CCC contributions, including fire prevention, exotic weed control, erosion control, and landscaping. Together, these features and qualities contribute to the integrity aspects of association, materials, workmanship, and design.

Crater Rim Historic District has undergone changes since the end of the period of significance as the park has responded to the shifting volcanic landscape and updated to accommodate evolving visitor needs. These changes include the relocation or realignment of sections of Crater Rim Drive and changes to the width and character of some portions of the road. The changes, however, do not diminish the qualities for which the district is significant, and do not destroy its integrity. The overall landscape of the district retains enough of its physical features and its appearance and character to reveal the property's historic associations and design styles. As a result the landscape characteristics, including natural systems and features, spatial organization, buildings and structures, circulation, topography, vegetation, views and vistas, land use, and archeological sites, contribute to the district's integrity.

## **Natural Systems and Features**

The natural systems and features at Kilauea's summit have both driven and thwarted the development around the caldera. Considered the home of Pele by the Native Hawaiians, the spectacular eruptions in Halemaumau first drew non-Hawaiian visitors in the nineteenth century. Since then, people have continued to come to Kilauea for the unique opportunity to safely approach an active volcano and to see phenomena such as fiery lakes of lava, lava fountains, steam vents, and other volcanic curiosities. As visitors travel around the caldera rim, they are treated to sweeping views of the caldera, smoking lava fields, and lush forests of ohia lehua trees and hapuu tree ferns. Development on the caldera rim and the road that circles it were designed to highlight and provide access to the spectacular natural features of the park. The same natural systems that drew people to the park, however, frequently turned destructive, destroying roads and structures and causing profound changes to the landscape. The Kilauea Caldera rim area has developed over the past 120 years in concert with the summit's natural systems and features, showcasing the unique sites and responding to the more destructive forces. Kilauea's constantly changing landscape and the park's response to it is evident today in the raw volcanic forms, the traces of former development, and the fragments of destroyed road that still cling to the edge of the caldera.

## Kilauea Caldera

The Crater Rim Historic District circles the Kilauea Caldera, a summit caldera 2.5 miles long, 2 miles wide, and 400 feet deep. This caldera was created around 1,500 years ago when magma drained from the large magma chamber beneath the volcano's summit. The empty magma chamber could no longer support the weight of the earth above it and collapsed, creating a large, roughly circular caldera with steep walls and a flat floor. Since its formation, the caldera has continued to be active, erupting frequently. The floor of the caldera is covered with a patchwork of lava beds from various eruptions over the past few centuries. Halemaumau Crater, which sits in the southwest corner of the caldera, was very active until the early part of the twentieth century. Earthquakes have collapsed the caldera walls, and ring fractures around the caldera act as vents for steam and volcanic gasses. Today the caldera still steams and smokes, although it has not erupted since the 1980s. The north and east walls are vertical cliffs of over 400 feet, while the southern wall is lower and more gradual. This allowed roads to be built into the caldera itself, bringing visitors in direct contact with the smoking giant. Kilauea Caldera is the centerpiece of Hawaii Volcanoes National Park and provides many of the sweeping views in the caldera rim area.

## Volcanic Activity

During the nineteenth and early twentieth centuries, volcanic activity at Kilauea was concentrated within the caldera. Halemaumau was particularly active during this period, often filled with a lava lake and fiery fountains that spewed molten rock hundreds of feet in the air, a site that Mark Twain called in 1866, "the vision of Hell and its angels." Because of this, Halemaumau was the primary attraction for visitors to the volcano. Once passable roads had reached the volcano's summit, the goal to convey visitors to Halemaumau's edge led to the construction of the first road onto the caldera floor. When Halemaumau was active, it was smaller in diameter than it is today. In 1924, a series of explosive, or phreatic, eruptions (relatively rare in Kilauea's recent past) caused the lava to drain from the crater. Unsupported, the walls of the crater collapsed, more than tripling the diameter of Halemaumau and destroying the parking lot and overlook. The parking lot was rebuilt larger to accommodate the crowds that came to witness the active crater. The 1920s, however, seems to have been the last great gasp of Halemaumau for a while, quietly smoking on the caldera floor since.

In 1959, Kilauea Iki, a crater that had long been quiet, erupted, filling the crater with lava and spewing ash and cinders hundreds of feet in the air. The eruption happened on the southwest edge of the crater, and the prevailing trade winds blew much of the ejected material over Crater Rim Drive to the southwest. The eruption buried over a mile of the road in cinder and created Puu Puai, a 185-foot spatter cone. While part of the road could be excavated and returned to service, almost a mile was permanently closed and traffic was rerouted around the devastated area. The fragments of road were turned into parking areas and trailheads for Devastation Trail, an interpretive trail that takes visitors through the cinder drifts.

After the Kilauea Iki eruption, volcanic activity continued to affect the Kilauea summit. Periodic eruptions of various cracks and vents in and around the caldera occasionally buried the road with lava. The most recent of these occurred in 1974 and 1982 between Halemaumau and Keanakakoi. Each time, the road was rebuilt with minimum realignments. When a series of earthquakes shook the summit in the early 1980s, large sections of Crater Rim Drive along Waldron Ledge were destroyed as portions of the rim collapsed into the caldera. Traffic was permanently rerouted around the destroyed section, and portions of the destroyed road were eventually reopened as part of the Crater Rim Trail.

The earthquakes in the caldera in 1982 and 1983 were indications of a shift in volcanic activity from the caldera to the East Rift Zone. A vent in the East Rift Zone, currently named Puu Oo, began erupting in

January 1983 and has been erupting continuously ever since. This activity away from the volcano summit has left the caldera much quieter, with no significant eruptive activity in the caldera since.

### Climate

The climate at the summit of Kilauea is often cool and wet, with the area receiving more than 100 inches of rain many years. Periodically heavy rains caused erosion damage to many of the early roads, requiring frequent repairs and the addition of structures help stabilize the roadbeds. The superintendent and landscape architect reports that chronicled activities in the park during its early years contain many accounts of erosion damage to the roads. The frequent road repairs necessitated by the heavy rains often exhausted the annual budget for road repairs. Only months after the Uwekahuna-Bird Park Road was completed in 1934, heavy rains severely rutted the road and washed out its shoulders. CCC crews were called upon to make the roads passable again. Rock-lined ditches and shoulders, mortared stone embankments, and large culverts were built along the Southwest Rift section to protect the road from future damage.

Precipitation across the caldera varies from the east side, which receives 140 inches per year, and the southwest side, which gets 50 inches. This disparity in moisture, combined with the different age and composition of the soil from one side of the caldera to the other, has led to vastly different vegetation communities.

### Vegetation Communities

For the purposes of this discussion, the term “native” refers to vegetation that is indigenous, endemic, or Polynesian-introduced; “exotic” refers to species that have been introduced since non-Polynesian contact.

Kilauea Caldera is a study in contrasts in many ways, but few more striking than in the area’s vegetation. Along the eastern edge of the caldera, lush forests of hapuu tree ferns and ohia lehua shroud the road. In the northwest areas, dry shrublands characterize the edges of the Kau Desert. And in the bottom of the caldera itself, the rolling black lava beds are practically devoid of vegetation.

The native forest along the eastern rim of the caldera, often referred to as the “fern jungle”, is dominated by hapuu tree ferns (*Cibotium* sp.), ohia lehua (*Metrosideros polymorpha*), and koa (*Acacia koa*) trees, and also contains indigenous and endemic species such as aalii (*Dodonaea viscosa*), amau fern (*Sadleria cyatheoides*), sandalwood (*Santalum* sp.), introduced species such as ti (*Cordyline fruticosa*) and ginger (*Zingiber zerumbet*), as well as invasive exotics such as Kahili ginger (*Hedychium gardnerianum*). This forest is typically very dense and lush, creating a character of enclosure. When the road from the Volcano House to Halemaumau was first constructed, the route along the eastern side of the caldera was chosen in part because it passed through this forest and provided a scenic quality for visitors. When the same road was updated in the 1920s to ease curves and steep grades, specific instruction was given by the superintendent that the tree fern forest should not be unnecessarily harmed. Some of the realignment suggestions were foregone in favor of protecting the forest. Today this dense forest continues to provides a unique experience for travelers of Crater Rim Drive.

West of the headquarters area on the north rim of the caldera the vegetation abruptly changes. The lush forests give way to open forest and scrub, with dwarfed ohia lehua, grasses, and shrubs. The summit of Kilauea causes a slight rain shadow to the southwest of the caldera, and what rain does fall quickly drains through the coarse volcanic soil. This causes desert-like conditions on the southwest slope of Kilauea. The vegetation community on the northwest edge of the caldera is dominated by widely-spaced dwarfed

ohia lehua, amau ferns, and ohelo (*Vaccinium reticulatum*), as well as non-native grasses broomsedge (*Andropogon virginicus*) and beargrass (*Schizachyrium condensatum*).

From the Southwest Rift Zone through the caldera and past Keanakakoi, lava flows are recent enough to exclude any significant vegetation.

In the area south of Kilauea Iki, the land is recovering from the 1959 eruption that covered the ground in several feet of ash and cinder. The area is beginning to recover, with the ohia forest reestablishing itself, but because of the coarse nature of the soil here, the recovery is slow and the forest still has a distinctly open character.

### Trade Winds

The prevailing trade winds on Hawaii are from the northeast. In addition to bringing more moisture to the north and east slopes, the winds carry irritating and sometimes harmful volcanic vapors away from the caldera toward the southwest. The areas around Halemaumau and the Southwest Rift Zone can be unpleasant due to these vapors. People with breathing or heart problems or women who are pregnant are advised to avoid these areas. By contrast, the northeast bluffs of the caldera are often free of the irritating gasses. The Volcano House – and subsequently the rest of the headquarters area – was located here for this reason.

The trade winds also blow gasses and ejected material to the southwest during eruptions. When Kilauea Iki erupted in 1959, for instance, the ash and cinder blew to the southwest, forming the large spatter cone and burying the road. Visitors could safely view the eruption from the Kilauea Iki overlook on the northeast edge of the caldera. In general, this pattern has led to contrasting surficial geology around the caldera. Surface soils along the eastern side are much older and can support more vegetation. To the west, the volcanic soils are younger and more coarse with little organic matter. The vegetation communities sustained on these thin soils are stunted and spare, resembling desert communities.



Natural Systems and Features #1. Prior to the 1930s, Halemaumau Crater, located on the floor of the Kilauea Caldera, was very active, spewing lava in fountains high above a lava lake that covered the crater floor. Halemaumau more than tripled in diameter in 1924 after a series of explosions sent rocks and debris thousands of feet in the air. Today the crater is much less active, quietly smoking on the caldera floor. (PWRO 2005)



Natural Systems and Features #2. Puu Puai, the large spatter cone formed during the 1959 Kilauea Iki eruption. The spatter cone is nearly 200 feet above the rim of Kilauea Iki. (PWRO 2005)

## Spatial Organization

Spatial Organization is the three-dimensional organization of physical forms and visual associations in the landscape. The contributing aspects of spatial organization in the Crater Rim Historic District include the alignment of Crater Rim Drive and its associated features and the location and arrangement of the developed areas within the district.

### Overall Organization

When the master plans for Hawaii National Park were developed in the 1930s, they followed the established NPS design principles of rustic design and naturalistic landscape architecture. One of the goals of these design styles is the concentration of development into nodes along the road. This practice allowed visitors to experience the natural wonders of the park while protecting those wonders from the damage of excessive or uncontrolled development. At Kilauea Caldera, developed areas and areas of concentrated visitor activity were placed around the caldera in strategic places to provide visitors a chance to see the park's features. These nodes included the Volcano House and headquarters area, Kilauea Military Camp, Uwekahuna Bluff, Halemaumau, Thurston Lava Tube, and various overlooks along the east rim of the caldera. Subsequent development in the park has remained faithful to the overall organization pattern established by the master plans, and there has been no significant development outside of existing nodes since the period of significance.

### Crater Rim Drive

Crater Rim Drive developed somewhat piecemeal as roads to and around the caldera were constructed, connected, and adjusted. By early 1931, when the first master plan for Hawaii National Park was developed, the overall structure for the loop road was in place, and the composition and arrangement of the developed areas were laid out. The route for the road was chosen to simultaneously preserve and showcase the natural wonders of the volcano while providing a pleasant driving experience for drivers. In establishing the alignment of the road, the designers strove to negotiate the topography around the caldera while minimizing sharp curves and steep grades. Small adjustments to the alignment, still visible in many places in the topography and remnant stone work near the road, were made through the 1930s to improve the driving experience. These adjustments tended to be minor, and in the case of the fern forest near Thurston Lava Tube, the protection of the native vegetation was given priority over large alignment changes.

After the completion of Uwekahuna-Bird Park Road in 1934, few changes were made to the alignment of Crater Road until 1959, when the eruption of Kilauea Iki destroyed a one-mile section of the road and forced traffic to be rerouted around the closure. The eruption happened to correspond with a planned restructuring of Kilauea's road system, including a new bypass road that would allow through-traffic to pass through the park without traveling on Crater Rim Drive. Fueled by funds from Mission 66, the project created the Mamalahoa Highway bypass (Highway 11), eliminated the Uwekahuna-Bird Park Road between Uwekahuna and the highway, created the bypass around the portion of the road destroyed in the Kilauea Iki eruption, improved parking areas at Kilauea Iki and Thurston Lava Tube, and created a number of small connector segments that reestablished the loop road.

Further changes to the alignment of Crater Rim Drive occurred in the early 1980s, when a series of earthquakes damaged, and ultimately destroyed, sections of the road along Waldron Ledge. Traffic was diverted onto a bypass connector that had been built in 1961. This bypass became a permanent part of Crater Rim Drive, and portions of the road along Waldron Ledge that were still intact were converted to a pedestrian trail. Visitors are still allowed to reach the Waldron Ledge overlook on foot.

These seemingly significant changes to the alignment of Crater Rim Drive, however, resulted in few new sections and preserved much of the original road system. Today, nearly 85 percent of the existing road alignment is the same as it was during the period of significance.

#### Volcano House (see diagram Spatial Organization #1)

The site of the Volcano House is known at least as far back as the first wooden structure constructed in 1877. This structure, which replaced a grass-thatch structure built in 1866, was built on a small bench on the high northeast bluff of the caldera. Over the years, the Volcano House evolved, with additions being added in 1896 and 1921. When the 1921 addition was built, the 1877 structure was moved 90 feet to the northeast and replaced by two larger wings. This move spared the structure from the fire that destroyed the Volcano House in 1940, and it remains today. The site of the Volcano House from 1877 to 1940 is also evident today in the topography and few stone features that remain. After the hotel burned, it was rebuilt on a nearby site on the edge of the caldera. The new site offered better views of the caldera and allowed the hotel more room to expand. The new hotel was built broadside along the caldera rim, offering caldera views from many of the guest rooms. Behind the hotel, a small grassy area and walkway provided an overlook of the caldera and of Halemaumau in the distance. A small annex was built on the west end of the Volcano House in 1948.

When the new Volcano House was built, the vehicular access to the hotel and around the administration building was reconfigured into a loop drive with parking. The drive passed along the front of the hotel and under a small porte-cochere, and provided a small number of angled parking spaces. In the 1950s, the drive was expanded to accommodate more parking and bus drop-off areas. The porte-cochere was also enlarged to accommodate tour busses.

#### Uwekahuna Bluff (see diagram Spatial Organization #2)

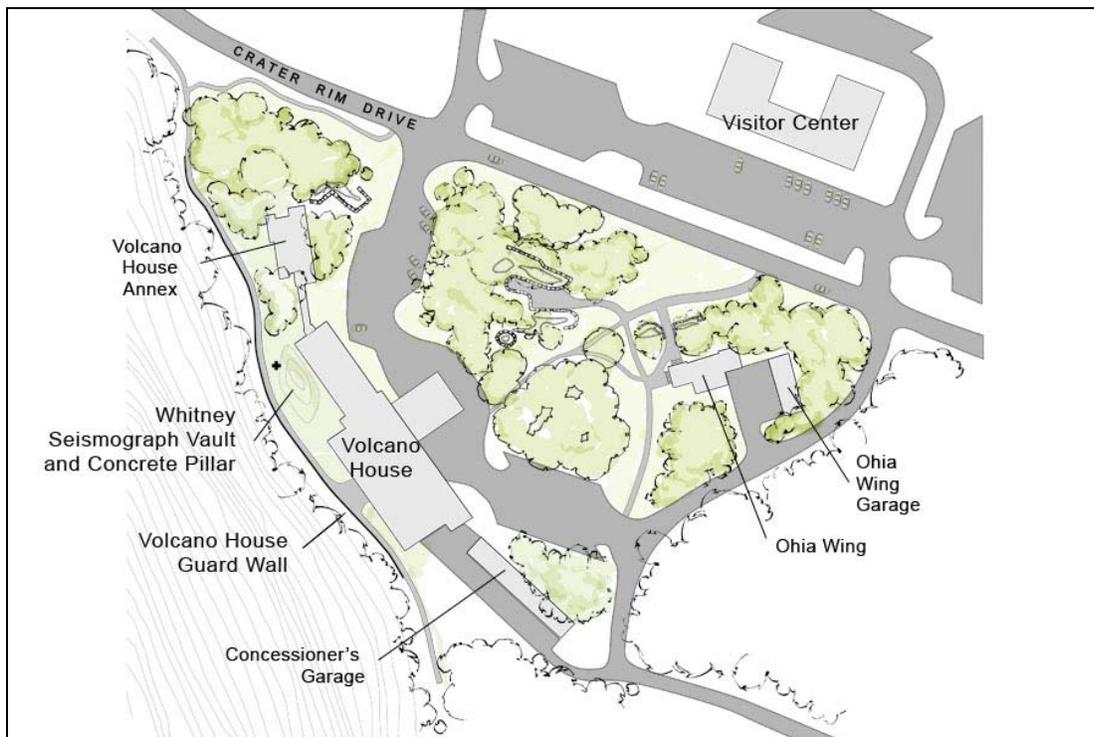
Even before structures were built on Uwekahuna Bluff, the high prospect was an important element of the organization around the caldera. An early footpath took advantage of the slope below the bluff that made it one of the few places where a descent could be made from the north bluff to the caldera floor. Soldiers at Kilauea Military Camp used this steep route to reach Halemaumau. The footpath was later replaced by a wagon trail that passed through Uwekahuna on its way around to the west rim of the caldera and to Halemaumau. In the 1920s, the Hawaii Volcano Research Association recognized the bluff's key location and superior views of both Halemaumau and Mauna Loa when they chose the bluff as the location of the volcano observatory and museum.

The initial structures at Uwekahuna, built in 1927 between the caldera rim and a large earthquake crack, consisted of the main museum building, a naturalist office and light plant, and two comfort stations. The existing wagon road passed through this cluster on the non-caldera side of the museum. In 1934 when the Uwekahuna-Bird Park Road was constructed, a new parking lot was built on the opposite side of the earthquake crack, and the wagon road was converted into a bridle path, and later, part of the Crater Rim Trail. Throughout the 1930s, park master plans proposed a variety of additions to the museum in an effort to relocate the main volcano research facilities from the aging Whitney Observatory near the Volcano

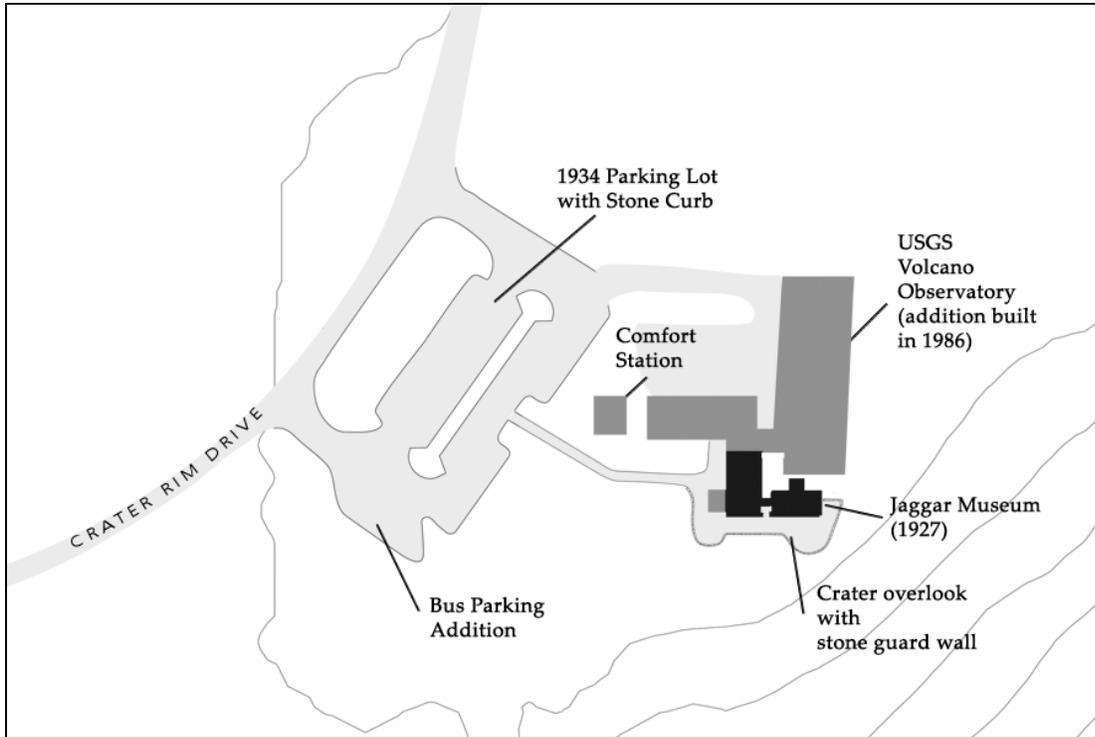
House to Uwekahuna. Although the facilities were eventually moved to Uwekahuna in 1948, no significant changes were made to the museum building until 1986, when a large addition was built to house the USGS research facilities.

#### Thurston Lava Tube (see diagram Spatial Organization #3)

The area around the lava tube was well developed by the time the NPS acquired the property in 1933. A footpath into what was then called the Twin Craters dates from the early years of tourism. A bridge over the chasm at the entrance to the tube was constructed in 1924, providing visitors access to the tube. Shortly after the NPS acquired the property, they engaged in a couple of projects funded by Public Works money: the construction of the comfort station and paving of the trail. The bridge at the tube entrance was widened and improved and the whole trail was surfaced with cold asphalt emulsion. By 1940, the Thurston Lava Tube trail featured dry-stacked stone retaining walls, stone steps, and an overlook at the trailhead with mortared stone guard wall and drinking fountain. These features remain today in their original arrangement and contribute to the historic scene of the district.



Spatial Organization #1. Diagram showing the Volcano House and Whitney Seismograph Vault on the rim of Kilauea Caldera. (PWRO 2006)



Spatial Organization #2. Diagram showing the Jaggar Museum and Volcano Observatory on Uwekahuna Bluff. (PWRO 2006)



## Contributing Circulation

Roads:

### Crater Rim Drive

LCS ID: 444159

Crater Rim Drive is a scenic, two-lane, 10.6-mile loop road that circles Kilauea's summit caldera and craters. The road begins at the park entrance off of Mamalahoa Highway and passes through rainforest and desert and features numerous scenic stops as it circles the caldera. The road is the main circulation route around the caldera and provides access to the summit's sites and developed areas, including the headquarters area and Volcano House; the Jaggar Museum and Volcano Observatory at Uwekahuna Bluff; Halemaumau, Keanakakoi, and Kilauea Iki Craters; and Thurston Lava Tube. The current road is an amalgam of road segments that were developed throughout the historic period, and has frequently been repaired and realigned in response to both natural phenomena and design improvements. The width of the travel lanes and shoulders varies around the loop road, reflecting the different periods of construction, road repair, and topographical constraints. The majority of the road in its current alignment was in place by the end of the period of significance in 1941. Furthermore, the road's purpose as a scenic loop road around the caldera, as well as its design intent, is intact.

For the purposes of this analysis, Crater Rim Drive can be split into a number of sections based on their construction period. These sections will be delineated by mile marks, beginning at the turn off from Mamalahoa Highway and proceeding counterclockwise around the caldera.

Section 1: Park Entrance, 1961

Mile 0.0-0.2 and mile 10.5-10.6

This section of Crater Rim Drive comprises the Mamalahoa Highway intersection, the entrance gate, and the intersection with the end of the loop road. This entrance section of the road was constructed in 1961 when the Mamalahoa Highway bypass was built. Utilitarian in character and wide with wide shoulders, the entrance section was designed to facilitate traffic flow through the sometimes congested entrance gate. Koa trees and ginger plants line the road edges in addition to ohia lehua and tree ferns.

Section 2: Park Headquarters to Kilauea Military Camp, 1888

Mile 0.2-1.1

This is the oldest section of Crater Rim Drive that has survived without major realignments, dating to the original Peter Lee Road finished in 1888. The portion of the road between the visitor center and the Volcano House has been updated periodically through the 1960s, when the visitor center parking lot was rehabilitated to accommodate traffic. Vegetation on the sides of the road is lush and dense with native Hawaiian plants. Beyond the visitor center, the relatively narrow two-lane road has changed little since the early twentieth century. It winds past the original Volcano House site, where stone walls date from the early periods of development. From here the road passes through dense ohia forest over a raised (filled) roadbed with parapet guard walls and dry-stacked retaining walls on the fill slopes.

As the road emerges onto the high plateau of the steam vents, the forest opens up to a broad grassland with the first sweeping views of Mauna Loa's summit. The parking area for the steam vents, first paved in 1959 but present well before that, is on this section on the caldera side of the road. Here, motorists may stop to for a close-up view of the steam vents. Lava rock road shoulders line both sides of the road along this segment. The date of construction for these shoulders is unknown, but they are consistent with

stone shoulders and gutters constructed along other sections of Crater Rim Drive in the 1930s. Asphalt obscures the stone shoulders on one or both sides of the road in many places.

Section 3: Kilauea Military Camp, 1937  
Mile 1.1-1.8

Towering groves of koa trees enclose the road as it approaches Kilauea Military Camp. The section of Crater Rim Drive immediately in front of Kilauea Military Camp was realigned from its original 1888 location when the entry of the camp was redesigned in 1937. Since then, the road has not changed significantly. The stone work associated with the camp entrance, as well as the lava stone steps that lead to the Crater Rim Trail, were constructed at this time. The stone wall that spans the front of Kilauea Military Camp along Crater Rim Drive was constructed in 2005. Features associated with Kilauea Military Camp will be assessed separately as part of its own CLI and do not contribute to the Crater Rim Historic District.

Section 4: KMC to Uwekahuna Connector, 1961  
Mile 1.8-2.6

When the Mamalahoa Highway bypass was built in 1961, this segment of Crater Rim Drive was built to connect Kilauea Military Camp to Uwekahuna Bluff, while the original road was used as the highway bypass. This section of road includes the intersection with an emergency connector road to Mamalahoa Highway and a side road to the Kilauea overlook parking lot and picnic area.

When the bypass was built, the segment of the Uwekahuna-Bird Park Road from Uwekahuna to the highway bypass was discontinued. Effort was made to obscure the defunct roadbed, but the fragile volcanic landscape here has been slow to recover, and the road trace is still evident. A small grove of vegetation at the point where the road trace meets Crater Rim Drive obscures the trace from the road. The road trace still features stone culvert headwalls and retaining walls built during the 1933 project.

Section 5: Uwekahuna to Halemaumau, 1933-1934  
Mile 2.6-5.4

This section, which before the 1961 bypass project connected Halemaumau to Bird-Park via Uwekahuna Bluff, was built with PWA funds in the winter of 1933-1934. This road replaced an auto trail built just 2 years earlier that connected Halemaumau to Uwekahuna (Leavitt's Road, part of which is still present as the Crater Rim Trail). The spring after the Uwekahuna-Bird Park road was built, heavy rains damaged the road in many places. As one of their first projects in Hawaii National Park, the CCC repaired the damage and built stone drainage ditches along much of the road. These ditches are still present, but are obscured by asphalt on one or both sides of the road in many places.

In 1962, when the Mamalahoa Highway bypass was constructed, the section of the road between Uwekahuna and the new highway was decommissioned, leaving only the section between Uwekahuna and Halemaumau as part of the Crater Rim Drive loop. This section crosses Uwekahuna Bluff, the site of the Thomas A. Jaggar Museum and the USGS Hawaiian Volcano Observatory, and around the west side of the caldera to Halemaumau. Along the way, the road passes along the edge of the Kau Desert, where remnants of an earlier auto trail are still visible, before descending through the Southwest Rift Zone to the caldera floor. The auto trail, built in 1931 under the supervision of Superintendent Leavitt, is now part of the Crater Rim Trail. Portions of stone retaining wall and the original grade of the road remain.