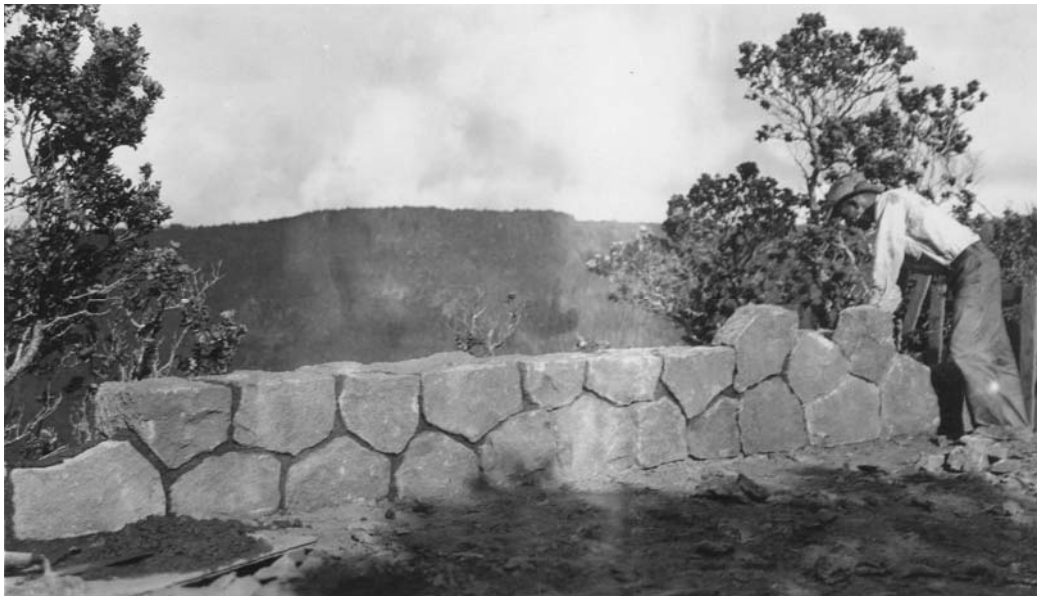
National Park Service
Cultural Landscape Inventory
2006



Crater Rim Historic District
Hawaii Volcanoes National Park

Table of Contents

Executive Summary 1
Park Information 3
Property Level and CLI Number 3
Completion Status 3
Landscape Description 4
CLI Hierarchy Description 5
Location Map 5
Boundary Description 6
Regional Context 6
Site Plans 8
Chronology 11
Statement of Significance 15

Physical History
- Pre NPS (1823-1916) 19
- Early National Park Development (1916-1930) 25
- Master Planning and the CCC (1931-1942) 27
- World War II and Beyond (1942-Present) 36

Analysis and Evaluation
- Summary 40
- Natural Systems and Features 41
- Spatial Organization 46
- Circulation 50
- Buildings and Structures 61
- Topography 74
- Vegetation 78
- Views and Vistas 84
- Land Use 88
- Archeological Sites 90

Management Information
- Descriptive and Geographic Information 94
- National Register Information 94
- Adjacent Lands Information 96
- General Management Information 97
- Condition Assessment and Impacts 97
- Treatment 100
- Approved Treatment Cost 100
- Stabilization Costs 100

Appendix
- Bibliography 101
- Supplemental Information 102
- Existing Conditions Site Map
- Site Map (1916 Conditions)
- Site Map (1941 Conditions)
- Contributing Features Map: Circulation
- Contributing Features Map: Structures

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

Park Name:	Hawaii Volcanoes National Park
Administrative Unit:	Hawaii Volcanoes National Park
Park Organization Code:	8300
Park Alpha Code:	HAVO

Property Level and CLI Number

Property Level:	Landscape
Name:	Crater Rim Historic District
CLI Identification Number:	975082
Parent Landscape CLI ID Number:	975082

Completion Status

Date Data Collected:	06/21/2005
Data Recorder:	John Hammond, Gretchen Stromberg, Erica Owens
Date Entered:	03/01/2006
Data Entry Recorder:	John Hammond
Site Visit Conducted:	Yes
Completed:	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

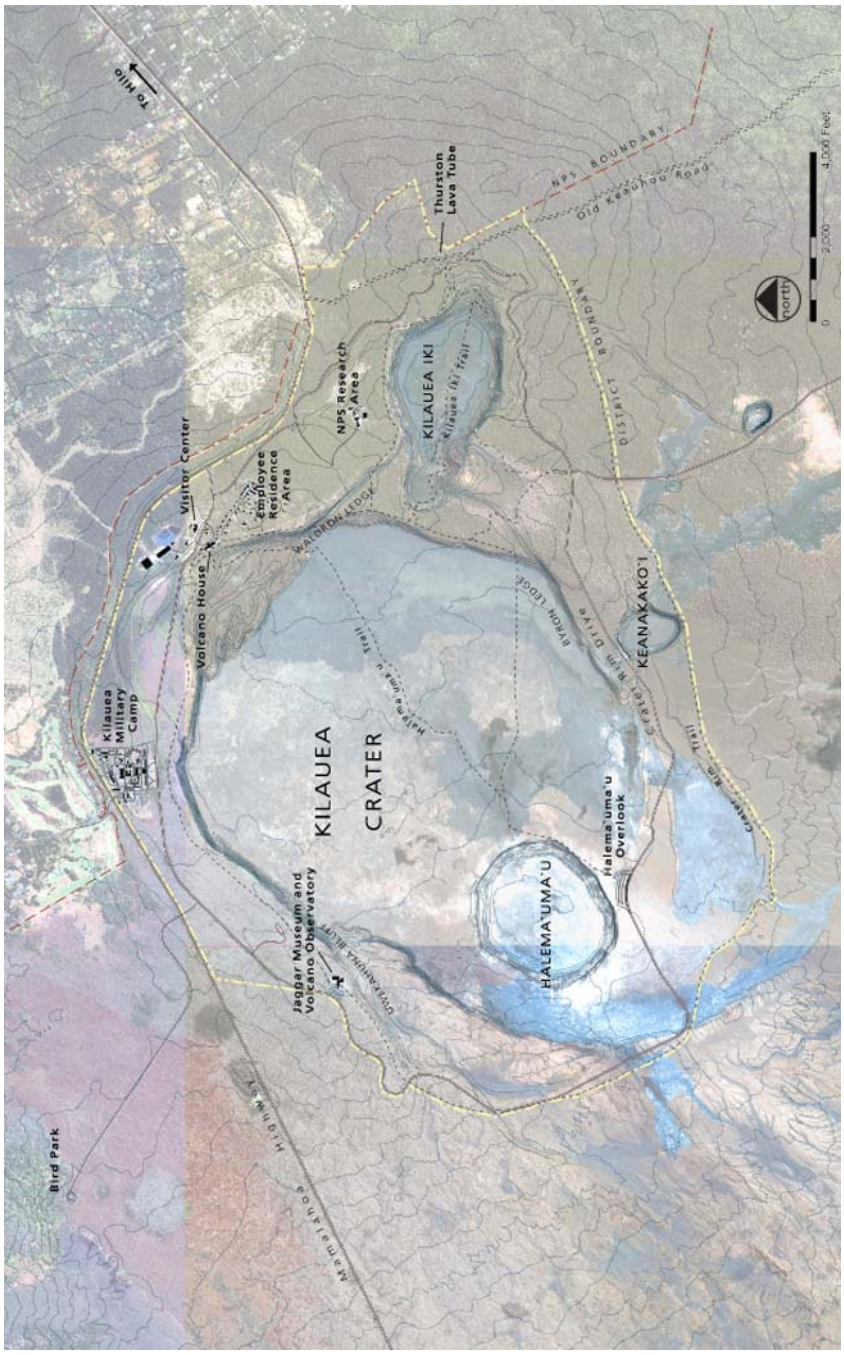
Considered the home of Pele by the native Hawaiians, the spectacular eruptions at Kilauea first drew non-Hawaiian visitors to the volcano in the nineteenth century. Since then, people have continued to come to Kilauea for the unique opportunity to safely approach an active volcano to witness ongoing 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

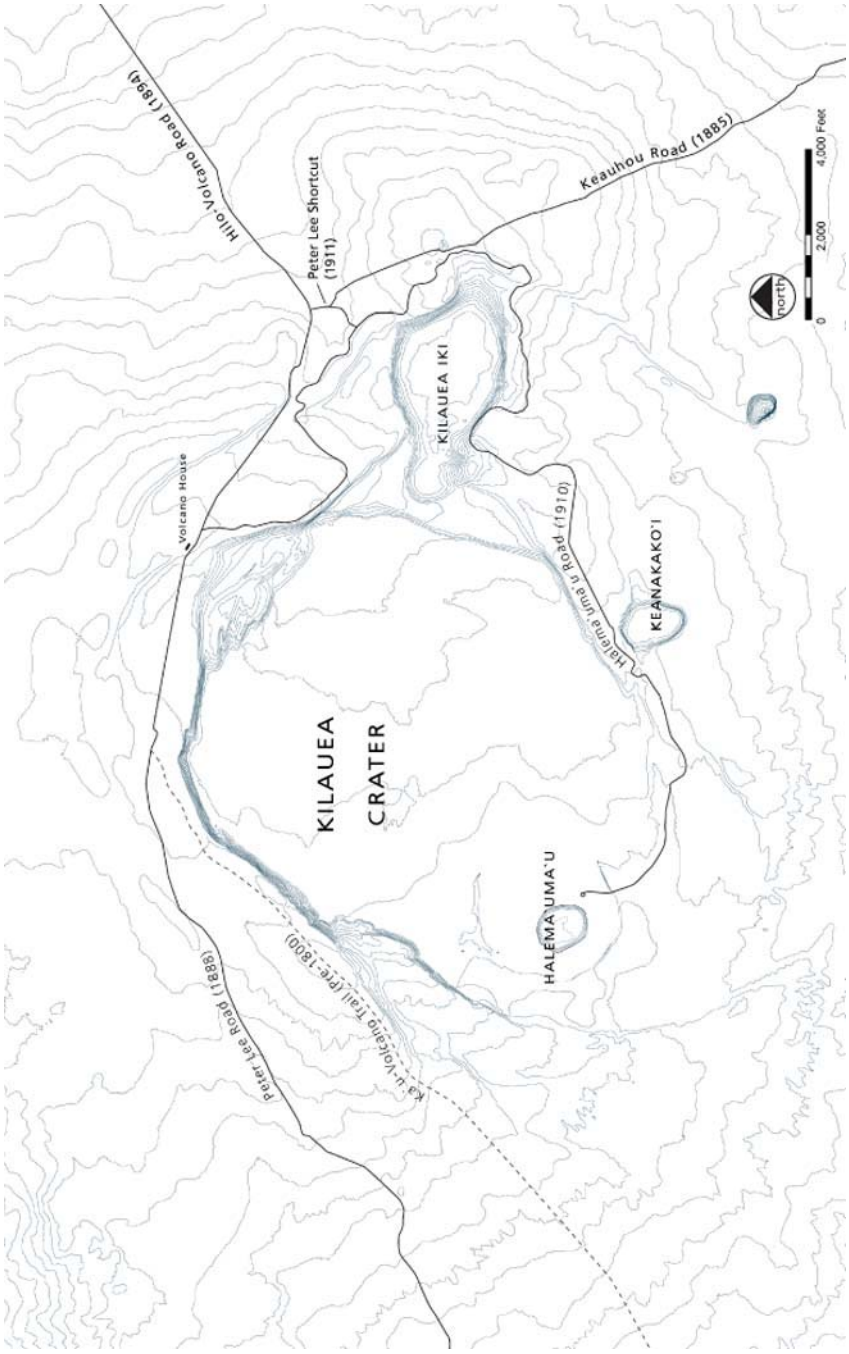
The Crater Rim Historic District is located in Hawaii Volcanoes National Park—a park that encompasses 377 square-miles from the coast to the tip of Mauna Loa. The historic district (as well as the entire national park) is located in the county, island, and state of Hawaii. It is in Hawaii's Second Congressional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

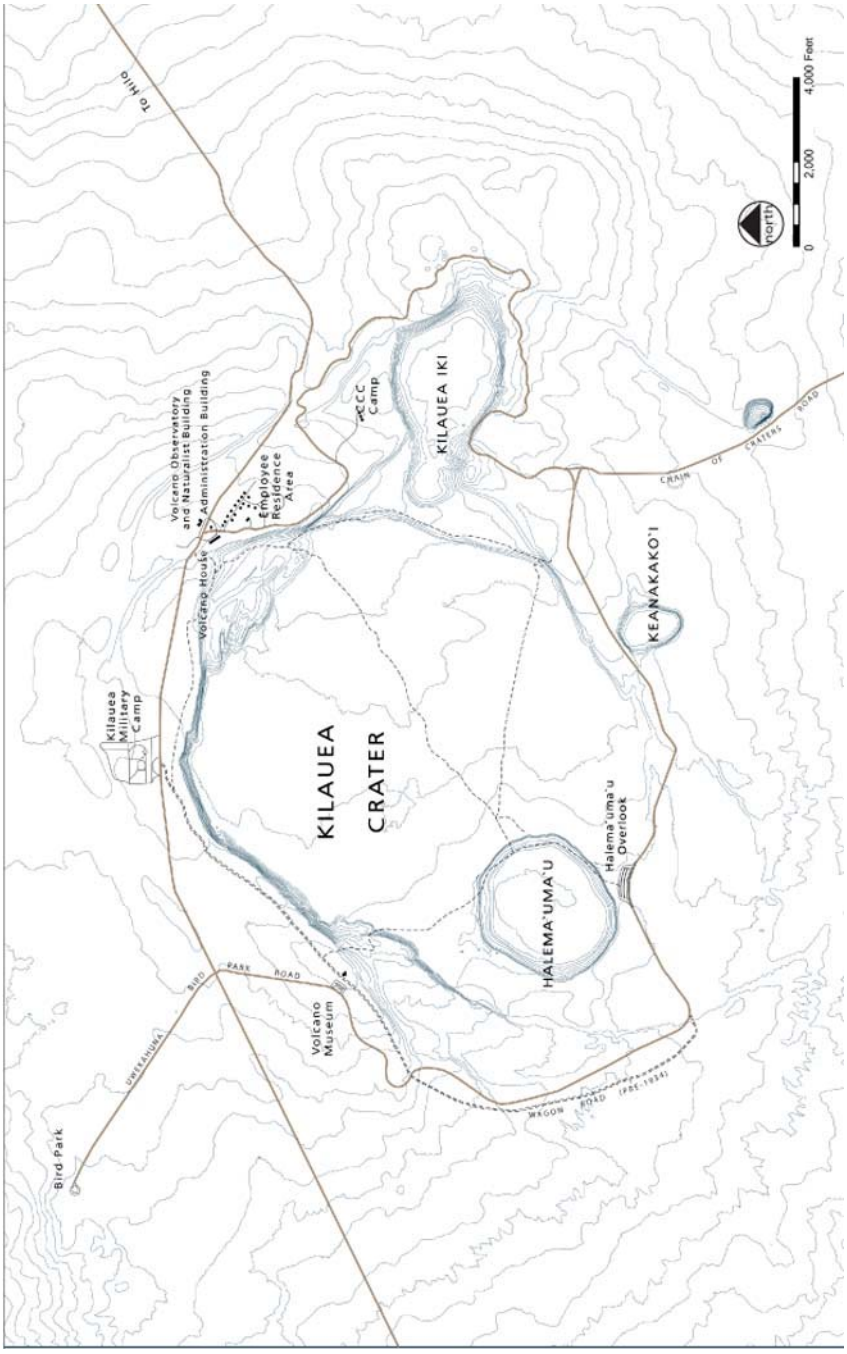
Site Plan



Site Plan #1. Composite site map showing the existing conditions in 2005. (See Appendix for larger map.)



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

Year	Event	Description
19th 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	Mamalahoa Highway bypass was built along the north side of

		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.
1960-1962	Built	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.
1962	Built	New parking areas were built at Kilauea Iki and Thurston Lava Tube.
1962	Built	A new deluxe wing for the Volcano House (Volcano House Annex) was built.
1963	Improved	Headquarters parking area was reconstructed and enlarged.
1971-1974	Destroyed	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.
1975	Improved	Parking areas at Waldron Ledge and Keanakakoi were improved and enlarged.
1981	Damaged	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.
1982	Damaged	Kilauea Iki erupted again, damaging sections of Crater Rim Drive between Halemaumau and Keanakakoi.
1982	Destroyed	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.
1983	Destroyed	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.

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 as 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-feet-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 Hisotry #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 or 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 carports, 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

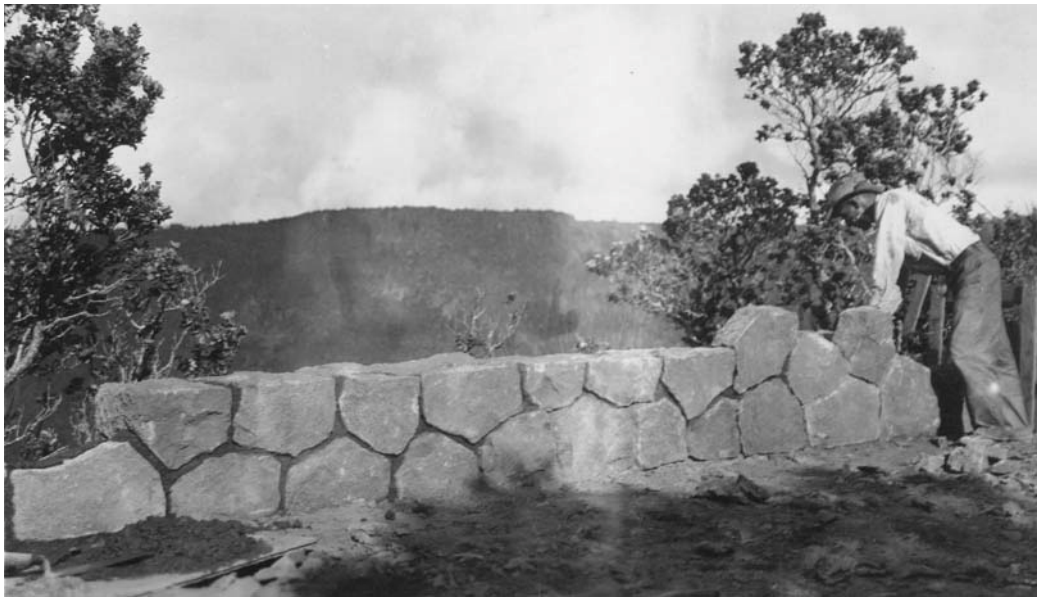
In 1930, NPS Chief Landscape Architect Thomas Vint made a visit to Hawaii National Park to inspect the park as part of the master planning process. One of his top concerns on that trip was to devise a strategy for the role the Volcano House would continue to play in the park. According to Vint, the hotel 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 that 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 course 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).

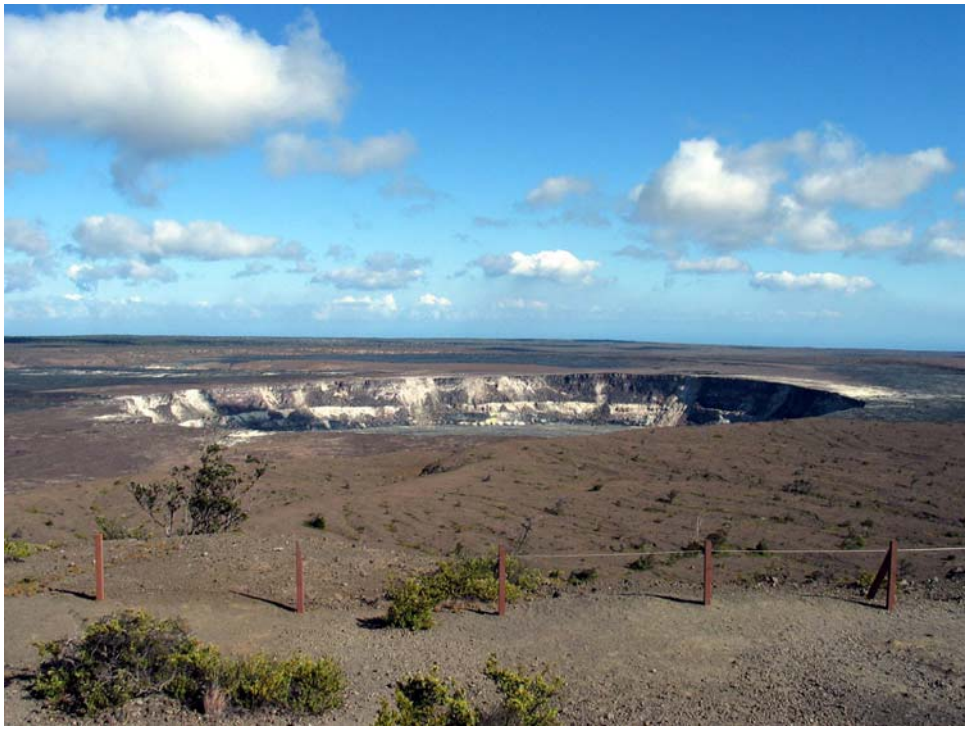
From the Southwest Rift Zone through the caldera and past Keanakakoi, lava flows are recent enough to exclude any significant vegetation.

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 tail. 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)

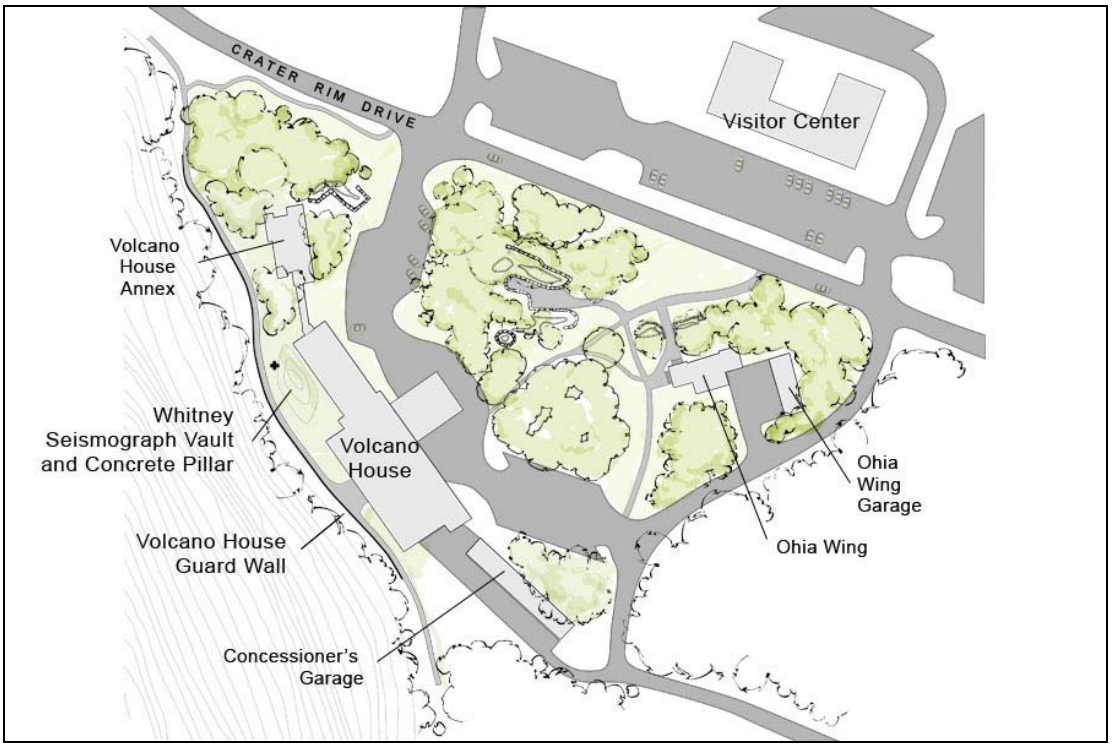
Even before structures were built on Uwekahuna Bluff, the high prospect was an important element of the organization around the caldera. An early footpath took advantage of the slope below the bluff that made it one of the few places where a descent could be made from the north bluff to the caldera floor. 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

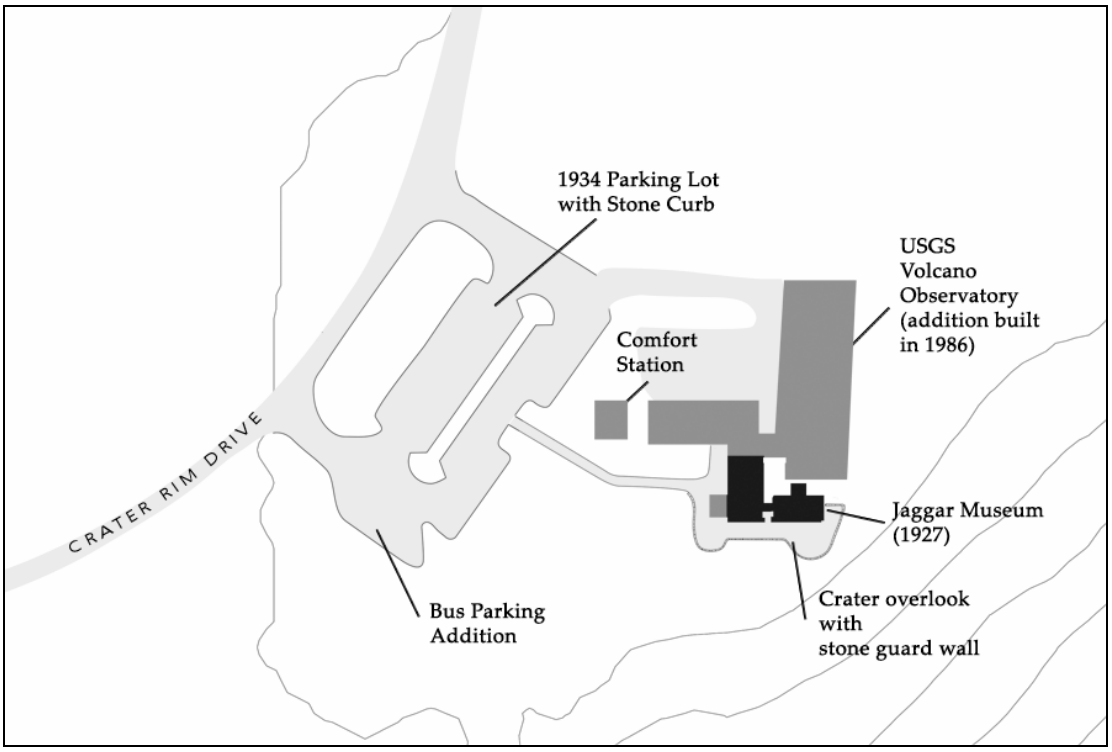
House to Uwekahuna. Although the facilities were eventually moved to Uwekahuna in 1948, no significant changes were made to the museum building until 1986, when a large addition was built to house the USGS research facilities.

Thurston Lava Tube (see diagram Spatial Organization #3)

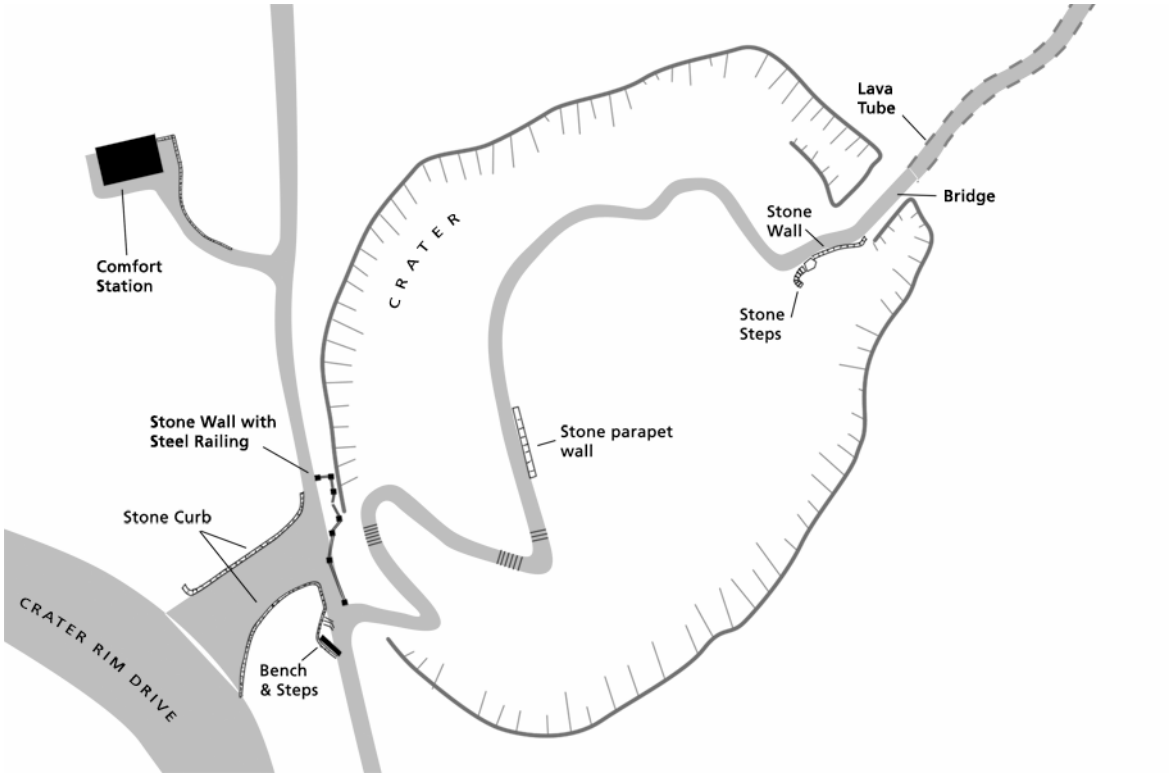
The area around the lava tube was well developed by the time the NPS acquired the property in 1933. A footpath into what was then called the Twin Craters dates from the early years of tourism. A bridge over the chasm at the entrance to the tube was constructed in 1924, providing visitors access to the 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)



Spatial Organization #3. Diagram showing the stone walls and other features at Thurston Lava Tube. (PWRO 2006)

Circulation

Circulation is the core characteristic that holds the Crater Rim Historic District together. Early NPS master plans typically organized parks as series of discrete nodes of development along roads surrounded by wilderness. This was the case at Hawaii National Park, as the park's developed areas around Kilauea Caldera were developed along Crater Rim Drive. A desire for easy travel to and around the caldera drove development in the area before and during the NPS' management. As the park improved the road system, they adhered to NPS standards for road widths and alignments that maximized driver experience while minimizing intrusion on the landscape. Trails, as well, were carefully planned and constructed to showcase the natural features of the park while remaining inconspicuous. Today, the vehicular and pedestrian circulation systems in the Crater Rim Historic District reflect the master planning process, the rustic and naturalistic landscape design principles, and the work of skilled craftsmen that characterized them during the historic period.

See Appendix for a map of the circulation system in Crater Rim Historic District.

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 were 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.

The museum building at Uwekahuna was built in 1927 by a private organization and has served as the educational center for the park ever since. The parking lot, with a capacity of 150 cars, was planned and constructed in conjunction with the Uwekahuna-Bird Park road in the early 1930s. From here, the road circles around the west side of the Caldera, passes through the Southwest Rift Zone, and then descends into the caldera floor to Halemaumau. Long, paved turnouts along the Southwest Rift section were constructed after the historic period to accommodate visitors viewing the fissures. Numerous stone features in this section date to the 1930s, including stone culverts and embankment facing and stone drainage ditches. Toward the bottom of the slope into the caldera, a large stone drainage ditch and stone wall constructed by the CCC in 1934 directs storm runoff along the side of the road.

Section 6: Halemaumau to Chain of Craters Road, 1908-1931
Mile 5.4-7.5

This section of road has survived from the first road from Volcano House to Halemaumau in 1908 with few realignments. The large parking lot was constructed around 1932 in response to large volumes of visitors during Halemaumau eruptions in the 1920s. Other portions of the road were realigned in the 1920s to eliminate sharp curves or steep grades. The road here has long open vistas and gently curves through lava flows, some from the nineteenth and early twentieth centuries and some as recent as 1974.

Past the Halemaumau parking lot, the road begins to climb the gradual slope of the caldera's south wall. There are two non-historic paved turnouts on the caldera side that offer views back toward Halemaumau and Uwekahuna, and a third turnout that notes the 1982 lava flow nearby. The road then passes Keanakakoi, one of the smaller craters on Kilauea's summit, where turnouts on either side allows motorists to stop and view the caldera. A stone parapet guard wall constructed in 1933 was destroyed during volcanic activity in the 1980s and replaced with a new stone guard wall.

Beyond Keanakakoi, Crater Rim Drive passes through an area that was buried in pumice cinder in the 1959-1960 eruption of Kilauea Iki. While part of the original Crater Road was buried and/or destroyed beyond repair, the portion just east of Keanakakoi was excavated and repaired in its original alignment. The sides of the road here are mounds of cinder, slowly recovering with a regenerating ohia forest.

Segment 7: Devastation Bypass, 1961
Mile 7.5-7.9

This section was constructed in the early 1960s to bypass the part of the road destroyed in the 1959 Kilauea Iki eruption. The character here is similar to the previous portion, characterized by roadside cinder embankments and dry ohia forest. The intersection with Chain of Craters Road was reconfigured when the new section was constructed, replacing the original wye intersection with a simple four-leg intersection. Opposite the Chain of Craters Road is part of the original road, which is today the parking area for the Devastation Trail interpretive area. The other end of the destroyed road is also a parking area now, providing access to Puu Puai, the spatter cone formed in the eruption. These parking areas were configured in the 1960s.

Section 8: Puu Puai to Headquarters Connector, 1908-1931
Mile 7.9-10.1

This section was also part of the original 1908 road from Volcano House to Halemaumau. The route was chosen, over one that would have approached Halemaumau from the west, in part because of the scenic

value of the fern forest, the Twin Craters (Thurston Lava Tube), Kilauea Iki, and Keanakakoi. The early road, which wound through the dense fern jungle as it skirted the craters contained a number of sharp curves. After Hawaii National Park was formed in 1916, the park made efforts to bring the road to NPS standards, without undue intrusion on the native fern forest. The result was incremental changes to the grade and alignment of the road throughout the 1920s to widen sharp curves and reduce grades. Evidence of these realignments is still present in the form of topography and stone retaining walls now hidden in the dense roadside forest.

By the early 1930s, the road met NPS standards as a pleasant and scenic route around the caldera. In 1933, rustic stone parapet guard walls were built along Thurston Lava Tube and Kilauea Iki to improve driver safety, as well as the scenic value of the road. The long parapet wall at Thurston Lava Tube was built over an earlier 12-foot dry-stacked stone retaining wall.

This section of Crater Rim Drive contains two parking areas, both of which have been reconfigured some since the historic period. The Thurston Lava Tube parking area was most recently expanded in the early 1960s, adding parking for cars and busses. The new parking was carefully designed to retain existing lava rock walls and rock cuts. At Kilauea Iki, the original road alignment became the parking area, while the travel lane was realigned to the inside of the curve. This increased parking for the overlook and separated it from the road, while also reducing the curve for motorists. The parapet guard walls built in 1933 were retained in both overlook redesigns.

Section 9: Headquarters Connector, 1961
Mile 10.1-10.3

This short section was constructed in the 1961 Mamalahoa bypass project, connecting the original entrance road to the loop road, creating a bypass of Waldron Ledge. This was used as an alternate route around Waldron Ledge until the 1980s, when earthquake damage closed the Waldron Ledge section of Crater Rim Drive and making the connector and bypass route the main road.

Section 10: Original Entrance Road, 1894
Mile 10.3-10.5

Originally part of the road from Hilo to the Volcano House, the original entrance road dates to the early pre-park years. The alignment appears to have changed little since the 1894 government road, and probably dates well before that to the early foot trail to the volcano. In 1961, this section of road was bypassed with the new Mamalahoa Highway and a new park entrance was constructed. The original entrance road became an alternate route around Waldron Ledge until the earthquakes in the 1980s closed Waldron Ledge.

Other Roads

Research Center Road
LCS ID: 461598

Between park headquarters and Kilauea Iki, Crater Rim Drive comes to a tee intersection with a stop sign. Crater Rim Drive continues to the left, while the right road leads to the park research center. The research center was originally the second CCC camp, built in 1938. Today it consists of a number of offices and labs for natural and cultural resources in the park.

The road, beginning at the stop sign, was part of Crater Rim Drive until 1981 when earthquakes diverted traffic from Waldron Ledge to the headquarters connector. After a quarter mile, the road turns left off of the old Crater Rim Drive alignment and onto the access road to the research center. A traffic barrier blocks access to the closed portion of Crater Rim Drive. The research center access road continues for another quarter mile to the buildings at the research center.

Because the research center road has not had the same upgrades as other portions of Crater Rim Drive since at least the 1970s, it retains a character closer to that of the historic period.

Waldron Ledge Road (Ruin)
LCS ID: 501686

This segment of Crater Rim Drive from the entrance to the employee residential area to the research center was closed due to earthquake damage in the 1980s. Originally part of the road from the Volcano House to Halemaumau built in 1908, it wound along the edge of Waldron Ledge, providing some of the best views of the caldera from the road. Vegetation was cleared along the ledge in 1918 to improve the views, and an overlook was built to allow motorists to stop. In 1933, a stone parapet guard wall was built along the overlook to improve safety and scenic quality. In the 1970s, the road along Waldron Ledge was realigned to move it further away from the caldera rim. The original overlook was retained and enlarged as a parking area. In 1981, large earth cracks undermined the road and caused its closure between the overlook and the research center and traffic was diverted to the headquarters connector bypass. Traffic was still allowed to reach the Waldron Ledge overlook from the headquarters area. Then, in 1983, more earthquakes shook large portions of the road into the caldera below. A 450-foot section of the road between the overlook and the research center was lost, and portions near the residential area were severely damaged. This permanently closed the Waldron Ledge section of the road to vehicles, making the bypass permanent.

Today, portions of the road, as well as the overlook at Waldron Ledge, are accessible by foot. Part of the Crater Rim Trail, the damaged road dramatically demonstrates how volcanic activity continues to change the landscape.

Parking Areas

Steam Vents
The parking area for the Steam Vents, located on the Steaming Bluff just west of the Volcano House, was paved in the 1960s, but was probably an informal gravel area well before that. The parking area consists of a short loop access road and a small parking area accommodating about a dozen cars. There are no significant stone curbs or walls associated with this parking area. The parking area provides access to large steam vents that emit near-constant billows of steam directly adjacent to the access loop, as well as to the Steaming Bluff overlook.

Jaggar Museum and Volcano Observatory
The parking lot for the museum on Uwekahuna Bluff was built in 1933-1934 with the construction of the Uwekahuna-Bird Park Road. The parking lot features a symmetrical design with raised medians edged with 8 inch by 12 inch stone curbs. The lot has changed little since its construction, aside from bus parking, sidewalk, and retaining wall along the southwest side. At the lot's east end is a drainage ditch, landscaped with boulders and native shrubs, that delivers water into the roadside drainage through a small

single iron pipe culvert with a lava rock headwall. At the lot's west end is a crosswalk, double iron pipe culvert, and a wide paved gutter that drains into a slightly recessed area of pavement. The culverts appear to have been built at the same time as the parking lot.

The stone curb has been damaged in places, with some of the large curbstones misplaced. Successive paving of the parking lot has also reduced the height of the curbs from their original 9 inches above the parking surface.

Halemaumau
The large parking lot at Halemaumau was built around 1932 in response to large volumes of visitors during Halemaumau eruptions in the 1920s. Like the parking lot at Uwekahuna, the Halemaumau lot is symmetrical with curbed medians. The curbstones are the same type as those at Uwekahuna: 9 inch by 12 inch cut stone. On the eastern end of the parking lot, stone edging reveals a road alignment that predates the construction of the current lot. The lot has not changed significantly since it was constructed the 1930s.

Thurston Lava Tube
The parking lot at Thurston Lava Tube was configured in 1962, but still retains features from earlier configuration. The new design of the parking area was careful to preserve the existing stone walls and rock cuts that helped define the character of the road through the fern jungle area. Parking is currently on both sides of the road, with perpendicular auto parking on the west side of the road and parallel bus parking on the east side of the road.

Volcano House
When the Volcano House relocated to the south side of Crater Rim Drive after it burned in 1940, the roads and parking around it and the park headquarters were reconfigured. Where there had been a wye intersection with the headquarters building (today the Ohia Wing) at the apex, a new loop access road was constructed, circling behind the headquarters building. This access road brought traffic to a drop-off area and porte-cochere in front of the Volcano House. Limited parking for the Volcano House was provide along this access road. In the 1950s, the parking was expanded along the access road, adding angled spaces on either side of the hotel's porte-cochere. The porte-cochere was also enlarged to accommodate tour busses.

Trails

Halemaumau Trail
LCS ID: 58432

One of the earliest trails at Kilauea was a footpath that descended from the Volcano House and struck out directly across the lava beds to Halemaumau Crater. Before the roads were built, this was the primary access to the "fire pit." Early Volcano House register entries refer to the trail as "The Worlds Weirdest Walk," in reference to the bizarre landscape created by the various lava flows. The alignment of the trail across the floor of the caldera has changed from time to time in response to new lava flows, but the trail is essentially the same as it was in the earliest years of tourist travel to the volcano.

Kilauea Iki Trail
LCS ID: 501695

In 1922, Superintendent Boles directed the construction of a trail from Byron Ledge down the west wall of Kilauea Iki. With access by a second trail into Kilauea Iki from the road opposite Thurston Lava Tube, this loop trail became one of the most popular in the park. In 1934, the trail from the road down to Kilauea Iki was rebuilt by the CCC, who relocated and regraded the trail and built stone retaining walls in many places along the upper portion. In the 1959 Kilauea Iki eruption, the upper portions of the trail and all of the CCC stone work were spared. After the eruption, the path across the caldera floor and out of the western end were rebuilt. Today, this path continues to be a popular hiking route in the caldera, showcasing prime examples of CCC stone work.

Crater Rim Trail
LCS ID: 58431

Crater Rim Trail developed over the years from a variety of historic and non-historic trail segments. One of the first segments of it was built in 1922, when Superintendent Boles directed the construction of the Waldron Ledge Trail between Kilauea Iki and the Volcano House. Today, this portion of the trail follows the old Crater Rim Road section along Waldron Ledge that was damaged in earthquakes in the 1980s. Portions of the road that fell into the caldera are bypassed by new trail segments.

The trail along Steaming Bluff from the Volcano House to Kilauea Military Camp was developed in 1930, and connected to an older trail from Kilauea Military Camp to Uwekahuna. The rather treacherous Uwekahuna Bluff trail down the face of the north bluff to Halemaumau was discontinued not long after the road to Halemaumau was built in 1931. The current segment of Crater Rim Trail from Kilauea Military Camp to Halemaumau follows the alignment of this precursor to the Uwekahuna-Bird Park Road and retains much of the old road's topographic features and several rock retaining walls.

The southern portion of Crater Rim Trail, from the western caldera wall, past Keanakakoi, to the old Keauhou Road appears to have originated after the historic period in an attempt to complete the loop trail.

Byron Ledge Trail
LCS ID: 501705

In 1927, a trail was built from the summer camp at Byron Ledge down the caldera wall and across the lava flows to connect with the Halemaumau Trail. In 1930, the summer camp trail was extended north along Byron Ledge, along the rim of Kilauea Iki to the talus slopes at the foot of Waldron Ledge to connect with the existing trail from the Volcano House. The current trail from Byron Ledge into the caldera follows the historic alignment.

Thurston Lava Tube Trail
LCS ID: 501706

The trail from Crater Rim Drive down to and through the Thurston Lava Tube has long been a popular attraction at the park. The trail itself, which dates from before the land was acquired by the NPS in 1933, began as a small footpath from the road to the tube opening. The bridge over a fissure at the tube entrance provided access to the tube itself in 1924. After the park acquired the lava tube, they paved the trail and made improvements to the stairs and other structures.

The short length and accessibility of the trail at Thurston Lava Tube made it one of the most popular attractions in the park. As the numbers of people using the trail increased, it assumed more the character and needs of a walkway for people in street clothing rather than a trail for those equipped to hike. In

1955, the trail was re-surfaced, all steps re-laid with hand rails and a blacktop trail laid through the tube itself with warning lights at low spots, etc. Through the end of the 1950s, improvements continued to be made to the trail to increase accessibility and safety. These included guardrails at steep drops, protective cables on the bridge, lights throughout the tube, stair improvement, and better surfacing. The stairs at the tube's exit were improved, and the return trail was improved and surfaced. The result was a half-mile pathway that most park visitors could negotiate with little trouble.

Turnouts

Several turnouts along Crater Rim Drive allow drivers to stop and view the many sites around the caldera. This is consistent with roads developed in national parks around the country in the early twentieth century, where turnouts were used to provide places for drivers to pull over without damaging the road shoulders or natural features often located very close to the road. Turnouts on early roads were typically short areas, large enough for one or two cars to pull safely out of the lane of travel. Usually gravel, although sometimes surfaced with asphalt, the turnouts were generally between 20 and 50 feet long and lens shaped, with short, curved exit and reentry points. Large boulders were often used to delineate the turnout and contain the cars.

As travel speed and traffic volumes increased over the years, turnouts became longer, with more space for exiting and reentering traffic. The turnouts were usually paved and edged to contain the cars and prevent shoulder damage on either end of the turnout. Today, turnouts are often from 60 feet to more than 100 feet in length and have a more trapezoidal shape with straight sides and angled returns.

Turnouts along Crater Rim Drive represent both of these categories. Some are short and lens shaped, with lava boulders delineating their extent. Others are long and paved, with straight, angled sides. While it is unknown which specific turnouts date from the historic period, it is possible to describe a character that is consistent with historic turnout design. Many of the turnouts along the north and northwest sections of Crater Rim Drive, in the area of the steam vents and Uwekahuna Bluff, exhibit the characteristics of historic turnouts. By contrast, many of the turnouts along the Southwest Rift Zone and near Keanakakoi were built in the 1950s and 1960s and are clearly of a more modern design.

Summary

Today, the systems of vehicular and pedestrian circulation around Kilauea Caldera comprise mix of historic and non-historic elements as complex as the story of their development. The overall structure of the circulation, consisting of a loop road that provided access to the sites around the caldera together with a system of trails, was laid out by the park's master planning process and was in place by the early 1930s. The current circulation, including Crater Rim Drive, parking lots at the developed areas, turnouts, and trails, reflects the designs of the first master plans, effectively moving visitors around the Kilauea summit area. While Crater Rim Drive was periodically realigned in response to design improvements or volcanic events, it retains the majority of its historic alignment, with four short segments dating from after 1942, and three segments of the historic alignment lost. Parking areas at Uwekahuna Bluff and Halemaumau Crater are essentially unchanged from 1934 and demonstrate the rustic design principles that guided road construction in the period. This is true, too, of the Kilauea Iki Trail, which showcases stone work characteristic of the CCC era. Overall, the circulation in Crater Rim Historic District helps convey the significance of the district and contributes to its integrity.

Circulation #1. Contemporary photo of the mortared-stone embankment facing and raised roadbed with culvert, located in the Southwest Rift Zone. Asphalt covers the top of the embankment from successive road paving. (PWRO 2005)

Circulation #2. Road traces and remnant retaining walls, most likely from Leavitt's Road from Uwekahuna to Halemaumau built in 1931, are today part of the Crater Rim Trail in the northwest corner of the caldera. (PWRO 2005)

Circulation #3. Several remnants of retaining walls mark former road alignments of Crater Rim Drive. The wall remnants, which date to before the 1920s, are mostly hidden in the dense vegetation near the current road south of Thurston Lava Tube. (PWRO 2005)

Characteristic Feature	ID LCS Number	Type of Contribution
Crater Rim Drive	444159	Contributing
Research Center Road	461598	Contributing
Waldron Ledge Road Ruin	501686	Contributing
Halemaumau Trail	58432	Contributing
Kilauea Iki Trail	501695	Contributing
Crater Rim Trail	58431	Contributing
Byron Ledge Trail	501705	Contributing
Thurston Lava Tube Trail	501706	Contributing
Steam Vents Parking Area		Contributing

Jaggar Museum and Volcano Observatory Parking Area	Contributing
Halemaumau Parking Area	Contributing
Thurston Lava Tube Parking Area	Contributing
Volcano House Parking Area	Contributing
Crater Rim Drive Turnouts	Contributing

Buildings and Structures

The buildings and structures in the Crater Rim Historic District are important manifestations of the rustic design style that guided national park development in the 1920s and 1930s and help tell the story of the development of the Kilauea Caldera area. These include classic examples of Park Service Rustic style buildings, such as the Volcano Observatory and Jaggar Museum and the comfort station at Thurston Lava Tube; the two Volcano House structures, which reveal a continuity of use from one of the caldera's earliest hotels built in 1877 to the latest incarnation built in 1941; the Whitney Seismograph Vault, which brings to light the significant role scientific research has played in the development of Kilauea; and numerous stone retaining walls and other stone features that blend infrastructure with a naturalistic design philosophy. In aggregate, the buildings and structures of the Crater Rim Historic District are essential character-defining elements that contribute strongly to the historic scene and help convey the district's significance.

See Appendix for a map of contributing buildings and structures.

1877 Volcano House
LCS ID:05842

This one-story building with ten rooms is approximately 110 feet long and 35 feet wide with a long porch on the caldera side. The building is of frame-on-wooden-post construction with shingle exterior walls and a galvanized metal roof.

This substantial wooden building, which replaced the grass-thatch Volcano House built in 1866, greatly improved visitor comfort and helped increase tourism to the volcano. In 1891, a large, Victorian-style two-story frame addition was built on the west end of the structure, greatly increasing the capacity of the hotel. In 1921, the hotel was updated once again, but this time, the original 1877 structure was moved roughly 90 feet away to make room for two new wings. This would be the structure's saving grace when the Volcano House burned in 1940.

The 1877 Volcano House was listed on the National Register of Historic Places in 1972. Today the building houses the Volcano Art Center. By virtue of its association with the current Volcano House and its role in the development of the area, the 1877 Volcano House contributes to the Crater Rim Historic District.

Volcano Observatory and Jaggar Museum
LCS ID: 58270

This one-story lava stone and wood clapboard building on the rim of the caldera is rectangular in plan with a modern metal-clad, hipped roof. The front elevation features a projecting entry canopy with lava stone piers and a pair of glazed wood doors. To the north of the entry are six louvered vent panels above a lava stone base. The south side elevation is composed of three bays separated by lava stone piers with rows of fixed wood sash windows, while the east elevation facing the caldera is stone-clad with three windows. A rather long asphalt walkway leads from the parking area to the main entry and to large asphalt viewing areas on the building's south and east sides. These platforms have lava stone retaining walls. The building includes a large addition constructed by the USGS in the 1980s.

The museum, originally referred to as the Uwekahuna Museum, was constructed by the Hawaii Volcano Research Association in 1927 and transferred over to the NPS as a museum and lecture hall to accommodate the growing numbers of visitors. It was later renamed the Jaggar Museum in honor of Dr. Thomas A. Jaggar, the renowned volcanologist who first introduced the notion of having a permanent geologic observatory and laboratory on the island. Dr. Jaggar managed the research program in the park for decades. Located nearby, the Uwekahuna seismograph was constructed by the USGS in 1948. In 1986, the USGS attached a large, new facility to the Volcano Observatory/Jaggar Museum building.

Despite the large addition, the Volcano Observatory/Jaggar Museum retains the architectural details, spatial layout, use, and relationship to the rest of the district's resources, and contributes to the district's integrity.

Volcano House
LCS ID: 58274

The split-level, wood frame Volcano House features a low-sloped, gabled roof with unenclosed eaves and 12-inch horizontal clapboard cladding. The windows are either fixed or double-hung sash. The western portion is two stories with a glass hyphen connecting a two-story addition at the far west end; the eastern portion is one level with a gable-front projection and a battered, exterior lava stone chimney near the main entry. The east end of the one story section features a large shed dormer with six double-hung windows. At the two-story section the roof is corrugated metal, while the one-story section roof has concrete asbestos tile. The front entry at the center of the north elevation features a pair of glazed wood doors and a projecting entry chamber; a large porte-cochere in front of this entry features battered lava stone piers and a pyramidal, corrugated metal-clad roof. The long, south elevation facing Kilauea Caldera features a row of large picture windows in sets of two or three, with louvered window panels with un-hewn timber posts between. (See photo Buildings and Structures #1.)

The building was built in 1941 after the previous Volcano House burned. The original building was located on the north side of Crater Rim Drive, but after it was destroyed, the owners chose to build the new building closer to the caldera on land they had long leased from the NPS. This site had been home to the volcano observatory and volcanologist's residence before those functions moved to Uwekahuna Bluff. The eight-room addition on the western end, connected to the rest of the hotel by a glass-walled hyphen, was built in 1948. Since then, the interior of the Volcano House has been modified extensively, although the original lobby, sitting room, and bar remain largely intact. On the exterior of the building, the porte-cochere was enlarged after the period of significance to accommodate large vehicles, significantly altering the character of the building's facade. Despite the changes to the building, however, the Volcano House represents an important element of the history of the Kilauea area and of Hawaii Volcanoes National Park, reflecting one of the earliest uses of the area by tourists. The hotel retains its historic associations and contributes to the rustic aesthetic of the headquarters village.

Thurston Lava Tube Comfort Station
LCS ID: 58272

This one-story restroom structure is rectangular in plan with corrugated metal cladding, a concrete foundation, and a corrugated metal-clad, gable-on-hip roof. Each corner features a large, battered lava stone pier. The structure is divided into two equal restroom sections with a small water storage/janitor's closet between. Each restroom section has a row of three nine-lite hopper windows on each side.

Constructed in 1933-1934, the comfort station was part of a Public Works Administration-funded project to improve the lava tube developed area shortly after it was acquired by the NPS. The detailed plans, received from the Branch of Plans and Design in late 1933, were of a design that blended standard Park Service Rustic design elements of the 1920s and 1930s with local Hawaiian design features. The project was begun in late 1933 and completed the following August.

The Thurston Lava Tube comfort station has changed little since it was constructed. Its design is characteristic of the style favored in Hawaii National Park in its early decades, revealing elements of both Park Service Rustic style and Hawaiian vernacular design. The comfort station retains its design elements, spatial layout, and relationship to other resources, and contributes to the district's integrity. (See photo Buildings and Structures #2.)

Whitney Seismograph Vault
LCS ID: 05841

The Whitney seismograph vault, located adjacent to the Volcano House on the caldera side, is an underground room of reinforced concrete walls, concrete floor, and concrete slab roof, measuring 18 feet by 17.5 feet on the inside. A number of concrete pillars protruding from the floor originally held instruments, and a wooden partition with glass panels separates the room into an instrument area and a viewing corridor. The structure is not visible from the outside, except for a large earth mound that was used to cover the structure in 1941 and a free-standing concrete pier.

The seismograph vault was originally constructed in 1912 and marked the beginning of the continuous and resident study by American scientists of the earth's volcanic and seismic activity at Kilauea and Mauna Loa volcanoes. The Hawaiian Volcano Observatory, a U.S. Government facility since 1917, used the vault from 1912 through 1961, when more sophisticated instrumentation made the seismometers and tilt meters it was designed to house obsolete.

The 1912 structure was only partially underground, with the concrete floor resting on a solid ledge of basalt 5 ½ feet below the original ground level. Concrete walls extended from the floor to the ground level, with the upper portion of the walls made of wood with windows. The free-standing, reinforced concrete pier above the vault was about 7 feet above the 1912 ground level was used for triangulation and camera stations. This pier originally protruded up through the porch of the volcano observatory building, also built in 1912.

The seismograph vault underwent substantial alterations in 1941, when the current Volcano House structure was built. The wooden walls and ceiling were replaced with concrete and the whole structure buried beneath an earth mound. The volcano observatory building was razed, but the concrete pier was retained. Today this pier functions as a visual marker for the vault, with a small interpretive sign explaining its function and significance.

The Whitney Seismograph Vault is an important connection to the tradition of scientific inquiry that is historically and currently such a significant part of the development of Kilauea. The structure was listed on the National Register of Historic Places in 1974, and continues to contribute to the Crater Rim Historic District. (See Buildings and Structures #3.)

1887 Marker (Marker with Benchmark)
LCS ID: 58399

Adjacent to Crater Rim Drive directly across from the original site of the Volcano House is a concrete monument consisting of a base approximately 5 feet wide, 8 feet long, and 3 feet high with a small concrete marker on top. Inscribed in the marker is "AUG 1887", and a USGS bench mark, dated 1912, is installed in the top of the monument.

The purpose of the monument is undocumented, but speculation can be made based on the monument's date and location. In the 1880s, an enterprising hotelier named Peter Lee constructed a road from Pahala west of Kilauea to the Volcano House, where it met the old road from Hilo. The best estimate for the date of completion of Peter Lee's Road comes from a Volcano House register entry dated October 1888 by a guest who claimed to be the first visitor to travel by means of a wheeled conveyance the entire way from an ocean port to the volcano. The register entry included a description of Peter Lee's new road. While the October 1888 date of the entry does not match the August 1887 date on the monument, it is possible that the road was finished earlier, or that the segment that finally connected the two roads was completed before the entire road was fit for travel. Either way, it is conceivable that the monument was installed to commemorate the completion of the Peter Lee's road at the point where it met the road from Hilo.

Today the monument is cracked and worn from exposure to the elements. Vegetation, including a substantial ohia lehua tree, is growing in the cracks and exacerbating the damage. Graffiti from visitors has been scratched into the monument as well. Despite this damage, the monument is an important link to the earliest development of Kilauea summit and one of the first completed segments of Crater Rim Drive. (See photo Buildings and Structures #4.)

Crater Rim Drive Guard Walls
LCS ID: 58395

Six segments of crenellated parapet guard walls were constructed by the park along Crater Rim Drive in 1933-1934; of these, five are intact. Guard walls can be found along current segments of Crater Rim Drive just east of the Volcano House and at Thurston Lava Tube. There are also guard walls on discontinued sections of the historic road at the Kilauea Iki overlook, Waldron Ledge overlook, and the Puu Puai overlook. The section constructed at Keanakakoi was destroyed and rebuilt with a different style of guard wall in the 1980s. All of these walls are of "Type 2" as designated in the 1928 standard detail sheet for guard rails produced by the NPS landscape division. These walls were originally 18 inches wide and 18 inches high in their crenels (low part of the wall). The crenels are 12 feet long and the merlons (high parts) are 6 inches above the crenels and 5 feet long with angled returns. Since their construction, the height of the walls has been reduced in places by the buildup of road surfacing material. The walls are roughly coursed with smooth, semi-hewn faces and recessed mortar joints.

The stone guard walls represent an important element of the NPS strategy for creating a unified aesthetic in its parks based on rustic architecture and naturalistic landscape design principles. Not only do they reflect the use of natural materials, skilled craftsmen, and rustic design characteristic of park design of the time, they also represent the effort to standardize park designs. The philosophy of unified aesthetic

design was developed together with the implementation of park master planning. The stone guard walls in Crater Rim Historic District reflect the larger movements of Park Service rustic style and park master planning.

Today the five remaining walls are largely intact. Some of the walls are lower than they were historically, either from settling into the soft organic soil, as is the case for portions of the Thurston Lava Tube parapet wall, or from successive buildup of road surfacing material. Along the guard wall near the Volcano House, the road surface has nearly reached the top of the wall, and some of the crenels have been filled in to raise the height above the road surface. Guard rails were installed in the walls at the overlooks at Kilauea Iki, Waldron Ledge, and Puu Puai. At Kilauea Iki and Waldron Ledge, these are metal rails with recycled plastic posts, and at Puu Puai the rail is all metal. These rails are mortared directly to the top of the guard wall. Despite these changes, the walls still display the design, materials, and workmanship that reveal their significance and their contribution to the historic district. (See photos Buildings and Structures #5 and #6.)

Thurston Lava Tube Guard Walls
LCS ID: 101790

Roughly-coursed lava stone curbing and walls were constructed along the pathways leading to the Thurston Lava Tube. Guard walls at Thurston Lava Tube occur in three places. Although little is known about the history of the walls around Thurston Lava Tube, estimates on the dates of construction can be surmised by the wall styles.

At the top of the trail near the parking lot, a low parapet wall with straight segments in an angled alignment lines the edge of the caldera. The crenellated wall has long, low crenels (the low part of the wall) and short, cubical merlons (the raised part) with vertical returns. Mounted to the top of this wall is a metal guard rail with recycled plastic posts. This wall at the top of the trail is not of Type 2, nor does it match any other standard wall type developed by the NPS. It is likely that this wall predates the acquisition of the property by the NPS in 1933. The wall is in fact very similar in style and materials to the guard wall built at Uwekahuna Bluff in 1927 when the museum was built, and so may date from that time as well. The metal rail with recycled plastic posts on the guard wall is a recent addition that changes the character of the wall, but the design, materials, and workmanship of the wall are still evident.

Halfway down the trail to the lava tube is a short section of parapet guard wall that matches the Type 2 guard walls built along Crater Rim Drive in 1933-1934. The wall is 44 feet long with 5-foot-long merlons with angled returns. Although park reports from the historic period do not mention the section of wall on the Thurston Lava Tube Trail, because it conforms to the Type 2 walls being built on the road, it is likely that it was constructed at the same time, i.e. 1934. This section of parapet wall was repaired and placed on a concrete foundation recently to correct damage from settling. While the overall workmanship of the repair is compatible with the historic feature, the wall was rebuilt on the concrete foundation higher than it had originally been constructed. This has resulted in a modest change in character, as the proportions of the wall have are different than they were historically. Nonetheless, the design and materials of the wall are intact and continue to reveal the historic character of the feature.

Finally, stone retaining walls line the trail at the entrance to the lava tube. These are low stone walls, roughly coursed, without crenellations. At one end of this wall, stone steps lead a short way up the hill against a stone cliff. The purpose of these steps is unknown. These wall may have been built before the NPS acquired the property in 1933, but it may also have been part of the area's improvements in the 1950s.

Both the upper section of wall, built in the 1920s, and the middle section, built in 1934, contribute to the historic district. Until the construction date of the lower section of wall at the lava tube entrance can be determined, its contribution to the historic district is unknown.

Volcano House Guard Wall
LCS ID: 58394

Extending approximately 200 feet along the south elevation of the Volcano House at the edge of the caldera is a lava rock retaining wall with black mortar. The rocks are roughly coursed with smooth faces. The wall is approximately 3 feet high on the caldera side and about 18 inches high on the walkway side.

This stone retaining wall was built about three years before the current Volcano House was built in 1941. It was meant to protect visitors from the caldera edge and to help aesthetically unify the Volcano House area with the rest of the park village.

Old Volcano House Site Retaining Wall
LCS ID: 461594

A mortared stone wall along Crater Rim Drive retains the terrace on which the Volcano House stood from 1877 to 1940. This retaining wall, which begins shortly after the intersection at the old hotel site and continues for approximately 120 feet, may date as far back as the late nineteenth century when the road was first constructed. The wall is indicated as "existing" in a plan drawing dated 1938.

Old Volcano House Site Overlook Walls
LCS ID: 568346

In 1938, stone walls were added to the front of the Volcano House, at its original site on the north side of Crater Rim Drive. The project included a stone retaining wall that extended from the existing retaining wall (noted above) for another 250 feet along the road in front of the Volcano House. In the center of this section of retaining wall, an overlook was built with a stairway that descended the face of the terrace to the road.

Several segments of this stone wall project remain today. At the top of the cut bank, directly opposite the Crater Rim Trail trailhead, is a short section of free-standing mortared stone wall with a gap in the middle. This was originally the overlook platform for the Volcano House. The gap in the wall once led to the stairway that descended the cut bank to the road and a crosswalk. At the road level are more remnants of this overlook and stairway structure. On the south side of the road is a short free-standing wall that matches the one at the top of the cut bank. This was likely related to the overlook and stairway structure.

The stone walls related to the old Volcano House site exhibit some wear and deterioration. Stones are loose or missing in places, and the mortar is cracked. Damage is particularly evident on the wall segment south of Crater Rim Drive. These wall segments reveal the spatial relationship between the old Volcano House site and the rest of the headquarters village. They also display the design, materials, and workmanship that characterized early development at Kilauea Caldera. As such, the wall remnants contribute to the historic district.

Rubble Retaining Walls in Fern Jungle
LCS ID: 568371

Along the section of Crater Rim Drive that passes through the fern jungle between Thurston Lava Tube and Puu Puai are a number of stone retaining walls. These are typically on the fill slope of the road bed and are largely obscured by moss, debris, and the dense vegetation that lines the roadway. The retaining walls most likely dated to between the beginning of the twentieth century to the 1920s, when incremental changes were made to the road's grade and alignment. Many of these walls are offset from the current road bed by several feet, reflecting former road alignments.

The walls range in size from 1 to 4 feet in height and are typically composed of roughly coursed rubble lava rocks. Most of the walls are mortared, although some are either dry-laid, or the mortar has decomposed to the point that they appear dry-laid.

The walls are decomposing with age and with intrusion from vegetation. While this does not appear to threaten the structural integrity of the road, it does threaten the historical integrity of the walls and their ability to help convey the significance of the district.

Mortared Lava Rock Embankment Facing
LCS ID: 568433

Along the Southwest Rift area of Crater Rim Drive west of Halemaumau, two sections of mortared stone embankments retain the road fill. These embankments are between 3 and 8 feet in height and sloped. The stone embankments were constructed in 1934 by the CCC to stabilize the new road and prevent erosion damage. One of the embankments is on the caldera side of the road, and the other is on the non-caldera side. The embankment on the non-caldera side – the larger of the two – has a culvert built into it to carry water from one side of the road to the other. The culvert is concrete with mortared stone headwalls on both the inlet and outlet.

A large, mortared rock-lined drainage ditch and embankment wall lines the non-caldera side of Crater Rim Drive just west of Halemaumau. The road here begins to climb back out of the caldera floor from Halemaumau to the Southwest Rift Zone, and is one of the steeper sections of the road. Like the stone embankments, the ditch was installed in 1934 by the CCC to mitigate damage to the new road segment from the heavy rains. The ditch is approximately 450 feet long. The ditch has several lined side chutes with 2-foot-high sidewalls on the uphill side of the main ditch. Asphalt covers some of the rock lining, and the chute outlet is beginning to crumble down the steep slope.

Stone-lined Ditches along Crater Rim Drive
LCS ID: 568377

The loose soils and frequent heavy rains around Kilauea Caldera created constant drainage and erosion problems. To mitigate erosion damage to Crater Rim Drive, several stone structures were constructed along the road to reinforce the roadway and channel rain runoff. The majority of these structures, which included stone-lined drainage ditches and stone drainage chutes near the headwalls of culverts, were built in conjunction with the Uwekahuna-Bird Park Road in 1933-1934. These structures can be found today along the north and west sides of the caldera from the Steaming Bluffs area to Keanakakoi.

Long discontinuous sections of mortared stone-lined drainage ditches extend on both sides of the road for about 4,000 feet beginning south of the Jaggar Museum parking lot. These were likely built in 1933-1934

when the Uwekahuna-Bird Park Road was constructed. The ditches include chute inlets and drainage chutes to channel water to culverts.

Stone Shoulders on Crater Rim Drive
LCS ID: 568389

Stone road shoulders were originally built on both sides of the road with flat, mortared lava flagstones. As the roadway was repaved and widened over the years, the stone shoulders were covered over on one side of the road or the other, so that today, the shoulder is discontinuous and is typically only visible on one side of the road at a time. Sections of stone road shoulders are visible along Crater Rim Drive for roughly 1,500 feet in the vicinity of the Steaming Bluffs parking area.

Cut Lava Rock Curbing
LCS ID: 568408

The parking lots at Halemaumau and the Jaggar Museum are edged with cut stone curbing. The curbing, installed around 1933 or 1934, is similar in style and construction to curbs used by the NPS in other parks at that time. The stones are rectangular, 8 inches wide, 12 inches high, and of varying lengths. As originally specified, the curb stones would have been buried 3 inches in the parking surface, with 9 inches showing above the parking lot. The stone were mortared end-to-end to create a continuous curb.

Today, some of the stones, especially in the Jaggar Museum parking lot, have come loose or have been displaced. In other places, successive paving, possibly in combination with settling, has obscured most of the lower portions of the stones, leaving only a few inches above the parking lot surface. This changes the character of the curb, reducing the massing and visual impact of the large curb stones.

Culverts

A number of culverts were built during the period of significance along Crater Rim Drive to convey water from one side of the road to the other. These vary somewhat in size, style, and materials, but all conform to the principles of rustic and naturalistic design, using native lava stone and remaining inconspicuous in the landscape. For the purposes of this CLI, the 16 extant contributing culverts along the road have been grouped together based on size, style, and period of construction.

Volcano Observatory Parking Lot Culverts
LCS ID: 568412

There are two culverts that span the entrances to the parking lot at the Jaggar Museum and Volcano Observatory. One collects runoff from a landscaped swale at the east end of the parking lot and runs it through a single iron pipe in a low arched rock headwall. The pipe runs under a wide gravel path at the intersection and empties into a swale on the same side of the road. The second culvert is at the southwest end of the parking lot and collects water through two side-by-side 12-inch iron pipes held in place by a low rock wall. These were likely built in conjunction with the construction of the parking lot in 1933 and contribute to the historic district.

Jaggar Museum Culvert
LCS ID: 568414

A single culvert outlet is located at the edge of the caldera rim just east of the Jaggar Museum near the observation platform. This is of the same style as the culverts along Crater Rim Drive, with a mortared stone headwall and corrugated metal pipe. The inlet of the culvert was not located. It is unknown when this culvert was constructed, but it is likely it was built either in conjunction with the museum in 1927 or with the road and parking lot in 1933.

Concrete Pipe Culverts
LCS ID: 568422

Several culverts of similar size and style occur along the section of Crater Rim Drive that was build as part of the Uwekahuna-Bird Park Road in 1933-1934. These medium-size culverts with lava stone headwalls on the inlet and outlet sides convey water across the road. The headwalls are typically 5 to 8 feet across and 2 to 3 feet high with 24-inch diameter culvert pipes. Eight of the culvert have are octagonal concrete pipes as specified in the plans for the road to prevent corrosion from volcanic gasses. One of the eight concrete pipe culverts is somewhat larger than the others, with a 3-feet-high headwall and angled wing walls on the inlet side. This culvert is part of a large mortared stone embankment in the Southwest Rift Zone.

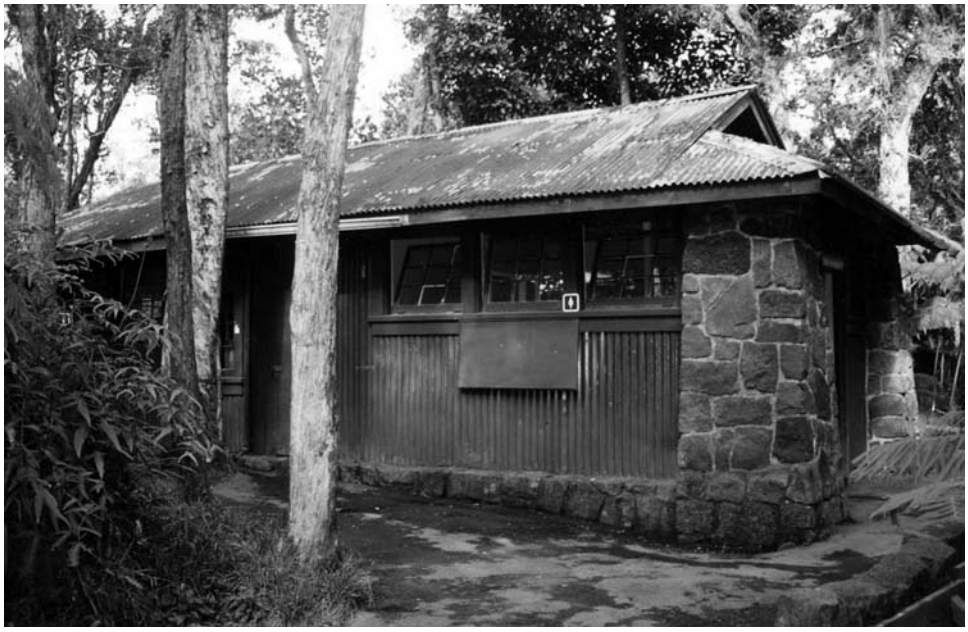
Corrugated Steel Pipe Culverts
LCS ID: 568424

In addition to the eight concrete pipe culverts, three culverts in the same section of Crater Rim Drive have corrugated steel pipes, and one has a combination of the two materials, with metal on the inlet side and concrete on the outlet side. These are of similar style and materials as the concrete pipe culverts and differ only in the pipe material.

Fern Jungle Culvert
LCS ID: 568427

One culvert can be found in the section of Crater Rim Drive that passes through the fern jungle area near Thurston Lava Tube. The culvert has double 12-inch metal pipes and a mortared stone headwall on the inlet and outlet sides. On the inlet side, a similar retaining wall holds back the cut slope about 2 feet from the face of the headwall, allowing a small space between the two for water to empty into. It is unknown when this culvert was built, but it almost certainly dates at least to the significant period.

Buildings and Structures #1. Contemporary photo of the Volcano House, built in 1941. (PWRO 2005)



Buildings and Structures #2. Contemporary photo of the Thurston Lava Tube comfort station, built in 1933. (Carey and Co. 2002)

Buildings and Structures #3. Contemporary photo of the concrete pillar at the Whitney Seismograph Vault. The vault is beneath the mound in the background. (PWRO 2005)

Buildings and Structures #4. The concrete marker, inscribed "AUG 1887", may be a monument marking the completion of Peter Lee's road from Pahala to the Volcano House. (PWRO 2005)

Buildings and Structures #5. The stone guard wall at Puu Puai parking lot was once along the Crater Rim Drive alignment. The metal guard rail was installed after the period of significance. (PWRO 2005)

Buildings and Structures #6. The guard wall at the Thurston Lava Tube parking lot is lower than when it was constructed, either from settling, a build-up of paving matrix, or a combination of both. Compare with photo History #7. (PWRO 2005)

Characteristic Feature	ID LCS Number	Type of Contribution
1877 Volcano House	05842	Contributing
Volcano Observatory and Jaggar Museum	58270	Contributing
Volcano House	58274	Contributing
Thurston Lava Tube Comfort Station	58272	Contributing
Whitney Seismograph Vault	5841	Contributing
1887 Marker (Marker with Benchmark)	58399	Contributing
Crater Rim Guard Walls	58395	Contributing
Thurston Lava Tube Guard Walls	101790	Contributing
Volcano House Guard Wall	58394	Contributing
Old Volcano House Site Retaining Wall	461594	Contributing
Old Volcano House Site Overlook Walls	568346	Contributing
Rubble Retaining Walls in Fern Jungle	568371	Contributing
Mortared Lava Rock Embankment Facing	568433	Contributing
Stone-lined Ditches along Crater Rim Drive	568377	Contributing
Stone Shoulders on Crater Rim Drive	568389	Contributing
Cut Lava Rock Curbing	568408	Contributing
Volcano Observatory Parking Lot Culverts	568412	Contributing
Jaggar Museum Culvert	568414	Contributing
Concrete Pipe Culverts	568422	Contributing
Corrugated Steel Pipe Culverts	568424	Contributing
Fern Jungle Culvert	568427	Contributing

Topography

For the purposes of the CLI, topography is defined as the three-dimensional configuration of the landscape surface characterized by features (such as slope and articulation) and orientation (such as elevation and solar aspect).

One of the tenets of the rustic and naturalistic design principles that guided park development in the 1920s and 1930s is the unobtrusiveness of human-built forms in the natural landscape. This was often achieved through careful planning of building sites and road alignments that minimized cut and fill and disturbance to the native forest and desert. Where manipulation of the ground plane was necessary, the earth cuts and fill slopes were treated in a way that blended them with the surrounding topography, often rendering them all but invisible to visitors. Rock cuts were carefully carved by skilled masons to appear natural, high banks were reinforced with stone retaining walls, and steep road shoulders were rounded and planted with native vegetation to prevent erosion. These techniques were employed at Hawaii Volcanoes National Park in the development of the Kilauea summit area, the construction of Crater Rim Drive, and the building of the signature trails, and are still apparent in the extant terraces, embankments, rock cuts, and other topographical features in the Crater Rim Historic District.

Crater Rim Drive

Many of the roads that would eventually make up Crater Rim Drive were constructed before Hawaii National Park was formed. The routes and alignments of these roads, as well as the techniques for constructing the roadbed, were based on economy and available labor and resources, rather than on a concerted design philosophy. The meager budgets and simple technologies of the early road projects led the road builders to choose routes that reduced the need for large-scale grading, a consequence in line with naturalistic road engineering principles. When the NPS expanded and upgraded the Kilauea road system in the 1920s and 1930s, they employed techniques that were being used in other national parks to create scenic park roads. On existing roads, the park made small adjustments to the alignment and profile of the road to ease curves and reduce grades. New roads were carefully sited to maximize the scenic experience of visitors while minimizing the impact on the landscape.

Crater Rim Drive takes visitors from the high north bluff, the highest point on the caldera rim at 4,080 feet, down to Halemaumau and back, a 445-foot change in elevation. Along the way, it crosses an undulating landscape of lava beds, the steep slopes of the caldera walls, and the alternating ridges and drainages of the fern jungle.

Cut and Fill

Due to the undulating volcanic landscape around Kilauea Caldera, the cross section of Crater Rim Drive tends to alternate between cut and fill. Where the road cuts through the lava or bedrock, the exposed rock cuts were shaped to give them a naturalistic appearance. Where the cut banks are soil, the shoulders were rounded by CCC crews and planted with native vegetation to prevent erosion. Cut-through sections typically have ditches on either side to convey water.

Filled-through sections of the road were built on raised roadbed of soil and cinder, with the fill banks often reinforced with riprap or mortared stone embankment facing. These fill-through sections are most prominent in the Southwest Rift area, where there is no vegetation to conceal the fill banks. The raised roadbed provides long views of the lava beds and the Kau desert. These areas contrast with the forested

areas west of headquarters and through the fern jungle, where the fill banks disappear in the dense vegetation, and the cross section of the road is not evident from the roadway.

There are few sections of the road characterized by a cross slope cut and fill. One such section, as Crater Rim Drive descends from the South West Rift area to Halemaumau, features a stone embankment and drainage ditch on the non-caldera side.

Many segments of Crater Rim Drive cross flat areas that required little cut and fill. These segments include the headquarters area, Steaming Bluff and Uwekahuna Bluff, and the lava beds in the floor of the caldera. The exception in the headquarters area is in front of the original Volcano House site, where portions of the bluff are retained on the non-caldera side with a stone retaining wall and exposed cuts through the lava.

Rock Cuts

Beyond mere utility, the rock cuts along Crater Rim Drive are featured design elements of the road that help define its character. Following the tenants of naturalistic landscape design, NPS landscape engineers who designed park roads in the 1920s and 1930s went to great lengths to make rock cuts appear natural. Skilled stone masons were often employed to carve the rock cuts into naturalistic forms, following the natural patterns of the indigenous rock.

This effort is evident in the rock cuts along Crater Rim Drive. Moss-covered rock cuts near Thurston Lava Tube seem to emerge from the lush fern jungle. In the open landscape of the Steaming Bluff, dark, low lava rock banks line the road, resembling natural rock outcroppings. The rock cuts vary in character depending on the nature of the lava through which they cut, often revealing the unusual forms created when the lava flowed. In places, they appear to be made of large stone blocks, while in others, layers of folded lava created cavities that were exposed when the cut was made. Some of the exposed rock cuts are combined with dry-stacked stone walls, irregularly coursed with lava stones, which blend nearly indiscernibly with the rock cuts. As a whole, the rock cuts are a strongly unifying element of Crater Rim Drive.

Retaining Walls

Where embankments were too steep to support themselves, they were reinforced with stone. Along Crater Rim Drive these stone reinforcements typically occur on the fill slopes and are of three types: cobble riprap embankments, mortared stone embankments, and dry-stacked stone retaining walls. The riprap and mortared stone embankments are found along the section of Crater Rim Drive that was constructed in 1933 as part of the Uwekahuna-Bird Park road. This section crosses the undulating topography of the Southwest Rift zone and is characterized by long segments of raised roadbed on fill. The hand-laid cobble riprap embankments extend discontinuously for nearly a half mile just west of Uwekahuna Bluff. The mortared stone embankments were laid by the CCC in 1934 to repair damage the road had sustained from heavy rains in the months after its construction. These embankment facings are smooth and un-coursed. Asphalt from subsequent road paving has covered the stone embankments in places.

The dry-stacked retaining walls occur mostly in the fern jungle section around Thurston Lava Tube. Due to dense vegetation, these are not visible from the road. One of the largest walls is just south of the lava tube parking area on the caldera side of the road. The roughly-coursed stone wall is 8.5 feet high at its tallest. The date of construction of this (and other walls in the area) may date as far back as the

completion of the Halemaumau Road in 1908. In 1933, a parapet guard wall was constructed along the top of the retaining wall. Other smaller sections of retaining wall occur throughout the fern jungle. Some of these, hidden several feet from the current road in the dense vegetation, reveal earlier alignments of the road.

Road Traces

As the alignment of Crater Rim Drive was adjusted throughout the 1920s, traces of the former roadbed were left alongside the new road. These can be seen today in the near-road topography in the fern jungle and in the Southwest Rift area. In the fern jungle, these road traces are often accompanied by fragments of retaining wall and reveal where the sharp curves of the early road were eased. In the Southwest Rift area, the road traces are from the first road between Halemaumau and Uwekahuna built in 1931.

Topography #1. Rock cuts in the dark volcanic rock west of the headquarters site look like natural rock outcroppings. (PWRO 2005)

Topography #2. Rock cuts near Kilauea Iki reveal unique volcanic formations. (PWRO 2005)

Topography #3. The terrace that held the Volcano House before 1940 is retained by a combination of stone retaining wall and natural rock cut. (PWRO 2005)

Topography #4. Contemporary photo showing grading on the Kilauea Iki Trail, built by the CCC in 1934. Stone riprap and dry-stacked retaining walls were used to support the steep slopes and switchback corners. (PWRO 2005)

Vegetation

Vegetation that may contribute to the historic district includes individual plants and plant communities, whether indigenous or introduced to the landscape. 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.

Vegetation within the Crater Rim Historic District is a major character-defining feature. This includes native vegetation communities that create strikingly different landscapes from one point on the caldera to another, as well as planted landscaping plants that lend a distinctly local aesthetic to the developed areas. Early park planners gave a great deal of thought to the role vegetation was to play in the park landscape. Master Plans from the 1930s included planting plans for the area in front of the Volcano House and for the employee housing area. Native plant species were favored in these plans, and NPS landscape architects cautioned against the use of exotic ornamentals. Natural plant communities were also given consideration in the planning of the park. The dense forests around Thurston Lava Tube were considered a park attraction in themselves, and the original route of the road to the caldera floor was chosen in part because it passed through what was called the "fern jungle." When suggestions were made in the 1920s to widen some of the curves along the road to create a better driving experience, Superintendent Boles insisted that it be done in such a way that preserved as much of the natural forest along the road as possible. These efforts created a park that was unique in its local Hawaiian character, while adhering to established NPS design philosophies. The patterns of vegetation within Crater Rim Historic District

continue to reveal the historic character and design principles that characterized the park during the period of significance.

Natural Vegetation Patterns

Much of the vegetation in the historic district is a result of carefully preserved natural communities. These include the closed ohia and hapuu tree fern forest on the east side of the caldera and the open ohia woodland and dry shrubland in the north and northwest portions, as well as the barren lava beds, which have a distinct character in their lack of vegetation. The majority of the areas outside of the headquarters area, including Uwekahuna Bluff, Thurston Lava Tube, and the various lookouts around the caldera, rely on the natural vegetation to establish the landscape character. These areas contain little in the way of identifiably intentional planting schemes.

The natural vegetation communities of Kilauea Caldera are discussed in further detail in the Natural Systems and Features section above.

Planted Vegetation

Designed and intentionally planted vegetation within the Crater Rim Historic District is for the most part limited to the headquarters area. Early planting plans called for the use of native vegetation, including ohi'a lehua (Metrosideros polymorpha), koa (Acacia koa), and hapuu tree ferns (Cibotium sp.), along the road and around the buildings in the headquarters area. Under the NPS landscape division's direction, indigenous and endemic plants such as: aalii (Dodonaea viscosa), hapuu fern, and amau fern (Sadleria cyatheoides) were the principal plants used as ornamentals. Additionally, several specimen kopiko trees (Psychotria hawaiiensis) were transplanted from the Bird Park area to the Administration building area in 1935. M.S. Sager, the NPS landscape architect orchestrating the landscape design, noted that the "planting project is interesting experimentally as the writer believes that many of the native shrubs of the park have never been transplanted, or certainly not used before in ornamental planting." (Landscape Architects Reports April and May 1934). Images from the late 1930s show that many of the native plants that were transplanted throughout the district, were thriving in their new location. Today, aalii, hapuu fern, and amau fern are well established and appear as though they have always grown there.

Existing designed vegetation in the headquarters area and around the Volcano House tends to be massed in beds that create a lush, tropical look. The vegetation occurs in three main types of arrangement: 1) widely spaced ohia lehua planted on lawn; 2) widely spaced ohia lehua, koa, sandalwood (Santalum sp.), or other native trees with a low-lying understory consisting of ginger, ti (Cordyline fruticosa), and hapuu and amau fern; and 3) dense native vegetation whose understory and canopy create a uniform and impenetrable wall comprised of ohia lehua, koa, sandalwood, hapuu, amau, ti, etc, as well as exotics such as kahili ginger. These types of planting beds are arranged informally around buildings, flanking pathways and roads, and on the edge of developed areas. Small areas of open lawn of Bermuda grass (Cynodon dactylon) are also located throughout the area interspersed with the beds of native vegetation. Please see diagram Spatial Organization #1 for general character and arrangement of vegetation around the Volcano House.

Overall, the existing vegetation patterns and plant palette is still representative of the patterns and palette that date to the period of significance. Despite some additions of exotic ornamentals and invasive weeds, native vegetation such as dense ohia forest and ornamental natives still dominate the landscape. Because the historic vegetation patterns and palette are largely intact, the vegetation landscape characteristic contributes to the setting of the Crater Rim Historic District.

Exotic Vegetation

In 1930, when Thomas Vint (Chief Landscape Architect of the NPS Western Field Office) made his first visit to Hawaii Volcanoes to begin master planning for the park, he recognized the park's problem with invasive vegetation such as nasturtiums and blackberry and encouraged a vigorous removal plan. In his trip report, he also commented on the inappropriateness of exotic ornamentals he observed around the Volcano House. He recommended that the Volcano House gardeners should slowly replace the ornamental exotics with indigenous or endemic plants. Furthermore, he encouraged the park and its residents to use only native plants in their gardening. He explained, "This question of exotic plants is one that is particularly serious in Hawai'i Park. It is one that will not be solved in a short time. It should be considered a permanent problem, and one which every park employee is responsible for." (Landscape Architect Report, February and March 1930).

Despite Vint's position on exotic vegetation in the park, exotic ornamentals were planted throughout the administration and employee housing area and around the Volcano House. Exotic species included: camellia, hydrangea, azalea (Rhododendron sp.), fuchsia, rose (rosa), iris, and Norfolk pine (Araucaria heterophylla); as well as exotic invasives (or potential invasives) such as lacevine (Polygonum sp.), avocado, agave, Hilo holly (Ardisia crenata), English ivy (Hedera helix), sweet pea (Lathyrus odoratus), spiderplant (Chlorophytum cosmosus), giant reed (Arundo donax), daisy fleabane (Erigeron karvinskianus), pearl flower (Heterocaentron subtriplenervum), common horehound (Marrubrium vulgare), monstera (Monstera deliciosa), Mexican elderberry (Sambucus mexicana), dwarf octopus tree (Schefflera arboricola), roving sailor (Saxifraga stolonifera), Tibouchina sp., and Morella faya. Careful management of vegetation and the avoidance of exotic vegetation in planting designs in recent decades have reduced the presence of these species within the district.

Today, exotic ornamental species such as camellia, hydrangea, azalea, iris, fuchsia, and rose are largely confined to the residential and administration areas, still appearing as foundation or specimen plantings around the employee quarters. Outside of the employee quarters area, exotics are found in planting beds and native forest areas near the Volcano House and throughout the district, typically tucked in amongst the native vegetation. Both fire tree (Morella faya) and Kahili ginger are highly invasive species and displace native rain forest species at the Kilauea Summit area. Except where it is being actively controlled, fire tree dominates the rain forest between Thurston Lava Tube and Keanakakoi. Kahili ginger is the most conspicuous understory species in the rainforest along roads and trails between the Volcano House, Thurston Lava Tube, and the caldera floor.

No mention of the invasive or potentially invasive plants listed above is made in the landscape architecture reports from the 1930s. None of these species were identified as part of the planting palette during the period of significance and it is highly unlikely that the NPS landscape architects (Vint and Sager), who espoused the use of native vegetation and control of invasive species, would have suggested using these species as ornamentals. Because it is unlikely that these existing invasive or potentially invasive exotics date to the period of significance, they do not contribute to the historic district.

Vegetation #1. Photo of the Kilauea Iki Trail demonstrates how natural vegetation communities, in this case ohia lehua and hapuu forest, are used in developed areas to create a distinctive character. (PWRO 2005)

Vegetation #2. The open ohia lehua and dry shrub vegetation at Uwekahuna Bluff establish the character at the Jaggar Museum. (PWRO 2005)

Vegetation #3. The barren rock-strewn caldera floor near Halemaumau is notable for its lack of significant vegetation. (PWRO 2005)

Vegetation #4. A combination of naturally occurring and planted vegetation composes the landscape around the Volcano House. (PWRO 2005)

Vegetation #5. A small number of native foundation plants adorn the front of the Volcano House. (PWRO 2005)

Vegetation #6. Behind the Volcano House, ohia lehua trees are planted over Bermuda grass lawn, creating an open character. (PWRO 2005)

Views and Vistas

One of the primary attractions of Hawaii Volcanoes National Park has always been the spectacular views. Sweeping views of the caldera can be enjoyed from numerous places around its rim. Mauna Loa rises above the open Kau desert on the north and west side of the caldera. Crater Rim Drive was carefully designed to showcase the natural features of the park, skirting close to the rim to offer frequent peeks over its precipice. In places, vegetation was cleared and overlooks constructed, complete with parking areas and guard walls, to provide discrete vistas. In other places, the wide open landscape allowed views of nearly 360 degrees. As Crater Rim Drive developed and evolved to meet new needs, views of the caldera, Mauna Loa, volcanic features, and the park's unique vegetation were carefully protected to ensure an uncompromised visitor experience. Today, the views and vistas in the Crater Rim Historic District continue to define the visitor experience and help to preserve the district's historic character.

For the purpose of this CLI, the views and vistas around Kilauea Caldera can be categorized into two groups: discrete views and vistas that were specifically designed and should be carefully managed to preserve the design intent, and broader, general views that are available by virtue of the open landscape and dramatic terrain and that contribute generally to the setting of the district.

Discrete, Designed Views

Volcano House (see photo Views and Vistas #1)
The view from the caldera rim behind the Volcano House is the first glimpse most visitors get of Kilauea. As visitors emerge from the back door of the Volcano House, they are greeted with a wide view of Kilauea Caldera. Halemaumau is visible, as is Steaming Bluff and Uwekahuna Bluff. Rather than a

vertical drop, the caldera wall here is a gradual forested slope. Because of this, the view of the blackened, desolate caldera floor is framed from below by the lush, green Hawaiian vegetation.

The view is accessible from a long walkway that runs the length of the Volcano House. A stone guard wall that follows the path predates the Volcano House, when the site was the location of the volcano observatory and volcanologist's residence. As it is the most accessible from the Volcano House and headquarters area, this has always been one of the most important views in the park.

Because of the lush vegetation in this area and the sloped caldera wall behind the guard wall, there is the potential for the views from behind the Volcano House to be obscured by vegetation. The character of the views here should be defined by low, framing vegetation, but should not be allowed to become overgrown or obscured.

Uwekahuna Bluff
Uwekahuna Bluff was chosen as the site for the volcano observatory and museum because of its commanding view of Kilauea Caldera and Halemaumau Crater. The bluff is the highest point on the caldera rim and overlooks a vertical drop of several hundred feet. An observation area and stone guard wall was built on the caldera's edge when the museum was constructed in 1927. The view from the back part of this viewing area is sweeping and unobstructed.

Halemaumau
From a large parking lot, a short trail crosses the lava beds to an observation platform, where visitors can peer into Halemaumau Crater. There is no vegetation here, and the view is only obscured by the steam and volcanic gasses issuing from the many cracks in the lava.

In the early days of tourism at Kilauea, Halemaumau was the summit's premier attraction. The crater was in a period of activity in the late nineteenth and early twentieth centuries. The bottom of the crater was filled with a lava lake and frequent flares and fountains delighted viewers. The first crater road from Volcano House was built expressly to offer visitors a close-up view of the "fire pit." The road terminated a mere 150 feet from the edge of the crater. In the 1920s, volcanic activity in Halemaumau diminished as the magma receded underground. As the floor of the crater sank, the walls collapsed, increasing the size of the crater and destroying part of the road and viewing area. By the early 1930s, the parking area had been rebuilt to accommodate over 500 cars. Although volcanic activity in the crater has abated since then, Halemaumau continues to be a popular destination for park visitors.

Keanakakoi
Although one of the smaller craters on Kilauea's summit, Keanakakoi is nonetheless an impressive site. The route for the first Crater Road was chosen specifically so that it would pass Keanakakoi and Kilauea Iki craters. Crater Rim Drive passes within 50 feet of the edge of Keanakakoi, where a turnout parking area provides an opportunity to stop and view the crater. The view into the crater from the turnout is open and unobstructed by vegetation.

Thurston Lava Tube (see photo Views and Vistas #2)
The view into the Thurston Lava Tube crater contrasts sharply with many of the other views around Kilauea summit. Whereas the active craters, including Halemaumau, Keanakakoi, Kilauea Iki, and Kilauea Caldera itself are black and barren, the Thurston crater is lush and green. From the parking area, visitors walk a short distance to an observation platform with stone guard walls. Here, views of the small crater are filtered through tree trunks and fern fronds. The viewpoint is above a canopy of tree ferns, which give the impression of a soft green carpet below.

Kilauea Iki (see photo Views and Vistas #3)
Like Keanakakoi, Kilauea Iki was one of the sites the original Crater Road showcased as it wound its way down from the Volcano House to Halemaumau. Dormant at the time, the crater was nonetheless an impressive site. Crater Road passed very close to the crater rim, providing an opportunity to create an overlook turnout, where drivers could stop to view the crater. In 1959, Kilauea Iki awoke and spewed lava, ash, and cinders from its southwest wall. Throngs came to view the eruption, overwhelming the meager parking area and prompting an expansion and realignment of the parking lot and road. When the eruption was over, a new cinder mound, called Puu Puai, rose above the crater wall where the eruption occurred, and cracked, steaming lava covered the crater floor. Today this is a popular stop along Crater Rim Drive. Views from the overlook are framed by vegetation, but are generally open in character.

Waldron Ledge
Waldron Ledge was another important vista point along Crater Rim Drive, providing a view of Kilauea Caldera over a vertical caldera wall of 400 feet. The road segment along Waldron Ledge was closed in the 1980s due to earthquake damage, but the overlook was still accessible on foot. Today, portions of the damaged road, as well as the overlook, are part of the Crater Rim Trail and continue to allow visitors to access the view at Waldron Ledge.

General Views

Mauna Loa
As Crater Rim Drive emerges from the forest onto Steaming Bluff, the first views of Mauna Loa open up. Mauna Loa is a broad, shield-shaped volcanic dome that looms over the northwest horizon. Although often obscured by clouds, on clear days Mauna Loa is clearly visible over the low scrub and grassland along the bluff.

Steaming Bluff
From the steam vents parking area, a short trail leads to the edge of Steaming Bluff, where it intersects with Crater Rim Trail. The drop from here to the caldera floor is vertical, and the view is unobstructed.

Views and Vistas #1. Views of the caldera from behind the Volcano House are framed by ferns and low vegetation.

Views and Vistas #2. The view from the overlook at Thurston Lava Tube of the lush, fern-filled crater is filtered through tree trunks and fern fronds. (PWRO 2005)

Views and Vistas #3. The view from the Kilauea Iki overlook is characteristic of views around the caldera that are framed by vegetation. (PWRO 2005)

Characteristic Feature	ID LCS Number	Type of Contribution
Uwekahuna Bluff View		Contributing
Halemaumau View		Contributing
Keanakakoi View		Contributing
Thurston Lava Tube View		Contributing
Kilauea Iki View		Contributing
Waldron Ledge View		Contributing

Land Use

Land use is defined as the principal activities that have formed, shaped, or organized the landscape as a result of human activity. The primary uses in and around Kilauea Caldera have historically fallen into the categories of visitor recreation and site-seeing, lodging, and scientific research. These continue to be the primary land uses within the Crater Rim Historic District and contribute to its integrity.

Visitor Services
The development around Kilauea Caldera was guided foremost by the desire to bring visitors in close contact with the volcano. This led to the first roads to the summit and to the establishment of the Volcano House in the nineteenth century to allow people to stay at the caldera overnight. Since then, nearly all of the development in the district has been for the accommodation and circulation of visitors amongst the caldera's many natural attractions.

Lodging
The first structure for lodging visitors to the volcano was built in 1846. Since then, the Volcano House has operated nearly continuously, providing accommodations on the caldera rim. When Hawaii National Park was formed in 1916, the land that the Volcano House occupied was incorporated into the park and leased back to the hotel company as a private concession. For nearly 100 years, the various incarnations of the hotel occupied the original site, just north of the main road through the park. In 1941, after a fire destroyed the hotel, it relocated to the south side of the road on the precipice of the caldera itself. Today, the Volcano House, still operated by a private concessionaire, continues to provide lodging to park visitors.

Circulation
Crater Rim Drive and its various associated elements, including parking lots, turnouts, overlooks, and side roads, have served to move people around the caldera rim area, allowing them to see such sites as Thurston Lava Tube, Kilauea Iki, Keanakakoi, Halemaumau, and other natural attractions. These elements continue to serve this purpose, playing an important role in the organization and the function of the district.

Education
In 1927, Hawaiian Volcano Research Association constructed the volcano observatory and museum at Uwekahuna Bluff. The museum was later renamed the Thomas A. Jaggar Museum in honor of the volcanologist who led the research at Kilauea from 1912 to 1940. The Jaggar Museum continues to be the center of educational services in the park.

Scientific Research
In 1912, the first permanent structure for the study of Kilauea's volcanic activity was constructed on the northeast rim near the Volcano House by Thomas Jaggar, then a professor of volcanology at MIT. The early observatory consisted of a seismograph vault dug into the soil to the bedrock and a wooden observatory building. The observatory served as the center of scientific research for Kilauea and Mauna Loa from its inception in 1912 until 1940, when the facilities (all but the seismograph vault) were razed to make room for the new Volcano House. At the end of 1941, the observatory moved into its new building on the other side of Crater Rim Drive, conducting its research here for seven years. In 1948, the NPS took over the new observatory building for a visitor center, moving the scientific functions, by now under the management of the United States Geological Survey (USGS) to the facility at Uwekahuna Bluff.

The buildings at Uwekahuna Bluff were constructed by the Hawaiian Volcano Research Association in 1927 as a museum and naturalist office in order to provide a point of interface between the scientific work and the visiting public. When the USGS was evicted from their building near the Volcano House, the primary scientific functions moved to Uwekahuna, sharing the space with the museum. The new site was better suited for scientific research, as it has clear views of both Halemaumau and Mauna Loa, and it was further away from the congested headquarters area. The observatory has remained at Uwekahuna Bluff since, moving into a large addition constructed in 1985.

Archeological Sites

For the purpose of the CLI, archeological sites refer to the location of ruins, traces, or deposited artifacts in the landscape and are evidenced by the presence of either surface or subsurface features. By identifying archeological resources within the historic district, we are not suggesting that the property is significant under criterion D (the potential to yield information), but that the archeological resources contribute to the integrity of the property by helping to convey the design or association of the district.

Headquarters Area

In 1994, an archeological survey of the headquarters area by park staff and reported by the Western Archeological Conservation Center (WACC) identified three sites and three features: the Steam Bath House (50-10-52-19, 456); the Ginger Patch Dump (50-10-52-19, 457); and the HQ Crack Dump (50-10-52-19, 458). The features include what is suspected to be a foundation for the chemistry laboratory, the remains of water tank supports under the water shed, and a road trace.

The steam bath house consists of a concrete foundation partitioned into six rooms, and is accessed by mortared stone stairs and a concrete path.. A metal heater tube is in the steam crack nearby. It is unknown when the steam bath was constructed, but it is depicted on historic maps from 1931 and 1963.

The Ginger Patch Dump refers to a debris dump, so named because it was discovered in the process of clearing a patch of ginger plants in 1992. Artifacts were collected by the park archeologist Laura Schuster and are accessioned into park collections under number 355. The site is now under fill and a site record was compiled utilizing documentation by Schuster in 1992 and the location plotted by Schuster and Park Superintendent Jim Martin in 1994.

The HQ Crack Dump is about 10 meters wide and at least 20 meters deep in places; a moderate amount of steam is still emitted. This crack was reportedly a main dump for the Volcano House and in years past park employees would climb into the crack to collect bottles. A Model T car is also reportedly located in the crack. The crack is heavily overgrown with vegetation and is too dangerous to enter without proper equipment and training.

Feature 1 is probably the chemistry laboratory foundation which consists of only a cement slab foundation, 26 feet by 33 feet 8 inches, with a drain pipe in the northwest corner and one cement block with a utility pole in it. The pole measures 4 inches by 5 inches and is 4 feet tall with two iron I-beams attached to the sides. The lab was built in 1925 and razed in 1959. Ground visibility was good and it is likely that artifacts exist.

Feature 2 is the remains of water tank supports under the water shed, portions of which were constructed in 1927. The area once contained a 400,000 gallon tank which collapsed in 1946. Eleven 10,000 gallon redwood water tanks were “moved from the CCC camp and relocated on the concrete base of the former 400,000 gallon tank” in 1950 or 1951. Today all that is extant are the sides of mortared stone foundations which were paved over by maintenance crews in 1994; the foundations are still intact under the asphalt.

Feature 3 is a road trace that extends along the north edge of the headquarters area. This trace, visible both in topography and vegetation patterns, appears on the 1938 master plan as “bridle path around the crater.”

Uwekahuna-Bird Park Road Trace (see photos Archeological Sites #1 and #2)

The trace of the Uwekahuna-Bird Park road constructed in 1933 and discontinued in 1961 is still visible in the desert north of Uwekahuna Bluff. The trace extends for 2,000 feet from Crater Rim Drive to Mamalahoa Highway (and for a short distance north of the highway, although the portion north of the highway is outside of the boundary of the historic district and will be addressed at a future time). At the junction with Crater Rim Drive, denser vegetation was planted to hide the trace from the road, but beyond this clump of ohia lehua trees and shrubs, the road is plainly visible. The roadbed is raised in places and stones line the trace on both sides. In the dry conditions and compacted soil, vegetation has been slow to obscure the road. Current vegetation on the roadbed consists of grasses and ohelo, and the straight road trace is obvious from its lack of trees. Four culverts are extant along the road trace. These are octagonal concrete pipe culverts with mortared stone headwalls on both inlet and outlet. One culvert has a substantial dry-stacked stone retaining wall above it, holding the high filled roadbed. Because the road no longer functions as it was intended, and because there is currently no access to or visibility of the road trace, it is being managed as an archeological site rather than a contributing structure or circulation feature.

Halemaumau Vaults (see photos Archeological Sites #3 and #4)

Two concrete vault located near the Halemaumau parking lot are likely the remnants of restrooms that were located there in the 1930s. The vaults are approximately 4 feet by 10 feet and 6 feet deep. Remnants of timber framing are in and near the vaults.

Archeological Sites #1. Although not visible from Crater Rim Drive, the Uwekahuna-Bird Park Road trace is evident from the topography and vegetation patterns. (PWRO 2005)

Archeological Sites #2. Several culverts, including this one with a dry-stacked retaining wall above it, remain on the abandoned Uwekahuna-Bird Park Road trace. (PWRO 2005)

Archeological Sites #3. One of two concrete vaults cut into the lava near the Halemaumau parking lot. These vaults were likely the two comfort stations built sometime in the 1920s or 1930s. (PWRO 2005)

Archeological Sites #4. The shelter and two comfort stations at Halemaumau, c. 1934 (no longer extant). (HAVO Landscape Architects Reports)

Management Information

Descriptive and Geographic Information

Historic Name: Kilauea Crater, Hawaii National Park
Current Name: Crater Rim Historic District, Hawaii Volcanoes National Park
Management Unit:
Tract Numbers:
State and County: Hawaii, Hawaii
Size (acres): 5,000

Boundary UTM

Source	Type	Datum	Zone	Easting	Northing
GPS Uncorrected	Area	NAD 83	11	258422	2147851
GPS Uncorrected	Area	NAD 83	11	259625	2150014
GPS Uncorrected	Area	NAD 83	11	261469	2151126
GPS Uncorrected	Area	NAD 83	11	265612	2149329
GPS Uncorrected	Area	NAD 83	11	265750	2147562
GPS Uncorrected	Area	NAD 83	11	260463	2145444
GPS Uncorrected	Area	NAD 83	11	259138	2146221

National Register Information

National Register Documentation:

Explanatory Narrative:
Carey and Company, a historical architecture firm based out of San Francisco, prepared the Kilauea Administration and Employee Housing Historic District nomination, the Crater Rim Drive Historic District nomination, and the multiple property: Hawaii National Park Planning ad Development through World War II nomination. All of these documents are currently (2005) on park review.

National Register Eligibility:

Explanatory Narrative:

Date of eligibility Determination:

National Register Classification: District

Significance Level: State

Contributing/Individual: Individual

Significance Criteria: C—Inventory unit embodies distinctive characteristics of type/period/method of construction; or represents work of master; or possesses high artistic values; or represents significant/distinguishable entity whose components lack individual distinction.

A—Inventory Unit is associated with events that have made a significant contribution to the broad patterns of our history.

Period of Significance

Time Period: 1916-1942
Historic Context Theme: Transforming the Environment
Historic Context Subtheme: Conservation of Natural Resources
Historic Context Facet: The Great Depression and Conservation

Time Period: 1916-1942
Historic Context Theme: Expressing Cultural Values
Historic Context Subtheme: Landscape Architecture
Historic Context Facet: The 1930s: Era of Public Works

Area of Significance

Category: Conservation
Priority: 1

Category: Landscape Architecture
Priority: 2

Category: Architecture
Priority: 2

National Historic Landmark Information

No

World Heritage Site Information

Hawaii Volcanoes National Park was named a World Heritage Site by UNESCO in 1987.

Cultural Landscape Type and Use

Cultural Landscape Type: Designed Landscape

Current and Historic Use/Function:

Use/Function Category: Landscape
Use/Function: Natural Area - Other

Use/Function Category:	Recreation/Culture
Use/Function:	Outdoor Recreation
Use/Function Category:	Recreation/Culture
Use/Function:	Museum
Use/Function Category:	Education
Use/Function:	Research Facility

Ethnographic Information

Ethnographic Survey Conducted: Yes:

An ethnographic study was conducted by Charles M. Langlas, Cultural Anthropologist with the University of Hawaii at Hilo. The results of the study were completed in 2003: Native Hawaiian Use of Hawaii Volcanoes National Park: A Historical and Ethnographic Overview. The purpose of this study was to document traditional Native Hawaiian use of resources on Park lands, both in the past and the present and to examine the relationship between that resource use and Park management. Perhaps most important to mention is that Native Hawaiians view the entire Kilauea Caldera as sacred and as the "origin of new land." Hawaiians give thanks to Kilauea and the goddess Pele (the maker of land) in sites all over the caldera's rim. Additionally, Native Hawaiian's access areas throughout the park, including the Kilauea headquarters area to collect plants for religious purposes. Aalii and liko lehua (the leaf buds of the ohia tree) are two plants that are particularly sought after and available in this area. In addition to plant gathering, the area in front of the 1877 Volcano House—located just outside of the historic district boundaries—is often used for religious rituals.

Adjacent Lands Information

Do Adjacent Lands Contribute: No

General Management Information

Management Category: Should be preserved and maintained
Management Category Date: November 27, 2005
Explanatory Narrative: Crater Rim Historic District meets all of the following criteria: the property meets National Register criteria; the property is compatible with the park's legislated significance; and the property has continuing or potential purpose that is appropriate to its traditional use or function.

Condition Assessment and Impacts

The criteria for determining the condition of landscapes is consistent with the Resource Management Plan Guideline definitions (1994) and is decided with the concurrence of park management. Cultural landscape conditions are defined as follows:

Good: indicates the landscape shows no clear evidence of major negative disturbance and deterioration by natural and/or human forces. The landscape's cultural and natural values are as well preserved as can be expected under the given environmental conditions. No immediate corrective action is required to maintain its current condition.

Fair: indicates the landscape shows clear evidence of minor disturbances and deterioration by natural and/or human forces, and some degree of corrective action is needed within 3-5 years to prevent further harm to its cultural and/or natural values. If left to continue without the appropriate corrective action, the cumulative effect of the deterioration of many of the character-defining elements will cause the landscape to degrade to a poor condition.

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

Undetermined: not enough information available to make an evaluation.

Condition Assessment: Good
Assessment Date: 06/21/2005
Date Recorded: 03/01/2006
Park Management Concurrence:
Level of Impact Severity: low

Stabilization Measures:

Stabilization for features within Crater Rim Historic District include the management of invasive vegetation, the management of views being obscured by vegetation, the removal of intrusive vegetation in or near stone structures, and the repair of stone structures that have experienced structural deterioration.

Impact:

Type of Impact:	Vegetation/Invasive Plants
Internal/External:	Internal
Description:	Several species of invasive plants are found throughout the historic district, particularly in the areas around the Volcano House and along the edges of roads and trails. Invasive vegetation management programs are ongoing in an effort to reduce the impacts of these species on the natural and historic landscape.

Impact:

Type of Impact:	Vegetation/Invasive Plants
Internal/External:	Internal
Description:	Views along the caldera rim in the eastern portion of the caldera, where vegetation is lush and grows rapidly, are being obscured or threatened by encroaching vegetation. Currently, only the view from the Kilauea Iki overlook is in need of clearing to stabilize the historic view, but views at the Volcano House, Waldron Ledge, and Thurston Lava Tube should also be monitored for encroaching vegetation.

Impact:

Type of Impact:	Structural Deterioration
Internal/External:	Internal
Description:	Stone structures throughout the district, including the parapet guard walls on Crater Rim Drive, the walls from the old Volcano House, stone retaining walls along Crater Rim Drive in the fern jungle, and stone structures at Thurston Lava Tube, are showing signs of deterioration, cracking, and instability. These structures should be repaired using appropriate techniques and materials. Repairs should include removal of intrusive non-historic vegetation, reclaiming and reusing displaced stones, and repointing mortar. Replacement stones, if required should be compatible with existing stones.

Impact:

Type of Impact:	Vegetation/Invasive Plants
Internal/External:	Internal
Description:	Stone structures throughout the district are threatened by intrusive vegetation growing in or near the structures. Tree roots, if left unchecked, can pry stones out of stone walls and other structures. Features that were identified as being impacted by vegetation include the stone retaining walls along Crater Rim Drive in the fern jungle, stone wall around Thurston Lava Tube, stone walls at the old Volcano House site, and the 1887

	marker near the old Volcano House site. Non-historic intrusive vegetation should be removed, taking care not to further damage stone work.
Impact:	
Type of Impact:	Erosion
Internal/External:	Internal
Description:	Kilauea Iki Trail was severely damaged by erosion resulting from heavy rains in November 2001. Some emergency repairs were done to make it safe for visitor use immediately following the rains. However, these repairs were temporary and long-term repairs are needed to stabilize the resources.

Agreements, Legal Interest, and Access

Management Agreement:	None
Explanatory Narrative:	
NPS Legal Interest:	Fee Simple
Explanatory Narrative:	
Public Access:	Unrestricted

Treatment

Approved Treatment: Preservation

Approved Treatment Document: General Management Plan

Document Date: 1985

Explanatory Narrative:
The current approved treatment of "preservation" was determined in the 1985 General management Plan which states, "Preserve the sites and structural remains of the early Hawaiian period and historical period in cooperation with local Hawaiian interests."

Approved Treatment Completed: No

Approved Treatment Cost

LCS Structure Approved Treatment Cost: None
Landscape Approved Treatment Cost: None
Cost Date:
Level of Estimate:
Cost Estimate:
Explanatory Description:

Stabilization Costs

LCS Structure Stabilization Cost: $292,020

LCS Stabilization Measures	PMIS Number	Estimated Cost
Repair historic stonework throughout the district	43679	$ 155,000.00
Repair Kilauea Iki Trail	86876	$ 87,020.00
Repair leaking roof in Jaggar Museum	85270	$ 50,000.00

Landscape Stabilization Costs: $154,775

Landscape Stabilization Measures	PMIS Number	Estimated Cost
Restore historic views and remove hazardous trees and exotic vegetation around the Volcano House.	117775	$ 10,000.00
Clear vegetation to restore historic views at Kilauea Iki overlook.	121238	$ 18,096.00

Cost Date: 06/01/2006
Level of Estimate: C – Similar Facilities
Cost Estimator: Support Office
Explanatory Description:

The LCS and Landscape stabilization cost estimates were obtained from PMIS statements that cover the stabilization and repair of historic structures as well as vegetation clearing to maintain historic views and control historically inappropriate exotic vegetation.

Appendix

Bibliography

Allen, Thomas J. "Superintendent's Monthly Reports." 1929.

"The Approaches to the Volcano: What They Are and What They Should Be." Honolulu Pacific Commercial Advertiser. December 11, 1888.

Bevens, Darcy, ed. On the Rim of Kilauea: Exerpts from the Volcano House Register, 1865-1955. Hawaii National Park, Hawaii: Hawaii Natural History Association. 1992.

Carr, Ethan. Wilderness by Design: Landscape Architecture and the National Park Service. Lincoln: University of Nebraska Press. 1998.

Ellis, William. Journal of William Ellis: Narrative of a Tour of Hawaii, or Owhyhee; with Remarks on the History, Traditions, Manners, Customs and Language of the Inhabitants of the Sandwich Islands. Honolulu: Hawaiian Gazette Co. 1917.

Fagerlund, Gunnar. "The Exotic Plants of Hawai'i National Park." Natural History Bulletin No. 10. Department of Interior. 62 pp. 1947.

Good, Albert H. Park and Recreation Structures. U.S. Department of the Interior, National Park Service. 1938.

Jackson, Frances. An Administrative History of Hawai'i Volcanoes National Park [&] Haleakala National Park. Honolulu: Unpublished NPS document. 1971.

Kittredge, Frank A. Report on Hawaii National Park Road Program. U.S. Department of Agriculture, Bureau of Public Roads. Honolulu: Unpublished NPS document. 1925.

Langlas, Charles M. Native Hawaiian Use of Hawaii Volcanoes National Park: A Historical and Ethnographic Overview. University of Hawaii at Hilo. 2003.

McClelland, Linda Flint. Building the National Parks. Baltimore: Johns Hopkins University Press. 1998.

National Register of Historic Places Multiple Property Documentation Form for Historic Park Landscapes in National and State Parks. Washington, D.C.: U.S. Department of the Interior, National Park Service. 1995.

Olson, Gunder E. The Story of the Volcano House. Hilo: The Hilo Tribune Herald. 1941.

Paige, John C. The Civilian Conservation Corps and the National Park Service, 1933-1942: An Administrative History. Washington, DC: U.S. Department of the Interior, National Park Service. 1985.

Sandler, Rob. Architecture in Hawai'i: A Chronological Survey. Honolulu: Mutual Publishing. c. 1993.

Twain, Mark. "The Great Volcano of Kilauea". Sacramento Daily Union. November 16. 1866.

Tweed, William C., Laura E. Soulliere and Henry G. Law. National Park Service Rustic Architecture: 1916-1942. Western Regional Office: U.S. Department of the Interior, National Park Service. 1977.

Supplemental Information

Title: Existing Conditions Site Map (attached)
Description: Composite site map showing the existing conditions in 2005.

Title: 1916 Site Map (attached)
Description: Site Map showing the Kilauea Caldera Rim area at the beginning of the period of significance in 1916.

Title: 1942 Site Map (attached)
Description: Site Map showing the Kilauea Caldera Rim area at the end of the period of significance in 1942.

Title: Contributing Features Map #1 (attached)
Description: Map showing the sections of Crater Rim Drive that still reflect the alignment of the historic period.

Title: Contributing Features Map #2 (attached)
Description: Map showing the contributing buildings and structures in the Crater Rim Historic District.

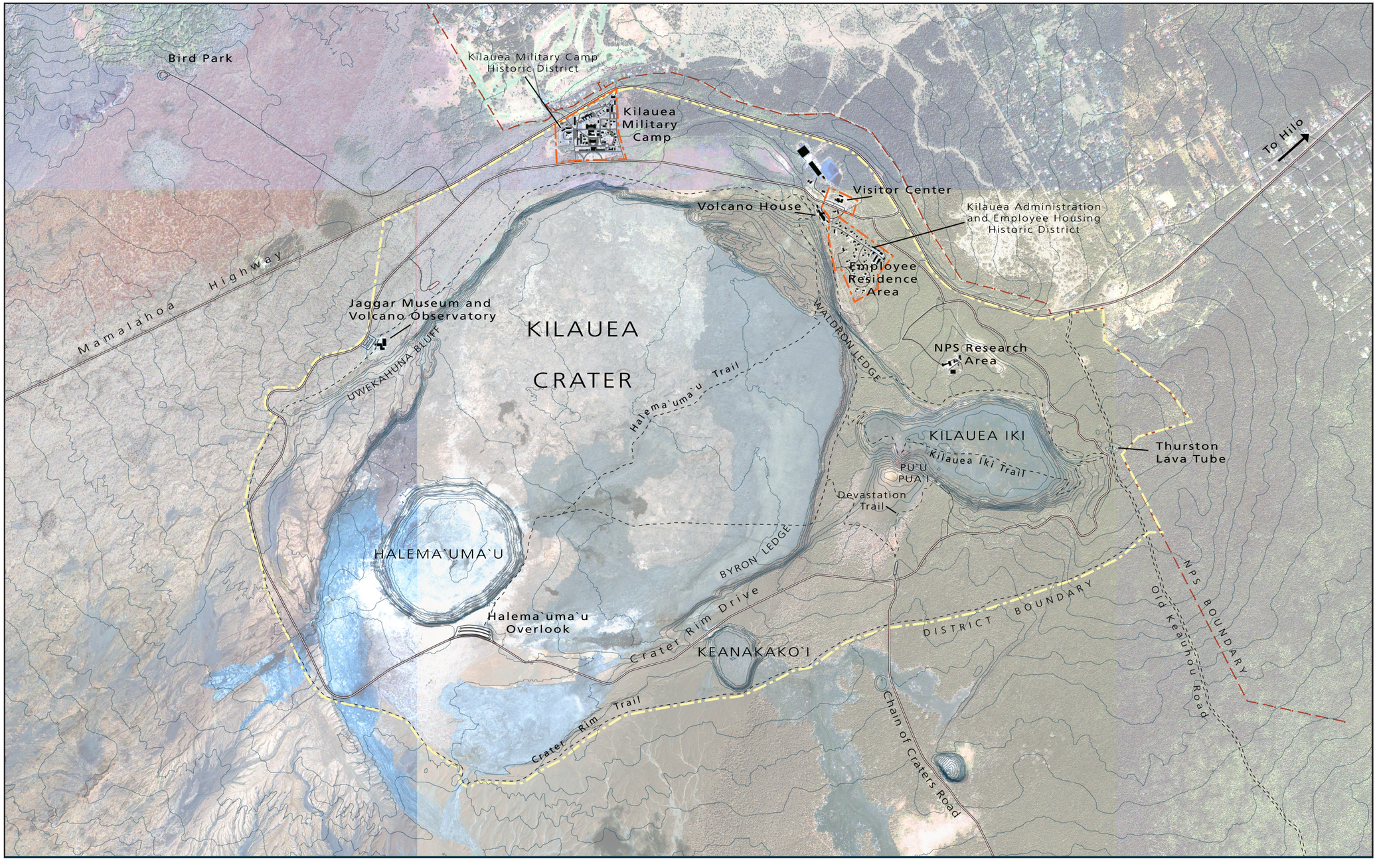
Title: Hawaii National Park Master Plans, 1931-1941.
Description: Master plans for the headquarters area and for the general development of the caldera updated annually from 1931-1941. Copies located at the Denver Service Center (DSC).

Title: Kilauea Historic Maps, 1912-1963
Description: Various historic maps of the Kilauea summit area, including USGS maps and NPS plans. Copies located at the DSC.

Title: Draft Crater Rim Drive Historic Road Inventory
Description: Prepared by Architectural Resources Group (ARG). Inventory of historic and non-historic resources along Crater Rim Drive. Draft currently on review.

Title: Hawaii Volcanoes National Park Roads
Description: Historic American Engineering Record (HAER) report on the roads in Hawaii Volcanoes National Park, including Crater Rim Drive.

Title:	Hawaii Volcanoes National Park Headquarter Area Archeological Survey
Description:	Prepared by the Western Archeological Conservation Center (WACC) in 1994; survey of the archeological resources in the Kilauea headquarter area.



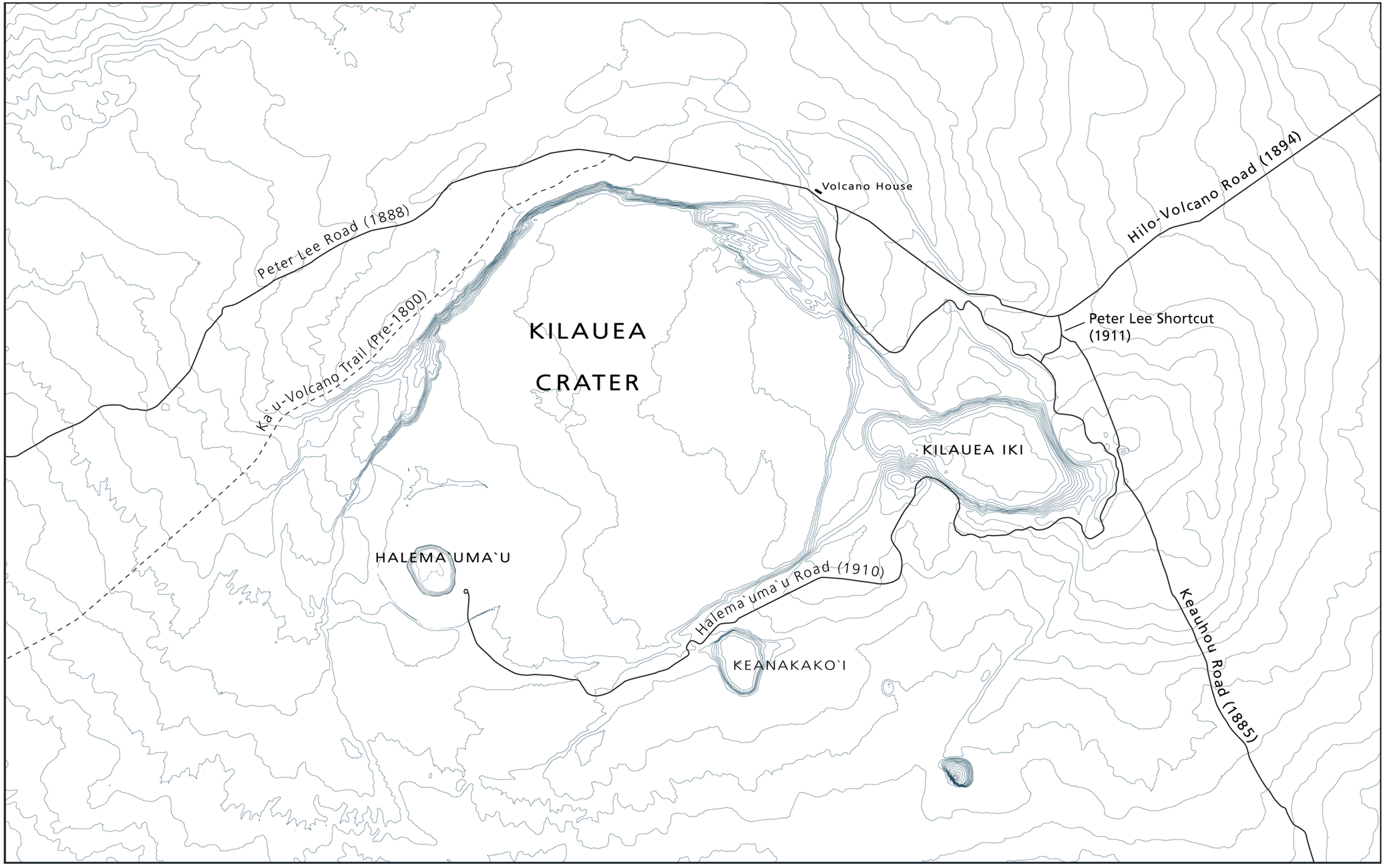
SUPPLEMENTAL INFORMATION

Existing Conditions Site Map

Composite site map showing the existing conditions in 2005.

Cultural Landscapes Inventory
Crater Rim Historic District 2006

National Park Service
Pacific West Region
Cultural Landscape Program



SUPPLEMENTAL INFORMATION

1916 Site Map

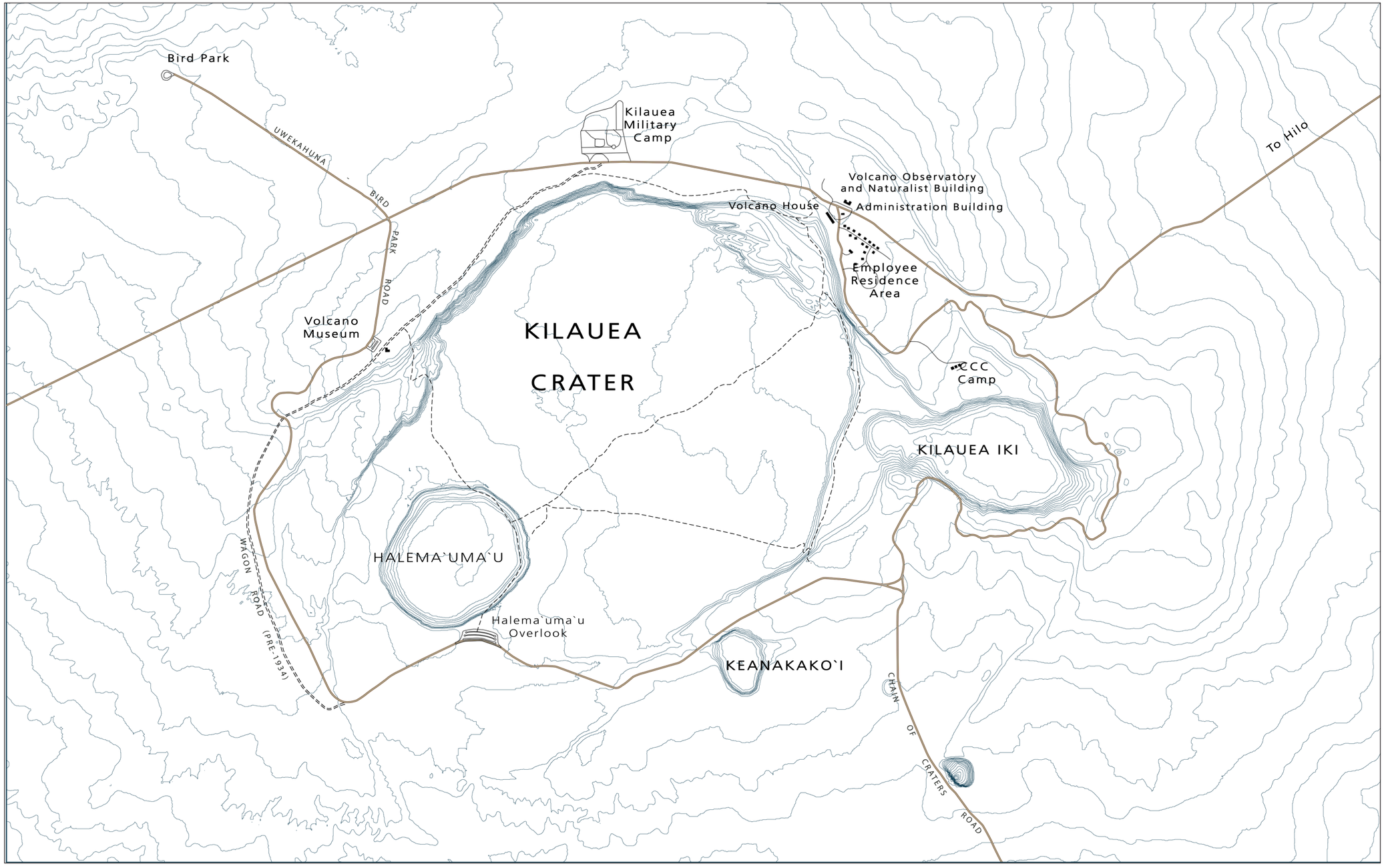
Site map showing the Kilauea Crater Rim area at the beginning of the period of significance in 1916.

north

0 2,000 4,000 Feet

Cultural Landscapes Inventory
Crater Rim Historic District 2006

National Park Service
Pacific West Region
Cultural Landscape Program



SUPPLEMENTAL INFORMATION

1942 Site Map

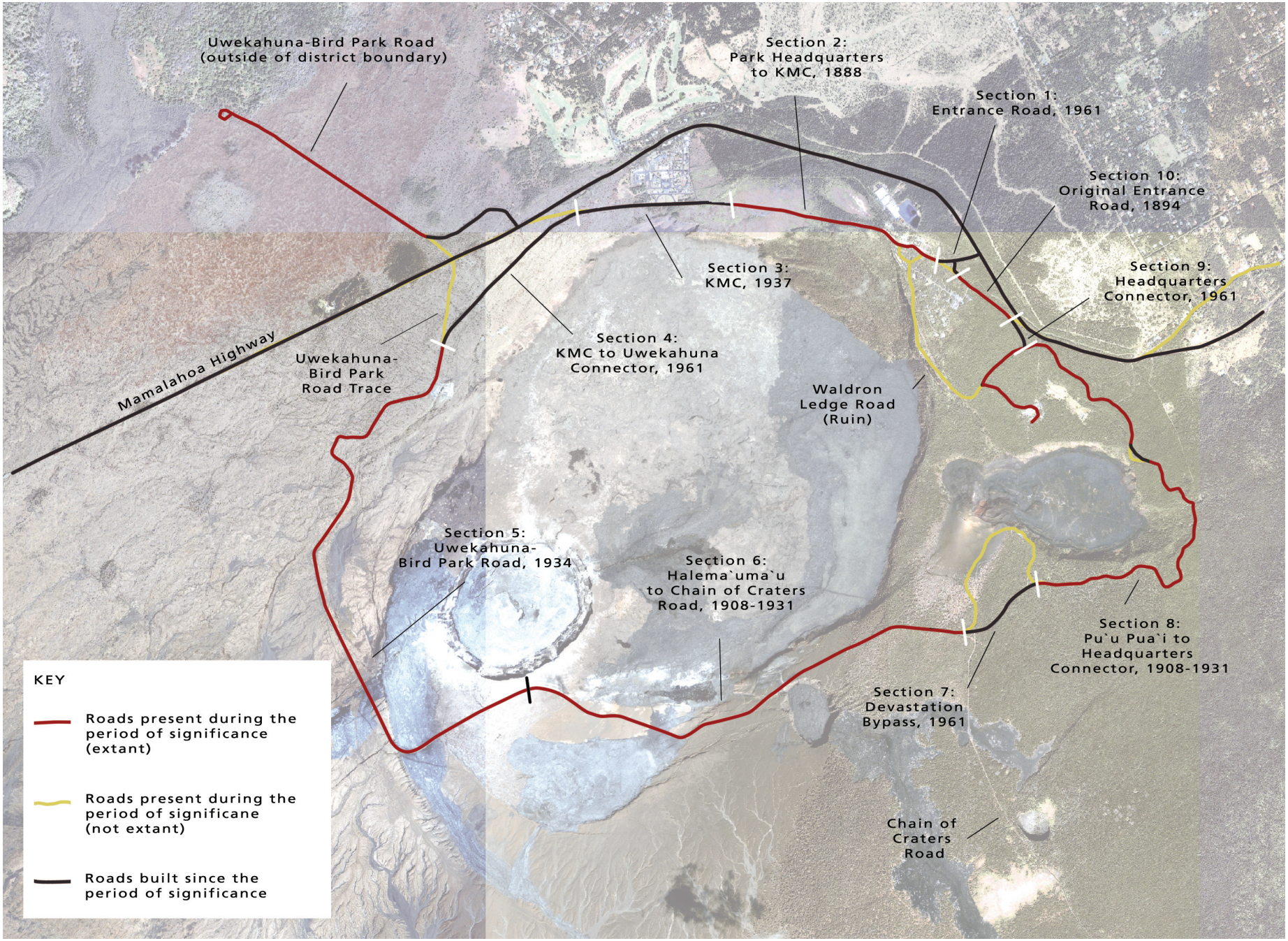
Site map showing the Kilauea Crater Rim area at the end of the period of significance in 1942.

north

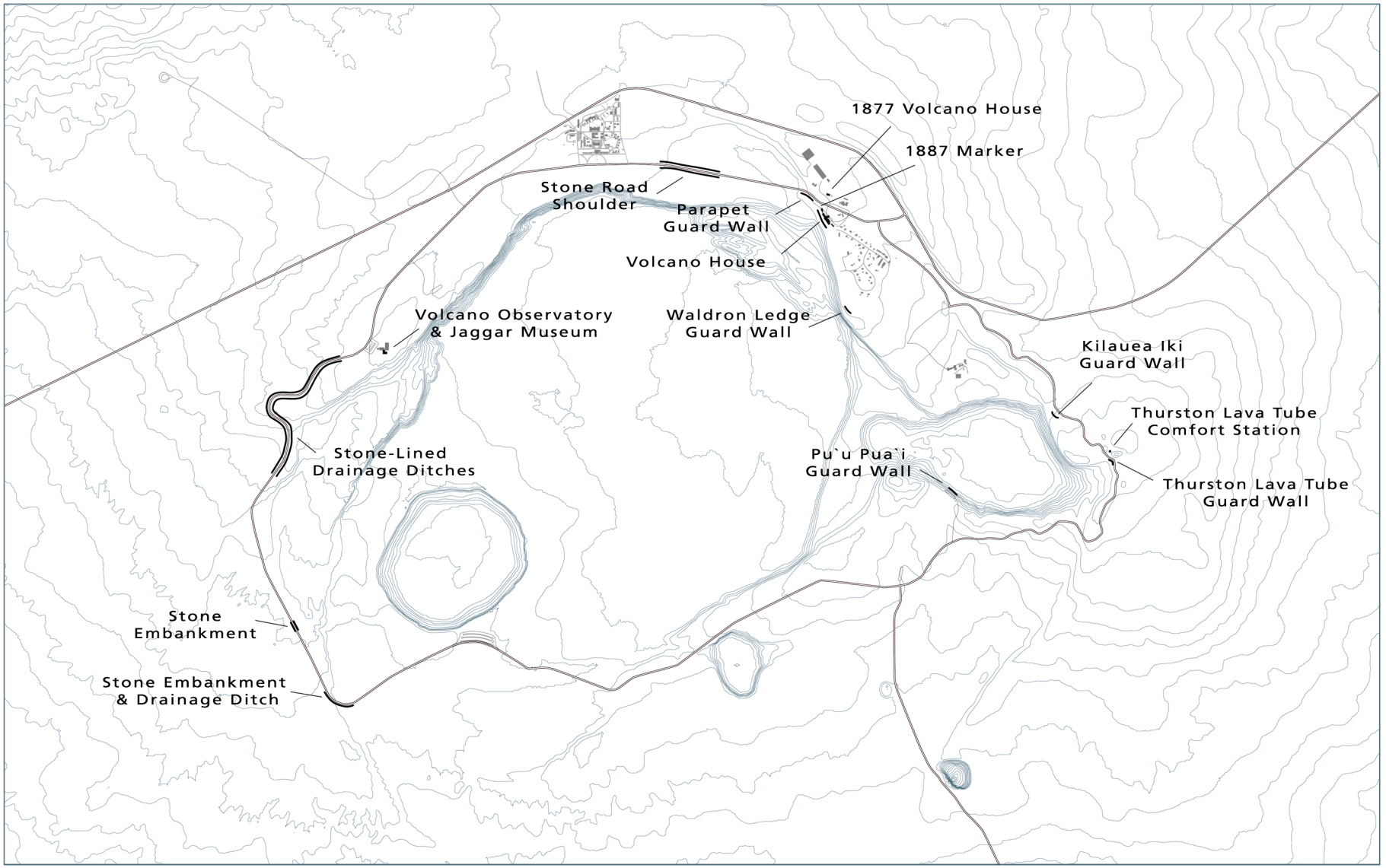
0 2,000 4,000 Feet

Cultural Landscapes Inventory
Crater Rim Historic District 2006

National Park Service
Pacific West Region
Cultural Landscape Program



Contributing Features Map #1. Diagram showing the sections of Crater Rim Drive that still reflect the alignment of the historic period.



Contributing Features Map #2. Map of Crater Rim Historic District showing contributing buildings and structures.

The museum building at Uwekahuna was built in 1927 by a private organization and has served as the educational center for the park ever since. The parking lot, with a capacity of 150 cars, was planned and constructed in conjunction with the Uwekahuna-Bird Park road in the early 1930s. From here, the road circles around the west side of the Caldera, passes through the Southwest Rift Zone, and then descends into the caldera floor to Halemaumau. Long, paved turnouts along the Southwest Rift section were constructed after the historic period to accommodate visitors viewing the fissures. Numerous stone features in this section date to the 1930s, including stone culverts and embankment facing and stone drainage ditches. Toward the bottom of the slope into the caldera, a large stone drainage ditch and stone wall constructed by the CCC in 1934 directs storm runoff along the side of the road.

Section 6: Halemaumau to Chain of Craters Road, 1908-1931
Mile 5.4-7.5

This section of road has survived from the first road from Volcano House to Halemaumau in 1908 with few realignments. The large parking lot was constructed around 1932 in response to large volumes of visitors during Halemaumau eruptions in the 1920s. Other portions of the road were realigned in the 1920s to eliminate sharp curves or steep grades. The road here has long open vistas and gently curves through lava flows, some from the nineteenth and early twentieth centuries and some as recent as 1974.

Past the Halemaumau parking lot, the road begins to climb the gradual slope of the caldera's south wall. There are two non-historic paved turnouts on the caldera side that offer views back toward Halemaumau and Uwekahuna, and a third turnout that notes the 1982 lava flow nearby. The road then passes Keanakakoi, one of the smaller craters on Kilauea's summit, where turnouts on either side allows motorists to stop and view the caldera. A stone parapet guard wall constructed in 1933 was destroyed during volcanic activity in the 1980s and replaced with a new stone guard wall.

Beyond Keanakakoi, Crater Rim Drive passes through an area that was buried in pumice cinder in the 1959-1960 eruption of Kilauea Iki. While part of the original Crater Road was buried and/or destroyed beyond repair, the portion just east of Keanakakoi was excavated and repaired in its original alignment. The sides of the road here are mounds of cinder, slowly recovering with a regenerating ohia forest.

Segment 7: Devastation Bypass, 1961
Mile 7.5-7.9

This section was constructed in the early 1960s to bypass the part of the road destroyed in the 1959 Kilauea Iki eruption. The character here is similar to the previous portion, characterized by roadside cinder embankments and dry ohia forest. The intersection with Chain of Craters Road was reconfigured when the new section was constructed, replacing the original wye intersection with a simple four-leg intersection. Opposite the Chain of Craters Road is part of the original road, which is today the parking area for the Devastation Trail interpretive area. The other end of the destroyed road is also a parking area now, providing access to Puu Puai, the spatter cone formed in the eruption. These parking areas were configured in the 1960s.

Section 8: Puu Puai to Headquarters Connector, 1908-1931
Mile 7.9-10.1

This section was also part of the original 1908 road from Volcano House to Halemaumau. The route was chosen, over one that would have approached Halemaumau from the west, in part because of the scenic

value of the fern forest, the Twin Craters (Thurston Lava Tube), Kilauea Iki, and Keanakakoi. The early road, which wound through the dense fern jungle as it skirted the craters contained a number of sharp curves. After Hawaii National Park was formed in 1916, the park made efforts to bring the road to NPS standards, without undue intrusion on the native fern forest. The result was incremental changes to the grade and alignment of the road throughout the 1920s to widen sharp curves and reduce grades. Evidence of these realignments is still present in the form of topography and stone retaining walls now hidden in the dense roadside forest.

By the early 1930s, the road met NPS standards as a pleasant and scenic route around the caldera. In 1933, rustic stone parapet guard walls were built along Thurston Lava Tube and Kilauea Iki to improve driver safety, as well as the scenic value of the road. The long parapet wall at Thurston Lava Tube was built over an earlier 12-foot dry-stacked stone retaining wall.

This section of Crater Rim Drive contains two parking areas, both of which have been reconfigured some since the historic period. The Thurston Lava Tube parking area was most recently expanded in the early 1960s, adding parking for cars and busses. The new parking was carefully designed to retain existing lava rock walls and rock cuts. At Kilauea Iki, the original road alignment became the parking area, while the travel lane was realigned to the inside of the curve. This increased parking for the overlook and separated it from the road, while also reducing the curve for motorists. The parapet guard walls built in 1933 were retained in both overlook redesigns.

Section 9: Headquarters Connector, 1961
Mile 10.1-10.3

This short section was constructed in the 1961 Mamalahoa bypass project, connecting the original entrance road to the loop road, creating a bypass of Waldron Ledge. This was used as an alternate route around Waldron Ledge until the 1980s, when earthquake damage closed the Waldron Ledge section of Crater Rim Drive and making the connector and bypass route the main road.

Section 10: Original Entrance Road, 1894
Mile 10.3-10.5

Originally part of the road from Hilo to the Volcano House, the original entrance road dates to the early pre-park years. The alignment appears to have changed little since the 1894 government road, and probably dates well before that to the early foot trail to the volcano. In 1961, this section of road was bypassed with the new Mamalahoa Highway and a new park entrance was constructed. The original entrance road became an alternate route around Waldron Ledge until the earthquakes in the 1980s closed Waldron Ledge.

Other Roads

Research Center Road
LCS ID: 461598

Between park headquarters and Kilauea Iki, Crater Rim Drive comes to a tee intersection with a stop sign. Crater Rim Drive continues to the left, while the right road leads to the park research center. The research center was originally the second CCC camp, built in 1938. Today it consists of a number of offices and labs for natural and cultural resources in the park.

The road, beginning at the stop sign, was part of Crater Rim Drive until 1981 when earthquakes diverted traffic from Waldron Ledge to the headquarters connector. After a quarter mile, the road turns left off of the old Crater Rim Drive alignment and onto the access road to the research center. A traffic barrier blocks access to the closed portion of Crater Rim Drive. The research center access road continues for another quarter mile to the buildings at the research center.

Because the research center road has not had the same upgrades as other portions of Crater Rim Drive since at least the 1970s, it retains a character closer to that of the historic period.

Waldron Ledge Road (Ruin)
LCS ID: 501686

This segment of Crater Rim Drive from the entrance to the employee residential area to the research center was closed due to earthquake damage in the 1980s. Originally part of the road from the Volcano House to Halemaumau built in 1908, it wound along the edge of Waldron Ledge, providing some of the best views of the caldera from the road. Vegetation was cleared along the ledge in 1918 to improve the views, and an overlook was built to allow motorists to stop. In 1933, a stone parapet guard wall was built along the overlook to improve safety and scenic quality. In the 1970s, the road along Waldron Ledge was realigned to move it further away from the caldera rim. The original overlook was retained and enlarged as a parking area. In 1981, large earth cracks undermined the road and caused its closure between the overlook and the research center and traffic was diverted to the headquarters connector bypass. Traffic was still allowed to reach the Waldron Ledge overlook from the headquarters area. Then, in 1983, more earthquakes shook large portions of the road into the caldera below. A 450-foot section of the road between the overlook and the research center was lost, and portions near the residential area were severely damaged. This permanently closed the Waldron Ledge section of the road to vehicles, making the bypass permanent.

Today, portions of the road, as well as the overlook at Waldron Ledge, are accessible by foot. Part of the Crater Rim Trail, the damaged road dramatically demonstrates how volcanic activity continues to change the landscape.

Parking Areas

Steam Vents
The parking area for the Steam Vents, located on the Steaming Bluff just west of the Volcano House, was paved in the 1960s, but was probably an informal gravel area well before that. The parking area consists of a short loop access road and a small parking area accommodating about a dozen cars. There are no significant stone curbs or walls associated with this parking area. The parking area provides access to large steam vents that emit near-constant billows of steam directly adjacent to the access loop, as well as to the Steaming Bluff overlook.

Jaggar Museum and Volcano Observatory
The parking lot for the museum on Uwekahuna Bluff was built in 1933-1934 with the construction of the Uwekahuna-Bird Park Road. The parking lot features a symmetrical design with raised medians edged with 8 inch by 12 inch stone curbs. The lot has changed little since its construction, aside from bus parking, sidewalk, and retaining wall along the southwest side. At the lot's east end is a drainage ditch, landscaped with boulders and native shrubs, that delivers water into the roadside drainage through a small

single iron pipe culvert with a lava rock headwall. At the lot's west end is a crosswalk, double iron pipe culvert, and a wide paved gutter that drains into a slightly recessed area of pavement. The culverts appear to have been built at the same time as the parking lot.

The stone curb has been damaged in places, with some of the large curbstones misplaced. Successive paving of the parking lot has also reduced the height of the curbs from their original 9 inches above the parking surface.

Halemaumau
The large parking lot at Halemaumau was built around 1932 in response to large volumes of visitors during Halemaumau eruptions in the 1920s. Like the parking lot at Uwekahuna, the Halemaumau lot is symmetrical with curbed medians. The curbstones are the same type as those at Uwekahuna: 9 inch by 12 inch cut stone. On the eastern end of the parking lot, stone edging reveals a road alignment that predates the construction of the current lot. The lot has not changed significantly since it was constructed the 1930s.

Thurston Lava Tube
The parking lot at Thurston Lava Tube was configured in 1962, but still retains features from earlier configuration. The new design of the parking area was careful to preserve the existing stone walls and rock cuts that helped define the character of the road through the fern jungle area. Parking is currently on both sides of the road, with perpendicular auto parking on the west side of the road and parallel bus parking on the east side of the road.

Volcano House
When the Volcano House relocated to the south side of Crater Rim Drive after it burned in 1940, the roads and parking around it and the park headquarters were reconfigured. Where there had been a wye intersection with the headquarters building (today the Ohia Wing) at the apex, a new loop access road was constructed, circling behind the headquarters building. This access road brought traffic to a drop-off area and porte-cochere in front of the Volcano House. Limited parking for the Volcano House was provide along this access road. In the 1950s, the parking was expanded along the access road, adding angled spaces on either side of the hotel's porte-cochere. The porte-cochere was also enlarged to accommodate tour busses.

Trails

Halemaumau Trail
LCS ID: 58432

One of the earliest trails at Kilauea was a footpath that descended from the Volcano House and struck out directly across the lava beds to Halemaumau Crater. Before the roads were built, this was the primary access to the "fire pit." Early Volcano House register entries refer to the trail as "The Worlds Weirdest Walk," in reference to the bizarre landscape created by the various lava flows. The alignment of the trail across the floor of the caldera has changed from time to time in response to new lava flows, but the trail is essentially the same as it was in the earliest years of tourist travel to the volcano.

Kilauea Iki Trail
LCS ID: 501695

In 1922, Superintendent Boles directed the construction of a trail from Byron Ledge down the west wall of Kilauea Iki. With access by a second trail into Kilauea Iki from the road opposite Thurston Lava Tube, this loop trail became one of the most popular in the park. In 1934, the trail from the road down to Kilauea Iki was rebuilt by the CCC, who relocated and regraded the trail and built stone retaining walls in many places along the upper portion. In the 1959 Kilauea Iki eruption, the upper portions of the trail and all of the CCC stone work were spared. After the eruption, the path across the caldera floor and out of the western end were rebuilt. Today, this path continues to be a popular hiking route in the caldera, showcasing prime examples of CCC stone work.

Crater Rim Trail
LCS ID: 58431

Crater Rim Trail developed over the years from a variety of historic and non-historic trail segments. One of the first segments of it was built in 1922, when Superintendent Boles directed the construction of the Waldron Ledge Trail between Kilauea Iki and the Volcano House. Today, this portion of the trail follows the old Crater Rim Road section along Waldron Ledge that was damaged in earthquakes in the 1980s. Portions of the road that fell into the caldera are bypassed by new trail segments.

The trail along Steaming Bluff from the Volcano House to Kilauea Military Camp was developed in 1930, and connected to an older trail from Kilauea Military Camp to Uwekahuna. The rather treacherous Uwekahuna Bluff trail down the face of the north bluff to Halemaumau was discontinued not long after the road to Halemaumau was built in 1931. The current segment of Crater Rim Trail from Kilauea Military Camp to Halemaumau follows the alignment of this precursor to the Uwekahuna-Bird Park Road and retains much of the old road's topographic features and several rock retaining walls.

The southern portion of Crater Rim Trail, from the western caldera wall, past Keanakakoi, to the old Keauhou Road appears to have originated after the historic period in an attempt to complete the loop trail.

Byron Ledge Trail
LCS ID: 501705

In 1927, a trail was built from the summer camp at Byron Ledge down the caldera wall and across the lava flows to connect with the Halemaumau Trail. In 1930, the summer camp trail was extended north along Byron Ledge, along the rim of Kilauea Iki to the talus slopes at the foot of Waldron Ledge to connect with the existing trail from the Volcano House. The current trail from Byron Ledge into the caldera follows the historic alignment.

Thurston Lava Tube Trail
LCS ID: 501706

The trail from Crater Rim Drive down to and through the Thurston Lava Tube has long been a popular attraction at the park. The trail itself, which dates from before the land was acquired by the NPS in 1933, began as a small footpath from the road to the tube opening. The bridge over a fissure at the tube entrance provided access to the tube itself in 1924. After the park acquired the lava tube, they paved the trail and made improvements to the stairs and other structures.

The short length and accessibility of the trail at Thurston Lava Tube made it one of the most popular attractions in the park. As the numbers of people using the trail increased, it assumed more the character and needs of a walkway for people in street clothing rather than a trail for those equipped to hike. In

1955, the trail was re-surfaced, all steps re-laid with hand rails and a blacktop trail laid through the tube itself with warning lights at low spots, etc. Through the end of the 1950s, improvements continued to be made to the trail to increase accessibility and safety. These included guardrails at steep drops, protective cables on the bridge, lights throughout the tube, stair improvement, and better surfacing. The stairs at the tube's exit were improved, and the return trail was improved and surfaced. The result was a half-mile pathway that most park visitors could negotiate with little trouble.

Turnouts

Several turnouts along Crater Rim Drive allow drivers to stop and view the many sites around the caldera. This is consistent with roads developed in national parks around the country in the early twentieth century, where turnouts were used to provide places for drivers to pull over without damaging the road shoulders or natural features often located very close to the road. Turnouts on early roads were typically short areas, large enough for one or two cars to pull safely out of the lane of travel. Usually gravel, although sometimes surfaced with asphalt, the turnouts were generally between 20 and 50 feet long and lens shaped, with short, curved exit and reentry points. Large boulders were often used to delineate the turnout and contain the cars.

As travel speed and traffic volumes increased over the years, turnouts became longer, with more space for exiting and reentering traffic. The turnouts were usually paved and edged to contain the cars and prevent shoulder damage on either end of the turnout. Today, turnouts are often from 60 feet to more than 100 feet in length and have a more trapezoidal shape with straight sides and angled returns.

Turnouts along Crater Rim Drive represent both of these categories. Some are short and lens shaped, with lava boulders delineating their extent. Others are long and paved, with straight, angled sides. While it is unknown which specific turnouts date from the historic period, it is possible to describe a character that is consistent with historic turnout design. Many of the turnouts along the north and northwest sections of Crater Rim Drive, in the area of the steam vents and Uwekahuna Bluff, exhibit the characteristics of historic turnouts. By contrast, many of the turnouts along the Southwest Rift Zone and near Keanakakoi were built in the 1950s and 1960s and are clearly of a more modern design.

Summary

Today, the systems of vehicular and pedestrian circulation around Kilauea Caldera comprise mix of historic and non-historic elements as complex as the story of their development. The overall structure of the circulation, consisting of a loop road that provided access to the sites around the caldera together with a system of trails, was laid out by the park's master planning process and was in place by the early 1930s. The current circulation, including Crater Rim Drive, parking lots at the developed areas, turnouts, and trails, reflects the designs of the first master plans, effectively moving visitors around the Kilauea summit area. While Crater Rim Drive was periodically realigned in response to design improvements or volcanic events, it retains the majority of its historic alignment, with four short segments dating from after 1942, and three segments of the historic alignment lost. Parking areas at Uwekahuna Bluff and Halemaumau Crater are essentially unchanged from 1934 and demonstrate the rustic design principles that guided road construction in the period. This is true, too, of the Kilauea Iki Trail, which showcases stone work characteristic of the CCC era. Overall, the circulation in Crater Rim Historic District helps convey the significance of the district and contributes to its integrity.

Circulation #1. Contemporary photo of the mortared-stone embankment facing and raised roadbed with culvert, located in the Southwest Rift Zone. Asphalt covers the top of the embankment from successive road paving. (PWRO 2005)

Circulation #2. Road traces and remnant retaining walls, most likely from Leavitt's Road from Uwekahuna to Halemaumau built in 1931, are today part of the Crater Rim Trail in the northwest corner of the caldera. (PWRO 2005)

Circulation #3. Several remnants of retaining walls mark former road alignments of Crater Rim Drive. The wall remnants, which date to before the 1920s, are mostly hidden in the dense vegetation near the current road south of Thurston Lava Tube. (PWRO 2005)

Characteristic Feature	ID LCS Number	Type of Contribution
Crater Rim Drive	444159	Contributing
Research Center Road	461598	Contributing
Waldron Ledge Road Ruin	501686	Contributing
Halemaumau Trail	58432	Contributing
Kilauea Iki Trail	501695	Contributing
Crater Rim Trail	58431	Contributing
Byron Ledge Trail	501705	Contributing
Thurston Lava Tube Trail	501706	Contributing
Steam Vents Parking Area		Contributing

Jaggar Museum and Volcano Observatory Parking Area	Contributing
Halemaumau Parking Area	Contributing
Thurston Lava Tube Parking Area	Contributing
Volcano House Parking Area	Contributing
Crater Rim Drive Turnouts	Contributing

Buildings and Structures

The buildings and structures in the Crater Rim Historic District are important manifestations of the rustic design style that guided national park development in the 1920s and 1930s and help tell the story of the development of the Kilauea Caldera area. These include classic examples of Park Service Rustic style buildings, such as the Volcano Observatory and Jaggar Museum and the comfort station at Thurston Lava Tube; the two Volcano House structures, which reveal a continuity of use from one of the caldera's earliest hotels built in 1877 to the latest incarnation built in 1941; the Whitney Seismograph Vault, which brings to light the significant role scientific research has played in the development of Kilauea; and numerous stone retaining walls and other stone features that blend infrastructure with a naturalistic design philosophy. In aggregate, the buildings and structures of the Crater Rim Historic District are essential character-defining elements that contribute strongly to the historic scene and help convey the district's significance.

See Appendix for a map of contributing buildings and structures.

1877 Volcano House
LCS ID:05842

This one-story building with ten rooms is approximately 110 feet long and 35 feet wide with a long porch on the caldera side. The building is of frame-on-wooden-post construction with shingle exterior walls and a galvanized metal roof.

This substantial wooden building, which replaced the grass-thatch Volcano House built in 1866, greatly improved visitor comfort and helped increase tourism to the volcano. In 1891, a large, Victorian-style two-story frame addition was built on the west end of the structure, greatly increasing the capacity of the hotel. In 1921, the hotel was updated once again, but this time, the original 1877 structure was moved roughly 90 feet away to make room for two new wings. This would be the structure's saving grace when the Volcano House burned in 1940.

The 1877 Volcano House was listed on the National Register of Historic Places in 1972. Today the building houses the Volcano Art Center. By virtue of its association with the current Volcano House and its role in the development of the area, the 1877 Volcano House contributes to the Crater Rim Historic District.

Volcano Observatory and Jaggar Museum
LCS ID: 58270

This one-story lava stone and wood clapboard building on the rim of the caldera is rectangular in plan with a modern metal-clad, hipped roof. The front elevation features a projecting entry canopy with lava stone piers and a pair of glazed wood doors. To the north of the entry are six louvered vent panels above a lava stone base. The south side elevation is composed of three bays separated by lava stone piers with rows of fixed wood sash windows, while the east elevation facing the caldera is stone-clad with three windows. A rather long asphalt walkway leads from the parking area to the main entry and to large asphalt viewing areas on the building's south and east sides. These platforms have lava stone retaining walls. The building includes a large addition constructed by the USGS in the 1980s.

The museum, originally referred to as the Uwekahuna Museum, was constructed by the Hawaii Volcano Research Association in 1927 and transferred over to the NPS as a museum and lecture hall to accommodate the growing numbers of visitors. It was later renamed the Jaggar Museum in honor of Dr. Thomas A. Jaggar, the renowned volcanologist who first introduced the notion of having a permanent geologic observatory and laboratory on the island. Dr. Jaggar managed the research program in the park for decades. Located nearby, the Uwekahuna seismograph was constructed by the USGS in 1948. In 1986, the USGS attached a large, new facility to the Volcano Observatory/Jaggar Museum building.

Despite the large addition, the Volcano Observatory/Jaggar Museum retains the architectural details, spatial layout, use, and relationship to the rest of the district's resources, and contributes to the district's integrity.

Volcano House
LCS ID: 58274

The split-level, wood frame Volcano House features a low-sloped, gabled roof with unenclosed eaves and 12-inch horizontal clapboard cladding. The windows are either fixed or double-hung sash. The western portion is two stories with a glass hyphen connecting a two-story addition at the far west end; the eastern portion is one level with a gable-front projection and a battered, exterior lava stone chimney near the main entry. The east end of the one story section features a large shed dormer with six double-hung windows. At the two-story section the roof is corrugated metal, while the one-story section roof has concrete asbestos tile. The front entry at the center of the north elevation features a pair of glazed wood doors and a projecting entry chamber; a large porte-cochere in front of this entry features battered lava stone piers and a pyramidal, corrugated metal-clad roof. The long, south elevation facing Kilauea Caldera features a row of large picture windows in sets of two or three, with louvered window panels with un-hewn timber posts between. (See photo Buildings and Structures #1.)

The building was built in 1941 after the previous Volcano House burned. The original building was located on the north side of Crater Rim Drive, but after it was destroyed, the owners chose to build the new building closer to the caldera on land they had long leased from the NPS. This site had been home to the volcano observatory and volcanologist's residence before those functions moved to Uwekahuna Bluff. The eight-room addition on the western end, connected to the rest of the hotel by a glass-walled hyphen, was built in 1948. Since then, the interior of the Volcano House has been modified extensively, although the original lobby, sitting room, and bar remain largely intact. On the exterior of the building, the porte-cochere was enlarged after the period of significance to accommodate large vehicles, significantly altering the character of the building's facade. Despite the changes to the building, however, the Volcano House represents an important element of the history of the Kilauea area and of Hawaii Volcanoes National Park, reflecting one of the earliest uses of the area by tourists. The hotel retains its historic associations and contributes to the rustic aesthetic of the headquarters village.

Thurston Lava Tube Comfort Station
LCS ID: 58272

This one-story restroom structure is rectangular in plan with corrugated metal cladding, a concrete foundation, and a corrugated metal-clad, gable-on-hip roof. Each corner features a large, battered lava stone pier. The structure is divided into two equal restroom sections with a small water storage/janitor's closet between. Each restroom section has a row of three nine-lite hopper windows on each side.

Constructed in 1933-1934, the comfort station was part of a Public Works Administration-funded project to improve the lava tube developed area shortly after it was acquired by the NPS. The detailed plans, received from the Branch of Plans and Design in late 1933, were of a design that blended standard Park Service Rustic design elements of the 1920s and 1930s with local Hawaiian design features. The project was begun in late 1933 and completed the following August.

The Thurston Lava Tube comfort station has changed little since it was constructed. Its design is characteristic of the style favored in Hawaii National Park in its early decades, revealing elements of both Park Service Rustic style and Hawaiian vernacular design. The comfort station retains its design elements, spatial layout, and relationship to other resources, and contributes to the district's integrity. (See photo Buildings and Structures #2.)

Whitney Seismograph Vault
LCS ID: 05841

The Whitney seismograph vault, located adjacent to the Volcano House on the caldera side, is an underground room of reinforced concrete walls, concrete floor, and concrete slab roof, measuring 18 feet by 17.5 feet on the inside. A number of concrete pillars protruding from the floor originally held instruments, and a wooden partition with glass panels separates the room into an instrument area and a viewing corridor. The structure is not visible from the outside, except for a large earth mound that was used to cover the structure in 1941 and a free-standing concrete pier.

The seismograph vault was originally constructed in 1912 and marked the beginning of the continuous and resident study by American scientists of the earth's volcanic and seismic activity at Kilauea and Mauna Loa volcanoes. The Hawaiian Volcano Observatory, a U.S. Government facility since 1917, used the vault from 1912 through 1961, when more sophisticated instrumentation made the seismometers and tilt meters it was designed to house obsolete.

The 1912 structure was only partially underground, with the concrete floor resting on a solid ledge of basalt 5 ½ feet below the original ground level. Concrete walls extended from the floor to the ground level, with the upper portion of the walls made of wood with windows. The free-standing, reinforced concrete pier above the vault was about 7 feet above the 1912 ground level was used for triangulation and camera stations. This pier originally protruded up through the porch of the volcano observatory building, also built in 1912.

The seismograph vault underwent substantial alterations in 1941, when the current Volcano House structure was built. The wooden walls and ceiling were replaced with concrete and the whole structure buried beneath an earth mound. The volcano observatory building was razed, but the concrete pier was retained. Today this pier functions as a visual marker for the vault, with a small interpretive sign explaining its function and significance.

The Whitney Seismograph Vault is an important connection to the tradition of scientific inquiry that is historically and currently such a significant part of the development of Kilauea. The structure was listed on the National Register of Historic Places in 1974, and continues to contribute to the Crater Rim Historic District. (See Buildings and Structures #3.)

1887 Marker (Marker with Benchmark)
LCS ID: 58399

Adjacent to Crater Rim Drive directly across from the original site of the Volcano House is a concrete monument consisting of a base approximately 5 feet wide, 8 feet long, and 3 feet high with a small concrete marker on top. Inscribed in the marker is "AUG 1887", and a USGS bench mark, dated 1912, is installed in the top of the monument.

The purpose of the monument is undocumented, but speculation can be made based on the monument's date and location. In the 1880s, an enterprising hotelier named Peter Lee constructed a road from Pahala west of Kilauea to the Volcano House, where it met the old road from Hilo. The best estimate for the date of completion of Peter Lee's Road comes from a Volcano House register entry dated October 1888 by a guest who claimed to be the first visitor to travel by means of a wheeled conveyance the entire way from an ocean port to the volcano. The register entry included a description of Peter Lee's new road. While the October 1888 date of the entry does not match the August 1887 date on the monument, it is possible that the road was finished earlier, or that the segment that finally connected the two roads was completed before the entire road was fit for travel. Either way, it is conceivable that the monument was installed to commemorate the completion of the Peter Lee's road at the point where it met the road from Hilo.

Today the monument is cracked and worn from exposure to the elements. Vegetation, including a substantial ohia lehua tree, is growing in the cracks and exacerbating the damage. Graffiti from visitors has been scratched into the monument as well. Despite this damage, the monument is an important link to the earliest development of Kilauea summit and one of the first completed segments of Crater Rim Drive. (See photo Buildings and Structures #4.)

Crater Rim Drive Guard Walls
LCS ID: 58395

Six segments of crenellated parapet guard walls were constructed by the park along Crater Rim Drive in 1933-1934; of these, five are intact. Guard walls can be found along current segments of Crater Rim Drive just east of the Volcano House and at Thurston Lava Tube. There are also guard walls on discontinued sections of the historic road at the Kilauea Iki overlook, Waldron Ledge overlook, and the Puu Puai overlook. The section constructed at Keanakakoi was destroyed and rebuilt with a different style of guard wall in the 1980s. All of these walls are of "Type 2" as designated in the 1928 standard detail sheet for guard rails produced by the NPS landscape division. These walls were originally 18 inches wide and 18 inches high in their crenels (low part of the wall). The crenels are 12 feet long and the merlons (high parts) are 6 inches above the crenels and 5 feet long with angled returns. Since their construction, the height of the walls has been reduced in places by the buildup of road surfacing material. The walls are roughly coursed with smooth, semi-hewn faces and recessed mortar joints.

The stone guard walls represent an important element of the NPS strategy for creating a unified aesthetic in its parks based on rustic architecture and naturalistic landscape design principles. Not only do they reflect the use of natural materials, skilled craftsmen, and rustic design characteristic of park design of the time, they also represent the effort to standardize park designs. The philosophy of unified aesthetic

design was developed together with the implementation of park master planning. The stone guard walls in Crater Rim Historic District reflect the larger movements of Park Service rustic style and park master planning.

Today the five remaining walls are largely intact. Some of the walls are lower than they were historically, either from settling into the soft organic soil, as is the case for portions of the Thurston Lava Tube parapet wall, or from successive buildup of road surfacing material. Along the guard wall near the Volcano House, the road surface has nearly reached the top of the wall, and some of the crenels have been filled in to raise the height above the road surface. Guard rails were installed in the walls at the overlooks at Kilauea Iki, Waldron Ledge, and Puu Puai. At Kilauea Iki and Waldron Ledge, these are metal rails with recycled plastic posts, and at Puu Puai the rail is all metal. These rails are mortared directly to the top of the guard wall. Despite these changes, the walls still display the design, materials, and workmanship that reveal their significance and their contribution to the historic district. (See photos Buildings and Structures #5 and #6.)

Thurston Lava Tube Guard Walls
LCS ID: 101790

Roughly-coursed lava stone curbing and walls were constructed along the pathways leading to the Thurston Lava Tube. Guard walls at Thurston Lava Tube occur in three places. Although little is known about the history of the walls around Thurston Lava Tube, estimates on the dates of construction can be surmised by the wall styles.

At the top of the trail near the parking lot, a low parapet wall with straight segments in an angled alignment lines the edge of the caldera. The crenellated wall has long, low crenels (the low part of the wall) and short, cubical merlons (the raised part) with vertical returns. Mounted to the top of this wall is a metal guard rail with recycled plastic posts. This wall at the top of the trail is not of Type 2, nor does it match any other standard wall type developed by the NPS. It is likely that this wall predates the acquisition of the property by the NPS in 1933. The wall is in fact very similar in style and materials to the guard wall built at Uwekahuna Bluff in 1927 when the museum was built, and so may date from that time as well. The metal rail with recycled plastic posts on the guard wall is a recent addition that changes the character of the wall, but the design, materials, and workmanship of the wall are still evident.

Halfway down the trail to the lava tube is a short section of parapet guard wall that matches the Type 2 guard walls built along Crater Rim Drive in 1933-1934. The wall is 44 feet long with 5-foot-long merlons with angled returns. Although park reports from the historic period do not mention the section of wall on the Thurston Lava Tube Trail, because it conforms to the Type 2 walls being built on the road, it is likely that it was constructed at the same time, i.e. 1934. This section of parapet wall was repaired and placed on a concrete foundation recently to correct damage from settling. While the overall workmanship of the repair is compatible with the historic feature, the wall was rebuilt on the concrete foundation higher than it had originally been constructed. This has resulted in a modest change in character, as the proportions of the wall have are different than they were historically. Nonetheless, the design and materials of the wall are intact and continue to reveal the historic character of the feature.

Finally, stone retaining walls line the trail at the entrance to the lava tube. These are low stone walls, roughly coursed, without crenellations. At one end of this wall, stone steps lead a short way up the hill against a stone cliff. The purpose of these steps is unknown. These wall may have been built before the NPS acquired the property in 1933, but it may also have been part of the area's improvements in the 1950s.

Both the upper section of wall, built in the 1920s, and the middle section, built in 1934, contribute to the historic district. Until the construction date of the lower section of wall at the lava tube entrance can be determined, its contribution to the historic district is unknown.

Volcano House Guard Wall
LCS ID: 58394

Extending approximately 200 feet along the south elevation of the Volcano House at the edge of the caldera is a lava rock retaining wall with black mortar. The rocks are roughly coursed with smooth faces. The wall is approximately 3 feet high on the caldera side and about 18 inches high on the walkway side.

This stone retaining wall was built about three years before the current Volcano House was built in 1941. It was meant to protect visitors from the caldera edge and to help aesthetically unify the Volcano House area with the rest of the park village.

Old Volcano House Site Retaining Wall
LCS ID: 461594

A mortared stone wall along Crater Rim Drive retains the terrace on which the Volcano House stood from 1877 to 1940. This retaining wall, which begins shortly after the intersection at the old hotel site and continues for approximately 120 feet, may date as far back as the late nineteenth century when the road was first constructed. The wall is indicated as "existing" in a plan drawing dated 1938.

Old Volcano House Site Overlook Walls
LCS ID: 568346

In 1938, stone walls were added to the front of the Volcano House, at its original site on the north side of Crater Rim Drive. The project included a stone retaining wall that extended from the existing retaining wall (noted above) for another 250 feet along the road in front of the Volcano House. In the center of this section of retaining wall, an overlook was built with a stairway that descended the face of the terrace to the road.

Several segments of this stone wall project remain today. At the top of the cut bank, directly opposite the Crater Rim Trail trailhead, is a short section of free-standing mortared stone wall with a gap in the middle. This was originally the overlook platform for the Volcano House. The gap in the wall once led to the stairway that descended the cut bank to the road and a crosswalk. At the road level are more remnants of this overlook and stairway structure. On the south side of the road is a short free-standing wall that matches the one at the top of the cut bank. This was likely related to the overlook and stairway structure.

The stone walls related to the old Volcano House site exhibit some wear and deterioration. Stones are loose or missing in places, and the mortar is cracked. Damage is particularly evident on the wall segment south of Crater Rim Drive. These wall segments reveal the spatial relationship between the old Volcano House site and the rest of the headquarters village. They also display the design, materials, and workmanship that characterized early development at Kilauea Caldera. As such, the wall remnants contribute to the historic district.

Rubble Retaining Walls in Fern Jungle
LCS ID: 568371

Along the section of Crater Rim Drive that passes through the fern jungle between Thurston Lava Tube and Puu Puai are a number of stone retaining walls. These are typically on the fill slope of the road bed and are largely obscured by moss, debris, and the dense vegetation that lines the roadway. The retaining walls most likely dated to between the beginning of the twentieth century to the 1920s, when incremental changes were made to the road's grade and alignment. Many of these walls are offset from the current road bed by several feet, reflecting former road alignments.

The walls range in size from 1 to 4 feet in height and are typically composed of roughly coursed rubble lava rocks. Most of the walls are mortared, although some are either dry-laid, or the mortar has decomposed to the point that they appear dry-laid.

The walls are decomposing with age and with intrusion from vegetation. While this does not appear to threaten the structural integrity of the road, it does threaten the historical integrity of the walls and their ability to help convey the significance of the district.

Mortared Lava Rock Embankment Facing
LCS ID: 568433

Along the Southwest Rift area of Crater Rim Drive west of Halemaumau, two sections of mortared stone embankments retain the road fill. These embankments are between 3 and 8 feet in height and sloped. The stone embankments were constructed in 1934 by the CCC to stabilize the new road and prevent erosion damage. One of the embankments is on the caldera side of the road, and the other is on the non-caldera side. The embankment on the non-caldera side – the larger of the two – has a culvert built into it to carry water from one side of the road to the other. The culvert is concrete with mortared stone headwalls on both the inlet and outlet.

A large, mortared rock-lined drainage ditch and embankment wall lines the non-caldera side of Crater Rim Drive just west of Halemaumau. The road here begins to climb back out of the caldera floor from Halemaumau to the Southwest Rift Zone, and is one of the steeper sections of the road. Like the stone embankments, the ditch was installed in 1934 by the CCC to mitigate damage to the new road segment from the heavy rains. The ditch is approximately 450 feet long. The ditch has several lined side chutes with 2-foot-high sidewalls on the uphill side of the main ditch. Asphalt covers some of the rock lining, and the chute outlet is beginning to crumble down the steep slope.

Stone-lined Ditches along Crater Rim Drive
LCS ID: 568377

The loose soils and frequent heavy rains around Kilauea Caldera created constant drainage and erosion problems. To mitigate erosion damage to Crater Rim Drive, several stone structures were constructed along the road to reinforce the roadway and channel rain runoff. The majority of these structures, which included stone-lined drainage ditches and stone drainage chutes near the headwalls of culverts, were built in conjunction with the Uwekahuna-Bird Park Road in 1933-1934. These structures can be found today along the north and west sides of the caldera from the Steaming Bluffs area to Keanakakoi.

Long discontinuous sections of mortared stone-lined drainage ditches extend on both sides of the road for about 4,000 feet beginning south of the Jaggar Museum parking lot. These were likely built in 1933-1934

when the Uwekahuna-Bird Park Road was constructed. The ditches include chute inlets and drainage chutes to channel water to culverts.

Stone Shoulders on Crater Rim Drive
LCS ID: 568389

Stone road shoulders were originally built on both sides of the road with flat, mortared lava flagstones. As the roadway was repaved and widened over the years, the stone shoulders were covered over on one side of the road or the other, so that today, the shoulder is discontinuous and is typically only visible on one side of the road at a time. Sections of stone road shoulders are visible along Crater Rim Drive for roughly 1,500 feet in the vicinity of the Steaming Bluffs parking area.

Cut Lava Rock Curbing
LCS ID: 568408

The parking lots at Halemaumau and the Jaggar Museum are edged with cut stone curbing. The curbing, installed around 1933 or 1934, is similar in style and construction to curbs used by the NPS in other parks at that time. The stones are rectangular, 8 inches wide, 12 inches high, and of varying lengths. As originally specified, the curb stones would have been buried 3 inches in the parking surface, with 9 inches showing above the parking lot. The stone were mortared end-to-end to create a continuous curb.

Today, some of the stones, especially in the Jaggar Museum parking lot, have come loose or have been displaced. In other places, successive paving, possibly in combination with settling, has obscured most of the lower portions of the stones, leaving only a few inches above the parking lot surface. This changes the character of the curb, reducing the massing and visual impact of the large curb stones.

Culverts

A number of culverts were built during the period of significance along Crater Rim Drive to convey water from one side of the road to the other. These vary somewhat in size, style, and materials, but all conform to the principles of rustic and naturalistic design, using native lava stone and remaining inconspicuous in the landscape. For the purposes of this CLI, the 16 extant contributing culverts along the road have been grouped together based on size, style, and period of construction.

Volcano Observatory Parking Lot Culverts
LCS ID: 568412

There are two culverts that span the entrances to the parking lot at the Jaggar Museum and Volcano Observatory. One collects runoff from a landscaped swale at the east end of the parking lot and runs it through a single iron pipe in a low arched rock headwall. The pipe runs under a wide gravel path at the intersection and empties into a swale on the same side of the road. The second culvert is at the southwest end of the parking lot and collects water through two side-by-side 12-inch iron pipes held in place by a low rock wall. These were likely built in conjunction with the construction of the parking lot in 1933 and contribute to the historic district.

Jaggar Museum Culvert
LCS ID: 568414

A single culvert outlet is located at the edge of the caldera rim just east of the Jaggar Museum near the observation platform. This is of the same style as the culverts along Crater Rim Drive, with a mortared stone headwall and corrugated metal pipe. The inlet of the culvert was not located. It is unknown when this culvert was constructed, but it is likely it was built either in conjunction with the museum in 1927 or with the road and parking lot in 1933.

Concrete Pipe Culverts
LCS ID: 568422

Several culverts of similar size and style occur along the section of Crater Rim Drive that was build as part of the Uwekahuna-Bird Park Road in 1933-1934. These medium-size culverts with lava stone headwalls on the inlet and outlet sides convey water across the road. The headwalls are typically 5 to 8 feet across and 2 to 3 feet high with 24-inch diameter culvert pipes. Eight of the culvert have are octagonal concrete pipes as specified in the plans for the road to prevent corrosion from volcanic gasses. One of the eight concrete pipe culverts is somewhat larger than the others, with a 3-feet-high headwall and angled wing walls on the inlet side. This culvert is part of a large mortared stone embankment in the Southwest Rift Zone.

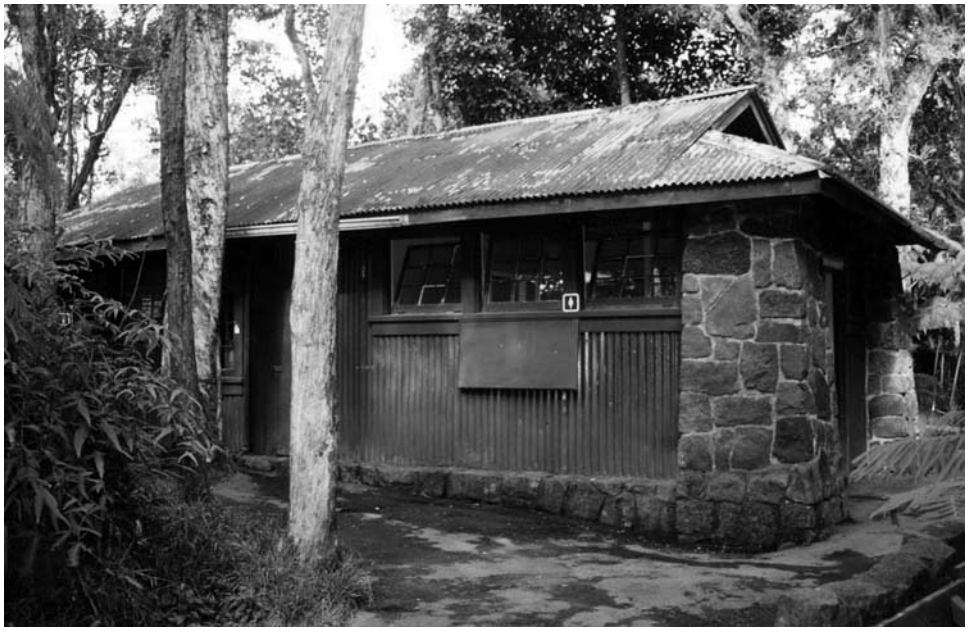
Corrugated Steel Pipe Culverts
LCS ID: 568424

In addition to the eight concrete pipe culverts, three culverts in the same section of Crater Rim Drive have corrugated steel pipes, and one has a combination of the two materials, with metal on the inlet side and concrete on the outlet side. These are of similar style and materials as the concrete pipe culverts and differ only in the pipe material.

Fern Jungle Culvert
LCS ID: 568427

One culvert can be found in the section of Crater Rim Drive that passes through the fern jungle area near Thurston Lava Tube. The culvert has double 12-inch metal pipes and a mortared stone headwall on the inlet and outlet sides. On the inlet side, a similar retaining wall holds back the cut slope about 2 feet from the face of the headwall, allowing a small space between the two for water to empty into. It is unknown when this culvert was built, but it almost certainly dates at least to the significant period.

Buildings and Structures #1. Contemporary photo of the Volcano House, built in 1941. (PWRO 2005)



Buildings and Structures #2. Contemporary photo of the Thurston Lava Tube comfort station, built in 1933. (Carey and Co. 2002)

Buildings and Structures #3. Contemporary photo of the concrete pillar at the Whitney Seismograph Vault. The vault is beneath the mound in the background. (PWRO 2005)

Buildings and Structures #4. The concrete marker, inscribed "AUG 1887", may be a monument marking the completion of Peter Lee's road from Pahala to the Volcano House. (PWRO 2005)

Buildings and Structures #5. The stone guard wall at Puu Puai parking lot was once along the Crater Rim Drive alignment. The metal guard rail was installed after the period of significance. (PWRO 2005)

Buildings and Structures #6. The guard wall at the Thurston Lava Tube parking lot is lower than when it was constructed, either from settling, a build-up of paving matrix, or a combination of both. Compare with photo History #7. (PWRO 2005)

Characteristic Feature	ID LCS Number	Type of Contribution
1877 Volcano House	05842	Contributing
Volcano Observatory and Jaggar Museum	58270	Contributing
Volcano House	58274	Contributing
Thurston Lava Tube Comfort Station	58272	Contributing
Whitney Seismograph Vault	5841	Contributing
1887 Marker (Marker with Benchmark)	58399	Contributing
Crater Rim Guard Walls	58395	Contributing
Thurston Lava Tube Guard Walls	101790	Contributing
Volcano House Guard Wall	58394	Contributing
Old Volcano House Site Retaining Wall	461594	Contributing
Old Volcano House Site Overlook Walls	568346	Contributing
Rubble Retaining Walls in Fern Jungle	568371	Contributing
Mortared Lava Rock Embankment Facing	568433	Contributing
Stone-lined Ditches along Crater Rim Drive	568377	Contributing
Stone Shoulders on Crater Rim Drive	568389	Contributing
Cut Lava Rock Curbing	568408	Contributing
Volcano Observatory Parking Lot Culverts	568412	Contributing
Jaggar Museum Culvert	568414	Contributing
Concrete Pipe Culverts	568422	Contributing
Corrugated Steel Pipe Culverts	568424	Contributing
Fern Jungle Culvert	568427	Contributing

Topography

For the purposes of the CLI, topography is defined as the three-dimensional configuration of the landscape surface characterized by features (such as slope and articulation) and orientation (such as elevation and solar aspect).

One of the tenets of the rustic and naturalistic design principles that guided park development in the 1920s and 1930s is the unobtrusiveness of human-built forms in the natural landscape. This was often achieved through careful planning of building sites and road alignments that minimized cut and fill and disturbance to the native forest and desert. Where manipulation of the ground plane was necessary, the earth cuts and fill slopes were treated in a way that blended them with the surrounding topography, often rendering them all but invisible to visitors. Rock cuts were carefully carved by skilled masons to appear natural, high banks were reinforced with stone retaining walls, and steep road shoulders were rounded and planted with native vegetation to prevent erosion. These techniques were employed at Hawaii Volcanoes National Park in the development of the Kilauea summit area, the construction of Crater Rim Drive, and the building of the signature trails, and are still apparent in the extant terraces, embankments, rock cuts, and other topographical features in the Crater Rim Historic District.

Crater Rim Drive

Many of the roads that would eventually make up Crater Rim Drive were constructed before Hawaii National Park was formed. The routes and alignments of these roads, as well as the techniques for constructing the roadbed, were based on economy and available labor and resources, rather than on a concerted design philosophy. The meager budgets and simple technologies of the early road projects led the road builders to choose routes that reduced the need for large-scale grading, a consequence in line with naturalistic road engineering principles. When the NPS expanded and upgraded the Kilauea road system in the 1920s and 1930s, they employed techniques that were being used in other national parks to create scenic park roads. On existing roads, the park made small adjustments to the alignment and profile of the road to ease curves and reduce grades. New roads were carefully sited to maximize the scenic experience of visitors while minimizing the impact on the landscape.

Crater Rim Drive takes visitors from the high north bluff, the highest point on the caldera rim at 4,080 feet, down to Halemaumau and back, a 445-foot change in elevation. Along the way, it crosses an undulating landscape of lava beds, the steep slopes of the caldera walls, and the alternating ridges and drainages of the fern jungle.

Cut and Fill

Due to the undulating volcanic landscape around Kilauea Caldera, the cross section of Crater Rim Drive tends to alternate between cut and fill. Where the road cuts through the lava or bedrock, the exposed rock cuts were shaped to give them a naturalistic appearance. Where the cut banks are soil, the shoulders were rounded by CCC crews and planted with native vegetation to prevent erosion. Cut-through sections typically have ditches on either side to convey water.

Filled-through sections of the road were built on raised roadbed of soil and cinder, with the fill banks often reinforced with riprap or mortared stone embankment facing. These fill-through sections are most prominent in the Southwest Rift area, where there is no vegetation to conceal the fill banks. The raised roadbed provides long views of the lava beds and the Kau desert. These areas contrast with the forested

areas west of headquarters and through the fern jungle, where the fill banks disappear in the dense vegetation, and the cross section of the road is not evident from the roadway.

There are few sections of the road characterized by a cross slope cut and fill. One such section, as Crater Rim Drive descends from the South West Rift area to Halemaumau, features a stone embankment and drainage ditch on the non-caldera side.

Many segments of Crater Rim Drive cross flat areas that required little cut and fill. These segments include the headquarters area, Steaming Bluff and Uwekahuna Bluff, and the lava beds in the floor of the caldera. The exception in the headquarters area is in front of the original Volcano House site, where portions of the bluff are retained on the non-caldera side with a stone retaining wall and exposed cuts through the lava.

Rock Cuts

Beyond mere utility, the rock cuts along Crater Rim Drive are featured design elements of the road that help define its character. Following the tenants of naturalistic landscape design, NPS landscape engineers who designed park roads in the 1920s and 1930s went to great lengths to make rock cuts appear natural. Skilled stone masons were often employed to carve the rock cuts into naturalistic forms, following the natural patterns of the indigenous rock.

This effort is evident in the rock cuts along Crater Rim Drive. Moss-covered rock cuts near Thurston Lava Tube seem to emerge from the lush fern jungle. In the open landscape of the Steaming Bluff, dark, low lava rock banks line the road, resembling natural rock outcroppings. The rock cuts vary in character depending on the nature of the lava through which they cut, often revealing the unusual forms created when the lava flowed. In places, they appear to be made of large stone blocks, while in others, layers of folded lava created cavities that were exposed when the cut was made. Some of the exposed rock cuts are combined with dry-stacked stone walls, irregularly coursed with lava stones, which blend nearly indiscernibly with the rock cuts. As a whole, the rock cuts are a strongly unifying element of Crater Rim Drive.

Retaining Walls

Where embankments were too steep to support themselves, they were reinforced with stone. Along Crater Rim Drive these stone reinforcements typically occur on the fill slopes and are of three types: cobble riprap embankments, mortared stone embankments, and dry-stacked stone retaining walls. The riprap and mortared stone embankments are found along the section of Crater Rim Drive that was constructed in 1933 as part of the Uwekahuna-Bird Park road. This section crosses the undulating topography of the Southwest Rift zone and is characterized by long segments of raised roadbed on fill. The hand-laid cobble riprap embankments extend discontinuously for nearly a half mile just west of Uwekahuna Bluff. The mortared stone embankments were laid by the CCC in 1934 to repair damage the road had sustained from heavy rains in the months after its construction. These embankment facings are smooth and un-coursed. Asphalt from subsequent road paving has covered the stone embankments in places.

The dry-stacked retaining walls occur mostly in the fern jungle section around Thurston Lava Tube. Due to dense vegetation, these are not visible from the road. One of the largest walls is just south of the lava tube parking area on the caldera side of the road. The roughly-coursed stone wall is 8.5 feet high at its tallest. The date of construction of this (and other walls in the area) may date as far back as the

completion of the Halemaumau Road in 1908. In 1933, a parapet guard wall was constructed along the top of the retaining wall. Other smaller sections of retaining wall occur throughout the fern jungle. Some of these, hidden several feet from the current road in the dense vegetation, reveal earlier alignments of the road.

Road Traces

As the alignment of Crater Rim Drive was adjusted throughout the 1920s, traces of the former roadbed were left alongside the new road. These can be seen today in the near-road topography in the fern jungle and in the Southwest Rift area. In the fern jungle, these road traces are often accompanied by fragments of retaining wall and reveal where the sharp curves of the early road were eased. In the Southwest Rift area, the road traces are from the first road between Halemaumau and Uwekahuna built in 1931.

Topography #1. Rock cuts in the dark volcanic rock west of the headquarters site look like natural rock outcroppings. (PWRO 2005)

Topography #2. Rock cuts near Kilauea Iki reveal unique volcanic formations. (PWRO 2005)

Topography #3. The terrace that held the Volcano House before 1940 is retained by a combination of stone retaining wall and natural rock cut. (PWRO 2005)

Topography #4. Contemporary photo showing grading on the Kilauea Iki Trail, built by the CCC in 1934. Stone riprap and dry-stacked retaining walls were used to support the steep slopes and switchback corners. (PWRO 2005)

Vegetation

Vegetation that may contribute to the historic district includes individual plants and plant communities, whether indigenous or introduced to the landscape. 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.

Vegetation within the Crater Rim Historic District is a major character-defining feature. This includes native vegetation communities that create strikingly different landscapes from one point on the caldera to another, as well as planted landscaping plants that lend a distinctly local aesthetic to the developed areas. Early park planners gave a great deal of thought to the role vegetation was to play in the park landscape. Master Plans from the 1930s included planting plans for the area in front of the Volcano House and for the employee housing area. Native plant species were favored in these plans, and NPS landscape architects cautioned against the use of exotic ornamentals. Natural plant communities were also given consideration in the planning of the park. The dense forests around Thurston Lava Tube were considered a park attraction in themselves, and the original route of the road to the caldera floor was chosen in part because it passed through what was called the "fern jungle." When suggestions were made in the 1920s to widen some of the curves along the road to create a better driving experience, Superintendent Boles insisted that it be done in such a way that preserved as much of the natural forest along the road as possible. These efforts created a park that was unique in its local Hawaiian character, while adhering to established NPS design philosophies. The patterns of vegetation within Crater Rim Historic District

continue to reveal the historic character and design principles that characterized the park during the period of significance.

Natural Vegetation Patterns

Much of the vegetation in the historic district is a result of carefully preserved natural communities. These include the closed ohia and hapuu tree fern forest on the east side of the caldera and the open ohia woodland and dry shrubland in the north and northwest portions, as well as the barren lava beds, which have a distinct character in their lack of vegetation. The majority of the areas outside of the headquarters area, including Uwekahuna Bluff, Thurston Lava Tube, and the various lookouts around the caldera, rely on the natural vegetation to establish the landscape character. These areas contain little in the way of identifiably intentional planting schemes.

The natural vegetation communities of Kilauea Caldera are discussed in further detail in the Natural Systems and Features section above.

Planted Vegetation

Designed and intentionally planted vegetation within the Crater Rim Historic District is for the most part limited to the headquarters area. Early planting plans called for the use of native vegetation, including ohi'a lehua (Metrosideros polymorpha), koa (Acacia koa), and hapuu tree ferns (Cibotium sp.), along the road and around the buildings in the headquarters area. Under the NPS landscape division's direction, indigenous and endemic plants such as: aalii (Dodonaea viscosa), hapuu fern, and amau fern (Sadleria cyatheoides) were the principal plants used as ornamentals. Additionally, several specimen kopiko trees (Psychotria hawaiiensis) were transplanted from the Bird Park area to the Administration building area in 1935. M.S. Sager, the NPS landscape architect orchestrating the landscape design, noted that the "planting project is interesting experimentally as the writer believes that many of the native shrubs of the park have never been transplanted, or certainly not used before in ornamental planting." (Landscape Architects Reports April and May 1934). Images from the late 1930s show that many of the native plants that were transplanted throughout the district, were thriving in their new location. Today, aalii, hapuu fern, and amau fern are well established and appear as though they have always grown there.

Existing designed vegetation in the headquarters area and around the Volcano House tends to be massed in beds that create a lush, tropical look. The vegetation occurs in three main types of arrangement: 1) widely spaced ohia lehua planted on lawn; 2) widely spaced ohia lehua, koa, sandalwood (Santalum sp.), or other native trees with a low-lying understory consisting of ginger, ti (Cordyline fruticosa), and hapuu and amau fern; and 3) dense native vegetation whose understory and canopy create a uniform and impenetrable wall comprised of ohia lehua, koa, sandalwood, hapuu, amau, ti, etc, as well as exotics such as kahili ginger. These types of planting beds are arranged informally around buildings, flanking pathways and roads, and on the edge of developed areas. Small areas of open lawn of Bermuda grass (Cynodon dactylon) are also located throughout the area interspersed with the beds of native vegetation. Please see diagram Spatial Organization #1 for general character and arrangement of vegetation around the Volcano House.

Overall, the existing vegetation patterns and plant palette is still representative of the patterns and palette that date to the period of significance. Despite some additions of exotic ornamentals and invasive weeds, native vegetation such as dense ohia forest and ornamental natives still dominate the landscape. Because the historic vegetation patterns and palette are largely intact, the vegetation landscape characteristic contributes to the setting of the Crater Rim Historic District.

Exotic Vegetation

In 1930, when Thomas Vint (Chief Landscape Architect of the NPS Western Field Office) made his first visit to Hawaii Volcanoes to begin master planning for the park, he recognized the park's problem with invasive vegetation such as nasturtiums and blackberry and encouraged a vigorous removal plan. In his trip report, he also commented on the inappropriateness of exotic ornamentals he observed around the Volcano House. He recommended that the Volcano House gardeners should slowly replace the ornamental exotics with indigenous or endemic plants. Furthermore, he encouraged the park and its residents to use only native plants in their gardening. He explained, "This question of exotic plants is one that is particularly serious in Hawai'i Park. It is one that will not be solved in a short time. It should be considered a permanent problem, and one which every park employee is responsible for." (Landscape Architect Report, February and March 1930).

Despite Vint's position on exotic vegetation in the park, exotic ornamentals were planted throughout the administration and employee housing area and around the Volcano House. Exotic species included: camellia, hydrangea, azalea (Rhododendron sp.), fuchsia, rose (rosa), iris, and Norfolk pine (Araucaria heterophylla); as well as exotic invasives (or potential invasives) such as lacevine (Polygonum sp.), avocado, agave, Hilo holly (Ardisia crenata), English ivy (Hedera helix), sweet pea (Lathyrus odoratus), spiderplant (Chlorophytum cosmosus), giant reed (Arundo donax), daisy fleabane (Erigeron karvinskianus), pearl flower (Heterocaentron subtriplenervum), common horehound (Marrubrium vulgare), monstera (Monstera deliciosa), Mexican elderberry (Sambucus mexicana), dwarf octopus tree (Schefflera arboricola), roving sailor (Saxifraga stolonifera), Tibouchina sp., and Morella faya. Careful management of vegetation and the avoidance of exotic vegetation in planting designs in recent decades have reduced the presence of these species within the district.

Today, exotic ornamental species such as camellia, hydrangea, azalea, iris, fuchsia, and rose are largely confined to the residential and administration areas, still appearing as foundation or specimen plantings around the employee quarters. Outside of the employee quarters area, exotics are found in planting beds and native forest areas near the Volcano House and throughout the district, typically tucked in amongst the native vegetation. Both fire tree (Morella faya) and Kahili ginger are highly invasive species and displace native rain forest species at the Kilauea Summit area. Except where it is being actively controlled, fire tree dominates the rain forest between Thurston Lava Tube and Keanakakoi. Kahili ginger is the most conspicuous understory species in the rainforest along roads and trails between the Volcano House, Thurston Lava Tube, and the caldera floor.

No mention of the invasive or potentially invasive plants listed above is made in the landscape architecture reports from the 1930s. None of these species were identified as part of the planting palette during the period of significance and it is highly unlikely that the NPS landscape architects (Vint and Sager), who espoused the use of native vegetation and control of invasive species, would have suggested using these species as ornamentals. Because it is unlikely that these existing invasive or potentially invasive exotics date to the period of significance, they do not contribute to the historic district.

Vegetation #1. Photo of the Kilauea Iki Trail demonstrates how natural vegetation communities, in this case ohia lehua and hapuu forest, are used in developed areas to create a distinctive character. (PWRO 2005)

Vegetation #2. The open ohia lehua and dry shrub vegetation at Uwekahuna Bluff establish the character at the Jaggar Museum. (PWRO 2005)

Vegetation #3. The barren rock-strewn caldera floor near Halemaumau is notable for its lack of significant vegetation. (PWRO 2005)

Vegetation #4. A combination of naturally occurring and planted vegetation composes the landscape around the Volcano House. (PWRO 2005)

Vegetation #5. A small number of native foundation plants adorn the front of the Volcano House. (PWRO 2005)

Vegetation #6. Behind the Volcano House, ohia lehua trees are planted over Bermuda grass lawn, creating an open character. (PWRO 2005)

Views and Vistas

One of the primary attractions of Hawaii Volcanoes National Park has always been the spectacular views. Sweeping views of the caldera can be enjoyed from numerous places around its rim. Mauna Loa rises above the open Kau desert on the north and west side of the caldera. Crater Rim Drive was carefully designed to showcase the natural features of the park, skirting close to the rim to offer frequent peeks over its precipice. In places, vegetation was cleared and overlooks constructed, complete with parking areas and guard walls, to provide discrete vistas. In other places, the wide open landscape allowed views of nearly 360 degrees. As Crater Rim Drive developed and evolved to meet new needs, views of the caldera, Mauna Loa, volcanic features, and the park's unique vegetation were carefully protected to ensure an uncompromised visitor experience. Today, the views and vistas in the Crater Rim Historic District continue to define the visitor experience and help to preserve the district's historic character.

For the purpose of this CLI, the views and vistas around Kilauea Caldera can be categorized into two groups: discrete views and vistas that were specifically designed and should be carefully managed to preserve the design intent, and broader, general views that are available by virtue of the open landscape and dramatic terrain and that contribute generally to the setting of the district.

Discrete, Designed Views

Volcano House (see photo Views and Vistas #1)
The view from the caldera rim behind the Volcano House is the first glimpse most visitors get of Kilauea. As visitors emerge from the back door of the Volcano House, they are greeted with a wide view of Kilauea Caldera. Halemaumau is visible, as is Steaming Bluff and Uwekahuna Bluff. Rather than a

vertical drop, the caldera wall here is a gradual forested slope. Because of this, the view of the blackened, desolate caldera floor is framed from below by the lush, green Hawaiian vegetation.

The view is accessible from a long walkway that runs the length of the Volcano House. A stone guard wall that follows the path predates the Volcano House, when the site was the location of the volcano observatory and volcanologist's residence. As it is the most accessible from the Volcano House and headquarters area, this has always been one of the most important views in the park.

Because of the lush vegetation in this area and the sloped caldera wall behind the guard wall, there is the potential for the views from behind the Volcano House to be obscured by vegetation. The character of the views here should be defined by low, framing vegetation, but should not be allowed to become overgrown or obscured.

Uwekahuna Bluff
Uwekahuna Bluff was chosen as the site for the volcano observatory and museum because of its commanding view of Kilauea Caldera and Halemaumau Crater. The bluff is the highest point on the caldera rim and overlooks a vertical drop of several hundred feet. An observation area and stone guard wall was built on the caldera's edge when the museum was constructed in 1927. The view from the back part of this viewing area is sweeping and unobstructed.

Halemaumau
From a large parking lot, a short trail crosses the lava beds to an observation platform, where visitors can peer into Halemaumau Crater. There is no vegetation here, and the view is only obscured by the steam and volcanic gasses issuing from the many cracks in the lava.

In the early days of tourism at Kilauea, Halemaumau was the summit's premier attraction. The crater was in a period of activity in the late nineteenth and early twentieth centuries. The bottom of the crater was filled with a lava lake and frequent flares and fountains delighted viewers. The first crater road from Volcano House was built expressly to offer visitors a close-up view of the "fire pit." The road terminated a mere 150 feet from the edge of the crater. In the 1920s, volcanic activity in Halemaumau diminished as the magma receded underground. As the floor of the crater sank, the walls collapsed, increasing the size of the crater and destroying part of the road and viewing area. By the early 1930s, the parking area had been rebuilt to accommodate over 500 cars. Although volcanic activity in the crater has abated since then, Halemaumau continues to be a popular destination for park visitors.

Keanakakoi
Although one of the smaller craters on Kilauea's summit, Keanakakoi is nonetheless an impressive site. The route for the first Crater Road was chosen specifically so that it would pass Keanakakoi and Kilauea Iki craters. Crater Rim Drive passes within 50 feet of the edge of Keanakakoi, where a turnout parking area provides an opportunity to stop and view the crater. The view into the crater from the turnout is open and unobstructed by vegetation.

Thurston Lava Tube (see photo Views and Vistas #2)
The view into the Thurston Lava Tube crater contrasts sharply with many of the other views around Kilauea summit. Whereas the active craters, including Halemaumau, Keanakakoi, Kilauea Iki, and Kilauea Caldera itself are black and barren, the Thurston crater is lush and green. From the parking area, visitors walk a short distance to an observation platform with stone guard walls. Here, views of the small crater are filtered through tree trunks and fern fronds. The viewpoint is above a canopy of tree ferns, which give the impression of a soft green carpet below.

Kilauea Iki (see photo Views and Vistas #3)
Like Keanakakoi, Kilauea Iki was one of the sites the original Crater Road showcased as it wound its way down from the Volcano House to Halemaumau. Dormant at the time, the crater was nonetheless an impressive site. Crater Road passed very close to the crater rim, providing an opportunity to create an overlook turnout, where drivers could stop to view the crater. In 1959, Kilauea Iki awoke and spewed lava, ash, and cinders from its southwest wall. Throngs came to view the eruption, overwhelming the meager parking area and prompting an expansion and realignment of the parking lot and road. When the eruption was over, a new cinder mound, called Puu Puai, rose above the crater wall where the eruption occurred, and cracked, steaming lava covered the crater floor. Today this is a popular stop along Crater Rim Drive. Views from the overlook are framed by vegetation, but are generally open in character.

Waldron Ledge
Waldron Ledge was another important vista point along Crater Rim Drive, providing a view of Kilauea Caldera over a vertical caldera wall of 400 feet. The road segment along Waldron Ledge was closed in the 1980s due to earthquake damage, but the overlook was still accessible on foot. Today, portions of the damaged road, as well as the overlook, are part of the Crater Rim Trail and continue to allow visitors to access the view at Waldron Ledge.

General Views

Mauna Loa
As Crater Rim Drive emerges from the forest onto Steaming Bluff, the first views of Mauna Loa open up. Mauna Loa is a broad, shield-shaped volcanic dome that looms over the northwest horizon. Although often obscured by clouds, on clear days Mauna Loa is clearly visible over the low scrub and grassland along the bluff.

Steaming Bluff
From the steam vents parking area, a short trail leads to the edge of Steaming Bluff, where it intersects with Crater Rim Trail. The drop from here to the caldera floor is vertical, and the view is unobstructed.

Views and Vistas #1. Views of the caldera from behind the Volcano House are framed by ferns and low vegetation.

Views and Vistas #2. The view from the overlook at Thurston Lava Tube of the lush, fern-filled crater is filtered through tree trunks and fern fronds. (PWRO 2005)

Views and Vistas #3. The view from the Kilauea Iki overlook is characteristic of views around the caldera that are framed by vegetation. (PWRO 2005)

Characteristic Feature	ID LCS Number	Type of Contribution
Uwekahuna Bluff View		Contributing
Halemaumau View		Contributing
Keanakakoi View		Contributing
Thurston Lava Tube View		Contributing
Kilauea Iki View		Contributing
Waldron Ledge View		Contributing

Land Use

Land use is defined as the principal activities that have formed, shaped, or organized the landscape as a result of human activity. The primary uses in and around Kilauea Caldera have historically fallen into the categories of visitor recreation and site-seeing, lodging, and scientific research. These continue to be the primary land uses within the Crater Rim Historic District and contribute to its integrity.

Visitor Services
The development around Kilauea Caldera was guided foremost by the desire to bring visitors in close contact with the volcano. This led to the first roads to the summit and to the establishment of the Volcano House in the nineteenth century to allow people to stay at the caldera overnight. Since then, nearly all of the development in the district has been for the accommodation and circulation of visitors amongst the caldera's many natural attractions.

Lodging
The first structure for lodging visitors to the volcano was built in 1846. Since then, the Volcano House has operated nearly continuously, providing accommodations on the caldera rim. When Hawaii National Park was formed in 1916, the land that the Volcano House occupied was incorporated into the park and leased back to the hotel company as a private concession. For nearly 100 years, the various incarnations of the hotel occupied the original site, just north of the main road through the park. In 1941, after a fire destroyed the hotel, it relocated to the south side of the road on the precipice of the caldera itself. Today, the Volcano House, still operated by a private concessionaire, continues to provide lodging to park visitors.

Circulation
Crater Rim Drive and its various associated elements, including parking lots, turnouts, overlooks, and side roads, have served to move people around the caldera rim area, allowing them to see such sites as Thurston Lava Tube, Kilauea Iki, Keanakakoi, Halemaumau, and other natural attractions. These elements continue to serve this purpose, playing an important role in the organization and the function of the district.

Education
In 1927, Hawaiian Volcano Research Association constructed the volcano observatory and museum at Uwekahuna Bluff. The museum was later renamed the Thomas A. Jaggar Museum in honor of the volcanologist who led the research at Kilauea from 1912 to 1940. The Jaggar Museum continues to be the center of educational services in the park.

Scientific Research
In 1912, the first permanent structure for the study of Kilauea's volcanic activity was constructed on the northeast rim near the Volcano House by Thomas Jaggar, then a professor of volcanology at MIT. The early observatory consisted of a seismograph vault dug into the soil to the bedrock and a wooden observatory building. The observatory served as the center of scientific research for Kilauea and Mauna Loa from its inception in 1912 until 1940, when the facilities (all but the seismograph vault) were razed to make room for the new Volcano House. At the end of 1941, the observatory moved into its new building on the other side of Crater Rim Drive, conducting its research here for seven years. In 1948, the NPS took over the new observatory building for a visitor center, moving the scientific functions, by now under the management of the United States Geological Survey (USGS) to the facility at Uwekahuna Bluff.

The buildings at Uwekahuna Bluff were constructed by the Hawaiian Volcano Research Association in 1927 as a museum and naturalist office in order to provide a point of interface between the scientific work and the visiting public. When the USGS was evicted from their building near the Volcano House, the primary scientific functions moved to Uwekahuna, sharing the space with the museum. The new site was better suited for scientific research, as it has clear views of both Halemaumau and Mauna Loa, and it was further away from the congested headquarters area. The observatory has remained at Uwekahuna Bluff since, moving into a large addition constructed in 1985.

Archeological Sites

For the purpose of the CLI, archeological sites refer to the location of ruins, traces, or deposited artifacts in the landscape and are evidenced by the presence of either surface or subsurface features. By identifying archeological resources within the historic district, we are not suggesting that the property is significant under criterion D (the potential to yield information), but that the archeological resources contribute to the integrity of the property by helping to convey the design or association of the district.

Headquarters Area

In 1994, an archeological survey of the headquarters area by park staff and reported by the Western Archeological Conservation Center (WACC) identified three sites and three features: the Steam Bath House (50-10-52-19, 456); the Ginger Patch Dump (50-10-52-19, 457); and the HQ Crack Dump (50-10-52-19, 458). The features include what is suspected to be a foundation for the chemistry laboratory, the remains of water tank supports under the water shed, and a road trace.

The steam bath house consists of a concrete foundation partitioned into six rooms, and is accessed by mortared stone stairs and a concrete path.. A metal heater tube is in the steam crack nearby. It is unknown when the steam bath was constructed, but it is depicted on historic maps from 1931 and 1963.

The Ginger Patch Dump refers to a debris dump, so named because it was discovered in the process of clearing a patch of ginger plants in 1992. Artifacts were collected by the park archeologist Laura Schuster and are accessioned into park collections under number 355. The site is now under fill and a site record was compiled utilizing documentation by Schuster in 1992 and the location plotted by Schuster and Park Superintendent Jim Martin in 1994.

The HQ Crack Dump is about 10 meters wide and at least 20 meters deep in places; a moderate amount of steam is still emitted. This crack was reportedly a main dump for the Volcano House and in years past park employees would climb into the crack to collect bottles. A Model T car is also reportedly located in the crack. The crack is heavily overgrown with vegetation and is too dangerous to enter without proper equipment and training.

Feature 1 is probably the chemistry laboratory foundation which consists of only a cement slab foundation, 26 feet by 33 feet 8 inches, with a drain pipe in the northwest corner and one cement block with a utility pole in it. The pole measures 4 inches by 5 inches and is 4 feet tall with two iron I-beams attached to the sides. The lab was built in 1925 and razed in 1959. Ground visibility was good and it is likely that artifacts exist.

Feature 2 is the remains of water tank supports under the water shed, portions of which were constructed in 1927. The area once contained a 400,000 gallon tank which collapsed in 1946. Eleven 10,000 gallon redwood water tanks were “moved from the CCC camp and relocated on the concrete base of the former 400,000 gallon tank” in 1950 or 1951. Today all that is extant are the sides of mortared stone foundations which were paved over by maintenance crews in 1994; the foundations are still intact under the asphalt.

Feature 3 is a road trace that extends along the north edge of the headquarters area. This trace, visible both in topography and vegetation patterns, appears on the 1938 master plan as “bridle path around the crater.”

Uwekahuna-Bird Park Road Trace (see photos Archeological Sites #1 and #2)

The trace of the Uwekahuna-Bird Park road constructed in 1933 and discontinued in 1961 is still visible in the desert north of Uwekahuna Bluff. The trace extends for 2,000 feet from Crater Rim Drive to Mamalahoa Highway (and for a short distance north of the highway, although the portion north of the highway is outside of the boundary of the historic district and will be addressed at a future time). At the junction with Crater Rim Drive, denser vegetation was planted to hide the trace from the road, but beyond this clump of ohia lehua trees and shrubs, the road is plainly visible. The roadbed is raised in places and stones line the trace on both sides. In the dry conditions and compacted soil, vegetation has been slow to obscure the road. Current vegetation on the roadbed consists of grasses and ohelo, and the straight road trace is obvious from its lack of trees. Four culverts are extant along the road trace. These are octagonal concrete pipe culverts with mortared stone headwalls on both inlet and outlet. One culvert has a substantial dry-stacked stone retaining wall above it, holding the high filled roadbed. Because the road no longer functions as it was intended, and because there is currently no access to or visibility of the road trace, it is being managed as an archeological site rather than a contributing structure or circulation feature.

Halemaumau Vaults (see photos Archeological Sites #3 and #4)

Two concrete vault located near the Halemaumau parking lot are likely the remnants of restrooms that were located there in the 1930s. The vaults are approximately 4 feet by 10 feet and 6 feet deep. Remnants of timber framing are in and near the vaults.

Archeological Sites #1. Although not visible from Crater Rim Drive, the Uwekahuna-Bird Park Road trace is evident from the topography and vegetation patterns. (PWRO 2005)

Archeological Sites #2. Several culverts, including this one with a dry-stacked retaining wall above it, remain on the abandoned Uwekahuna-Bird Park Road trace. (PWRO 2005)

Archeological Sites #3. One of two concrete vaults cut into the lava near the Halemaumau parking lot. These vaults were likely the two comfort stations built sometime in the 1920s or 1930s. (PWRO 2005)

Archeological Sites #4. The shelter and two comfort stations at Halemaumau, c. 1934 (no longer extant). (HAVO Landscape Architects Reports)

Management Information

Descriptive and Geographic Information

Historic Name: Kilauea Crater, Hawaii National Park
Current Name: Crater Rim Historic District, Hawaii Volcanoes National Park
Management Unit:
Tract Numbers:
State and County: Hawaii, Hawaii
Size (acres): 5,000

Boundary UTM

Source	Type	Datum	Zone	Easting	Northing
GPS Uncorrected	Area	NAD 83	11	258422	2147851
GPS Uncorrected	Area	NAD 83	11	259625	2150014
GPS Uncorrected	Area	NAD 83	11	261469	2151126
GPS Uncorrected	Area	NAD 83	11	265612	2149329
GPS Uncorrected	Area	NAD 83	11	265750	2147562
GPS Uncorrected	Area	NAD 83	11	260463	2145444
GPS Uncorrected	Area	NAD 83	11	259138	2146221

National Register Information

National Register Documentation:

Explanatory Narrative:
Carey and Company, a historical architecture firm based out of San Francisco, prepared the Kilauea Administration and Employee Housing Historic District nomination, the Crater Rim Drive Historic District nomination, and the multiple property: Hawaii National Park Planning ad Development through World War II nomination. All of these documents are currently (2005) on park review.

National Register Eligibility:

Explanatory Narrative:

Date of eligibility Determination:

National Register Classification: District

Significance Level: State

Contributing/Individual: Individual

Significance Criteria: C—Inventory unit embodies distinctive characteristics of type/period/method of construction; or represents work of master; or possesses high artistic values; or represents significant/distinguishable entity whose components lack individual distinction.

A—Inventory Unit is associated with events that have made a significant contribution to the broad patterns of our history.

Period of Significance

Time Period: 1916-1942
Historic Context Theme: Transforming the Environment
Historic Context Subtheme: Conservation of Natural Resources
Historic Context Facet: The Great Depression and Conservation

Time Period: 1916-1942
Historic Context Theme: Expressing Cultural Values
Historic Context Subtheme: Landscape Architecture
Historic Context Facet: The 1930s: Era of Public Works

Area of Significance

Category: Conservation
Priority: 1

Category: Landscape Architecture
Priority: 2

Category: Architecture
Priority: 2

National Historic Landmark Information

No

World Heritage Site Information

Hawaii Volcanoes National Park was named a World Heritage Site by UNESCO in 1987.

Cultural Landscape Type and Use

Cultural Landscape Type: Designed Landscape

Current and Historic Use/Function:

Use/Function Category: Landscape
Use/Function: Natural Area - Other

Use/Function Category:	Recreation/Culture
Use/Function:	Outdoor Recreation
Use/Function Category:	Recreation/Culture
Use/Function:	Museum
Use/Function Category:	Education
Use/Function:	Research Facility

Ethnographic Information

Ethnographic Survey Conducted: Yes:

An ethnographic study was conducted by Charles M. Langlas, Cultural Anthropologist with the University of Hawaii at Hilo. The results of the study were completed in 2003: Native Hawaiian Use of Hawaii Volcanoes National Park: A Historical and Ethnographic Overview. The purpose of this study was to document traditional Native Hawaiian use of resources on Park lands, both in the past and the present and to examine the relationship between that resource use and Park management. Perhaps most important to mention is that Native Hawaiians view the entire Kilauea Caldera as sacred and as the "origin of new land." Hawaiians give thanks to Kilauea and the goddess Pele (the maker of land) in sites all over the caldera's rim. Additionally, Native Hawaiian's access areas throughout the park, including the Kilauea headquarters area to collect plants for religious purposes. Aalii and liko lehua (the leaf buds of the ohia tree) are two plants that are particularly sought after and available in this area. In addition to plant gathering, the area in front of the 1877 Volcano House—located just outside of the historic district boundaries—is often used for religious rituals.

Adjacent Lands Information

Do Adjacent Lands Contribute: No

General Management Information

Management Category: Should be preserved and maintained
Management Category Date: November 27, 2005
Explanatory Narrative: Crater Rim Historic District meets all of the following criteria: the property meets National Register criteria; the property is compatible with the park's legislated significance; and the property has continuing or potential purpose that is appropriate to its traditional use or function.

Condition Assessment and Impacts

The criteria for determining the condition of landscapes is consistent with the Resource Management Plan Guideline definitions (1994) and is decided with the concurrence of park management. Cultural landscape conditions are defined as follows:

Good: indicates the landscape shows no clear evidence of major negative disturbance and deterioration by natural and/or human forces. The landscape's cultural and natural values are as well preserved as can be expected under the given environmental conditions. No immediate corrective action is required to maintain its current condition.

Fair: indicates the landscape shows clear evidence of minor disturbances and deterioration by natural and/or human forces, and some degree of corrective action is needed within 3-5 years to prevent further harm to its cultural and/or natural values. If left to continue without the appropriate corrective action, the cumulative effect of the deterioration of many of the character-defining elements will cause the landscape to degrade to a poor condition.

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

Undetermined: not enough information available to make an evaluation.

Condition Assessment: Good
Assessment Date: 06/21/2005
Date Recorded: 03/01/2006
Park Management Concurrence:
Level of Impact Severity: low

Stabilization Measures:

Stabilization for features within Crater Rim Historic District include the management of invasive vegetation, the management of views being obscured by vegetation, the removal of intrusive vegetation in or near stone structures, and the repair of stone structures that have experienced structural deterioration.

Impact:

Type of Impact:	Vegetation/Invasive Plants
Internal/External:	Internal
Description:	Several species of invasive plants are found throughout the historic district, particularly in the areas around the Volcano House and along the edges of roads and trails. Invasive vegetation management programs are ongoing in an effort to reduce the impacts of these species on the natural and historic landscape.

Impact:

Type of Impact:	Vegetation/Invasive Plants
Internal/External:	Internal
Description:	Views along the caldera rim in the eastern portion of the caldera, where vegetation is lush and grows rapidly, are being obscured or threatened by encroaching vegetation. Currently, only the view from the Kilauea Iki overlook is in need of clearing to stabilize the historic view, but views at the Volcano House, Waldron Ledge, and Thurston Lava Tube should also be monitored for encroaching vegetation.

Impact:

Type of Impact:	Structural Deterioration
Internal/External:	Internal
Description:	Stone structures throughout the district, including the parapet guard walls on Crater Rim Drive, the walls from the old Volcano House, stone retaining walls along Crater Rim Drive in the fern jungle, and stone structures at Thurston Lava Tube, are showing signs of deterioration, cracking, and instability. These structures should be repaired using appropriate techniques and materials. Repairs should include removal of intrusive non-historic vegetation, reclaiming and reusing displaced stones, and repointing mortar. Replacement stones, if required should be compatible with existing stones.

Impact:

Type of Impact:	Vegetation/Invasive Plants
Internal/External:	Internal
Description:	Stone structures throughout the district are threatened by intrusive vegetation growing in or near the structures. Tree roots, if left unchecked, can pry stones out of stone walls and other structures. Features that were identified as being impacted by vegetation include the stone retaining walls along Crater Rim Drive in the fern jungle, stone wall around Thurston Lava Tube, stone walls at the old Volcano House site, and the 1887

	marker near the old Volcano House site. Non-historic intrusive vegetation should be removed, taking care not to further damage stone work.
Impact:	
Type of Impact:	Erosion
Internal/External:	Internal
Description:	Kilauea Iki Trail was severely damaged by erosion resulting from heavy rains in November 2001. Some emergency repairs were done to make it safe for visitor use immediately following the rains. However, these repairs were temporary and long-term repairs are needed to stabilize the resources.

Agreements, Legal Interest, and Access

Management Agreement:	None
Explanatory Narrative:	
NPS Legal Interest:	Fee Simple
Explanatory Narrative:	
Public Access:	Unrestricted

Treatment

Approved Treatment: Preservation

Approved Treatment Document: General Management Plan

Document Date: 1985

Explanatory Narrative:
The current approved treatment of "preservation" was determined in the 1985 General management Plan which states, "Preserve the sites and structural remains of the early Hawaiian period and historical period in cooperation with local Hawaiian interests."

Approved Treatment Completed: No

Approved Treatment Cost

LCS Structure Approved Treatment Cost: None
Landscape Approved Treatment Cost: None
Cost Date:
Level of Estimate:
Cost Estimate:
Explanatory Description:

Stabilization Costs

LCS Structure Stabilization Cost: $292,020

LCS Stabilization Measures	PMIS Number	Estimated Cost
Repair historic stonework throughout the district	43679	$ 155,000.00
Repair Kilauea Iki Trail	86876	$ 87,020.00
Repair leaking roof in Jaggar Museum	85270	$ 50,000.00

Landscape Stabilization Costs: $154,775

Landscape Stabilization Measures	PMIS Number	Estimated Cost
Restore historic views and remove hazardous trees and exotic vegetation around the Volcano House.	117775	$ 10,000.00
Clear vegetation to restore historic views at Kilauea Iki overlook.	121238	$ 18,096.00

Cost Date: 06/01/2006
Level of Estimate: C – Similar Facilities
Cost Estimator: Support Office
Explanatory Description:

The LCS and Landscape stabilization cost estimates were obtained from PMIS statements that cover the stabilization and repair of historic structures as well as vegetation clearing to maintain historic views and control historically inappropriate exotic vegetation.

Appendix

Bibliography

Allen, Thomas J. "Superintendent's Monthly Reports." 1929.

"The Approaches to the Volcano: What They Are and What They Should Be." Honolulu Pacific Commercial Advertiser. December 11, 1888.

Bevens, Darcy, ed. On the Rim of Kilauea: Exerpts from the Volcano House Register, 1865-1955. Hawaii National Park, Hawaii: Hawaii Natural History Association. 1992.

Carr, Ethan. Wilderness by Design: Landscape Architecture and the National Park Service. Lincoln: University of Nebraska Press. 1998.

Ellis, William. Journal of William Ellis: Narrative of a Tour of Hawaii, or Owhyhee; with Remarks on the History, Traditions, Manners, Customs and Language of the Inhabitants of the Sandwich Islands. Honolulu: Hawaiian Gazette Co. 1917.

Fagerlund, Gunnar. "The Exotic Plants of Hawai'i National Park." Natural History Bulletin No. 10. Department of Interior. 62 pp. 1947.

Good, Albert H. Park and Recreation Structures. U.S. Department of the Interior, National Park Service. 1938.

Jackson, Frances. An Administrative History of Hawai'i Volcanoes National Park [&] Haleakala National Park. Honolulu: Unpublished NPS document. 1971.

Kittredge, Frank A. Report on Hawaii National Park Road Program. U.S. Department of Agriculture, Bureau of Public Roads. Honolulu: Unpublished NPS document. 1925.

Langlas, Charles M. Native Hawaiian Use of Hawaii Volcanoes National Park: A Historical and Ethnographic Overview. University of Hawaii at Hilo. 2003.

McClelland, Linda Flint. Building the National Parks. Baltimore: Johns Hopkins University Press. 1998.

National Register of Historic Places Multiple Property Documentation Form for Historic Park Landscapes in National and State Parks. Washington, D.C.: U.S. Department of the Interior, National Park Service. 1995.

Olson, Gunder E. The Story of the Volcano House. Hilo: The Hilo Tribune Herald. 1941.

Paige, John C. The Civilian Conservation Corps and the National Park Service, 1933-1942: An Administrative History. Washington, DC: U.S. Department of the Interior, National Park Service. 1985.

Sandler, Rob. Architecture in Hawai'i: A Chronological Survey. Honolulu: Mutual Publishing. c. 1993.

Twain, Mark. "The Great Volcano of Kilauea". Sacramento Daily Union. November 16. 1866.

Tweed, William C., Laura E. Soulliere and Henry G. Law. National Park Service Rustic Architecture: 1916-1942. Western Regional Office: U.S. Department of the Interior, National Park Service. 1977.

Supplemental Information

Title: Existing Conditions Site Map (attached)
Description: Composite site map showing the existing conditions in 2005.

Title: 1916 Site Map (attached)
Description: Site Map showing the Kilauea Caldera Rim area at the beginning of the period of significance in 1916.

Title: 1942 Site Map (attached)
Description: Site Map showing the Kilauea Caldera Rim area at the end of the period of significance in 1942.

Title: Contributing Features Map #1 (attached)
Description: Map showing the sections of Crater Rim Drive that still reflect the alignment of the historic period.

Title: Contributing Features Map #2 (attached)
Description: Map showing the contributing buildings and structures in the Crater Rim Historic District.

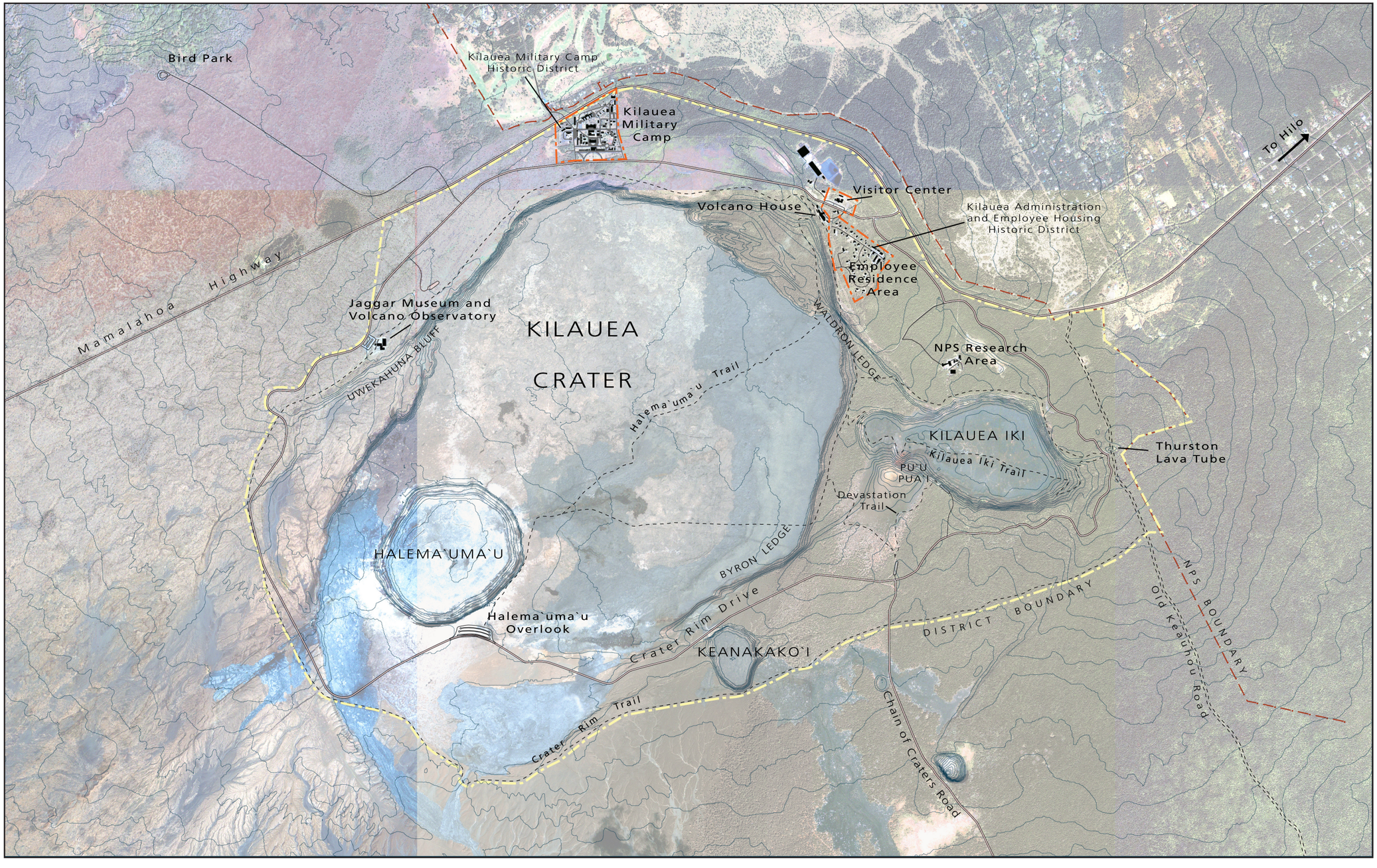
Title: Hawaii National Park Master Plans, 1931-1941.
Description: Master plans for the headquarters area and for the general development of the caldera updated annually from 1931-1941. Copies located at the Denver Service Center (DSC).

Title: Kilauea Historic Maps, 1912-1963
Description: Various historic maps of the Kilauea summit area, including USGS maps and NPS plans. Copies located at the DSC.

Title: Draft Crater Rim Drive Historic Road Inventory
Description: Prepared by Architectural Resources Group (ARG). Inventory of historic and non-historic resources along Crater Rim Drive. Draft currently on review.

Title: Hawaii Volcanoes National Park Roads
Description: Historic American Engineering Record (HAER) report on the roads in Hawaii Volcanoes National Park, including Crater Rim Drive.

Title:	Hawaii Volcanoes National Park Headquarter Area Archeological Survey
Description:	Prepared by the Western Archeological Conservation Center (WACC) in 1994; survey of the archeological resources in the Kilauea headquarter area.



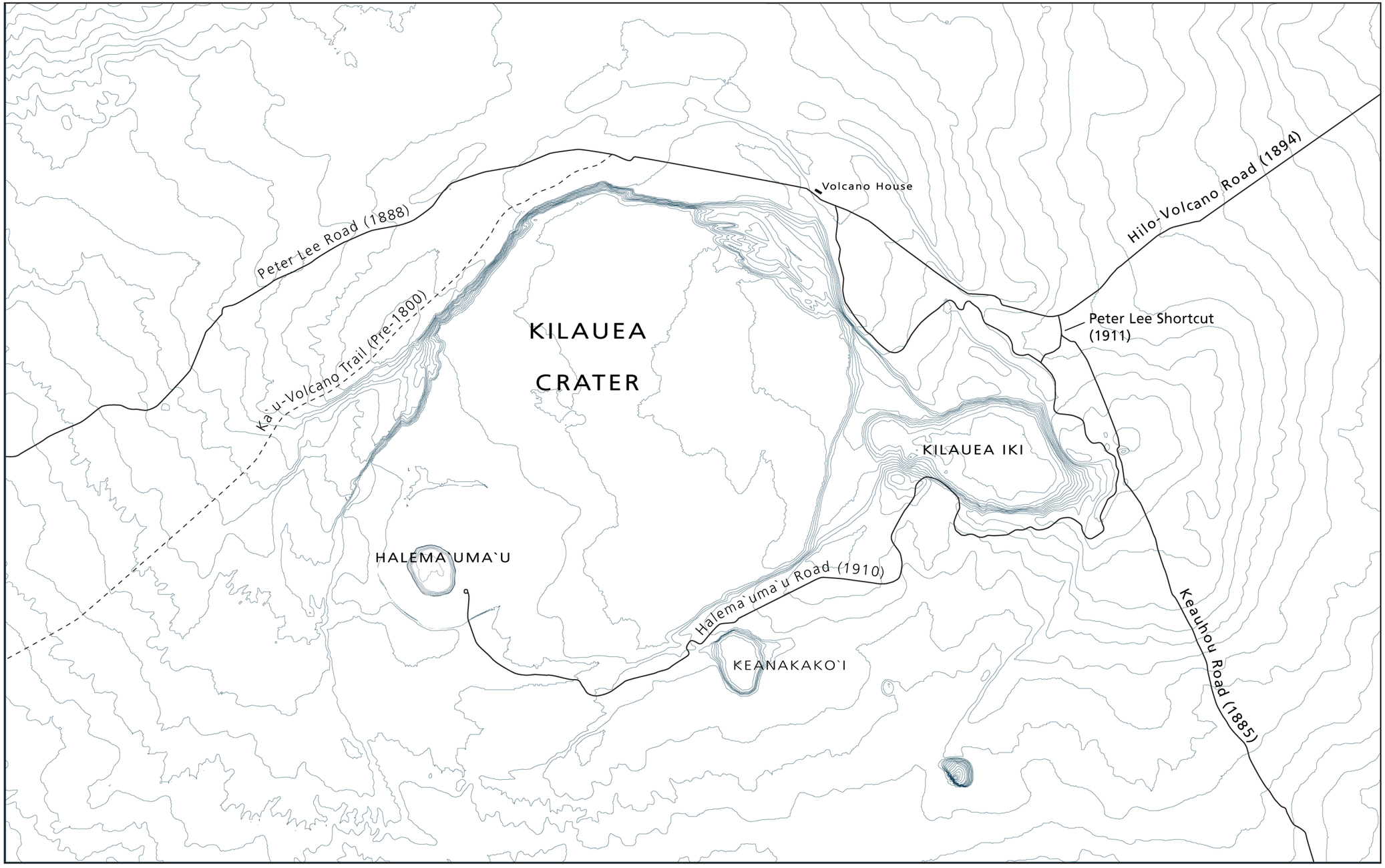
SUPPLEMENTAL INFORMATION

Existing Conditions Site Map

Composite site map showing the existing conditions in 2005.

Cultural Landscapes Inventory
Crater Rim Historic District 2006

National Park Service
Pacific West Region
Cultural Landscape Program



SUPPLEMENTAL INFORMATION

1916 Site Map

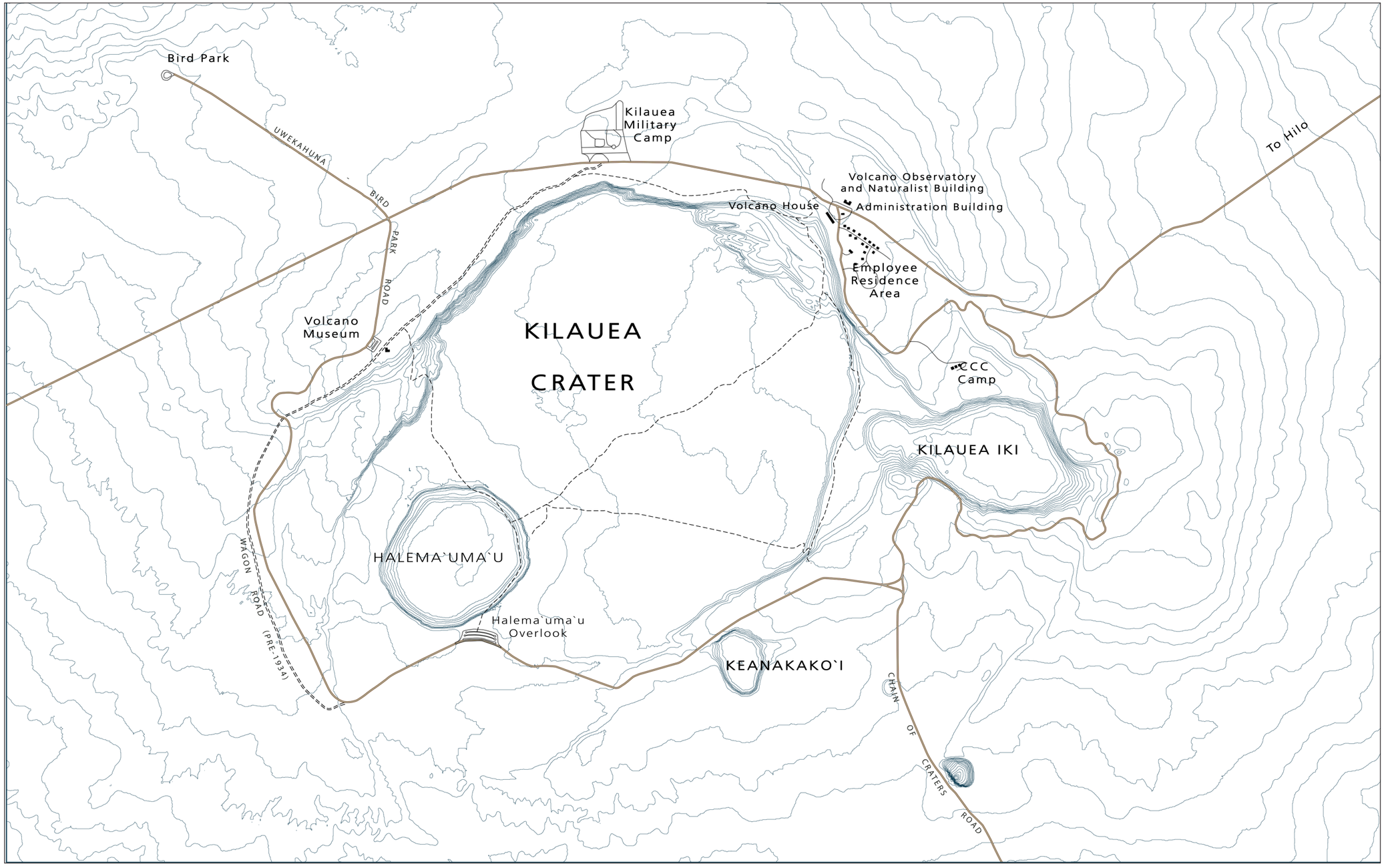
Site map showing the Kilauea Crater Rim area at the beginning of the period of significance in 1916.

north

0 2,000 4,000 Feet

Cultural Landscapes Inventory
Crater Rim Historic District 2006

National Park Service
Pacific West Region
Cultural Landscape Program



SUPPLEMENTAL INFORMATION

1942 Site Map

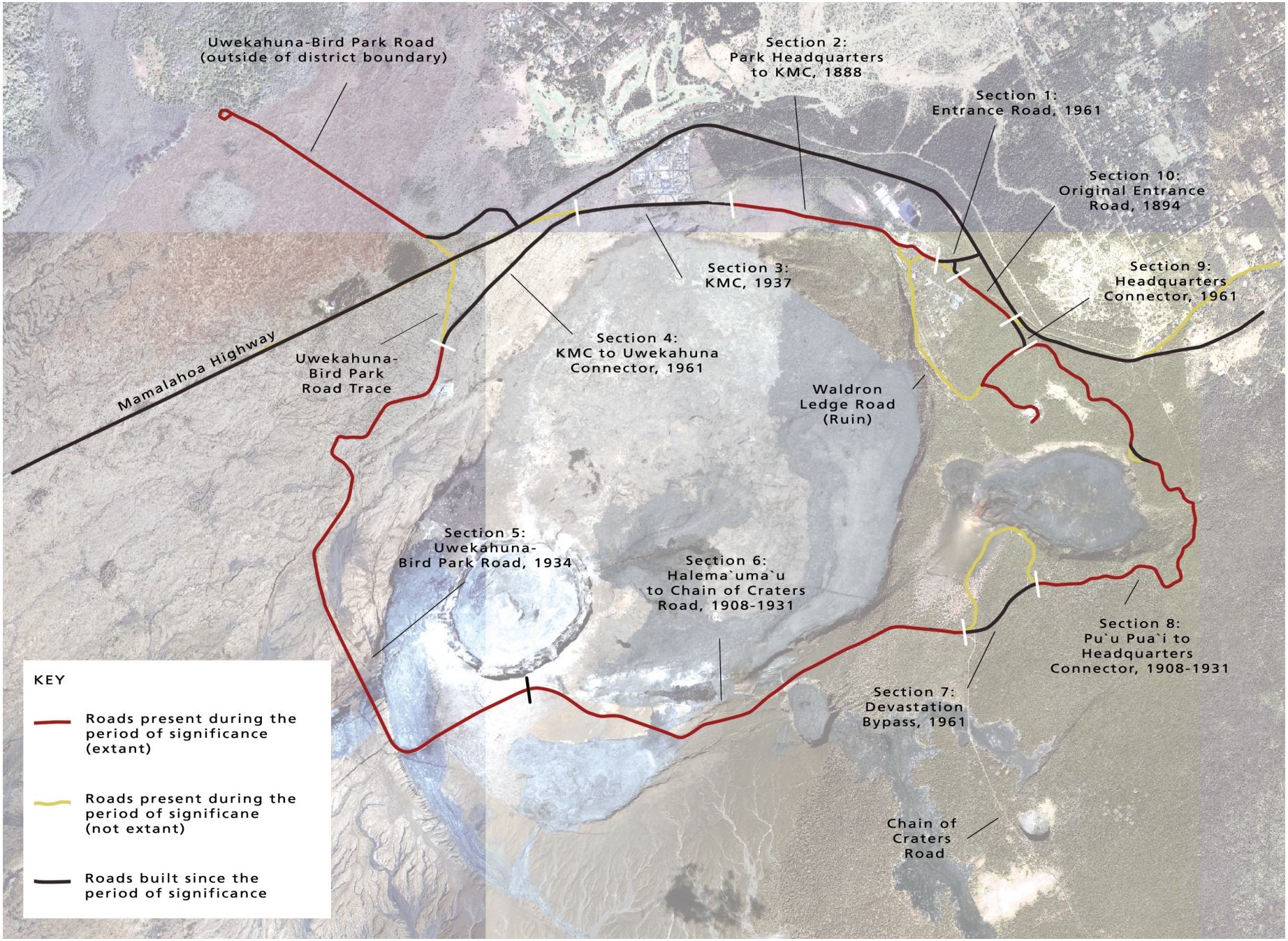
Site map showing the Kilauea Crater Rim area at the end of the period of significance in 1942.

north

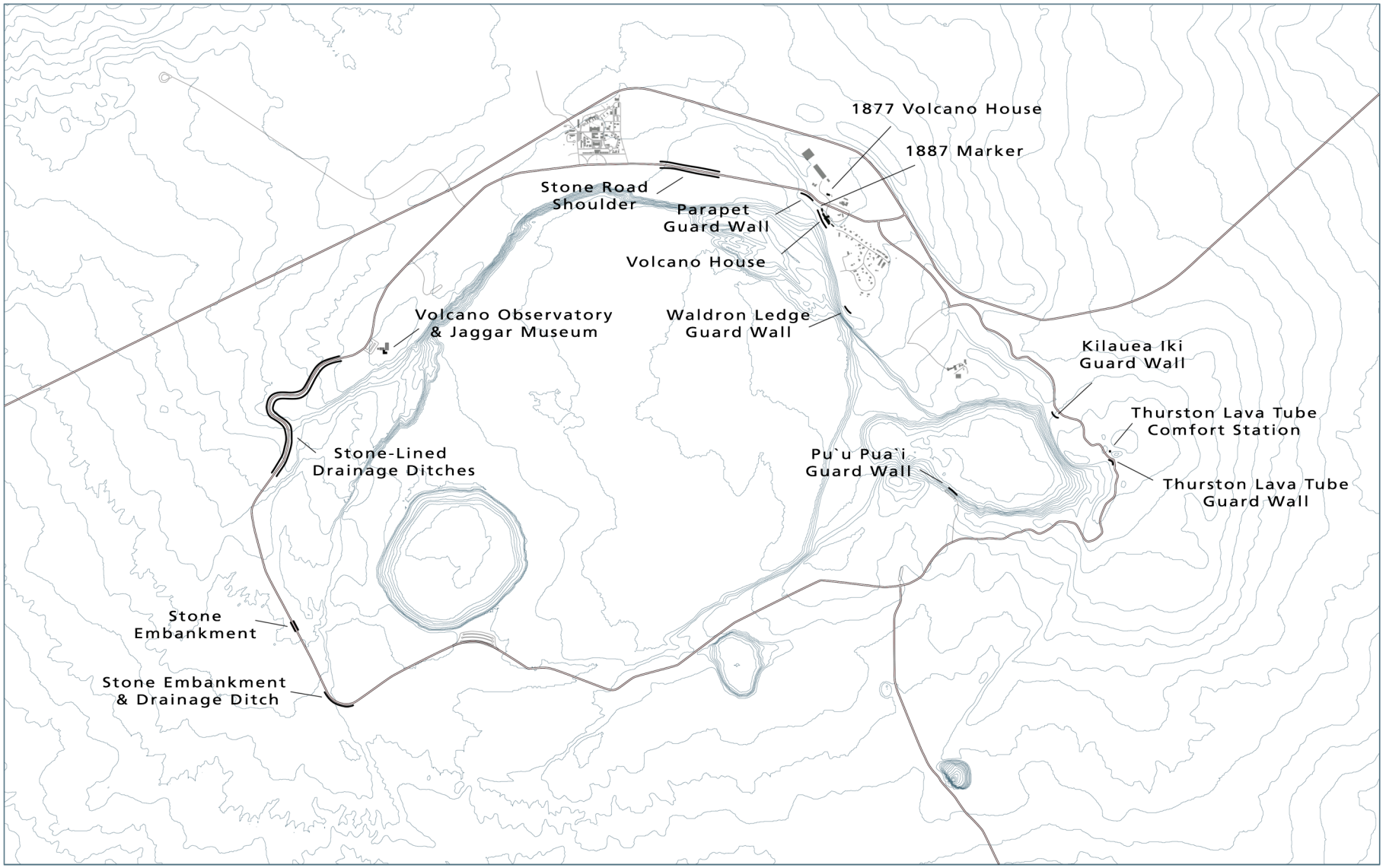
0 2,000 4,000 Feet

Cultural Landscapes Inventory
Crater Rim Historic District 2006

National Park Service
Pacific West Region
Cultural Landscape Program



Contributing Features Map #1. Diagram showing the sections of Crater Rim Drive that still reflect the alignment of the historic period.



Contributing Features Map #2. Map of Crater Rim Historic District showing contributing buildings and structures.