National Park Service
Cultural Landscapes Inventory
2008

Haleakala Highway
Haleakala National Park

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Haleakala National Park concurs with the findings of the CLI, including the management category and condition assessment as identified below:

MANAGEMENT CATEGORY: **B: Should be preserved and maintained**

CONDITION ASSESSMENT: **Good**

Marilyn H. Lewis 05/28/08

Superintendent, Haleakala National Park Date

Please return to:

Erica Owens
Cultural Landscape Inventory Coordinator-Seattle
National Park Service
Pacific West Regional Office
909 First Avenue
Seattle, WA 98104-1060

HALEAKALA NATIONAL PARK : Haleakala Highway

Hawaii SHPO Consensus Determination of Eligibility

Actions Requested:

1) SHPO concurrence on the eligibility of the Haleakala Highway historic district for the National Register of Historic Places:

I concur, ✓ I do not concur_____ with the eligibility of the Haleakala Highway historic district as described in the Cultural Landscape Inventory (CLI).

2) SHPO concurrence that the landscape characteristics as identified in the CLI contribute to the historic character of Haleakala Highway historic district (see the following landscape characteristic descriptions in the Analysis and Evaluation section of the CLI: Natural Systems and Features, Spatial Organization, Land Use, Buildings and Structures, Circulation, Topography, Views and Vistas, and Archeological Sites):

I concur ✓, I do not concur _____ that the landscape characteristics as described in the CLI contribute to the Haleakala Highway historic district.

3) SHPO concurrence with the list of contributing and non-contributing structures to Haleakala Highway historic district. (See tables below and the following landscape characteristic descriptions in the Analysis and Evaluation section of the CLI: Buildings and Structures; and Circulation):

Contributing Structures: Based on the information provided in the CLI, the following structures have been identified as contributing features of the Haleakala Highway historic district:

Contributing Structure Name	Date Built	Concur	Do not Concur
Haleakala Highway	1933-1935	✓	
Haleakala Highway Bridge	1934	✓	
Haleakala Highway Box Culvert (MP 1.993)	1933-35	Determined eligible by SHPO 10/24/1997	
Haleakala Highway Box Culvert (MP 2.621)	1933-35		
Haleakala Highway Box Culvert (MP 2.937)	1933-35		
Haleakala Highway Box Culvert (MP 2.950)	1933-35		
Haleakala Highway Box Culvert (MP 3.966)	1933-35		
Haleakala Highway Box Culvert (MP 4.209)	1933-35		

Contributing Structure Name	Date Built	Concur	Do not Concur
Haleakala Highway Box Culvert (MP 4.985)	1933-35	Determined eligible by SHPO 10/24/1997	
Haleakala Highway Box Culvert (MP 5.212)	1933-35		
Haleakala Highway Box Culvert (MP 5.819)	1933-35		
Haleakala Highway Box Culvert (MP 5.840)	1933-35		
Haleakala Highway Box Culvert (MP 5.910)	1933-35		
Haleakala Highway Culverts (29)	1933-35	✓	
White Hill Observatory/ Visitor Center	1936	Determined eligible by SHPO 10/24/1997	
White Hill Trail	1934	✓	
Red Hill (Pu'u'ula'ula) Observatory	1963	✓	
Red Hill Stairs	1963	✓	
Red Hill Road	1963	✓	
Red Hill Parking Lot	1963	✓	
Red Hill Walkway (asphalt)	1963	✓	
Kalahaku Overlook	1966	✓	
Kalahaku Stairs	1954	✓	
Kalahaku Silversword Enclosure Wall	1966	✓	
Kalahaku Overlook Walkways	1954-1966	✓	
Silversword Trail at Kalahaku Overlook	1957	✓	
Leleiwi Overlook	1966	✓	

Non-contributing Structures: Based on the information provided in the CLI, the following structures have been identified as non-contributing features of the Haleakala Highway historic district:

Non-contributing Structure Name	Date Built	Concur	Do Not Concur
Haleakala Highway Stone Retaining Walls (6)	Built Post-1966	✓	
Haleakala Highway Stone Aprons	Built Post-1966	✓	
Haleakala Highway Asphalt Curbs	Built Post-1966	✓	
Haleakala Highway Culverts (49)	Built Post-1966	✓	
Haleakala Turnouts/Pullouts (15)	Built Post-1966	✓	
Halemau'u Trailhead Access Road	Altered 1976-1980	✓	
Halemau'u Trailhead Parking Lot	Altered 1976-1980	✓	

Non-contributing Structure Name	Date Built	Concur	Do Not Concur
Leleiwi Overlook Parking Lot and Sidewalk	Altered 1976-1980	✓	
Leleiwi Overlook Trail	Built 1976-1980	✓	
Kalahaku Overlook Access Road and Parking Lot	Altered 1976-1980	✓	
White Hill Parking Lot, Sidewalks, and Walkways	Altered 1976-1980	✓	
White Hill Restroom – Women's	Built ca. 2002	✓	
White Hill Rock Walls	Built 1976-1980	✓	
Red Hill Rock Wall around Observatory building	Built Post-1966	✓	
Red Hill Rock Walls along parking lot	Built Post-1966	✓	
Red Hill Sidewalks	Altered 1976-1980	✓	
Red Hill Walkway through plant bed	Built Post-1966	✓	
Red Hill Path, unpaved	Established Post-1966	✓	
Park Entrance Station	Built 1996	✓	
Vault Toilets (2)	Built 1993/2000	✓	
Underground Water Tank	Built 1980-81	✓	
White Hill Restroom – Men's	Altered 2002	Determined ineligible by SHPO 1/20/2000	

Reasons/comments why any 'Do Not Concur' blocks were checked:

Nancy A. McMahon Deputy SHPO 9/8/08

Hawaii State Historic Preservation Officer Date

Please return forms to the attention of:
Elizabeth Gordon
Cultural Resources Program Manager
Haleakala National Park
P.O. Box 369
Makawao, HI 96768

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Inventory Unit Summary & Site Plan

Inventory Summary

The Cultural Landscapes Inventory Overview:

CLI General Information:

Cultural Landscapes Inventory – General Information

The Cultural Landscapes Inventory (CLI) is a database containing information on the historically significant landscapes within the National Park System. This evaluated inventory identifies and documents each landscape's location, size, physical development, condition, landscape characteristics, character-defining features, as well as other valuable information useful to park management. Cultural landscapes become approved inventory records when all required data fields are entered, the park superintendent concurs with the information, and the landscape is determined eligible for the National Register of Historic Places through a consultation process or is otherwise managed as a cultural resource through a public planning process.

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, National Park Service Management Policies (2001), and Director's Order #28: Cultural Resource Management. Since launching the CLI nationwide, the NPS, in response to the Government Performance and Results Act (GPRA), is required to report information that respond to NPS strategic plan accomplishments. Two goals are associated with the CLI: 1) increasing the number of certified cultural landscapes (1b2B); and 2) bringing certified cultural landscapes into good condition (1a7). The CLI maintained by Park Historic Structures and Cultural Landscapes Program, WASO, is the official source of cultural landscape information.

Implementation of the CLI is coordinated and approved at the regional level. Each region annually updates a strategic plan that prioritizes work based on a variety of park and regional needs that include planning and construction projects or associated compliance requirements that lack cultural landscape documentation. When the inventory unit record is complete and concurrence with the findings is obtained from the superintendent and the State Historic Preservation Office, the regional CLI coordinator certifies the record and transmits it to the national CLI Coordinator for approval. Only records approved by the national CLI coordinator are included on the CLI for official reporting purposes.

Relationship between the CLI and a Cultural Landscape Report (CLR)

The CLI and the CLR are related efforts in the sense that both document the history,

significance, and integrity of park cultural landscapes. However, the scope of the CLI is limited by the need to achieve concurrence with the park superintendent resolve eligibility questions when a National Register nomination does not exist or the nomination inadequately addresses the eligibility of the landscape characteristics. Ideally, a park's CLI work (which many include multiple inventory units) precedes a CLR because the baseline information in the CLI not only assists with priority setting when more than one CLR is needed it also assists with determining more accurate scopes of work.

In contrast, the CLR is the primary treatment document for significant park landscapes. It, therefore, requires an additional level of research and documentation both to evaluate the historic and the existing condition of the landscape in order to recommend preservation treatment that meets the Secretary of Interior's Standards for the treatment of historic properties.

The scope of work for a CLR, when the CLI has not been done, should include production of the CLI record. Depending on its age and scope, existing CLR's are considered the primary source for the history, statement of significance, and descriptions of contributing resources that are necessary to complete a CLI record.

Inventory Unit Description:

The Haleakala Highway cultural landscape is a historic district that includes the NPS-portion of the highway as well as the development nodes along its route. The Haleakala Highway is a 37-mile road from central Maui's main town of Kahului to the summit of Haleakala, with the last 10.6 miles of the road within the Haleakala National Park. Along its entire course, the highway climbs to 10,000' from sea level, attaining this height in a shorter distance than any other road in the world, and provides access and views of the Haleakala Crater.

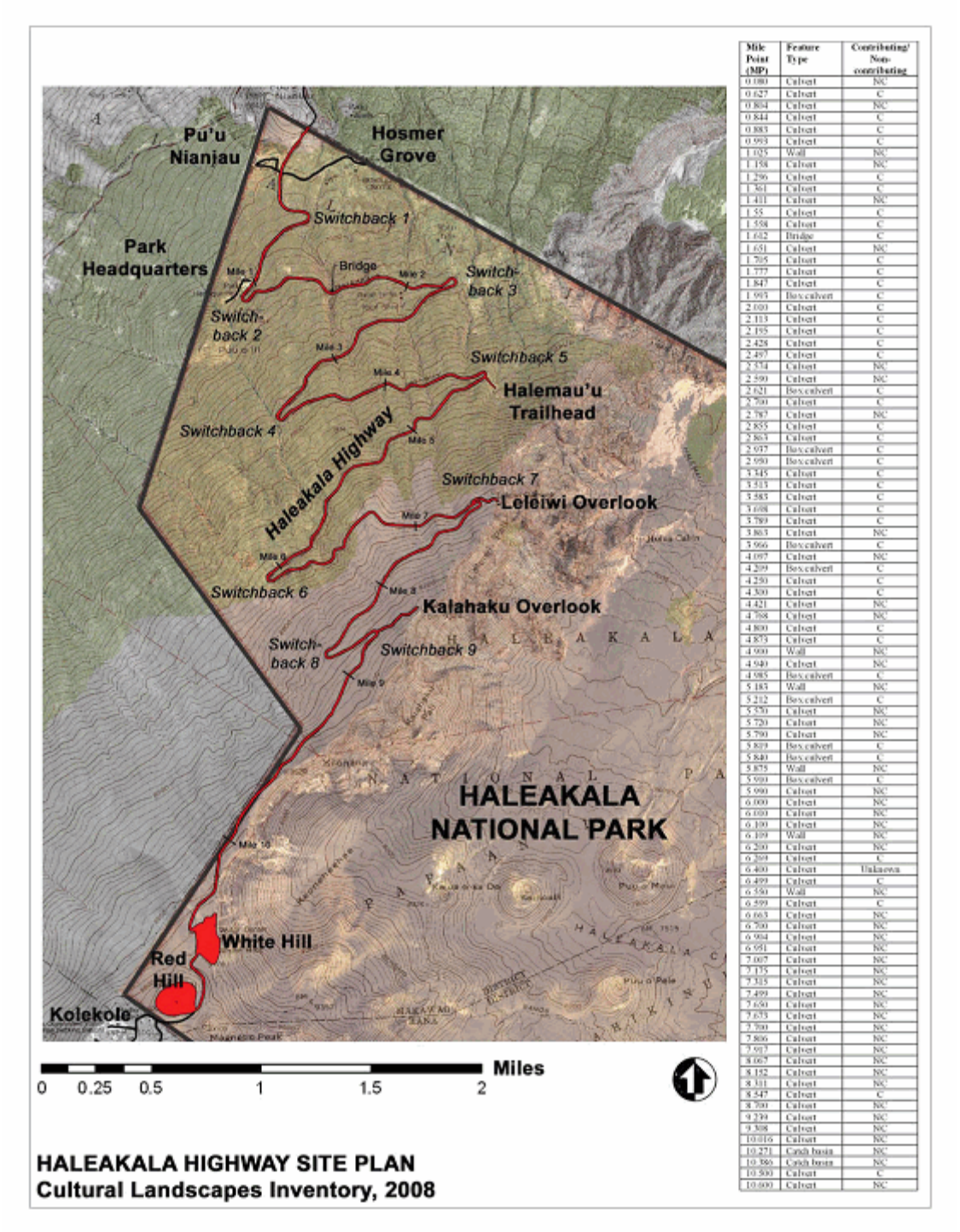
The 10.6-mile portion of the highway within the park boundaries was designed by the Bureau of Public Roads (BPR) between 1925 and 1933 with input from the Hawaii National Park superintendent and National Park Service (NPS) landscape architects. Road construction on this segment of the road began in 1933 and was completed in 1935 with improvements made at White Hill and the Kalahaku Overlook. Modifications and improvements to the transportation corridor continued until 1941 before the U.S. entered World War II and picked up again following the war as part of the Mission 66 Program. Alignment and construction techniques of the road, buildings, and structures were carefully employed to decrease its visual and physical impact on the landscape and to showcase the spectacular views of the island and ocean below as tourists would drive to the top of Haleakala Crater and culminate at the summit with views into the crater.

The cultural landscape resources documented in this CLI include the portion of the road owned and managed by the NPS and several of the developments along its route. The road corridor begins at the Haleakala National Park boundary at the northwestern corner of the park and ascends the northwest slopes of the Haleakala Crater with a series of switchbacks. Hosmer Grove, Park Headquarters Visitor Center, Halemau'u Trailhead, Leleiwi Overlook, Kalahaku Overlook, Haleakala Visitor Center (or White Hill Observation Station), and Red Hill (or the Pu'u'ula'ula Summit) are all accessed from the road, although Hosmer Grove and the Park Headquarters areas will be documented in separate CLIs

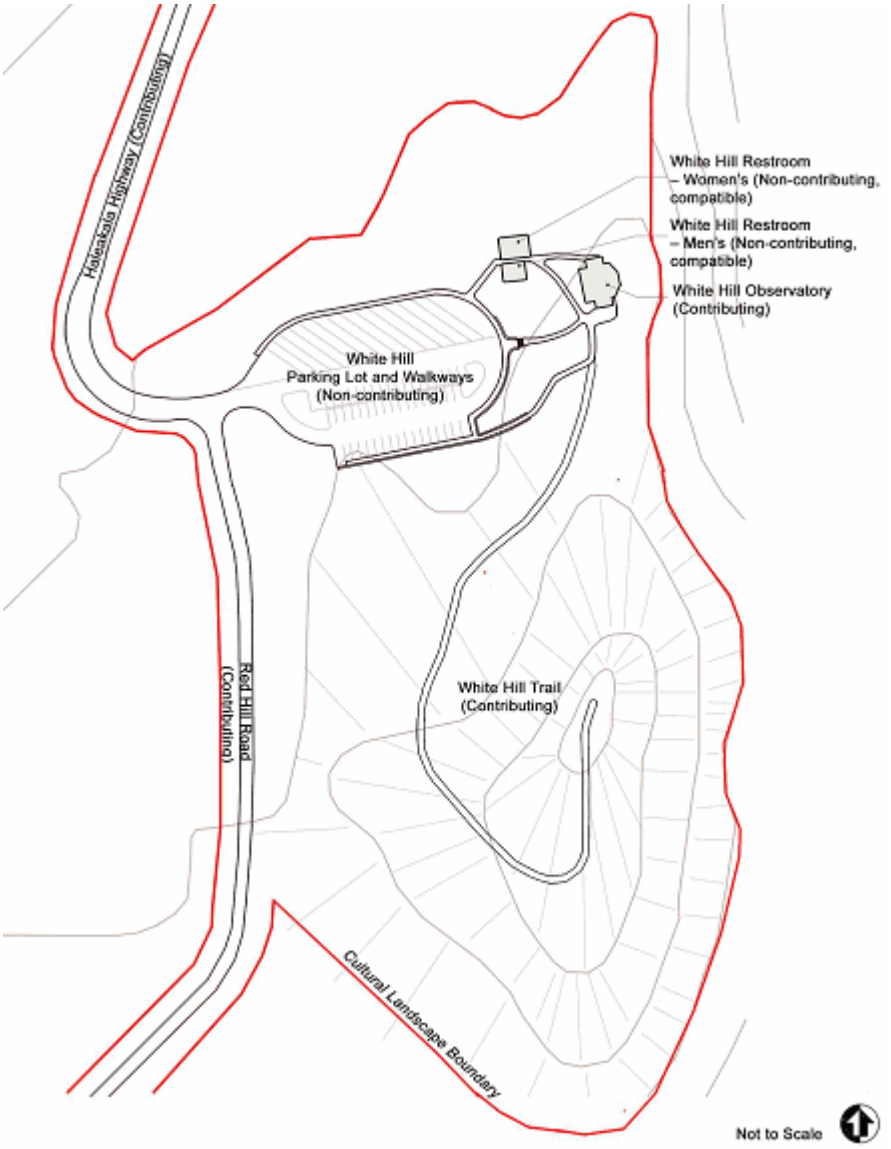
(see Boundary Description).

The period of significance for the historic district extends from 1933 to 1966, which begins with the initial construction of the road and covers the subsequent improvements and expansions of development nodes (such as Red Hill) along the road that furthered the park's mission to enhance visitor access to the Haleakala Crater. The period of significance ends with the construction of the observation structures at Leleiwi Lookout Point and the Kalahaku Overlook, the last Mission 66-related structures within the district boundary. Notably, this period includes the two intensive periods of development that defined the historic character of the district: the 1930s and Mission 66 eras. The proposed historic district contains buildings, roads, a bridge, trails, walkways, steps, retaining walls, culverts, and other features from the 1933 to 1966 period of significance which create a cohesive assemblage portraying NPS master planning from the 1930s and Mission 66 eras, and the evolution of NPS style from rustic to modern. The naturalistic and modern character of the historic district is evident in the following landscape characteristics: natural systems and features, spatial organization, land use, buildings and structures, circulation, topography, and views and vistas, and archeological sites. These characteristics and their surviving features continue to convey the historic character of the road as a scenic highway.

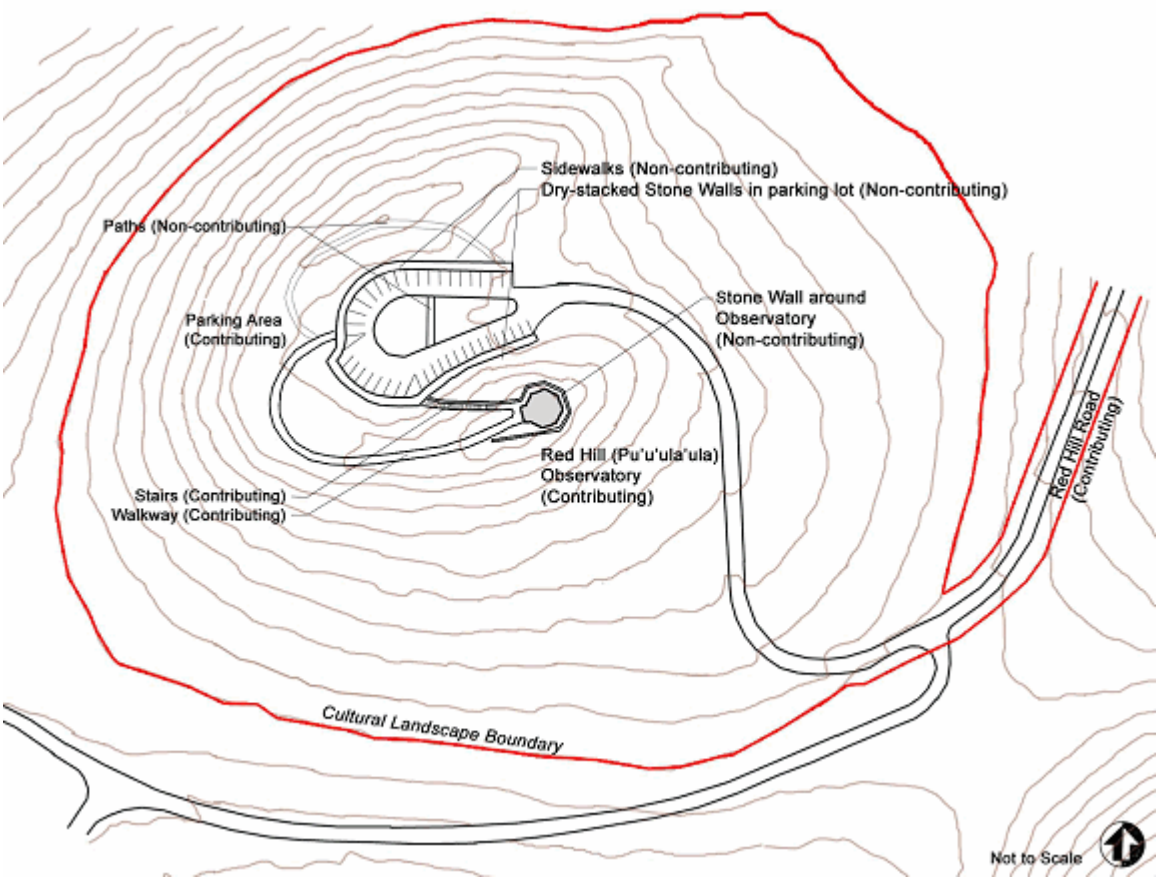
Site Plan



For a larger version of site plan see "Supplemental Information".



White Hill Site Plan. (PWRO 2008)



Red Hill Site Plan. (PWRO 2006)

Property Level and CLI Numbers

Inventory Unit Name:	Haleakala Highway
Property Level:	Landscape
CLI Identification Number:	975105
Parent Landscape:	975105

Park Information

Park Name and Alpha Code:	Haleakala National Park -HALE
Park Organization Code:	8290
Park Administrative Unit:	Haleakala National Park

Concurrence Status

Inventory Status: Complete

Completion Status Explanatory Narrative:

Field work was conducted in March 2006 by Mike Hankinson and Erica Owens. The report was written and prepared by Erica Owens.

Concurrence Status:

Park Superintendent Concurrence:	Yes
Park Superintendent Date of Concurrence:	05/28/2008
National Register Concurrence:	Eligible -- SHPO Consensus Determination
Date of Concurrence Determination:	09/08/2008

Geographic Information & Location Map

Inventory Unit Boundary Description:

The Haleakala Highway historic district is a 60-foot wide, 10.6-mile long corridor that has several access roads that connect to overlooks and a 0.7-mile Mission 66-era extension to Red Hill. The main corridor begins at the end of the territorial approach highway near Pu'u Nianiau at the park boundary and ends at the entrance to the White Hill parking lot. From White Hill, the corridor continues to follow the extension road to the Pu'u'ula'ula Summit at Red Hill. The boundary branches off the road corridor at four areas to include the following developments: Halemau'u Trailhead, Leleiwi Overlook, Kalahaku Overlook, and the Haleakala Visitor Center and parking lot at White Hill.

Boundary Justification
The boundary line parallels the center of the highway and access roads 30' in either direction from the centerline and includes all of the historic structures associated with road construction, including a bridge, box culverts, smaller culverts, ditches, and rock cuts, as well as the buildings, walkways, trails and other features associated with the developed areas.

The developments and access roads (both pre-Mission 66 and Mission 66) at the Hosmer Grove area, Park Headquarters, and Pu'u Nianiau are not included in the boundary of the Haleakala Highway CLI, but they will be documented in separate CLIs as the significance of the developments in these areas lie in the context of each respective developed area. The significance of these areas is not related to the highway which was built to provide visitor access to the Haleakala Crater. The significance of Hosmer Grove lies in the plantings of commercial trees in 1910 by Hawaii's first territorial forester, Ralph Hosmer, as part of a forestry experiment. The significance of the Headquarters area lies in the Rustic-era development and the Civilian Conservation Corps (CCC). The significance of Pu'u Nianiau lies in the U.S. Army's World War II-era presence in the park.

State and County:

State: HI

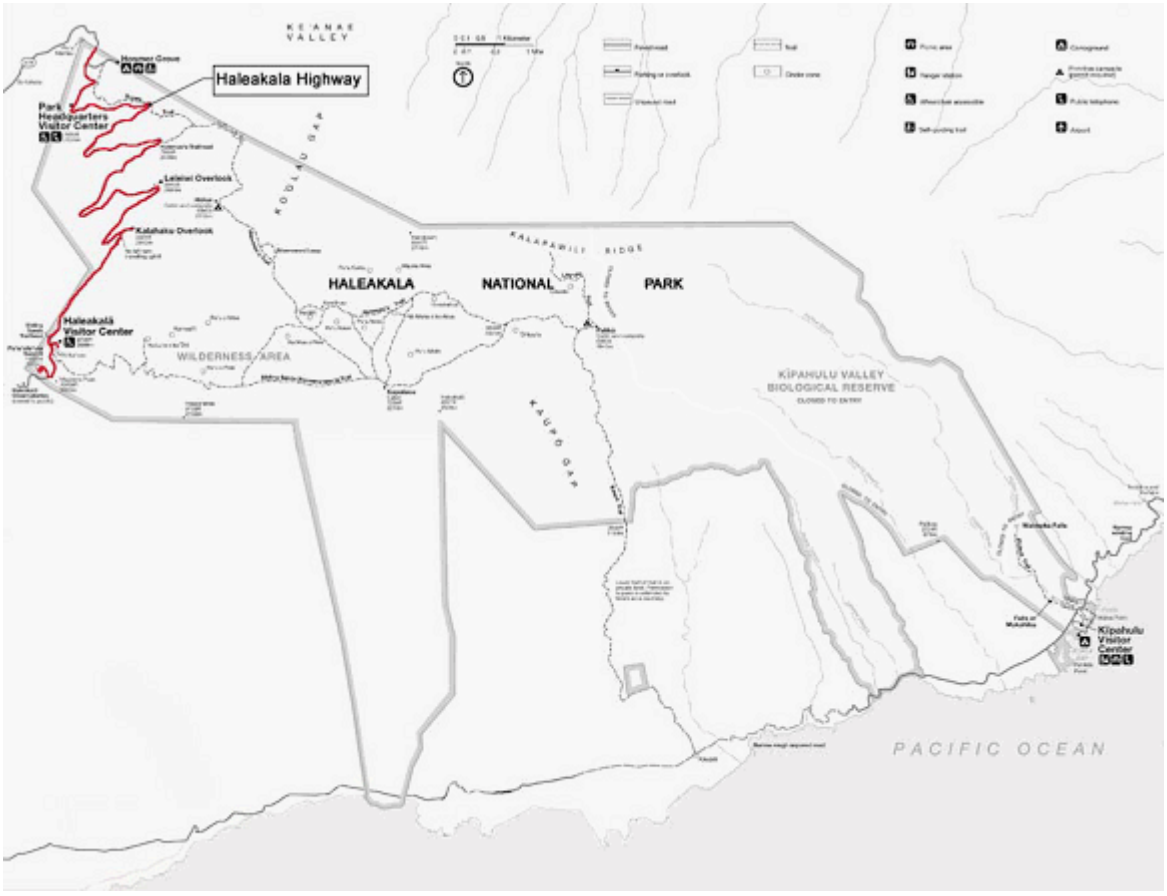
County: Maui County

Size (Acres): 110.00

Boundary UTMS:

Source	Type of Point	Datum	UTM Zone	UTM Easting	UTM Northing
GPS-Differentially Corrected	Line	NAD 83	4	787,199	2,299,206
GPS-Differentially Corrected	Line	NAD 83	4	786,671	2,297,870
GPS-Differentially Corrected	Area	NAD 83	4	788,302	2,298,012
GPS-Differentially Corrected	Line	NAD 83	4	786,946	22,969,955
GPS-Differentially Corrected	Line	NAD 83	4	788,536	2,297,300
GPS-Differentially Corrected	Line	NAD 83	4	786,885	2,295,715
		NAD 83	4		2,296,309
GPS-Differentially Corrected	Line	NAD 83	4	787,311	2,295,131
GPS-Differentially Corrected	Line	NAD 83	4	787,702	2,295,324
GPS-Differentially Corrected	Line	NAD 83	4	786,259	2,293,058
GPS-Differentially Corrected	Line	NAD 83	4	786,117	2,292,474

Location Map:



The Haleakala Highway is located within the northwestern portion of the park, traveling up the northwestern slope of the Haleakala Crater. (NPS 2007)

Regional Context:

Type of Context: Cultural

Description:

"Haleakala" from the Hawaiian language means "house [used] by the sun." Hawaiian legend tells that the demigod Maui lassoed the sun, slowed it down, and thereby lengthened the day, which allowed his mother Hina to dry her "kapa" (barkcloth) (Pukui 1986). The Haleakala volcano remains significant in Native Hawaiian culture today.

Type of Context: Physiographic

Description:

Haleakala Crater is at the summit of a massive 10,000' dormant volcano on the Hawaiian island of Maui. The crater is a 3,000' deep depression that is 7.5 miles by 2.5 miles wide. Surrounded by jagged mountain peaks, the crater is home to numerous threatened and endangered flora and fauna, most notably the "ahinahina" (silversword plant) and "nene" (Hawaiian goose). Geologic features in the crater include cinder cones, some of which rise over 600' high. Haleakala Crater is memorable for its dramatic panoramas, which are highlighted with vivid colors that vary from ochre to lavender to gold. Later additions to the national park were intended to ensure the protection of some of Hawaii's most outstanding natural features and endangered species, not only at Haleakala Crater, but also at the fragile ecosystem in the biological reserve of the upper Kipahulu Valley. Haleakala National Park was designated an International Biosphere Reserve in 1980.

Type of Context: Political

Description:

Haleakala National Park was originally a section of Hawaii National Park, which was established by Congress in 1916 to protect the outstanding natural features of Haleakala Crater on the island of Maui, and Kilauea and Mauna Loa volcanoes on the island of Hawaii. Haleakala became an independent national park, Haleakala National Park (HALE), in 1961. The park is located within the 2nd Congressional District of Hawaii.

Management Information

General Management Information

Management Category: Should be Preserved and Maintained

Management Category Date: 12/01/2006

Management Category Explanatory Narrative:

The inventory unit meets the following criteria for Management Category B: It meets National Register criteria (criterion A for park master planning during the rustic and Mission 66 eras and criterion C for workmanship related to these eras of development in the park); the inventory unit is compatible with the park's legislated significance (to protect and provide public access to the Haleakala Crater); and the inventory unit has a continuing or potential purpose that is appropriate to its traditional use or function (a road providing public access to the Haleakala Crater).

NPS Legal Interest:

Type of Interest: Fee Simple

Public Access:

Type of Access: Unrestricted

Adjacent Lands Information

Do Adjacent Lands Contribute? No

Adjacent Lands Description:

All lands that contribute to the inventory are located within the park boundary.

National Register Information

Existing National Register Status

National Register Landscape Documentation:

Undocumented

National Register Explanatory Narrative:

The Haleakala Highway has not been previously documented or listed in the National Register of Historic Places or on the Hawaii State Register.

National Register Eligibility

National Register Concurrence:	Eligible -- SHPO Consensus Determination
Contributing/Individual:	Individual
National Register Classification:	District
Significance Level:	Local
Significance Criteria:	A - Associated with events significant to broad patterns of our history C - Embodies distinctive construction, work of master, or high artistic values

Period of Significance:

Time Period:	AD 1933 - 1966
Historic Context Theme:	Creating Social Institutions and Movements
Subtheme:	Recreation
Facet:	Tourism
Time Period:	AD 1933 - 1966
Historic Context Theme:	Expressing Cultural Values
Subtheme:	Architecture
Facet:	Rustic Architecture
Time Period:	AD 1933 - 1966
Historic Context Theme:	Expressing Cultural Values
Subtheme:	Landscape Architecture
Facet:	The 1930's: Era Of Public Works
Time Period:	AD 1933 - 1988
Historic Context Theme:	Expressing Cultural Values
Subtheme:	Architecture
Facet:	NPS Mission 66

Area of Significance:

Area of Significance Category	Area of Significance Subcategory
Landscape Architecture	None
Entertainment - Recreation	None
Architecture	

Statement of Significance:

In 1999, the 10.6-mile portion of the Haleakala Highway located within the park boundary was documented by the Historic American Engineering Record (HAER) program in the report titled "Haleakala Highway, HAER No. HI-52." The report describes the highway segment as, "the classic National Park Service approach road, ... designed and built by the NPS and the Bureau of Public Roads during the Great Depression" (Duensing 1999, 1). In 2002, a multiple property submission entitled "Hawaii National Park: Planning and Development through World War II" was completed, but has not been submitted for SHPO review.

Building on the findings of these previously prepared documents with additional research and fieldwork for the cultural landscape inventory (CLI), the NPS-owned portion of the Haleakala Highway and its associated development nodes have been found to possess integrity. The Haleakala Highway cultural

landscape is a historic district found to have local significance under criterion A for its association with National Park Service master planning during the 1930s and Mission 66 eras. It is also locally significant under criterion C for its assemblage of buildings exemplifying the rustic and NPS modern styles of architecture and landscape architecture. The period of significance for the historic district extends from 1933 to 1966 which begins with the initial construction of the road and covers the subsequent improvements and expansions of development nodes (such as Red Hill) along the road that furthered the park's mission to enhance visitor access to the Haleakala Crater. The period of significance ends with the construction of the observation structures at Lookout Point and the Kalahaku Overlook, the last Mission 66-related structures built within the district. Notably, this period includes the two intensive periods of development that defined the historic character of the district: the 1930s and Mission 66. The proposed historic district contains buildings, roads, a bridge, trails, walkways, steps, retaining walls, culverts, and other features from the 1933 to 1966 period of significance which create a cohesive assemblage portraying NPS master planning from the 1930s and Mission 66 eras, and the evolution of NPS style from rustic to modern.

Although some historic features of the road have been removed or altered, key characteristics that historically defined the historic road and its associated development areas are intact and continue convey their historic character. Key characteristics of the historic district include the Haleakala Highway's alignment, the natural systems and features that influenced its design as well as the design of the overlooks, human manipulated topography to accommodate the roadbed (cuts and fills), views from the road to the island and ocean below and from the overlooks into the crater, the road's continued use as a tourist road to access the crater, circulation features (the road itself and White Hill trail), and several buildings and structures, including the rustic-style White Hill Observatory, a bridge, 11 box culverts, many small culverts with mortared stone headwalls, and the Mission 66 era observation structures at Red Hill, Leleiwi Lookout Point, and the Kalahaku Overlook.

The following narrative is modified from the Multiple Property Listing nomination, "Hawaii National Park: Planning and Development through World War II" and the "Historic American Engineering Record for Haleakala National Park Roads (HAER No. HI-52)":

Criterion A - Park Master Planning

Rustic Era Planning
In association with the events of the American Park Movement and early NPS master planning, the Haleakala Highway is significant as an integral part of the master plan of Hawaii National Park (HNP). 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)

Haleakala National Park was originally a section of Hawaii National Park, which was established by Congress in 1916 to protect the outstanding natural features of Haleakala Crater on the island of Maui, and Kilauea and Mauna Loa volcanoes on the island of Hawaii. Haleakala became an independent national park, Haleakala National Park, in 1961. Master planning efforts in the 1930s covered development on both islands. The first development plan for HNP 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 Western Field Office designers, making the effort more difficult than for mainland parks (Leavitt, Letter from HNP Superintendent to NPS Director, September 28, 1931). 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. At Haleakala, the section's anticipated primary access road bisected the narrow zone between the west park boundary and the crater's edge while the crater itself remained essentially undeveloped ("Special Areas & Fire Control Plan" [drawing], 1931).

Most aspects of park development were covered by the master plans, including roads, buildings, trails, backcountry shelters, fences, and picnic areas, as well as infrastructure systems like telephone, electricity, water, sewer, garbage collection, and forestry and fire protection systems. Of these, planners and designers expended considerable time and energy on the development of the park's roadways because they knew that the rapidly increasing use of automobiles by both visitors and land management officials made the successful creation of a car-centered circulatory system essential to the park's future. They also knew that roads were expensive to build and maintain, and because constructing them disturbed copious flora and fauna, their placement had to be very carefully planned. The most important road project proposed for the Haleakala portion of the park was the Haleakala Highway ("Special Areas & Fire Control Plan" [drawings], 1931-1939).

The other major focus of master planning at HNP was the identification and growth of "developed areas," small zones that were scattered across the park and contained most of HNP's buildings and structures. Strategically located along important stretches of road or at key intersections, these points of concentrated usage provided a complete visitor experience while allowing most of the park to remain essentially untouched. The growth of the most important existing or proposed developed areas was tracked on individualized, highly detailed drawings as part of the general development plan documentation. At the beginning of the master planning effort in 1931, HNP had six existing developed areas, five in the Kilauea section and one at Haleakala. Haleakala's one developed area, the Haleakala Rest House, was constructed by the Maui Chamber of Commerce at Kalahaku Pali ("Special Areas & Fire Control Plan" [drawing], 1931).

At first, park administrators and Western Field Office designers focused on the growth of these existing developed areas, but in the mid-1930s they began proposing new ones. Though generally smaller and more remote than their predecessors, these developed areas exhibited the same calculated roadside siting and visitor-oriented functions. Proposed in 1931 was the Haleakala Observation Station, now

Haleakala Visitor Center at White Hill, which originally consisted of a small overlook building, two toilet structures, and a surface parking lot for 90 cars. Sited in a dramatic crater-edge location at the end of the recently completed park road, this development was meant to serve as the major destination for Haleakala's car-based visitors ("Haleakala Headquarters & White Hill Area" [drawing], 1936).

Mission 66 Era Planning

In association with the NPS Mission 66 Program, development areas associated with Haleakala Highway (Red Hill, the Leleiwi Lookout Point, and the Kalahaku Overlook) are significant as a continuation of park planning efforts started in the 1930s to protect resources and increase visitor access to the crater. Mission 66 was a high profile, ten-year nationwide initiative aimed at modernizing the Park Service and accommodating changing visitation patterns. The program was so named because it would conclude in 1966 and commemorate the Service's fiftieth anniversary year. The years of neglect brought about by the economic climate of the war years left many of the Park Service facilities in substandard condition. The Service not only had inadequate housing for its own staff, it was also completely unprepared to meet the demands of the new influx of visitors introduced by a higher post-war standard of living and the automobile. In an effort to meet tremendous park needs with a limited budget, Mission 66 planners sought ways to modernize or update park facilities and, at the same time, decrease the cost of development. The NPS adopted contemporary modern architectural styles and methods of construction that were typically less expensive than traditional park styles and methods. Mission 66 represented the effort of the Park Service to update its facilities in preparation for the fiftieth anniversary of the Park Service in 1966, and is significant as historian Ethan Carr has argued as "the last major period of intense activity and profoundly new ideas to find expression in a systemwide program of national park development" (Carr 2007, 15).

During the Mission 66-era, most developed areas along the Haleakala Highway were updated, but the most significant developments along the road were at the Leleiwi Lookout Point, the Kalahaku Overlook, and Red Hill. The Mission 66 developments at Red Hill, Kalahaku, and Leleiwi are a continuation of the development that began in the 1930s to provide access to additional views of the Haleakala Crater in addition to those provided at White Hill. Red Hill is an especially intact Mission 66 development that includes an observation structure, an access road, parking area, and a system of walkways, and steps. Leleiwi Lookout Point and Kalahaku Overlook have observation structures with unobstructed views into the crater.

Criterion C

Rustic-Style Architecture and Naturalistic Landscape Design

The "rustic" approach toward national parks is most clearly evident in the design of individual buildings and landscapes of the period. Eventually referred to as the "Park Service Rustic" style, NPS designers integrated "the natural landform and character of each site" and "native materials and pioneering techniques of a region" into the badly-needed new park buildings and landscapes (McClelland 1998, 5.). As a result, many park structures built between 1916 and World War II did not appear as unwelcome, man-made intrusions into an otherwise bucolic landscape. Rather, these "rustic" designs complemented their sites, providing points of interest and destination for the visitor. When possible, the use of materials

and traditional building techniques typical of a particular park's context, such as stone walls and foundations in rocky landscapes, thatch roofs in tropical climates, or adobe in the American Southwest, highlighted the unique aspects of each park and allowed new construction to appear more appropriate, or "natural," to its setting.

The design of the 10.6-mile section of Haleakala Highway within the national park exhibits many characteristics of the naturalistic and rustic design styles, including the simple appearance of the road that belies the amount of engineering involved, the lack of guard rails so as not to impede views of the dramatic landscape below, the curvilinear alignment that hugs the natural topography of the slope and ravines, the "naturalization" of road shoulders, rock cuts, and fill slopes, the construction details for box culverts, small culverts, and the bridge, and the careful alignment of the road to maximize views and minimize the road's intrusion on the landscape. NPS landscape ideals are reflected in the road's relatively easy grades and curves, as well as in its harmony with surrounding terrain. Despite the fact that the road traversed open brush country, which is practically treeless due to over 100 years of ungulate browsing, careful alignment and landscaping during and after construction reduced or obliterated road scars. NPS landscape architect Merel S. Sager noted that the terrain itself was "not particularly interesting," but observed that the road provided beautiful panoramic views of the central Maui isthmus, West Maui, and other Hawaiian islands. Sager described the auto climb above the clouds as "inspiring" and claimed that the sunrise or sunset views over the clouds were "an experience long to be remembered" (Sager, December 10, 1935). Notable rustic structures and features along the road include the White Hill Observatory, White Hill trail, 11 box culverts, a bridge, and many small culverts with stone headwalls.

Although much of the rustic-style work on the Haleakala Highway was completed by contractors, the Civilian Conservation Corps played a small role in the development of areas along the road. CCC crews built the White Hill trail and graded the White Hill Observation site prior to the building's construction. While they conducted this work, as well as work on back country trails, they camped at the site of the crater rest house at Kalahaku.

Mission 66 Design

Following World War II, in an effort to meet tremendous park needs with a limited budget, Mission 66 planners sought ways to modernize or update park facilities and, at the same time, decrease the cost of development. The NPS adopted contemporary modern architectural styles and methods of construction that were typically less expensive than traditional park styles and methods. Modern style architecture emphasized machine production over craftsmanship and the use of new materials (inexpensive steel, concrete, and glass). Structural honesty, the use of simple, geometric forms, and restrained use of architectural details were important elements that characterized this style. The NPS adapted the style to visually blend the buildings into their surroundings through plainness, low massing, horizontal lines, and earth tone colors. To further increase efficiency, the NPS produced standardized architectural plans for park buildings that that were repeated throughout the region and nation, with modifications allowed to address specific landscape constraints such as sloping topography, as well as variations in climate.

During the Mission 66-era, most developed areas along the Haleakala Highway were updated, but the most significant developments along the road were at the Leleiwi Lookout Point, the Kalahaku Overlook, and Red Hill. The observatory at Red Hill was designed by Cecil Doty, a prominent NPS architect during the Mission-66 era. The development at Red Hill was constructed in 1963 and is nearly intact as originally designed and constructed. In addition, two observation structures located at the Kalahaku Overlook and Leleiwi Overlook were built in 1966, and exhibit the simple modern, architectural details characteristic of the Mission 66 era. Their geometric forms are typical of Mission 66 era design and their use of modern materials (steel and glass) as well as native rock reflects the modern philosophy to incorporate new materials, but at the same time blend in with the surrounding environment and with previously constructed rustic buildings such as at White Hill. The result is a sensitive development that uses modern design techniques, blends in with the earlier rustic style, and is, as a result, an excellent example of the park's transition from rustic to modern design.

National Historic Landmark Information

National Historic Landmark Status: No

World Heritage Site Information

World Heritage Site Status: No

Chronology & Physical History

Cultural Landscape Type and Use

Cultural Landscape Type: Designed

Current and Historic Use/Function:

Primary Historic Function: Automobile

Primary Current Use: Automobile

Current and Historic Names:

Name	Type of Name
Haleakala Highway	Historic
Park Road	Current

Chronology:

Year	Event	Annotation
AD 1828	Explored	Three American missionaries stationed in Hawaii, Richard Green, Lorrin Andrews, and William Richards, were the first non-Hawaiians to record their ascent of the Haleakala Crater.
AD 1841	Explored	Charles Wilkes and his party explored and mapped the area as part of the United States Exploring Expedition.
AD 1890	Established	By 1890, tourism was established in the Hawaiian Islands and Haleakala was Maui's prime attraction. The sunrise view had been established as an obligatory activity by then.
AD 1894	Built	The first facility, the crater rest house, was built at the crater's edge near current location of the Kalahaku Overlook.
AD 1900	Established	Organized visitor services to Haleakala's summit became available in the early twentieth century, including expeditions by horseback from Olinda.
AD 1915	Established	Interest in a road to the summit of Haleakala was growing. It was considered essential for the growth of tourism on Maui. Locals began considering possible routes for a summit road.
AD 1916	Established	Hawaii National Park was established.
AD 1920 - 1929	Established	Horace Albright, Field Assistant to the Director of the NPS, expressed interest in a road to the summit.
AD 1924 - 1925	Built	Two sleeping dormitories, an observation room, and a concrete water tank were added to the rest house area at Kalahaku.

AD 1925	Established	In May, Congressional Representatives W. C. Cramton of Michigan and J. A. Taylor of West Virginia visited Maui and toured Haleakala with local officials, including Governor Wallace Farrington. Cramton was chairman of the House Appropriations Sub-committee for the Department of the Interior and supported the proposal to build a road to the Haleakala Crater.
AD 1925	Established	In October, Superintendent Boles announced that a survey for the proposed Haleakala road would begin.
AD 1925	Designed	In October, a reconnaissance survey was conducted by Superintendent Boles, BPR Senior Highway Engineer Kittredge, and BPR Honolulu District Engineer Frank Wheeler. The report described two feasible locations for a road to the summit: the Olinda and Kula routes. The Olinda route was favored by Kittredge as it was considered significantly more scenic.
AD 1926	Designed	A memorandum of agreement was established between the NPS and the Bureau of Public Roads (BPR) allowing the NPS to use the BPR's expertise and organization to conduct surveys, determine contract specifications, and manage construction. Park superintendents and NPS landscape engineers determined the locations and character of park roads.
AD 1931	Designed	During the summer, a location survey was made by R. M. Belt, Senior Engineering Inspector Foreman of the Bureau of Public Roads, using the McCracken 1925 preliminary survey as a basis. The upper terminus was to be the rest house at Kalahaku. The road would be located around Pu'u o Ilii for the purpose of providing views of the central Maui valley. The survey called for the road to make "dips" into the crater three times at various elevations to provide additional views.
AD 1932	Designed	Senior Engineering Inspector-Foreman H. L. Handley made another road survey with the terminus at White Hill. The survey was to determine the most economical line possible, disregarding the park boundaries and following the mountain's contours as much as possible.
AD 1932	Designed	The final location survey was conducted from October through December.

AD 1931 - 1933	Built	The Territory of Hawaii constructed an approach road to the park boundary on which the NPS's plans for developing the Haleakala Highway were contingent.
AD 1933	Established	Original funding for the road was pulled due to the Great Depression. However, in the same year, new funding was acquired through the National Recovery Act of 1933.
AD 1933	Built	Construction of the road commenced on October 13, 1933 by Contractor E.E. Black, Ltd. of Honolulu.
AD 1934	Built	Local masons were employed to construct the masonry headwalls for the culverts and box culverts.
AD 1934	Built	The bridge was completed in August.
AD 1934	Built	The terminus at White Hill was completed, including the masonry wall. A CCC crew built a trail to the top of White Hill. The trail was 4' wide with a grade of 10%. (Narrative Report to the Chief Architect by Merel S. Sager, Associate Architect, Aug. 1-Aug.30, 1934)
AD 1934	Established	A CCC crew of 25 young men camped at the site of the old rest house at Kalahaku while they worked on the Halemau'u Trail and White Hill trail.
AD 1935	Built	Circa 1935, A simple, barbed wire enclosure was constructed around a patch of silversword plants at Kalahaku. This area was accessed by a trail from the highway.
AD 1935	Built	In March, the Haleakala Highway was completed and a dedication ceremony held.
AD 1935	Paved	The Hawaii Contracting Company, Ltd. of Honolulu was awarded the bituminous surfacing contract. Surfacing was completed in December.
AD 1935 - 1936	Restored	Under Sager's recommendation and Handley's supervision, a park force account (temporary day labor) began landscape restoration along the road including covering rock fills with soil.

AD 1935	Altered	Due to the road's tremendous popularity, traffic safety immediately became an issue. Boulders were placed along the outside of several curves and center lines were painted at each curve.
AD 1936	Built	At White Hill, the summit observation station and comfort stations were constructed by E. J. Walsh. A CCC crew helped to grade the site for the station prior to its construction (source).
AD 1936	Altered	Due to several rock slides, large rocks on the road banks were blasted and removed to prevent further damage to the road and improve visitor safety.
AD 1937	Altered	A white center line that consisted of white spots was painted along the entire length of the road to help visibility during heavy fogs and mist.
AD 1935 - 1940	Altered	To improve drainage on the road, park crews reduced the slopes on some of the road fills by adding new material. Some drainage ways were enlarged and some lined with stone. Additional drainage ditches were also constructed. Flagstone pavement set in concrete mortar was laid at the approaches to culverts where water was damaging the roadway. (These have since been removed or replaced.)
AD 1941	Built	Prior to 1941, the Department of the Interior and Department of War worked out an agreement for the army to use the summit area of Haleakala at Red Hill. In July, the army announced its plans to construct a spur road that linked the terminus of the Haleakala Highway with Haleakala's summit at Red Hill, which was constructed within the year.
AD 1941		After the attack on Pearl Harbor, the park was completely closed to the public. It was partially reopened in 1942 and completely opened in 1946.
AD 1950	Neglected	On June 2, the park service opened the Red Hill Road to the public to allow visitors to view the eruption of Mauna Loa. The Red Hill area was littered with dilapidated military buildings and several unsightly 90' tall antennae.
AD 1950 - 1959	Neglected	The condition of the territorial road, outside the park, was reported in poor condition.

AD 1950 - 1959	Altered	Haleakala crews continued to improve the park road during the 1950s. Slopes were stabilized by removing loose rocks and overhangs. Walls were constructed at the base of some slopes along the upper portion of the road. Some retaining walls were removed and material was used to build up and widen shoulders. In 1959 crews blasted and widened cuts in the upper three miles of the Haleakala Highway. Surplus material was used to reinforce fills and build up narrow shoulders.
AD 1952	Paved	A new sealcoat was put on the road surface and the center-line striped with a solid yellow line.
AD 1954	Built	A New comfort station was built at White Hill (today`s men`s comfort station).
AD 1954	Built	The road to the 1914 rest house and silversword enclosure at Kalahaku was constructed, following a pre-existing trail.
AD 1954	Built	In mid-1954, park road crews constructed an access road to the Civilian Aeronautics Administration (CAA) site at the Kolekole area, just outside the park boundaries south of the summit. The road ran in a southwesterly direction out of the park from the Red Hill Road. (Today the facilities are managed by the University of Hawaii and referred to as the Haleakala Observatories.)
AD 1955	Demolished	The original stone pit toilets at White Hill were razed.
AD 1954 - 1955	Built	The Pine Trees Camp and Picnic Ground Road (at Hosmer Grove) were constructed.
AD 1954 - 1955	Altered	Improvements to the main road included stabilization of slopes near the park entrance and a new entrance sign.
AD 1950 - 1959	Designed	1950s master plans included a development proposal for the Pu'u'ula'ula Observatory at Red Hill.
AD 1957 - 1857	Demolished	The 1914 rest house at Kalahaku Overlook was demolished.

AD 1957	Altered	The parking area near the Kalahaku Overlook silversword trail was enlarged. Steps and handrails were installed from the parking lot to the overlook. The trail along the silversword enclosure was widened.
AD 1961	Established	In June, Haleakala National Park and Hawaii Volcanoes National Park were designated as a two separate parks.
AD 1961	Demolished	Military buildings on Red Hill were obliterated and the area was graded and landscaped. The old road built by the military was eliminated and a new road to the Red Hill summit was constructed. The new road to Red Hill did not follow the ridgeline up to the summit as the military road did, but instead terminated in a depression below the summit.
AD 1962 - 1963	Built	The development at Red Hill (or Pu'u'ula'ula Summit) was designed and constructed. The Red Hill Observatory was designed by Cecil Doty.
AD 1966	Built	The Kalahaku Overlook structure and rock wall along the silversword trail were constructed.
AD 1966	Built	The Leleiwi Overlook structure was built and a parking area was constructed as a simple pullout.
AD 1980	Altered	The road was entirely resurfaced in a three-phase project. The road was widened in areas. New culvert headwalls were constructed where culverts had to be widened to accommodate the wider road bed.
AD 1977	Altered	Circa 1977, the Kalahaku Overlook parking area was slightly enlarged and curbs added to define edges of parking area and road.
AD 1977	Altered	Circa 1977, the Leleiwi Overlook parking area was expanded to include a parking island with plant beds and spaces for ten cars. The Leleiwi trail was improved.
AD 1993	Built	A vault toilet was installed at Halemau'u Trailhead.

AD 1996	Altered	Projects completed along the road included repairing pavement failures, installing a cattle guard at the park boundary, and widening the road in four locations to provide slow vehicle pullouts and space for an entrance fee kiosk in the center of the road.
AD 1999	Paved	In October, the road was resurfaced and the hitchhiker pull-out was constructed near the Halemau`u Trailhead.
AD 2002	Built	Women's comfort station constructed at White Hill. The 1954 historic comfort station was converted to a men's comfort station.
AD 2007	Altered	At the Halemau`u hitchhiker`s pull-out, the road was reconstructed due to a lava tube underneath the roadbed.

Physical History:

The following history is taken from the Historic American Engineering Record for Haleakala National Park Roads (HAER No. HI-52), which was completed by Dawn E. Duensing in 1999. The narrative has been shortened to fit the CLI database. For the complete history narrative, please see the HAER report on file at the park.

Pre-1925

EARLY TRAVEL TO HALEAKALA

Numerous archaeological sites including "heiau" (temples), platforms, pictographs, and burial sites indicate that Haleakala was a significant destination for ancient Hawaiians. Precious resources such as basalt, a dense rock used for adze making, were gathered near the summit (1). Slingstones have been found in the crater district, suggesting that ancient people visited Haleakala to hunt birds whose feathers were used in traditional art and clothing. According to Hawaiian tradition, the crater was also a sacred place where religious ceremonies were conducted. Hawaiians often buried their dead in isolated, remote areas, thus making the crater a favored burial site. Finally, the crater was an important link in Maui¡¦s transportation network; trails through the crater allowed for easier travel to East Maui. The Kihapiilani Highway, or the King's Highway, was probably the most established trail. This was a thoroughfare paved with smooth rock that led from the summit area, through the crater and Kaupo Gap, to East Maui (2).

Three American missionaries stationed in Hawaii, Richard Green, Lorrin Andrews, and William Richards, were the first non-Hawaiians to record their ascent of the massive volcano in 1828. After an early start from an undetermined location in East Maui, they reached the summit of Haleakala at about five o'clock in the afternoon. Although tired, they reported that they felt "richly repaid for the toil of the day, by the grandeur and beauty of the scene (3)."

Thirteen years later, Charles Wilkes and his party explored and mapped the area as part of the United States Exploring Expedition. Wilkes' account of his trip referred to the volcano as Mauna Haleakala, or House of the Sun, although he admitted he could not discover why it was so named. Some residents speculated that the name derived from the sun rising over the mountain and over to the people of West Maui (4).

Other than sailors from the mid-nineteenth century whaling boom in Hawaii, tourists on Maui were rare until the late nineteenth century. In 1881, Constance Frederica Gordon-Cumming described her horseback trip to Haleakala's summit. Guided by two natives, her party commenced in Makawao, situated on the slopes of Haleakala at an elevation of 1,500 feet. There were two choices for lodging between Makawao and the summit: S. T. Alexander's mountain house in Olinda (located at approximately 6,000' elevation, east of today's Haleakala Highway), or a campsite in a "lava bubble" (cave) about a mile below the summit (5).

By 1890, tourism was established in the Hawaiian Islands and Haleakala was Maui's prime attraction. Although access to the crater was not easy, The Tourists' Guide through the

Hawaiian Islands described the various ways visitors could reach the summit of Haleakala. Travel was available from several points, including central Maui's main town at the time, Wailuku (near Kahului); the north shore town of Paia; or Makawao, above Paia.

The sunrise view had been established as an obligatory activity by 1890, and tourists started their ascent as early as 2:00 a.m., which allowed time for horses to travel at a slow pace. According to the tourist literature, the arduous travel was worthwhile, as travelers were rewarded with a view of "the most stupendous of nature's works." The author was impressed with the crater's immense size, asserting that it could hold the whole of New York City south of Central Park (6).

With tourism on Maui established, the first summit facility, a rest house, was constructed near the crater's edge in 1894 (7). Organized visitor services to Haleakala's summit became available in the early twentieth century, including expeditions to Haleakala by horseback from Olinda (8).

In 1911, The Maui News reported that tourist visits to Haleakala were increasing, though a 1914 editorial complained that Haleakala still attracted relatively few tourists. The newspaper pointed out that Kilauea, on the island of Hawaii, received many more visitors because it was accessible by road and Haleakala was not (9). The editorial foreshadowed the competition for improved roads to attract tourists that would develop between the islands of Maui and Hawaii in the coming decades.

Despite the challenging access to Haleakala, tourists continued to visit the site and Maui residents remained committed to providing visitor services. The increasing number of visitors, as well as vandalism, rendered the rest house inadequate by 1914. A new concrete rest house on the edge of the crater was built in 1914. In 1924-25, two sleeping dormitories, an observation room, and a concrete water tank were added. By then, locals had raised and spent nearly $20,000 for improvements to accommodate visitors at Haleakala, creating an even stronger demand for improved access to the crater (10).

A road to the summit of Haleakala was considered essential for the growth of tourism on Maui. If a road were built, it would encourage visitors who previously neglected the summit to return to Maui and also attract those who had never been to Maui, both from the U.S. mainland and from the other Hawaiian Islands (11). Alexander Hume Ford extolled the virtues of Haleakala and a road to the summit in a lengthy letter to the Maui News. Ford asserted that the crater provided Maui with "the greatest possible tourist asset in the world." His big dreams for Haleakala included a comfortable hotel on the crater rim as well as a road into the crater itself. The excitement generated by discussions about a road to Haleakala prompted locals to begin considering possible routes for a summit road as early as 1915.

In 1920, the National Park Service's growing interest in a road to the summit of Haleakala was noted by Horace Albright, at that time Field Assistant to the Director of the National Park Service. Albright visited Haleakala's summit via the Olinda route and reported, "Ultimately a road should be built from Olinda to the summit of Haleakala, in order that everybody may make

the ascent in comfort and enjoy the wonderful effects of sunset and sunrise to be observed from the crater's rim (12)."

The first superintendent assigned to Hawaii National Park, Thomas Boles, made his first trip to Maui in 1924. Most of his expenses were paid by Maui¡¦s Haleakala enthusiasts. Boles also spoke to the Maui Chamber of Commerce, whose members were interested not only in the possibilities of a Haleakala road, but also in general park development issues.

In May 1925, Congressional Representatives W. C. Cramton of Michigan and J. A. Taylor of West Virginia visited Maui and toured Haleakala with local officials, including Governor Wallace Farrington. Cramton was chairman of the House Appropriations Sub-committee for the Department of the Interior and supported the proposal to build a road to the Haleakala Crater. Following Cramton's visit to Maui, the Chamber of Commerce and The Maui News worked to keep the subject of a Haleakala road alive and worked on a plan to obtain the necessary land. A Maui News editorial promoted the project as a commercial road, not just a scenic highway, emphasizing that catering to tourists was just as much a commercial enterprise as more obviously utilitarian pursuits. Scenic assets not accessible to visitors represented a loss of potential revenues that could be recouped by road development (13).

HAWAII NATIONAL PARK DEVELOPMENT

Prior to the completion of Haleakala Highway in 1935, the Haleakala section of Hawaii National Park could be described as a forgotten stepchild. During the period 1922-1933, the NPS was primarily concerned with improvements in the Kilauea section of the park. In 1921, Maui residents expressed concern about the lack of supervision in the Haleakala section of the national park. Their concerns were prompted by the lack of protection for the rare ahinahina (silversword). The Chamber of Commerce urged the federal government to do something to protect the plant before it became extinct (14).

The drive for a new road to the summit was the impetus as well as the means for development of the Haleakala section. It took nearly twenty years after the establishment of Hawaii National Park for the administrative situation to improve in the Haleakala section. Only after the Haleakala Highway was built did the National Park Service assume active administration of the area.

1925-1932

SURVEYS FOR A ROAD TO THE HOUSE OF THE SUN

In October 1925 Superintendent Boles announced that a survey for the proposed Haleakala road would begin. Haleakala Highway would be designed and constructed following standard National Park Service road-building policies, which were based on the 1926 memorandum of agreement between the Park Service and the Bureau of Public Roads. The interagency agreement allowed the NPS to use the BPR's expertise and organization to conduct surveys, determine contract specifications, and manage construction. Park superintendents and NPS landscape engineers determined the locations and character of park roads. This ensured that

park roads were built to the highest engineering standards while protecting landscapes and park values. The 1926 agreement provided the framework for decades of cooperation between the NPS and BPR, including the design and construction of Haleakala Highway (15). The Haleakala Highway project involved some of the most well-known names in the National Park Service, from early conceptualization of the road by Director Horace Albright to the planning and construction phases that included BPR engineer Frank A. Kittredge and NPS landscape architects Thomas Vint and Merel S. Sager.

Road surveys in the 1920s were typically conducted in three stages: reconnaissance, preliminary, and location. Each successive survey was completed with a greater level of precision and descriptive information (16). In October 1925, a ¡§hurried¡¨ reconnaissance survey for the proposed Haleakala Highway considered an Olinda route. The survey was conducted by Superintendent Boles, BPR Senior Highway Engineer Kittredge, and BPR Honolulu District Engineer Frank Wheeler (17). When Kittredge reported on his 1925 survey work at Haleakala, he described two feasible locations for a road to the summit: the Olinda and Kula routes. Kittredge did not favor the Kula route, as he believed it was not particularly scenic. Its only benefit would be a more easily acquired right-of-way. Kittredge regarded the Olinda option as significantly more scenic (18).

Shortly after Kittredge's "hurried" reconnaissance survey, a BPR survey team led by Assistant Highway Engineer E. J. McCracken ran preliminary lines for a proposed road from Olinda to the summit (19). McCracken's more detailed analysis incorporated aspects of Kittredge's reconnaissance surveys. McCracken's line had one terminus at the crater rest house and the other at Olinda, with a spur road to Kula. McCracken's survey was completed on December 4, 1925.

During the summer of 1931, a location survey was made by R. M. Belt, Senior Engineering Inspector Foreman of the Bureau of Public Roads, using the McCracken 1925 preliminary survey as a basis. The upper terminus was to be the rest house. The road would be located around Pu'u o Ilii for the purpose of providing views of the central Maui valley. The survey called for the road to make ¡§dips¡¨ into the crater three times at various elevations to provide additional views (20).

After the survey was completed, NPS Chief Landscape Architect Thomas Vint suggested the terminus be changed from the rest house to White Hill, which was located nearer the summit of Haleakala. Vint believed that it would be easier to get good views from White Hill, since it was not obscured in clouds as often as the rest house was.

In February 1932, NPS Assistant Landscape Architect John Wosky inspected the Belt survey. As a result of his study, the Belt survey was abandoned, the idea of using the rest house has a destination was abandoned, and the upper terminus became the White Hill area. Wosky's rejection of the BPR survey demonstrated that the BPR and NPS had different approaches to road building. More importantly, Wosky's refusal to accept the Belt survey showed how the 1926 NPS-BPR agreement was supposed to work: the NPS exercised its right to determine the location and character of park roads when scenic concerns and technical considerations came

into conflict. Wosky's primary objective was to keep the road out of the crater (21). It is unclear who decided that the road should not go into the crater, but Resident Landscape Architect Merel S. Sager felt that it seemed desirable to move the road away from the rim to prevent the motorist from viewing the crater until arriving at White Hill. In this scenario, the summit view of the crater would be the grand finale of the trip (22).

With the new provisos of avoiding the crater and having a White Hill terminus, Senior Engineering Inspector-Foreman H. L. Handley made a hurried reconnaissance survey in June 1932. This time, Handley's survey was governed by stipulations radioed from the San Francisco office of the BPR on June 1, 1932. The survey was to determine the most economical line possible, disregarding the park boundaries and following the mountain's contours as much as possible. This would provide a gentler grade and allow the builders to minimize expensive cuts and fills. Handley was instructed to survey based on a 6% grade above the rest house and to use grade compensation on switchbacks. He was instructed that short stretches of 7% grade could be introduced if found advisable. The new instructions specified that curves should have a minimum radius of 75 feet, though the engineers were encouraged to create the most gradual curves possible. Specifications called for the road to be 8 feet wide, widening to 16 feet on switchbacks. Superintendent Leavitt was requested to make a report on additional land that might be needed where the survey extended beyond park boundaries.

Handley described how the difficult topography affected his location survey. There were numerous small gullies to contend with, as well as two large ravines that almost paralleled each other about a half-mile apart. The engineer attempted to keep the line between the two ravines by using switchbacks as necessary until the line reached an elevation at which the ravines were small enough to cross without using large culverts or bridges (23). Handley insisted that these conditions, coupled with the BPR's latest directives, necessitated a dramatic departure from previous proposals. Handley maintained that it was impossible to follow the previous reconnaissance survey "even approximately" without departing significantly from the mandate to follow the contours as closely as possible without increasing the grade at times to compensate for the additional length induced by the additional curvature. Handley explained that the instructions to locate the road on contour required a great deal of curvature. This reduced the average grade to 5%, causing an appreciably longer roadway to be required to reach the summit (24).

Despite these extraordinary efforts, Handley noted: "Even with the use of these short radius curves, the line cannot be considered a contour location in many places." He explained that lava ridges and sharp depressions made it impossible to locate a line on contour with permissible curves. In order to locate a line that would conform to BPR standards, it would be necessary to cut through the ridges and fill the valleys in a way that would increase the road's cost beyond reason. Taking everything into consideration, Handley's survey was made with the longest radius curves possible and the estimates were made for a full 16 foot surface on all blind curves and reverses (25).

The tone of Handley's comments on alignment and grade indicated his frustration in dealing

with the BPR's specifications. He emphasized that the location survey was made with the understanding that all curves should be compensated and that some 7% grades were acceptable. He reiterated that it was impossible to follow San Francisco's instructions without making an entirely new location survey independent of the reconnaissance survey, which was exactly what he did (26).

Handley recommended the construction a 35 foot span bridge over a deep gulch between stations 85+15 and 85+50 just above the park entrance. The bridge would be on a 40 degree curve and the suggested width was not less than 20 feet. The road surface at that point was 11 feet wide. The survey also called for nine box culverts with cement rubble masonry. Handley advised using as little concrete as possible due to the fact that water was scarce on Haleakala and concrete relatively expensive (27). The location survey was completed on November 21, 1932.

In keeping with the established NPS-BPR road building procedures, National Park officials made suggestions for improvements to the plans in progress while Handley's crew was conducting the Haleakala survey. Park personnel participated in planning and review; with NPS landscape engineers studying aesthetic and scenic concerns, including viewpoints and the smooth flow of the road over the landscape's natural contours (28). In 1932, NPS landscape architect John B. Wosky spent almost a month making a thorough inspection of Hawaii National Park. Wosky, Superintendent Leavitt, and several other park employees visited the Haleakala section, where they noted that the proposed terminus at White Hill would make an excellent location for a hotel or rest house. Leavitt reported that Wosky went on foot from White Hill to the park's lower boundary and carefully studied all viewpoints, suggesting several changes along the route. He did not provide details of Wosky¡¦s proposed changes (29).

Leavitt monitored BPR survey activities and reviewed Handley's work. Leavitt saw two important differences from previous surveys. "First," he observed, "instead of fewer switchbacks with longer tangents along the mountainside, Mr. Handley felt it desirable, in order to save the expense of building bridges, to keep between the two largest and deepest gorges coming off the mountain, especially on the lower end of the road." In order to keep the road between the gullies, approximately ten additional switchbacks were added to the road plans. The second change was that Handley had located the road outside the park boundary just before it reached White Hill. Leavitt suggested that he try to keep the road within the existing park boundary and route the road across a deep gorge so that longer tangents could be run and some of the switchbacks eliminated. Handley accepted the superintendent¡¦s advice (30). The final location survey was conducted from October through December 1932 (31).

APPROACH ROAD TO THE PARK

The NPS's plans for developing the Haleakala Highway were contingent on the Territory of Hawaii constructing an approach road to the park boundary. The territorial portion of the road led from the Kula road, not Olinda, to the national park boundary. The road length was approximately ten miles with twenty-three switchbacks and an average grade of 6%. The maximum grade on the approach road was 8.5%. The road consisted of an 8 foot macadam

surface on a 12 foot grade. Frequent pullouts were provided for passing cars (32). The territory started construction on the approach road in June 1931 (33). The three-year project was finally completed on April 2, 1933. The road to the park boundary opened to the public that same month (34).

FUNDING

In 1931, $200,000 was appropriated for the construction of the Haleakala road within the national park. In February 1932, Superintendent Leavitt issued a press release announcing his upcoming visit to Maui and expressing his eagerness to carry out development plans there. He expressed his hope that the worsening economic depression would not interfere with work scheduled for 1932 (35). In 1933, with the United States sliding deeper into the Great Depression, the Bureau of the Budget in Washington, D.C. ordered that no new road construction be started, allowing funds to be used for payment on the previous year¡¦s projects. Since the Haleakala road had never been contractually obligated for construction, funds for that project were withdrawn (36). Politicians and local organizations in the territory urged the National Park Service to fund Hawaii National Park projects to help alleviate the effects of the Depression.

Press reports indicated that a public works bill in Congress was being considered and speculated that it might provide HNP between $500,000 and $1,000,000 (37). In July 1933, NPS Director Albright announced a $16 million appropriation for NPS road construction, including $400,000 for the Haleakala road (38). The road was financed through the National Recovery Act of 1933. The appropriation designated $376,000 for construction and $24,000 for engineering (39). Maui was finally getting the road it had dreamed of for more than thirty years. Contractor E.E. Black, Ltd. of Honolulu submitted the low bid, $367,068.32 and work commenced on October 13, 1933 (40).

1933-1936

CONSTRUCTING HALEAKALA HIGHWAY

In October, landscape architect Merel S. Sager was detailed to Hawaii National Park by the NPS Branch of Plans and Designs to supervise the landscape development issues on road construction projects at Haleakala and Kilauea. Sager arrived in Hawaii on November 3 and made his first inspection of the project with Superintendent Leavitt (41). Leavitt, who had for years been involved with the planning of the Haleakala road, was transferred to Mesa Verde National Park (42). Hawaii National Park's new superintendent, Edward G. Wingate, formerly of the Hawaii Volcano Observatory, believed Sager's services were valuable in supervising the work of the road contractor, E.E. Black, Ltd.

Specifications
The Haleakala road began at the end of the territorial approach highway near Pu'u Nianiau at the park boundary and extended to the rim of Haleakala Crater near White Hill. The elevation at the lower terminus was 6,700 feet, at the upper terminus, 9,735 feet. The construction project consisted of 10.658 miles of grading, draining, and surfacing with treated, crusher-run

base course. The controlling width of the roadway was 14 feet, carrying a crown section of 8 feet with 3 foot shoulders on each side and no ditches. Standard widening was used on all curves. All blind curves and reverses were widened by an extra 8 feet. Slopes were flattened and widened wherever the terrain permitted (43). The roadbed from shoulder to shoulder was surfaced with a 4 inch course of crusher-run material. The surface was treated with an application of 0.3 gallon per square yard of asphalt emulsion and covered with clean stone screenings. As soon as the fills on the new road were completely settled, a wearing surface on the road was to be applied. For that purpose, the contract also required crushing and stockpiling sufficient amounts of graded material for the wearing surface project (44).

The average grade on the Haleakala Highway was 5.367%. Every effort was made to keep the controlling grade down to 6% and the grade on all curves was "compensated" from 6%. Although there were a few short stretches of 6.8% grade on the road, these were not considered as adverse grades. The road had nine switchbacks (45). In comparison, the territorial approach road leading to the national park had an average grade of 6% with maximum grades of 8% and twenty-three switchbacks in a similar length of road (46). The minimum radius on the park road was 75 feet and this minimum was used only three times. There were five switchbacks with radii of 100 feet; one had a 42 degree curve. A curve of 100 feet radius with a central angle of 90 degrees led into the parking lot at the end of the road (47).

Excavation and Grading

The first shipment of construction equipment arrived at Kahului Harbor on October 12, 1933, and a small work gang began clearing the right-of-way on October 13. Progress on excavation work was quite satisfactory. In less than fourteen months, 121,746 cubic yards of material were moved. This was considered admirable progress as the work was heavy and had to be attacked from only one point since there were no roads into the area. NPS policy prohibited the introduction of construction access roads to minimize negative impacts on the surrounding landscape. To comply with this policy, construction crews had to work within the road's right-of-way. Pack mules carried all drills and explosives to the work site (48). Compressors were located as far ahead as possible on the grade and the air was piped ahead for drilling. To cross streambeds and gullies, construction crews sometimes built temporary wooden bridges and occasionally filled the streams with rocks. The contractor was advised against this practice because it would be necessary for them to remove excavated material and restore the stream to its natural condition (49).

The treeless, open brush country rendered practically all of the construction conspicuous when viewed from below. In September 1934, Sager requested and received an appropriation of $5000 to cover rock fills with soil. At first, there was confusion as to who would do the work, the contractor or the National Park Service. In January 1935, the work was started under a park force account (temporary day labor) and supervised by resident engineer Handley. The landscape restoration work continued long after the road was completed. No soil was brought in from off-site locations as anticipated. Fill and topsoil were obtained by flattening the cuts more than the specifications required. Sager was proud of this work and attached photographs to his final report to show how well the soil treatment worked to immediately obliterate the

construction scars. This work also provided conditions conducive to the early return of vegetation. Sager noted that confusion would have been avoided if this work had been included in the original construction contract (50).

Bridge and Culverts

In January 1934, construction of masonry headwalls for pipe culverts was started in the path of the grading. Local Japanese masons were employed. There was difficulty in getting them to build the masonry work as required by the contract. According to Sager, the specifications were not as detailed as on other national park projects and the first few masonry headwalls failed to meet requirements. The engineer noted that uniform joints, large stones, pointed joints, and the "rustic" appearance typically used in NPS construction were unfamiliar to Maui masons. The masons had to be replaced several times and work had to be rebuilt, causing the contractor to lose money. Headwalls for both pipe and concrete culverts were built as fast as the masons could work and, on a few of the box culverts, the headwalls were built before the concrete work was finished (51).

The Haleakala Road included one 47 foot long, single-span reinforced concrete girder bridge at Station 85+30. The bridge had a curved alignment and was 20 feet wide with stonework walls and abutments. As with the masonry headwalls, the workers had problems getting the stonework to meet NPS requirements (52). The concrete girders were not faced with stone as in much NPS road construction. Sager wanted to match the concrete girder to the color of the adjacent stonework. The concrete lintels and masonry headwalls were treated with a 10% solution of commercial hydrochloric acid and given two coats of saturated copperas solution. This was ineffective in making the bridge a dark enough shade to match the stonework. After several experiments with stains and oils, the problem was solved by applying a mixture of cement and lamp black. In addition to the bridge, there were 11 concrete box culverts with headwalls of rubble masonry. All concrete in the culverts was treated with a coat of cement and lamp black to match the shade of masonry. Corrugated metal culverts carried the rest of the drainage. Hand-laid rock berms were constructed on return curves to prevent scour and seepage through fills (53).

Concrete work began in May 1934 on the box culvert at Station 105+16 and was finished before September 15, 1934. The concrete work on the box culverts was completed in succession up to the culvert at Station 217+00. The bridge was poured in August and was nearly finished by the end of the month. The box culverts were also finished and backfilled that month (54). By the end of September, the road project was approximately 73% complete (55).

Surfacing

The contractor set up a crushing plant at station 160+00 with the bins across the roadway¡¦s centerline and began manufacturing the crusher-run bottom course in early June. All crusher rock was quarried onsite by widening rock cuts uniformly along the road (56). Once rock crushing was underway, experiments were made with short stretches of surfacing to determine the stability of the roadbed under traffic with the prescribed base course of 0.3 gallon of bitumus per square yard. In June 1935 Superintendent Wingate reported, "This sample of surfacing has not stood up under traffic and action should be taken immediately to apply an

armor coat surface to protect the base. Fills seem to be in a stable condition, and probably will not affect the surface (57)."

Obtaining a product with a sufficient proportion of fine material to meet specifications was a major problem. The hard blue basalt on Haleakala crushed satisfactorily, but would not make sufficient fines without a pulverizer. Fines had to be manufactured from the only material available: cinders from volcanic cones above Station 300+00. The cinders proved to be satisfactory, as the material possessed the proper cohesive qualities when compressed, made a hard, impervious surface, and did not absorb moisture and become muddy. In early September 1934, short stretches of crushed rock bottom course were surface-treated with emulsified asphalt at the rate of 0.3 gallon per square yard. Wingate reported that the surface stood up remarkably well at all points where there were sufficient fines in the base course and the base was properly worked. Small sections that showed evidence of insufficient fines were treated with additional fines until they compacted and held up under traffic. Frequent light rains and moisture from heavy clouds helped to bind the material (58). Having learned that the surface treatment was effective, the contractor then surface-treated the entire roadbed, completing this work by February 20, 1935 (59). By this time, the Haleakala road project was more than 95% complete (60).

Engineers discovered that if traffic was not allowed on the surface, part of the road would settle after thawing, but there would still be large patches where the surface was completely destroyed. They attempted to correct this defect by making a heavier application of asphalt (0.425 to 0.45 gallon per square yard) and applying a sealcoat at points with the greatest amount of damage. Although Superintendent Wingate thought the problem was solved, the heavier application helped, but did not eliminate, the problem. Sager agreed that the second oil treatment minimized the trouble, but noted that the problem was not completely fixed and would not be until an armor coat was applied, thus making the surface absolutely water tight (61). Engineers expected the road to weather the trouble during the first winter, but anticipated problems for the following winter. The material cost overrun of emulsified asphalt to repair the road between Station 300+00 and Station 567+00 amounted to 50%, the only material item that exceeded the contract estimate (62).

Contract Changes

A change was made to the contract in September 1934 after additional study of the alignment at the road's higher elevations; the parking area was moved from the southwest of White Hill to the north in order to provide a better point of observation and better shelter from the wind. This change required a revision of the line from Station 510+00 to 567+00, the end of the project. At Stations 519+00 and 548+00 the original survey line came to the edge of the crater and prescribed a 10 foot widening of the roadbed and construction of a masonry guardrail. The road was not widened and the masonry retaining wall was constructed at the upper terminus of the project instead. The survey line was moved away from the crater rim in order to prevent motorists from viewing the crater before arriving at White Hill (63). The change order also covered modifications to several culvert plans and locations (64).

A trail from Station 476+00 to the rest house was constructed by the contractor under an extra

work order. Sager considered it a "fine standard trail" and was pleased that enough money was saved on the project to give the trail a good treatment of oil to pack the surface and prevent dust. A parking area at the beginning of the trail was made possible by widening the upper side of the road (65).

Extensive changes had to be made to the survey¡¦s drainage plans. During construction, Handley studied the drainage problems and discovered that, in many cases, water did not run in what appeared to be well-defined watercourses. In some cases, gullies carried no water after a rain, while large amounts of water ran over the tops of cuts where no flow was indicated. Handley's observations taught him some geological lessons about Haleakala. The mountain was a relatively young volcano. Consequently, there was very little erosion and water flowed everywhere over the hard basalt rock, not necessarily into gullies. Based on this information, some corrugated metal pipe culverts had to be moved and numerous diversions or collection ditches were dug in order to confine the drainage across the roadway to watercourses where the culverts had already been installed (66).

Sager was pleased with the final results of the Haleakala Highway project. He concluded that the ten-mile section of highway completed within the national park was superior in every way to the approach road constructed by the Territory of Hawaii. He observed that the National Park Service had provided a necessary park development and more than fulfilled its obligation to connect the territorial approach road to the rim of the crater. Sager predicted that, with the application of the armor coat, the new road would handle park traffic for many years in the future. He maintained that the project was outstanding in the Territory of Hawaii in its general appearance, especially since National Park Service road standards requiring cleanup and elimination of road scars were not common practices in this part of the country (67).

Sager, Wheeler, Superintendent Wingate, Handley, and Black made a final inspection of the Haleakala Highway on March 14, 1935. The project was recommended for approval on March 20, 1935.

ROAD DEDICATION

Maui residents had worked for more thirty years to get their road to the summit of Haleakala. When the road was finally finished in early 1935, it was an occasion for celebration. The Maui Chamber of Commerce began planning festivities in March 1934. The chamber hired a full-time publicist and adopted the slogan "Bring the World to Maui (68)." The road was dedicated on February 23, 1935.

A one-hour radio broadcast by KGU in Honolulu transmitted the summit ceremonies to islanders throughout the territory. Superintendent Wingate enthused, "today dreams have come true. There is a road - thanks to those men of this Territory who have had both vision and will, and we are very happy. We are happy because now we know that the thrill which we have experienced will no longer be denied to anyone. Sunrise on Haleakala! and sunset - the brocken spectre! - the Silversword! These are for everyone now - and these are yours (69)."

Sager maintained that transportation improvements had traditionally been motivated by economic or material reasons. More recently, he claimed, roads were constructed for the sole purpose of making rare natural beauty accessible to the public. He explained the benefits of the new road while also warning of potential problems:

The National Park Service, with its chain of scenic jewels, has been charged with a sacred trust of preservation. It likewise has a duty to provide limited accessibility, but when accessibility comes, preservation is jeopardized. The National Park Service, through its landscape architects, makes critical study of all proposed road projects, for it is easily seen that an excess of development or the absence of careful planning ultimately destroy the very features which the Service is charged to preserve.

Sager continued by briefly highlighting a few NPS road construction principles used on the new road:

The Haleakala Highway, within the park, has been made unobtrusive in the landscape by location and methods of construction. Road cuts have been flattened and rock fills have been covered with soil permitting vegetation to quickly return and thus harmonize this man-made construction with its surroundings.

He praised the beauties of Haleakala and emphasized its importance to the National Park Service:

Haleakala Crater with its majestic expanse of colorful cones and precipitous walls has much to offer the observer in a spiritual way. It is akin to the Grand Canyon in its power to emotionally direct man's imagination into a realization of the great forces of nature. Here unfolded before him is the vivid story of not only the creation of a great mountain but of the creation of all the islands as well. Here is a panorama of elusive wild beauty which, thus far, the camera and brush have never caught. Haleakala is truly of national park standard and the National Park Service is proud of its part in making this superb spectacle accessible to all those who will only come and see (70).

FINAL TOUCHES

The initial contract for construction of the Haleakala Highway included surfacing with crusher-run material and stockpiling three sizes of crushed mineral aggregate for the final surfacing. The roadway embankments and surface were allowed to settle for almost a year in preparation for a bituminous surface treatment. The roadway design called for crushed rock surfacing to be placed over the entire roadway, but no shoulders. The sealcoat covered the entire roadway and the bituminous surface treatment extended to within one foot of the road's edge on embankments (71).

On August 1, 1935, an appropriation for $42,040 from the National Parks Roads and Trails Emergency Construction was approved for the bituminous surfacing project. The Hawaii Contracting Company, Ltd. of Honolulu submitted the low bid. The contract was signed

October 16, 1935 (72).

The specifications for the surface treatment included cleaning the roadway, applying 1/8 gallon of emulsified asphalt per square yard of surface, and covering the surface with a layer of coarse screenings. Another layer of intermediate screenings and emulsified asphalt of 1/4 gallon per square yard was then to be applied. A second application of emulsified asphalt at the rate of 3/8 gallon per square yard with intermediate screenings was laid. Finally, an application of sealcoat at the rate of 1/4 gallon emulsified asphalt was laid with a cover of fine screens (73).

In order to avoid the problems associated with the onset of an early winter on the mountain, the contractor chose, at his own responsibility, to begin this project as soon as recommendation of the award was made. The contractor began work on September 26 and the contract was signed on October 16, 1935. Surface treating of the road began at the summit parking area at White Hill. The construction was completed down to Station 173+00 near the stockpiled material, and then completed from Station 0+00 up to Station 173+00 (74). Despite the early difficulties with equipment, good progress was made and the contractor finished ahead of schedule, thus avoiding the severe winter weather (75). The project was recommended for approval on December 3, 1935, a few days after the final inspection was made (76).

Sager's final inspection report pointed with pride to the fact that, though the highway traversed a treeless area, the construction was relatively inconspicuous. Revegetation efforts were still underway and workers were transplanting grass on the most conspicuous road banks (77). Sager hoped that additional amelioration of construction scars would take place after the basic construction was completed. The surfacing contract had an estimated $14,000 left when it was completed. Wingate requested that $6,000 be transferred to the park for post-construction projects as there was insufficient time to get approval from Washington for any extra work orders. The work suggested for post-construction included building up shoulders on eroded embankments, facing ditches with stone, and covering rock fill scars with soil to encourage the return of vegetation (78). Workers continued the job of spreading soil on road banks to promote the growth of vegetation until mid 1936 (79).

Sager ended his final report by advising against further road construction on Haleakala. "There has been, and no doubt will be, agitation for a highway down into the Crater of Haleakala," he observed. While local interests would inevitably insist on the need for additional development, Sager insisted, "The service should never give ear to such a proposal as it would be a glaring violation of our obligation to preserve the areas of rare natural beauty in the parks." Continuing in this vein, he advised, "The present Haleakala Highway adequately fulfills the obligation and need of making the Crater accessible. It is believed the fine balance between accessibility and preservation has been reached at Haleakala as far as highway building is concerned. Any proposal for road work inside the Crater should be forever vigorously and strenuously opposed (80)."

Haleakala Highway, late 1930s. (HALE archives)

White Hill develpoment in 1936. Both sets of restroom facilities are extant, the pit toilets are in the distance and the newer restrooms are closer to the Observatory. (HALE archives)

1936-1939

USE AND MAINTENANCE

The popularity of the new road was evident by the end of 1935, when District Ranger Peck reported an increase in visitation of 455% in December over November. Not only did motorists come to view Haleakala from the newly completed roadway, but 3,500 visitors hiked to the summit of White Hill to observe the eruption of Mauna Loa on the island of Hawaii (81). Visitors also took advantage of the roadway to view botanical wonders, including the native sandalwoods, in bloom (82). In June 1941, traffic was well above normal as residents traveled to see the blooming silverswords (83).

Easy accessibility together with Haleakala¡¦s popularity led to the development of visitor services in the park. ¡¡±Sorely needed structures¡¨ such as a checking station, comfort stations,

and the summit observation station were completed by mid-1936. The ¡¡±normal¡¨ monthly travel statistics for June 1936 were 193 cars and 965 visitors. In October, 241 cars and 1,365 visitors were reported, an increase of more than 10% over the previous month¡¦s record. The year¡¦s visitation totaled 23,668 (84). Visitor facilities were further improved with the addition of shelters in the crater constructed by the Civilian Conservation Corps in 1937 (85).

Due to the road¡¦s tremendous popularity, traffic safety immediately became an issue for island residents. It was only a matter of months after the road¡¦s opening before complaints about the new highway were being registered with the National Park Service. In June 1935 Wingate made an inspection trip to Haleakala to substantiate claims that the lack of guardrails and markers along the road¡¦s curves made driving dangerous. His inspection failed to reveal any serious hazards, except to speeders. Nevertheless, Wingate asked Peck to have workers place boulders along the outside of several curves. It was believed that the boulders ¡¡±would do¡¨ until the road surfacing was completed and the center line painted (86). In November, two accidents resulted in fatalities, the first of which killed a motorist when his car went off the road. In another mishap, a driver turned out too far for an oncoming car, and rolled down the embankment. The superintendent noted that both incidents occurred on straight stretches of highway (87). By the end 1935 Wingate noted, ¡¡±At last the sharpest curves of a good portion of the Haleakala road are painted with center lines for guidance, which should be quite a safety factor for motorists (88).¡¨ In early 1937, the district ranger was instructed to paint a white center line the entire length of the road due to the constant heavy fogs and mist which made driving extremely hazardous. By May, work was completed on a center stripe that consisted of white spots (89).

Maintenance problems on the new highway were due primarily to natural phenomena. Alternate freezing and thawing at the highway¡¦s higher elevations caused the most persistent and troublesome problems. Water in the rock adjacent to the road froze, broke apart the rocks, and sent them onto the roadway. During the first winter the road was open, the superintendent routinely reported that workers spent a significant portion of their time clearing the road of rubble. Park workers frequently blasted and removed rocks from the upper banks along the road after they had been undermined by the weather. In June 1936 the district ranger reported that large rocks on the road banks had been blasted and removed because they appeared dangerous. He predicted, ¡¡±Continual freezing and thawing will necessitate more or less constant work of this nature¡¨(90). Eighteen years after construction, rockslides continued to be a problem and retaining walls were constructed to prevent the road from sliding (91).

Rain was another source of trouble for the new Haleakala Highway. During the winter rainy season, the superintendent noted monthly rainfall totals. In 1937, 16¡¨ of rain fell in January and 22.8¡¨ in March (92). In January 1948, 24¡¨ of rain fell in a two-day period, causing tremendous damage to the road. Culverts were clogged and rain 6-12¡¨ deep ran over the road in some places. Sections of pavement were washed away from the road and tons of dirt and rock washed onto the road. Some of the larger boulders had to be towed off the road with a truck (93). A ten-ton boulder had to be blasted and removed from the roadway after a heavy rain in March 1954 (94). Other ¡¡±acts of God¡¨ plagued the Haleakala Highway, including earthquakes. On January 29, 1938, the most severe earthquake in years caused a rockslide

over the road (95).

To improve drainage on the road, park crews reduced the slopes on some of the road fills by adding new material. Some drainways were enlarged and some lined with stone. Additional drainage ditches were also constructed. Flagstone pavement set in concrete mortar was laid at the approaches to culverts where water was damaging the roadway (96).

Perhaps the most unusual maintenance problem encountered during the early years of Haleakala Highway was damage attributed to pheasant droppings. The berries that the pheasants ate seemed to soften the bitumuls that bound the road. This softening seemed to be ¡¡±sufficiently permanent¡¨ that it caused traffic to suck out the loosened material, which left small pits in the road surface. The smaller pits were not a problem, but the larger pits allowed the damage to extend down to the road¡¦s base course (97). It is unknown how the park solved this problem.

Hawaii's mild climate also meant that vegetation along the roadways was a common problem. In June 1939, the park reported that an "imported, virile, creeping grass (kikuiu) [sic] is attacking the pavement of the Haleakala Road in two spots." Maintenance tried to dig out the grass, but that damaged the road too much. Two experiments were then tried, including killing the grass with a blowtorch and drenching it with creosote. The methods appeared to be successful and the cheaper method was to be adopted (98).

1940-1969

RED HILL DEVELOPMENT

Except for some minor improvements, Haleakala Highway remained largely unchanged until the approach of World War II in the Pacific. Sometime prior to April 1941, the Department of the Interior and Department of War worked out an agreement for the army to use the summit area of Haleakala at Red Hill (99). Red Hill was a cinder cone located less than a half-mile southwest of White Hill. Red Hill was not on the crater rim, but it was the true summit of Haleakala at 10,023 feet. In July 1941, five months before the Japanese attack on Pearl Harbor, the army began pushing the National Park Service for an extension of Haleakala Highway to the summit at Red Hill. The army had already established a camp on a flat above Pu'u Nianiau near the park entrance and insisted on the military necessity of establishing its presence at the summit. The park service remonstrated that the proposed improvements would create a conspicuous scar on the landscape (100). Nevertheless, the superintendent reluctantly gave authorization for part of the summit work, a six-acre Aircraft Warning Service (AWS) system on Red Hill (101). On December 7, 1941, following the attack on Pearl Harbor, the U.S. Army closed the Haleakala section of the park.

To access the Red Hill site, the army constructed a spur road that linked the terminus of the Haleakala Highway with Haleakala's summit. In July 1941, the army announced it would soon build a road from the White Hill parking area to the summit of Red Hill so that construction could begin on a signal corps station (102). The alignment of the army's spur road ran between White Hill and Red Hill and ascended up a very steep grade the last few hundred yards to the

summit. At the summit, the road ran along the ridge of the hill in the location of today¡¦s footpath (103). The AWS began operations in May 1942, but after less than one year the installation was abandoned because the natural features of the site did not allow the communications equipment to work properly. In April 1944, the Army began constructing a radar complex on the Red Hill site, including a number of brick buildings that appeared alarmingly permanent. After stalling, the Army returned the base camp property to the NPS in 1946 and Red Hill in 1948. In the ensuing years, however, the Army joined the Air Force, Mutual Telephone Company, University of Hawaii researchers, the Hawaii Air National Guard, the Federal Aviation Administration, and the Atomic Energy Commission in claiming that Red Hill and other park lands were necessary for their activities. This tense situation continued into the mid-1960s, when the agreements were reached to either temporarily use areas within the park, or use lands outside the park or on other islands (104).

Postwar road issues for the Haleakala section of Hawaii National Park centered on the inadequacy of the territorial approach road to the park, which Superintendent Frank Oberhansley dismissively characterized as "their so called trail up the mountain (105)." Hawaii National Park¡¦s assistant superintendent, Eugene J. Barton, assigned to the Haleakala section, gave Maui credit for having generally excellent roads, "the most notable exception being this ridiculously narrow approach to the park." He suggested that the territory could widen the road along the present alignment and make a good mountain highway with relatively little expense (106). HNP records do not indicate how the poor condition of the territorial approach road may have affected visitation. The Haleakala section of Hawaii National Park was making excellent progress on its postwar road repairs until a lengthy dockworkers' strike in 1949 caused a shortage of road oil, which slowed down the work (107). Park roadwork included patching raveled edges, cleaning gutters, and widening and dressing the shoulders (108).

On June 2, 1950, the park service opened the Red Hill Road to the public to allow visitors to view the eruption of Mauna Loa. The public response was favorable and travel to the Haleakala section increased by more than 54 %. Unfortunately, the Red Hill area was littered with dilapidated military buildings and several unsightly 90 foot antennae (which would later be completely removed in the 1960s). The military refused to give up its special use permits for the summit or remove buildings due to the Korean Conflict (109). After Red Hill Road opened to the public, "auto caravans" continued to the Red Hill summit following their stop at the observation station (110).

ROAD MAINTENANCE AND TOURISM

Despite the improving visitor services in the park, the situation on the approach road remained dire. Park Ranger James C. Lindsay claimed that there were so many chuckholes on the territorial road that a car could not miss them. He also noted that rockslides continued to cover the sides of the road and make it narrower (111).

The issue of constructing a road through the crater resurfaced in late 1950. During a special session of the Territorial Legislature, a resolution was passed urging the National Park Service to begin a study of the feasibility of a road through the crater. The legislators pointed out that

the East Maui community of Hana had a new airport and the territory had plans to increase tourism in the islands. By building a road through the crater, they argued, visitors could have a loop tour of East Maui from Kahului to the crater, down to Hana and then back along the coast to Kahului (112). NPS Director Newton B. Drury responded that the NPS could not conduct a survey because funding had been reduced due to the military situation in Korea (113). The idea of a road through the crater was still a matter of public discussion in 1954, especially after the new Maui Palms Hotel in Kahului opened and prompted local businessmen to expand their efforts to increase Maui tourism. Assistant Superintendent Barton did not explain why the NPS would not build the road, but he rebuked local officials by commenting that the territory should fix their poor approach road to the park rather than work on a scheme for a new road (114).

As of the early 1950s, the territory still had not started to rehabilitate the approach road. The National Park Service continued to maintain and improve the section of Haleakala Highway within its jurisdiction, however. A traffic counter was installed to provide an accurate account of visitation (115). Walls were constructed at the base of some slopes along the upper portion of the road. Where retaining walls were located on the inside or bank side of the road, they were removed and material was used to build up and widen shoulders. Narrow cuts were widened where loose material had been slipping down for years. Rocks in danger of falling from slopes and upper edges of cuts were broken, brought down with dynamite, and used to strengthen fills and shoulders. The park estimated that fifty tons of material was removed from rock cuts near Hosmer Grove. In addition, crews widened the road for turnarounds and parking (116). Major maintenance work in 1952 included a new sealcoat for the road surface. The road was also center-striped with a solid yellow line (117). In 1958 Hawaii National Park Engineer Stites visited Haleakala to inspect park roads and consider the possibility of widening the main road in some sections, though that project was not envisioned to occur for many years (118). In 1959 crews used almost 400 pounds of dynamite to blast and widen cuts in the upper three miles of the Haleakala Highway. Surplus material was used to reinforce fills and build up narrow shoulders. Superintendent Fred T. Johnston concluded that the road was "greatly improved."(119)

MISSION 66 PROGRAM

Mission 66 was a high profile, ten-year nationwide initiative aimed at modernizing the Park Service and accommodating changing visitation patterns. The program was so named because it would conclude in 1966 and commemorate the Service's fiftieth anniversary year. The years of neglect brought about by the economic climate of the war years left many of the Park Service facilities in substandard condition. The Service not only had inadequate housing for its own staff, it was also completely unprepared to meet the demands of the new influx of visitors introduced by a higher post-war standard of living and the automobile. The lack of adequate facilities in the parks was widely publicized. Popular magazines ran articles about the state of the parks, with some observers suggesting that a typical trip to a National Park would be an experiment in "discomfort, disappointment, even danger" (Stevenson 1955, 57). It was commonly felt that the public faced an "overuse of the deteriorating and outdated infrastructure in the parks, resulting in injuries, complaints, and damage to the parks, and a generally

unfulfilling experience for tourists" (Madrid 1998, 16). Mission 66 was conceived as a billion-dollar program to improve park facilities, increase staffing, and plan for the future expansion of the system. When the NPS was established in 1916, it put forth two basic concepts to define development of land for public use. The first NPS Director Stephen Mather argued for tourism development to attract people to the parks and in turn generate public and congressional support to ensure the parks' survival. NPS Director during the Mission 66-era, Conrad Wirth, argued in the same vein as Mather. He believed that development would control public access and prevent deterioration through what was termed the "paradox of protection by development" (Sellars 1997, 181). Wirth believed:

"Development is based on the assumption that when facilities are adequate in number, and properly designed and located, large numbers of visitors can be handled readily and without damage to the areas. Good development saves the landscape from ruin, protecting it for its intended recreational and inspirational values. It is the purpose of Mission 66 to locate developed areas where they will not invade the wilderness, impair fragile areas or features, or encroach upon a well-thought-out plan for the protection and interpretation of the natural and historic features of the areas." (U.S. Department of Interior 1957, 308)

Wirth was an adept politician and first convinced President Eisenhower in a special White House presentation on the need for improved park facilities. He addressed the President, "The problem of today is simply that the parks are being loved to death. They are neither equipped nor staffed to protect their irreplaceable resources, nor to take care of their increasing millions of visitors." (Dilsaver 1994, 194). He illustrated his argument with slides of parks that he compared to slums, with campers and autos overcrowding park facilities, noting the growing number of visitors that were literally being turned away at the entrances. He then successfully lobbied Senate and House members for funding of his development plan.

In an effort to meet tremendous park needs with a limited budget, Mission 66 planners sought ways to modernize or update park facilities and, at the same time, decrease the cost of development. The NPS adopted contemporary Modern architectural styles and methods of construction that were typically less expensive than traditional park styles and methods. Modern Style architecture emphasized machine production over craftsmanship and the use of new materials (inexpensive steel, concrete, and glass). Structural honesty, the use of simple, geometric forms, and restrained use of architectural details were important elements that characterized this style. The NPS adapted the style to visually blend the buildings into their surroundings through plainness, low massing, horizontal lines, and earth tone colors. To further increase efficiency, the NPS produced standardized architectural plans for park buildings that that were repeated throughout the region and nation, with modifications allowed to address specific landscape constraints, such as sloping topography, as well as variations in climate.

During the Mission 66-era, most developed areas along the Haleakala Road were updated, but the most significant developments along the road were at the Leleiwi Lookout Point, the Kalahaku Overlook, and Red Hill. (Park Headquarters and Hosmer Grove also underwent major development during the Mission 66-era, but the history specific to these areas will be covered in separate CLI records.)

Leleiwi Lookout Point
In March 1960 Park Engineer George D. Smith conducted a field survey of the Red Hill and headquarters areas. He also ran a line and cross-sectioned a proposed road for Leleiwi Lookout Point. The Leleiwi Point would provide another location for visitors to view the crater. In July, preliminary plans for the Leleiwi project were transmitted to Haleakala for review, comments, and recommendations. The superintendent recommended widening the proposed parking area in order to increase available parking spaces by seven or eight cars (120). A parking pull-out and observation structure were constructed in 1966. Circa 1977, the Leleiwi Overlook parking area was expanded to include a parking island with plant beds and spaces for ten cars.

Kalahaku Overlook (Silversword Access Road and Parking Area)
In March 1954 the park began construction on the first significant addition to the Haleakala Highway: the Silversword Access Road and Parking Area, known today as the Kalahaku Overlook. The project site was at the crater rim where the old 1914 rest house was located. Plans were prepared locally and used the shortest possible route from the road to the crater rim. The access road had no curves of less than 150 foot radius and was designed with balanced cuts and fills. Although the initial plans called for a ¡§loop¡¨ road around the old rest house, historic photos show that it was not a loop road, but rather a straight road with two widened areas for parking along the side of the road (121). Rough grading on the new road was about 50% complete by the end of March (122). The new road and parking lot were finished the next month except for the traffic signs and striping. The Silversword Access Road and Parking Area were completed in November 1954 and the park received approval to use remaining funds from the project for the Pine Trees Campground Road (or Hosmer Grove) (123). In August 1957, Maui contractor E. T. Ige demolished the old rest house and enlarged the parking area. New steps were built from the parking lot to the overlook where visitors could view crater (124). In 1966, the Kalahaku Overlook structure and rock wall along the silversword enclosure were constructed. Circa 1977, the Kalahaku Overlook parking area was slightly enlarged and curbs added to define edges of parking area and road. A vault toilet was added circa 2001.

Red Hill (or Pu'u'ula'ula Summit Observatory)
In June 1960 Senator Hiram Fong introduced a bill in Congress to designate Haleakala as a separate national park. In June 1961 Haleakala National Park (HALE) was dedicated. Soon after, unsightly buildings constructed by the military on Red Hill were obliterated and the area was graded and landscaped. The Pu'u'ula'ula Observatory was constructed in 1962-63 (125). Designs for the development were produced by NPS Architect Cecil Doty, a prominent architect during the Mission 66-era. Following the design, the old road built by the military was eliminated and converted into a footpath and a new road to the summit was constructed (126). The new road did not follow the ridgeline up to the summit like the military road alignment, but instead terminated in a depression below the summit. An observation structure was placed at the top of the summit that provided spectacular views into the crater, as well as 180 degree views of the island and ocean below.

Hosmer Grove Area (Pine Trees Camp and Picnic Ground)
The park hired 11 unemployed local men to begin work on the Pine Trees Camp and Picnic Ground road in July 1954. Progress was "not spectacular" due to heavy rain and resulting mud. Route 29 ran from Haleakala Highway in an easterly direction to the "pine trees" area, one-half mile from the Silversword Lodge near the park entrance. The road included one large stone-and-concrete storm drain and two culverts (127). Within four months, the project was 80% completed, with the road cleared, roughed, and the base course laid. Before it could be completed, however, 12 inches of rain fell in a twenty-four hour period, damaging the new campground road, which had not fully settled and compacted. The damage caused by the freezing and thawing of saturated ground amounted to $1000 (128). The Pine Tree Campground Road was recommended for approval by the park's engineering division in May 1955 (129).

The campground road project also included improvements to the main road, including stabilizing slopes near the park entrance and a new entrance sign. The old sign was described as "substandard," "insignificant," and "almost illegible." It fell to pieces while being removed to slope the banks (130). In April 1959, the campground road, designated the Hosmer Spur Road, was considered a primary road after being seal-coated with bitumuls and covered with screened cinders (131).

(Note: Hosmer Grove is located outside the Haleakala Highway CLI boundary and will be documented in a separate CLI.)

Civilian Aeronautics Administration (CAA) (Kolekole Area)
In mid-1954, park road crews constructed an access road to the Civilian Aeronautics Administration (CAA) site at the Kolekole area, just outside the park boundaries southwest of the summit. The park service built the road on a reimbursable basis for the CAA and park visitors were allowed access to this scenic skyline drive. The road ran in a southwesterly direction out of the park from the Red Hill Road (132). Today, this facility, referred to as the Haleakala Observatories, is owned by the State of Hawaii, managed by the University of Hawaii.

U.S. Army installation at Red Hill, date unknown. (HALE archives)

Red Hill development, 1963. (HALE archives)

Leleiwi Overlook pull-out, 1968. (HALE archives)

1970-Present

Haleakala Highway was a narrow, one-and-a-half lane road as late as the 1970s. The road was entirely resurfaced in a three-phase project that began in 1976 and was completed in the early 1980s. The projects were contracted to Goodfellows Brothers, Inc. and Fong Construction of Kahului, Maui. Fong Construction's contract was for the "lower road," between the park entrance at Station 0+00 to just below the Halemau'u parking area at Station 235+00, and the "upper road," between Station 470+00 just above the Kalahaku Overlook to the Red Hill parking area and to the end of the road at the park boundary. The original plans called for the new road surface to be 20 feet wide on tangents, although the as-constructed plans show that the surface was widened to 22 feet. Curves were also widened, although the width varied. The road in front of park headquarters was widened to four lanes to accommodate bus parking. New cement rubble headwalls were constructed where culverts had to be widened (133). The reconstructed road utilized a structural section consisting of a 1-1/2 inch thick asphaltic concrete over a 2-3/4 inch asphalt stabilized base course (134).

The large increase in traffic, especially buses, since the 1976-1980 reconstruction had created numerous sites where the pavement was cracking, settling, and breaking up. The area with the most severe damage was a 5,000 foot section of road between the park entrance and headquarters, where the entire road was cracked and settling. Above the headquarters, spot pavement failures ranged in size from 50 square feet to 1,500 square feet. Two culverts were buried with so little cover soil that the pipes were partially collapsed and the pavement was flexing and breaking up. Many of the spot failures were creating traffic hazards, since cars had to occasionally cross the centerline to avoid potholes. The environmental assessment stated that the road did not retain any historic integrity due to road work in 1976-1980, however, while

the original pavement had admittedly been replaced, this assessment did not take into account the surviving bridge and remaining masonry culvert headwalls, or address such broader concerns as the integrity of the general alignment and associated landscaping (135).

Haleakala Highway was resurfaced in October 1999. The job added a pullout just before the Halemau'u Trailhead and used the excavated materials to stabilize portions of the shoulder that were badly eroded. The excavated material also allowed the Park Service to enlarge a pullout near the turn at the 8,500 foot elevation (136).

THE FUTURE OF HALEAKALA'S ROADS

Like most national parks, Haleakala National Park has been significantly impacted by increasing visitation. In 1997, HALE set a record of 1.63 million visitors. The Maui Visitors Bureau reported that visitors chose HALE as Maui's second most popular attraction (137). With increasing visitation at Haleakala, park officials expected that the park would need expanded or redesigned parking at the headquarters and summit areas. This scenario may also force the park to consider a mass transportation solution for the future (138).

SUMMARY

Haleakala Highway has served as one of Maui's premier scenic roads for nearly sixty-five years. Constructed to provide easy access to Haleakala Crater at the summit of a great dormant volcano, the road continues to "bring the world to Maui" and has established the crater as one of Hawaii's most popular visitor attractions. As the road ascends the massive shield volcano, it provides opportunities to view the Hawaiian landscape, flora, and fauna. Dramatic vistas of the island of Maui, the Pacific Ocean, and other islands in the Hawaiian chain are enjoyed as one climbs above the clouds. At the summit of this road, visitors are treated to the majestic Haleakala Crater, the House of the Sun.

Over the years, changes to Haleakala Highway have been limited. Spur roads and scenic overlooks have been added, most notably the Red Hill Road, which was first constructed by the military in the 1940s and reconstructed in the 1960s by the NPS. Haleakala Highway was widened in areas to accommodate increased traffic and conform to more modern safety standards, with the majority of work occurring in the upper elevations of the road. The original alignment remains, as do the road's original bridge, 11 box culverts, and approximately half of the original stonework on the culverts. Although there have been alterations over time, the road retains the quality that early Bureau of Public Roads engineers and National Park Service designers intended. The highway features relatively easy curves and grades, with only a few grades over 6%. Following the contours of the volcano and passing through a nearly treeless landscape, the road blends naturally with its environment.

The Haleakala Highway was a major factor in enabling the development of Haleakala National Park as a separate unit within the National Park Service. The road also provided the opportunity for scientific research on Maui. The easy travel access afforded by this road allowed the University of Hawaii and other research institutions to build facilities at the summit

outside the park boundaries, its high elevation providing observatories with excellent atmospheric conditions.

Kalahaku Overlook in 1976. (HALE archives)

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Analysis & Evaluation of Integrity

Analysis and Evaluation of Integrity Narrative Summary:

The Haleakala Highway cultural landscape is a historic district that includes the NPS-owned portion of the highway and the development nodes constructed along its route to access the Haleakala Crater. The proposed historic district contains buildings, roads, a bridge, trails, walkways, steps, retaining walls, culverts, and other features from the 1933 to 1966 period of significance which create a cohesive assemblage portraying NPS master planning from the 1930s and Mission 66 eras, and the evolution of NPS style from rustic to modern. The naturalistic and modern character of the historic district is evident in the following landscape characteristics: natural systems and features, spatial organization, land use, buildings and structures, circulation, topography, and views and vistas, and archeological sites. These characteristics and their surviving features continue to convey the historic character of the road as a scenic highway.

The principal natural feature of Haleakala National Park is the Haleakala Crater. The crater is located at the summit of a massive 10,000-foot dormant shield volcano. The crater is a 3,000-foot deep depression that is approximately 7.5 miles by 2.5 miles wide. Surrounded by jagged mountain peaks, the crater is home to numerous threatened and endangered flora and fauna, most notably the “ahinahina” (silversword plant) and “nene” (Hawaiian goose). Natural topography, geology, climate, and native vegetation are existing natural systems and features that influenced the historic alignment, experience of the road, and placement of development nodes.

Spatial organization of Haleakala Highway is based on the road’s alignment and the development nodes along its path up the volcano. During the rustic era, the 10.6-mile segment of the highway within the park’s boundary was designed to create the most pleasant and scenic driving experience, while working within the constraints of a budget and rough, steep terrain of the volcano’s northern slope. Following rustic design guidelines, the road’s designers were careful to keep the grade of the road as low as possible and to blend it in with the landscape by allowing it to follow the contours of the land and using native lava stone as building material. Following the contours of the hillside also helped cut costs, by requiring less fill material. The switchbacks were carefully located to keep the road between two large gullies, thus eliminating the need for expensive bridges. In the 1940s, a spur road was added by the U.S. Army from White Hill to Red Hill, a road that was realigned during the Mission 66 era. The Mission-66 development at Red Hill is an especially excellent and intact example of a design by NPS Architect Cecil Doty. Since the period of significance, the road’s alignment has been minimally altered. The Haleakala Highway continues to be used in the way it was originally intended – providing Maui tourists vehicular access to the Haleakala Crater.

Associated buildings and structures built during the historic period are an integral part of the historic district, revealing the continuum of design philosophies from the naturalistic and rustic design philosophy of the 1920s and 30s to the modern philosophies of the 1950s and 60s. Both design styles made use of native materials, along with strict design principles and construction standards, ensured the structures blended with the scenery, matching the color and character of natural rock outcrops and surrounding terrain. The earlier structures used more labor-intensive construction techniques and natural materials,

while the later structures incorporated more modern construction techniques and materials. Today, many of the historic buildings and structures remain, including a bridge, 11 box culverts, 29 small culverts, buildings, and lookout structures. Together, these features help convey the design intent and aesthetic character of the historic highway.

Circulation features associated with the historic district include the Haleakala Highway itself, as well as development nodes with their associated spur roads, parking areas, sidewalks, and trails. These development nodes are found at Halemau'u Trailhead, Leleiwi Overlook, Kalahaku Overlook, White Hill, and Red Hill. These circulation features were constructed over the course of the period of significance with the common idea to provide visitors access to the crater and important viewpoints.

The construction of the Haleakala Highway required a significant amount of topographic manipulation which is still evident along the entire length of the road. The volcano's west slope is cut by deep gullies, lava dykes, and spurs, requiring engineering techniques to create a pleasant, scenic road for park visitors. As with any road construction, the Haleakala Highway required grading. Although great care was taken to minimize disturbance to the surrounding landscape, the use of rock cuts and cut and fill sections was required to negotiate the rough, sloping terrain. Although the gutters no longer remain, rock cuts and cuts and fills remain today and help to convey the historic character of the district.

Views play one of the most critical roles of the visitor experience along the Haleakala Highway and the associated developments. On a clear day, the drive to Haleakala's summit provides sweeping views of Maui's central valley, the West Maui mountains, the Pacific Ocean, and the islands of Lanai, Molokai, and Kahoolawe. Once they reach the summit, visitors are rewarded with amazing views into the crater itself from Kalahaku Overlook, Leleiwi Lookout Point, White Hill, and Red Hill.

Several archeological sites are potentially associated with the construction of the road. One site is the Kalahaku Overlook site. This was the location of both the 1894 and 1914 crater rest houses, a Maui landmark until it was demolished in 1957. The same area was used as a CCC camp while a crew constructed the White Hill trail and cleared the area for construction of the White Hill Observation Station. No archeological survey has been conducted at this site so far. Other potential sites include three caves located near the road that contain historic materials such as empty dynamite boxes, sawed wood, and ceramic serving plates and vessels. These sites may have been used as temporary campsites by workers engaged in the construction of the road.

Integrity

The Haleakala Highway cultural landscape 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 HNP's early planning and development history (criterion A) should retain a particularly high level of integrity in location, setting, feeling, and association. The road's location and alignment on the north side of the Haleakala Crater, its setting as a steep incline covered with low growing native vegetation and lave rock, and expansive views, its feeling as a rustic, narrow, windy road, 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.

Portions of the Haleakala Highway were widened to accommodate increased traffic and conform to more modern safety standards. As a result of widening, the upper portions of the road have diminished integrity. Overall, however, the original alignment remains, as do the road's original bridge and many of the original stonework on the culverts. Although there have been changes, the road retains the quality that early Bureau of Public Roads engineers and National Park Service designers intended. The highway features relatively easy curves and grades, with only a few grades over 6%. Following the contours of the volcano and passing through a nearly treeless landscape, the road blends naturally with its environment.

The development at Red Hill and the observation structures at Leleiwi Overlook and Kalahaku Overlook have excellent integrity to the Mission 66 era. The development at Red Hill is nearly intact and appears almost as it was designed and constructed during the period of significance, including the observation structure and circulation system through the site. Location and setting of the Red Hill development is reflected in the prominent placement on summit and at the other two lookouts on the edge of the crater. The materials, workmanship, feeling and association with Mission 66 are reflected in the geometric shapes and modern materials evident in the observation structure and the parking area at Red Hill and the observation structures at Leleiwi Overlook and Kalahaku Overlook. These developed areas help to convey the modern design philosophies of the Mission 66 era.

Together, the built features and landscape characteristics that contribute to the historic district still reflect the seven aspects of integrity and convey the historic significance of the district, reflecting the continuation of park planning efforts that spanned the rustic to the modern eras of design.

Landscape Characteristic:

Natural Systems and Features

The principal feature of Haleakala National Park is the Haleakala Crater. The crater is located at the summit of a massive 10,000-foot dormant shield volcano. The crater is a 3,000-foot deep depression that is approximately 7.5 miles by 2.5 miles wide. Surrounded by jagged mountain peaks, the crater is home to numerous endangered flora and fauna, most notably the "ahinahina" (silversword plant) and "nene" (Hawaiian goose). Haleakala National Park was designated an International Biosphere Reserve in 1980. The park encompasses 32,755 acres (including 4,100 acres acquired in 2007), of which 19,270 are wilderness, however the Haleakala Highway is located outside the wilderness boundary.

Natural Topography
From sea level to summit, the Haleakala Highway climbs to 10,000', attaining this height in a shorter distance than any other road in the world. The Haleakala National Park portion of Haleakala Highway begins at the park boundary at an elevation of 6,700' above sea level. The road travels up the west slope of the volcano, climbing 3,000' in approximately 10.6 miles before reaching White Hill (it's historic terminus) at the 9,740-foot elevation and continues to Red Hill at 10,023'.

While the volcano's west slope is not as eroded as the West Maui Mountains or the Kaupo Gap on Haleakala's south slope, it is cut by deep gullies, lava dykes, and spurs. To reduce the expense of the road, engineers and designers had to carefully consider the rough terrain to avoid building costly bridges and box culverts. The largest obstacles were two large ravines that almost paralleled each other about a half-mile apart. Road engineers avoided the need to build expensive bridges by aligning the road between the two ravines, using switchbacks as necessary until the line reached an elevation at which the ravines were small enough to cross without using a bridge. In order to keep the road between the gullies, additional switchbacks were added to the original road plans and as a result, only one bridge was necessary.

Geology
Geologic features in the crater include cinder cones, some of which rise over 600' high. Haleakala Crater is memorable for its geologic formations and dramatic panoramas highlighted with vivid colors that vary from ochre to lavender to gold. The beauty of these geologic features is what draws the majority of visitors to the park.

On the other hand, the landscape through which the Haleakala Highway traverses to reach the crater is predominantly characterized by fields of black lava rock deposited by hundreds of thousands of years of lava flows (with the last two flows occurring sometime between AD 1480 and 1600). The dark color of the landscape influenced design and construction methods of buildings and structures associated with the road, following standard design philosophies during the Rustic-era. Native lava stone was used for construction of culverts and buildings (both 1930s and Mission 66) to help blend them in with the natural environment.

Climate
The weather at the higher elevations of Haleakala National Park can be dramatically different from weather at lower elevations of the island. Temperatures are much cooler and often the summit is windy, cold, and misty. A layer of clouds often encircles the middle elevation of the volcano, so that as visitors climb to the summit, they experience being above the clouds. The clouds at the summit provide a unique Haleakala spectacle known as the "specter of the brocken," which occurs in the late afternoon when the crater fills with clouds and visitors can see their shadows outlined by rainbows in the mist below.

Because the weather on top of the summit is often windy, cold, and misty, the observation buildings and structures at Leleiwi Overlook, Kalahaku Overlook, White Hill, and Red Hill are at least partially, if not fully, enclosed with glass to protect visitors from the elements. In addition, as visitors ascend or descend the volcano, they often pass through the clouds with decreased visibility. For safety purposes, the park has maintained a center stripe (referenced as a fog line during the historic period) on the road as early as 1935.

Native Vegetation
At the lower elevations, below the park boundary, the road traverses through mesic forests of

pukiawe, mamane, ferns, and other shrubs. As the road enters the park at 6,700' and rises to about 9,000', the vegetation is characterized by low-growing shrubs and grasses. Described by Medeiros and Chimera, (1998), "Subalpine shrublands of Haleakala occur primarily on the western and northwestern flanks of the volcano extending from just below the park boundary at 6724' up to where it grades into the alpine zone at approximately 8,530'. . . . The most common species of the subalpine zone is the coriaceous, small leaved shrub pukiawe (Styphelia tameiameiae). The tallest tree-shrub of the subalpine shrublands is mamane (Sophora chrysophylla)" (5). Other common species include 'ohelo (Vaccinium reticulatum) and kupaoa (Dubautia mensiesii).

As the road ascends above 9,000', the terrain becomes more sparsely vegetated, with only a few hardy species such as the ahinahina (or silversword) surviving at the highest elevations. The threatened Haleakala silversword is found only on Haleakala. The road dissects critical habitat of the threatened silversword from 7000' to 10,000'. Park visitors have the opportunity to view this plant in the tear-shaped plant bed in the middle of the Red Hill parking lot. Near the summit, the alpine terrain appears barren with volcanic rock as its most prominent feature. The presence of low-growing to sparse vegetation along the entire length of the road provides unobscured, panoramic views from the road to the island and ocean below. Described by Medeiros and Chimera, (1998), "Haleakala's alpine zone occurs . . . above 8530' on the older, outside western slope of the volcano. . . . The alpine zone on Haleakala is sparsely vegetated (less than 25% cover, and usually less then 5%) and has low plant species diversity. . . . The relatively few plant species of this zone compromise a subset of typical subalpine species (Dubautia menziesii, Styphelia tameiameiae) together with unique characteristic elements (Tetramolopium humile, Argyroxiphium sandwicenses subsp. macrocephalum, Silene struthioloides, Agrostis sandwicensis). The native bunchgrass (Deschampsia nubigena), found in a number of native plant communities, is the most common native grass; other grasses (Argostis sandwicensis and Trisetum glomeratum), are locally found primarily in the alpine zone." (4-5)

"Generally, non-native species are few, limited in cover, and largely restricted to habitats modified by man, such as on compacted cinder, surrounding buildings, and in pavement cracks in parking lots. Characteristic alien species include gosmore (Hypchoeris radicata), evening primrose (Oenothera stricta), and rescue grass (Bromus willdenowii). Cheatgrass (Bromus tectorum) and telegraph plant (Heterotheca grandiflora) are invasive with natural levels of disturbance that occur in cinder flats and slopes in the crater.

The low-growing native vegetation through which the road traversed creates an open character that provides panoramic views of the island and ocean below. Historically, it also made construction scars conspicuous. In September 1934, Sager received funding to cover rock fills with soil, which helped to obscure traces of construction and also provided conditions for revegetation along the road.

Summary

As a landscape characteristic, natural systems and features have influenced the historic alignment and experience of the road ranging from the natural topography to the native vegetation and contributes to the historic character of the Haleakala Highway historic district.

Spatial Organization

Summary:
The entire roadway from central Maui's main town of Kahului to the summit of Haleakala is known locally as Haleakala Highway. State Highway 37 begins in Kahului and runs approximately ten miles to Pukalani, where it intersects with State Highway 377, which leads to Kula. In Kula, Haleakala Highway becomes State Highway 378, also known as Crater Road, and runs to the boundary of the national park. The trip from Kahului to the summit is thirty-seven miles, with only the last 10.6 miles of the Haleakala Highway in the national park. All in all, the Haleakala Highway climbs to 10,000' from sea level, attaining this height in a shorter distance than any other road in the world. An additional road extension to Red Hill is an additional half-mile to the true summit at 10,023'.

Spatial organization of Haleakala Highway cultural landscape is based on the road's alignment and the development nodes along its path up the volcano. Historically, the 10.6-mile segment of the highway within the park's boundary was designed to create the most pleasant and scenic driving experience, while working within the constraints of a budget and rough, steep terrain of the volcano's northern slope. Following rustic design guidelines, the road's designers were careful to keep the grade of the road as low as possible and to blend it in with the landscape by allowing it to follow the contours of the land and using native lava stone as building material. Following the contours of the hillside also helped cut costs, by requiring less fill material. The switchbacks were carefully located to keep the road between two large gullies, thus eliminating the need for expensive bridges. Since the period of significance, the road's alignment has remained the same, with the addition of road spurs and observation points along the way.

The NPS-owned portion of Haleakala Highway begins at the park boundary at an elevation of 6,700' above sea level. The road travels up the west slope of a massive shield volcano, climbing 3,000' in approximately 10.6 miles before terminating at White Hill at the 9,740' elevation. This cultural landscape inventory also includes the non-contributing, but compatible Mission 66-era half-mile extension to Red Hill.

(Note: The location of features is indicated in the narrative below by a unique mile point (MP), with MP 0.000 located at the park boundary near the north entrance and MP 11.000 located at the Red Hill parking lot. This protocol was previously established by the maintenance division's inventory of features along the highway.)

Description:
From the park entrance, the road follows the contours of the mountain as it rises to the edge of the crater through nine switchbacks. The volcano's west slope is cut by deep gullies, lava dykes, and spurs. As motorists wind up the side of the volcano, they are provided fantastic views of the island and ocean below. Between 5,000' and 7,000', the visitor often passes through a layer of clouds at the inversion layer. Once through the cloud belt, the visitor is

provided the unusual sensation of floating above the clouds. The last two miles of the road parallel the edge of the crater, just below the ridge, before making a 90 degree turn into the parking lot at White Hill. Park visitor's can also continue beyond the White Hill terminus to the Red Hill Observatory at the true summit of Haleakala at 10,023'. Motorists do not view the crater until their arrival at either the White Hill or Red Hill developments. They must park their vehicles and walk to the crater's edge or Observatories. This leaves the view of the crater until the end of the trip and provides the "grand finale" effect that landscape architect Merel Sager intended at White Hill.

Along the road's course up the volcano, several areas have been developed to provide access to the park's natural resources, amenities for park visitors, and administrative, maintenance and housing facilities for park staff.

Just past the park boundary, the road widens and an entrance fee station is located in the middle of the roadbed, allowing cars to pass the station on both sides. One-quarter mile past the park entrance, on the left, is a half-mile spur road which heads easterly to the Hosmer Grove Campground, picnic area, and nature trail. Opposite the Hosmer Grove entrance is a drive leading to maintenance and resources management buildings, park housing and offices, an area called Pu'u Nianiau. This area formerly housed a lodge that operated from the late 1940s to the early 1960s. During World War II, the site was occupied by the U.S. Army. Neither of these developments are included in the Haleakala Highway district boundary, but will be documented as separate cultural landscapes.

Just past the intersection for Hosmer Grove and Pu'u Nianiau, the road makes a sharp right curve into its first switch back. The park headquarters is located just before the second switchback, one mile past the park boundary. Here, the road widens to four lanes in front of the headquarters building; the added lanes are used for tour bus parking. The headquarters area includes a visitor center, parking lot, offices, and park housing. There is a gate at the headquarters that can be used to close the road when necessary. This developed area is not included within the Haleakala Highway CLI boundary, but is being documented as a separate cultural landscape.

After passing park headquarters, the road takes a sharp curve left into its second switchback. The road follows the contours of the hillside and as a result is curvilinear as it weaves in and out of the natural gullies and drainages. It crosses the only bridge along the road. This bridge was built during the period of significance and was designed using rustic design guidelines. Throughout the remainder of its alignment, the road passes over 11 box culverts and 78 smaller culverts built in the rustic style to blend with the landscape.

The road winds up the slope through the third and fourth switch backs. The vegetation is thicker at the lower elevations, covering the lava stone and dark soils beneath. The road widens to provide a slow vehicle turnout at MP 6.790. At the fifth switchback, is the Halemau'u intersection and Hitchhiker's pullout. The pullout is paved with asphalt and edged

with a rock wall on the right, uphill side of the road. It was constructed in 1999 to provide a place for hikers of the Halemau'u trail to find transportation to other trailheads or back to their parked vehicles.

The Halemau'u trailhead and parking lot are located at 7,990' elevation. This was originally developed as a gravel parking area in the 1950s or 60s. It was later redeveloped 1976-1980 to its current configuration. Motorists turn left onto a spur road that leads them to a parking lot. The parking lot is rectangular and allows for perpendicular parking on two sides. There are facilities for horseback riders, such as a horse loading ramp and a hitching post. There is also a vault toilet at the entrance to the parking lot. At the end of the parking lot is the trailhead with an interpretive kiosk marking its location. The trail provides access into the wilderness area within Haleakala Crater.

After the Halemau'u Trailhead intersection, the road continues to its sixth switchback. Between switchbacks six and seven, the terrain becomes much steeper, requiring steeper cuts and fills, and more rock cuts into the hillside. Here the vegetation is about 3' to 5' tall.

At elevation 8,840', just before the seventh switchback, is the Leleiwi Overlook (MP 7.261), with a parking lot and short trail that leads to the crater rim. This pullout was originally a simple pullout built in 1966. It was redeveloped into its current configuration in the late 1970s and early 1980s. The drive-through parking area, located on the right, uphill side of the road, has angle-in parking for ten vehicles. It has a sidewalk and two planting beds that separate the parking area from the main roadbed. A pedestrian crossing is painted across the road to the Leleiwi Overlook trailhead. The 1960s trailhead was originally located on the switchback. Visitors would access the trailhead by following foot path uphill from the parking lot, then cross the road as the switchback made its turn up the hill. The crossing was considered dangerous because drivers would not be able to see the pedestrians during foggy conditions. The parking lot and trailhead location were completely redesigned in the late 1970s. The first portion of the trail was realigned, but it reconnected with the 1960s alignment to access the Leleiwi Overlook structure on the crater's edge.

Between switchbacks seven, eight, and nine, the road continues up the slope, the vegetation becomes lower growing – about 18" tall. Larger bare patches of black lava stone are visible between the shrubs. The slopes are steep, with uniform 45 degree slopes. Many rock cuts are found in this stretch of the road. A second slow vehicle turnout is located at MP 8.272.

The Kalahaku Overlook intersection (MP 8.717) is located at switchback nine, the last of the series of switchbacks. From the intersection, a spur road to the left takes the motorist to a parking lot. It is here, where early plans for the road called for its terminus at 9,342' elevation. It is the location of the 1894 and 1914 rest houses and also a CCC camp in the 1930s. A silversword viewing area was established here during the period of significance, providing visitors an opportunity to view this rare plant, which is found only on Haleakala. In 1954, the area was developed with a paved spur road (replacing a trail), a parking lot, stairs and

walkways to connect the parking lot with the rest house viewing area, and the silversword trail. Both rest houses were removed by 1957. The area again underwent re-development in 1966 during the Mission 66-era. The Kalahaku Overlook structure was built in the general location of the 1914 rest house and the silversword trail was paved with a rock wall built along its edge. In the late 1970s and early 1980s, the parking lot was widened. More recently, a vault toilet was added to the parking lot.

Between Kalahaku and White Hill, the terrain continues to be steep, requiring steep cuts. Vegetation becomes almost non-existent and black lava stone and cinders becomes the prominent character of the landscape. After 10.5 miles of ascending the road to the crater, the motorist makes a 90 degree left turn into the parking lot at White Hill, reaching the historic terminus of the Haleakala Highway. The parking area was historically rectangular shaped. In 1976-1980, the parking lot was expanded to hold more vehicles and was reshaped to an oval. Additional walkways and rock walls between the parking lot and the White Hill Observatory were added.

Upon entering the White Hill area, the visitor first parks in the large open parking area. The parking lot is oval shaped and has sidewalks, railings, and rock walls defining its edges. At the far eastern end of the parking lot, near the crater's rim, is a cluster of rustic-style buildings including two comfort stations and the Observatory. To the south of the parking area rises White Hill (Pa Kaoao). A 0.2-mile trail, constructed by the CCC, winds up the hill for an even better view of the crater. From both the Observatory or the top of White Hill, the visitor is rewarded with magnificent views of the crater, cinder cones, clouds, and, in the distance, the summits of Mauna Kea and Mauna Loa on the island of Hawaii. Visitors can also access the Sliding Sands trail from this parking lot. Facilities for horses are provided, including a loading ramp and hitching post.

From the White Hill parking area, a spur road goes approximately 0.7 mile to the true summit of Haleakala at Red Hill (or the Pu'u'ula'ula Summit) at 10,023' in elevation. This road was not a part of the original highway plans. A road was originally constructed by the army prior to World War II that followed the ridgeline leading up to the top of the summit. The road was realigned by the NPS in the 1960s, following Mission 66 development plans, to its current alignment The landscape is void of plants and the topography is relatively gentle and rolling, with one steep incline as the road ascends to the parking lot in a depression below the summit of Red Hill. The area has a tear-shaped parking lot with a central plant bed. A set of stone stairs connects the parking lot to the summit observatory building. There is also a short trail that follows the ridge of the hill (the old military road alignment) and, depending on the weather, provides views of clouds or the Pacific Ocean and Maui. The facilities at the University of Hawaii's Haleakala Observatories are also visible from Red Hill. The extant NPS development was designed by the prominent Mission 66-era Architect Cecil Doty and constructed in 1962-63. This area has been minimally altered and still reflects the character of the Mission 66 design.

Land Use

The Haleakala Highway was a major construction project supported by the federal government,

the Maui government, and local business leaders to increase tourism on the island. The intent of the project was to convert the arduous horseback trip up the crater into a route accessible by automobile. With the road's completion in 1935, the park's main attraction of viewing the crater shifted from the early development at Kalahaku Overlook to the 1936 development at White Hill at the road's terminus. By 1890, the sunrise view from the Kalahaku Overlook had been established as an obligatory activity for visitors on horseback. With the new road and development at White Hill, the same activity attracted an increasing number of visitors during the period of significance.

The use of the road was later expanded with access routes for the United States military, Federal Aviation Administration, and scientific organizations that used the mountain. In the early 1940s, the U.S. Army developed Red Hill with several buildings, radio towers, and an access road. Approximately 15 years later, during the Mission 66 era, the park began to expand visitor opportunities along the road by adding additional lookouts and development areas, such as Hosmer Grove picnic and campground area, the Halemau'u Trailhead, and the Leleiwi Overlook. In 1961-63, the park removed military buildings and road to redevelop Red Hill with a new access road, parking lot, and the Pu'u'ula'ula Summit observatory.

Today, the crater district of Haleakala National Park attracts more than one million visitors annually, most of whom visit for only part of the day, the average visit being as little as two hours long. A typical park visit includes a drive to the summit to view the crater with a few stops at scenic turnouts. Many visitors arrange their day to experience Haleakala's premier attraction, the view of the sunrise from the summit. The sunrise view continues to be a main attraction today, observed predominantly from White Hill or Red Hill. Visitor services at White Hill include the historic observatory/visitor center and comfort stations, as well as a short (0.2 mile) hike to the summit of White Hill (Pa Kaoao). At Red Hill, the highest point of the summit, visitor are provided unobscured views of the crater and the island from the Mission 66-era Pu'u'ula'ula Summit observatory.

The Haleakala Highway continues to be used in the way it was originally intended – providing Maui tourists vehicular access to the Haleakala Crater. As a result, the use of the road is consistent with the historic design intent of the Haleakala Highway to promote tourism on the island with access to the crater.

Buildings and Structures

Structures built in association with Haleakala Highway over the course of the historic period reflect the spectrum of development periods from the naturalistic and rustic design philosophy of the 1930s to the more modern philosophies of the 1950s and 60s. The buildings, bridges, box culverts, and culverts along the road corridor were designed by architects and landscape architects over the course of the period of significance to minimize the visual impact of the structures and accentuate the picturesque qualities of the natural surroundings. Use of native materials, along with strict design principles and construction standards, ensured the structures blended with the scenery, matching the color and character of natural rock outcrops and surrounding terrain. The consistency in design and materials among the different structures along the road creates a visual unity and helps define the character of the road landscape.

Today, many of the early park-rustic structures remain, including a bridge, 11 box culverts, and 29 small culverts. Together, these structures help convey the early design intent and aesthetic character of the historic highway and contribute to the significance of the historic district. In addition, there are several Mission 66 buildings that also contribute to the later of significance of the road and were designed to blend in with the earlier rustic-era developments while at the same time incorporating more modern materials and construction techniques.

(Note: The location of features is indicated in the narrative below by a unique mile point (MP), with MP 0.000 located at the park boundary near the north entrance and MP 11.000 located at the Red Hill parking lot. This protocol was previously established by the maintenance division's inventory of features along the highway.)

Bridge (MP 1.612)
One bridge is located on the Haleakala Highway. It is located 0.6 miles above park headquarters. The bridge was built in 1934 as part of the original road construction project. It is a single-span, reinforced concrete girder bridge with masonry abutments and railings faced with local rock. It is 47' long and 20' wide. The structure has a curved alignment with a radius of 143.24' and has built-in super-elevation for the road surface. The concrete girders were originally stained to match the color of the adjacent stonework, but were later painted a bright yellow. The design load is 15 tons. (Duensing 1999) The bridge has not undergone any significant changes since the period of significance, except for the paint color which is fading with time.

Box Culverts
Eleven box culverts were built between 1933 and 1935 during construction of the road, all of which still remain. Seven of them are completely intact. Four have modified headwalls on the upslope side of the road to accommodate road widening, but have intact headwalls on the downslope side of the road.

The box culverts were built of poured concrete and faced with local stone. The concrete openings typically measure 6' by 6', up to 10' by 10'. The concrete was faced on both the upslope and downslope sides of the culverts with mortared stone. Two styles of stone masonry were used: either rough hewn stones mortared in a random course pattern or cut stones mortared in a running bond pattern mortared with white mortar.

Since the period of significance, four of the upslope stone headwalls have been covered by concrete headwalls to accommodate road widening. In all cases, the edges of the original stone headwalls are still visible from inside the culvert. The stone headwalls were left intact while the concrete walls were poured in front of them to extend the width of the culvert. These modifications occurred circa 1980. Despite the alterations, all 11 box culverts contribute to the historic district because they retain the majority of their historic fabric, location, setting, and function.

A chart listing the locations of the historic box culverts is included in the Supplemental Information section.

Small Culverts

During the historic period, 83 culverts were built along the road. Today, there are 78 culverts of which 29 are historic. Historically, the culverts were built with metal pipes ranging from 24" to 42". The extant historic culverts typically have 24" corrugated metal pipes. On the upslope side of the road, the headwalls typically measure 4' tall by 8' wide. The downslope headwalls typically measure 5' tall by 12' wide or the outflow pipe is covered with dry-stacked rubble. They are constructed of native stone that is either rough-hewn and mortared in a random course pattern, while a few are constructed of cut stone in a running bond pattern. All historic headwalls are capped with an even layer of stones across the top that finish off the wall neatly. Mortar joints are typically even, ranging from 2-3" wide. Mortar color is white or gray. In the late 1930s, flagstone pavement set in concrete mortar was laid at the approaches to culverts where water was damaging the roadway.

All but one of the culverts between MP 0.00 and MP 6.50 are historic. Above this point, the majority of culverts have been replaced in conjunction with road widening projects since the period of significance.

Some historic culverts have had only one headwall modified, while the other is still intact. Because over half of the historic fabric remains (one headwall and the pipe underneath the road), they are still in their original location and setting, and they function as historically intended, they have been counted as contributing features. Eight of the twenty-nine contributing culverts fall into this category.

The upper four miles of the road have undergone more dramatic widening, which has necessitated reconstruction of the culverts. The non-historic culverts vary widely in dimensions and quality of the masonry workmanship. Stones are typically mortared in a random course pattern and do not have the neatly arranged cap of stones typical of historic headwalls. Occasionally, it appears that the original stones were used to reconstruct the headwalls, but they were not replaced in the historic pattern, thus they no longer have integrity and are not counted as contributing.

A chart listing the locations of historic and non-historic culverts is included in the Supplemental Information section.

Gutters and Curbs

To improve drainage on the road, park crews reduced the slopes on some of the road fills by adding new material. Some drainways were enlarged and some lined with stone. Additional drainage ditches were also constructed. Flagstone pavement set in concrete mortar was laid at the approaches to culverts where water was damaging the roadway.

Gutters were constructed to work in conjunction with the numerous culverts and box culverts along the route to protect the roadbed from the damaging effects of runoff and erosion. The typical gutter along the Haleakala Highway was constructed of hand-placed lava rocks stacked three courses high. The rocks were a minimum of 6"x 6"x 8". The face of the gutter was flush with the face of the slope above. They were designed to blend in with their natural surroundings. Gutters were typically located on the cut side of the road. Exceptions to this occur at segments with berms, which included gutters on both sides of the road.

Approximately 5,280' of the road was edged with hand-laid rock gutters (NPS "Construction Report," 1935). These original gutters have been functionally replaced by asphalt curbs along the edges of the road and rock retaining walls. Many gutters were probably lost during road widening projects over the years. However, it is possible that some may still remain, covered by soil and vegetation, making them difficult to see. As a result, no historic hand-laid stone gutters were found in the field.

The Haleakala Highway makes use of a system of asphalt curbs and mortared stone gutters or aprons to direct surface runoff into culverts. All of the asphalt curbs have been constructed since the period of significance. Although some stone aprons were built during the period of significance in conjunction with culverts, many more have been added since. Most were probably replaced during road widening projects. It is unlikely that any of the existing aprons are historic.

Rock Walls along the Road

All existing rock walls along the road have been constructed since the period of significance and do not contribute. Rock walls are located at MP 1.025, MP 4.900, MP 5.183, MP 5.875, MP 6.109, and MP 6.550. They are typically constructed of mortared, random-coursed, lava stone on the uphill side of the road to prevent rocks from falling onto the roadbed. Dimensions of the walls range from 2' to 4' tall, typically 18" thick and are battered. Their construction and use of native materials blends them into their surroundings ad are considered compatible with the historic design of the road.

White Hill Buildings and Structures

White Hill Observatory (LCS ID# 06737), contributing
This rustic-style building was constructed 1936. It is a one-story, 1,350 square foot structure essentially rectangular in plan with two beveled corners and two attached, square vestibules. The walls are formed of uncoursed lava rock, large stones of approximately one square foot each mortared with white mortar. The corrugated metal-clad roof is hipped with wide, closed, soffitted eaves and half-round ridge flashing. Metal balls ornament the roof at the peak and at the corners of the primary mass. Large, fixed plate-glass windows face into the crater. Entry doors are non-original metal and glass sliders. The building is spectacularly situated at the edge

of the Haleakala Crater. Preliminary plans for the building were prepared by associate park architect Merel Sager. (Carey 2002)

White Hill Restroom – Men's (built 1954), non-contributing (determined ineligible for the National register on January 20, 2000
There have been four phases of restroom facilities at White Hill. By 1931, historic photos show that two, very simple stone pit toilets had been constructed of mortared lava stone – one for men and one for women – northwest of the Observatory. By 1935, two new larger pit toilets had been constructed, closer to the White Hill Observatory, just west and northwest of the building. In 1954, new facilities were constructed in the same location as the 1935 structures, with one building housing both the men's and women's restrooms. This building still remains, but was been modified and is now used solely as the men's comfort station. The interior of the building was gutted and the roof was replaced and changed from a gable to a hip roof. The building was determined ineligible for listing on the National Register in 2000. Although the building has lost integrity, several aspects still help to convey the historic character of the White Hill development, such as its location, its massing, and its stone façade. The building has a rectangular floor plan, hipped metal roof, and mortared lava stone walls. The mortar is pink. The original roof was gabled.

White Hill Restroom – Women's (built circa 2002), non-contributing, compatible
The women's restroom was constructed circa 2002 just east of the men's restroom. Its design is an enlarged, mirror image of the men's restroom. The building has a rectangular floor plan, hipped metal roof, and mortared lava stone walls. The mortar is pink.

White Hill Rock Walls – non-contributing, compatible
One low rock curb was constructed along the edge of the parking lot at White Hill. It was approximately 8" tall. It was removed with the expansion of the parking lot and replaced with concrete curbs and sidewalks. Several rock walls have been constructed since the period of significance. They create an edge along the east side of the parking lot and run along both edges of the walkway from the southeast corner of the parking lot. They are constructed of mortared lava stone.

Red Hill Buildings and Structures

Red Hill (or Pu'u'ula'ula Summit) Observatory (built 1963) – contributing
The floor plan of the Red Hill Observatory is an octagon with an extension on the west side for a covered entrance. Windows enclose seven sides of the building, providing views into the crater and a door is located on the eighth side. The windows are set on a mortared rock wall base. The building has a hipped roof with an octagon-shaped cupola at its peak. Exterior changes to the building have been minor. A chimney was removed from the roofline when an interior furnace or fireplace was removed. A weather antenna has been added. A panel was constructed in front of the door to block the wind from blowing inside the building. In addition, a rock wall has been constructed around the building's perimeter to prevent erosion from

undercutting the building's foundation and allow visitors to enjoy views from outside the building.

Red Hill Stairs (built 1963) – contributing
A set of stairs was constructed in association with the Observatory to connect the building with the parking lot. It consists of four flights of stairs, broken up by landings. The risers are 6' wide, 6" tall, and constructed of concrete. Cheek walls are constructed of random-coursed, mortared lava rock. The right cheek wall rises approximately 18" above the stairs and does not have a railing. The left cheek wall rises approximately 2' above the stairs, is capped with a thin layer of concrete, and has a metal, 2"-diameter pipe railing. The left cheek wall extends beyond the top landing to the wall of the Observatory. It is constructed of mortared lava stone approximately 2' tall. Where the wall originally met the building, its height stepped up to approximately 3'. Post-Mission 66, the taller portion of the wall was removed to provide access to a viewing platform out side the perimeter of the building, losing about 4' of the original wall.

Red Hill Rock Walls (built post-Mission 66) – non-contributing portions
Several rock walls built post-Mission 66 are associated with the Red Hill Observatory. One wall rock wall was constructed to wrap around the entire perimeter of the Observatory building, creating a viewing platform. It is constructed of random-coursed mortared lava rock about 20" tall. This rock wall blends nicely with the original fabric of the Observatory.

Additional rock walls were built around the edge of the parking lot along the sidewalks to prevent erosion of the surrounding hills. These walls are constructed of dry-stacked lava stone that blend into the landscape. These non-contributing walls, though non-historic are visually compatible with the historic district.

Other Buildings and Structures

Kalahaku Overlook (built 1966), contributing
Kalahaku Overlook Structure is located at 9,342' at the crater's rim. The original crater rest house was built in the same general area in 1894 and later replaced with a concrete rest house in 1914. The 1914 rest house was a Maui landmark until it was demolished in 1957. The extant Kalahaku Overlook was constructed in 1966 and is associated with Mission 66 development in the park. The floor plan is a square with one beveled corner on the crater-viewing side of the structure. The structure is open on two sides. The viewing side of the structure is enclosed with three large windows set on a mortared rock wall base. The structure has a flat, white, metal roof held up by metal posts set in a concrete foundation.

Kalahaku Stairs – contributing
There are four sets of stairs at Kalahaku, all built after the period of significance. They are all constructed of mortared lava rock and have 2" diameter metal railings. They were constructed in 1954 with the building of the Kalahaku spur road and parking lot. One set is located at the northeastern end of the parking lot, another set is at the southwestern parking area, a third set is

at the top of the hill near the Kalahaku Overlook, and the fourth is located at the Silversword enclosure.

Kalahaku Silversword Enclosure Wall – contributing
A silversword viewing area was established at Kalahaku during the period of significance. Originally, the area was enclosed with a barbed wire fence with wooden posts. In 1966, the fence was replaced with a dry-stacked rock wall.

Leleiwi Overlook (built 1966), contributing
The Leleiwi Overlook Structure, at 8,840', is located at the end of the Leleiwi trail, built in 1966 and is associated with Mission 66 development in the park. The structure is nearly identical to the Kalahaku Overlook. The floor plan is a square with one beveled corner on the crater-viewing side of the structure. The structure is open on two sides. The viewing side of the structure is enclosed with three large windows set on a mortared rock wall base. The structure has a flat, white, metal roof held up by metal posts set in a concrete foundation.

Vault Toilets – non-contributing (built in 1993 and 2000)
Vault toilets have been constructed at Kalahaku Overlook (circa 2000) and at Halemau'u Trailhead (1993) since the period of significance. They have rectangular floor plans, gable roofs clad with wood shingles, wood siding on the exterior walls, and concrete foundations. They have black vent pipes that extend above the rooflines.

Park Entrance Station (MP 0.144) – non-contributing (built circa 1996)
A small entrance station is located just south of the park boundary. It has a rectangular floor plan, hipped roof, and walls clad with wood siding on the upper half and stone veneer on the lower half.

Underground Water Tank (MP 1.580), non-contributing (built 1980-81)
An underground water tank was constructed as part of a 1980-1981 water system and comfort station project. It is set into the hillside on downhill side of the road located near the bridge. The exposed, downhill side of the tank is constructed of stone. The structure is accessed by a set of concrete steps from a pullout on the north side of the road.

Character-defining Features:

Feature: Haleakala Highway Bridge

Feature Identification Number: 131086

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 1.993)

Feature Identification Number: 131088

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 2.621)

Feature Identification Number: 131090

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 2.937)

Feature Identification Number: 131092

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 2.950)

Feature Identification Number: 131094

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 3.966)

Feature Identification Number: 131096

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 4.209)

Feature Identification Number: 131098

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 4.985)

Feature Identification Number: 131100

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 5.212)

Feature Identification Number: 131102

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 5.819)

Feature Identification Number: 131162

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 5.840)

Feature Identification Number: 131164

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Box Culvert (MP 5.910)

Feature Identification Number: 131166

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Culverts (29)

Feature Identification Number: 131168

Type of Feature Contribution: Contributing

Feature: White Hill Observatory/ Visitor Center

Feature Identification Number: 131170

Type of Feature Contribution: Contributing

Feature: Red Hill (Pu'u'ula'ula) Observatory

Feature Identification Number: 131172

Type of Feature Contribution: Contributing

Feature: Red Hill Stairs

Feature Identification Number: 131174

Type of Feature Contribution: Contributing

Feature: Kalahaku Overlook

Feature Identification Number: 131176

Type of Feature Contribution: Contributing

Feature: Kalahaku Stairs

Feature Identification Number: 131178

Type of Feature Contribution: Contributing

Feature: Kalahaku Silversword Enclosure Wall

Feature Identification Number: 131144

Type of Feature Contribution: Contributing

Feature: Leleiwi Overlook

Feature Identification Number: 131146

Type of Feature Contribution: Contributing

Feature: Haleakala Highway Stone Retaining Walls (6)

Feature Identification Number: 131148

Type of Feature Contribution: Non Contributing

Feature: Haleakala Highway Stone aprons

Feature Identification Number: 131150

Type of Feature Contribution: Non Contributing

Feature: Haleakala Highway Asphalt curbs

Feature Identification Number: 131152

Type of Feature Contribution: Non Contributing

Feature: Haleakala Highway Culverts (49)

Feature Identification Number: 131154

Type of Feature Contribution: Non Contributing

Feature: White Hill Restroom – Men's

Feature Identification Number: 131156

Type of Feature Contribution: Non Contributing

Feature: White Hill Restroom – Women's

Feature Identification Number: 131158

Type of Feature Contribution: Non Contributing

Feature: White Hill Rock Walls

Feature Identification Number: 131160

Type of Feature Contribution: Non Contributing

Feature: Red Hill Rock Wall around observatory

Feature Identification Number: 131180

Type of Feature Contribution: Non Contributing

Feature: Red Hill Rock Walls around parking lot

Feature Identification Number: 131182

Type of Feature Contribution: Non Contributing

Feature: Haleakala Highway Vault Toilets (2)

Feature Identification Number: 131184

Type of Feature Contribution: Non Contributing

Feature: Haleakala Park Entrance Station

Feature Identification Number: 131186

Type of Feature Contribution: Non Contributing

Feature: Haleakala Highway Underground Water Tank

Feature Identification Number: 131188

Type of Feature Contribution: Non Contributing

Landscape Characteristic Graphics:

Historic bridge along the Haleakala Highway. (PWRO 2006)

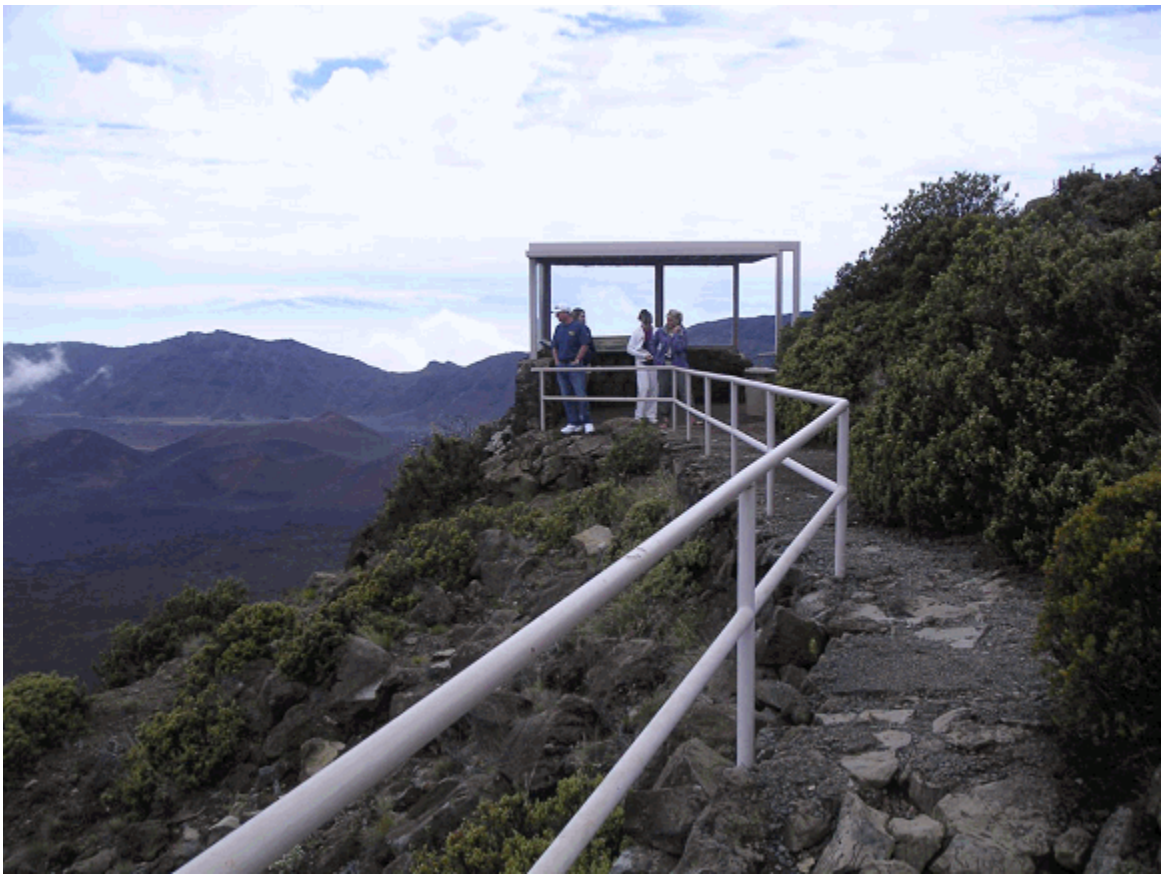
Example of a historic box culvert with a random course pattern along the Haleakala Highway. (PWRO 2006)

Historic culvert with a random course pattern along the Haleakala Highway. (PWRO 2006)

White Hill Observatory. (PWRO 2006)

Red Hill (Pu'u'ula'ula) Observatory. (PWRO 2006)

Kalahaku Overlook structure. (PWRO 2006)



Leleiwi Overlook structure. (PWRO 2006)

Circulation

Since its completion, the Haleakala Highway has served as the primary circulation route within the northwestern portion of the park. Construction of the road has allowed the park to develop visitor amenities, and meet park maintenance, administrative, and housing needs. Circulation features associated with the Haleakala Highway include the roadbed itself, as well as development nodes with their associated spur roads, parking areas, sidewalks, and trails. These development nodes are found at Halemau'u, Trailhead, Leleiwi Overlook, Kalahaku Overlook, White Hill, and Red Hill. The horizontal and vertical alignment and the typical cross sections of the road are discussed in the topography section.

Most of the circulation features at these development nodes were added or altered after the period of significance and therefore do not contribute to the road's historic significance. However, they are often compatible with the road's historic intent and purpose – a scenic road that provides visitor access to the park's amazing natural resources and allows staff to access resources.

(Note: The location of features is indicated in the narrative below by a unique mile point (MP),

with MP 0.000 located at the park boundary near the north entrance and MP 11.000 located at the Red Hill parking lot. This protocol was previously established by the maintenance division's inventory of features along the highway.)

Haleakala Highway

The portion of the Haleakala Highway within the park boundaries began at the end of the territorial approach highway near Pu'u Nianiau at the park boundary and extended to the rim of Haleakala Crater near White Hill. The elevation at the lower terminus was 6,700', at the upper terminus, 9,735'. The construction project consisted of 10.658 miles of grading, draining, and surfacing with treated, crusher-run base course. The road was designed to have as little visual impact on the landscape as possible with narrow travel lanes, no shoulders, and no guard rails. Historically, the controlling width of the roadway was 14', carrying a crown section of 8' with 3' shoulders on each side and no ditches. Standard widening was used on all curves. All blind curves and reverses were widened by an extra 8'. Slopes were flattened and widened wherever the terrain permitted. The roadbed from shoulder to shoulder was surfaced with a 4" course of crusher-run material. The surface was treated with an application of asphalt emulsion and covered with clean stone screenings.

Since the period of significance, the road has undergone some alterations to address maintenance and safety concerns. For instance, the road has been resurfaced and several intersections, spur roads, and pullouts have been added. In addition, travel lanes have been widened and in some areas, this has resulted in widening of the original prism of the roadbed, especially in the upper portions of the road and on sharp switchback turns. As a result of road widening and loss of historic culverts, the upper four miles of the road have diminished integrity. The road was resurfaced in a three-phase project that began in 1976 and was completed in 1980. The original plans called for the new road surface to be 20' wide on tangents, although the as-constructed plans show that in some areas the surface was widened to 22' including gravel shoulders. Curves were also widened, although the width varied. The road in front of park headquarters was widened to four lanes to accommodate bus parking. The reconstructed road utilized a structural section consisting of a 1-1/2" thick asphaltic concrete over a 2-3/4" asphalt stabilized base course. (DOI "Environmental Assessment," May 1993).

Haleakala Highway was again resurfaced in October 1999. The job added a pullout just before the Halemau'u Trailhead and used the excavated materials to stabilize portions of the shoulder that were badly eroded. The excavated material also allowed the Park Service to enlarge a pullout near the turn at the 8,500' elevation. The road was also widened near the park boundary to accommodate a new fee station in the middle of the road.

The result of these later modifications has impacted some portions of the road's integrity, but overall the majority of the historic road character is still intact. Widened portions of the road include the upper segments of the road, the switchback turns, and the segments of road at the park entrance station and the park headquarters building.

Today, the road continues to provide a unique experience of driving on a steep, windy, relatively narrow road, unique from typical highways constructed today. The road has limited shoulders and no guardrails, other than boulder barriers on some of the switchback turns, and continues to follow its original alignment as it zigzags up the slope of the volcano with nine switchbacks.

Spur Roads and Developed Areas

Halemau'u Trailhead

Halemau'u Trailhead Access Road (non-contributing)
The access road is short, approximately 100' long and follows a straight alignment between the main road and the parking lot, and is surfaced with asphalt. The Halemau'u Trail has been accessible from this point since the period of significance. The road was historically a one lane gravel road until it was reconstructed as part of the 1976-1980 road work.

Halemau'u Trailhead Parking Lot (non-contributing)
A parking area at Halemau'u Trailhead may have existed as early as 1936, when CCC crews were working on the trail. By the 1960s, it was a simple, irregular-shaped gravel parking lot. As part of the 1976-1980 road work, the parking lot elevation was significantly raised, enlarged, curbed, and resurfaced. Today the parking lot has a curved, rectangular shape. It is surfaced with asphalt and edged with 6" concrete curbs on all sides.

Leleiwi Overlook

Leleiwi Overlook Parking Lot (non-contributing)
In 1966, the Leleiwi parking area was a simple widening of the road into the hillside that allowed angle in parking on an asphalt surface. During the 1976-1980 road work, the parking area was formalized with a sidewalk, curbs, and plant beds. The parking area is located on the left hand, uphill side of the road. It has a separate entrance and exit, so that cars can only drive one direction through the lot. It accommodates 10 vehicles with angled parking. It is surfaced with asphalt.

Leleiwi Overlook Sidewalk (non-contributing)
A cement sidewalk separates the parking lot from the main road corridor. It is approximately 7' wide.

Leleiwi Overlook Trail (non-contributing)
The original trail was constructed in 1966, but was realigned during the 1976-1980 road work with a new pedestrian crossing to the west of the original road switchback crossing. The trail averages 3' wide. It is curvilinear as it navigates through the rocky and shrubby terrain. The trail is surfaced with gravel.

Kalahaku Overlook

Kalahaku Overlook Walkways (built 1954 and 1966) – contributing
A system of walkways, sidewalks, and stairs provide access from the parking areas to the vault toilet and the Kalahaku Overlook structure. Two set of stone stairs connect the two parking areas to an asphalt surfaced walkway on top of the hill. The southwesternmost stairs and the walkway on top of the hill were constructed in 1954. The northeasternmost trail, and possibly the stairs, were constructed in 1966. The walkway is approximately 2.5'wide, and curvilinear as it makes its way through rock outcroppings. Down below, in the parking lot, a cement sidewalk was built in association with the vault toilet to provide access from both parking areas. It is approximately 4' wide.

Silversword Trail at Kalahaku Overlook (built 1957) – contributing
In August 1957, new steps were built from the parking lot to the overlook where visitors could view the silverswords and crater. These steps still remain and lead to the Silversword Trail, a short trail along the silversword enclosure. The trail is approximately 3.5' wide and surfaced with asphalt.

Kalahaku Overlook Access Road (non-contributing)
In the 1930s, during construction of the road, a small parking area and trail were built at the last switchback on the road to Kalahaku Overlook where the 1914 rest house and silversword enclosure were located. In March 1954, the trail was replaced with a road, referred to as the "Silversword Access Road." Plans for the road used the shortest possible route from the road to the overlook. The access road was approximately a 0.2 miles long, had no curves of less than 150' radius, and was designed with balanced cuts and fills. It is approximately 20' wide, with two travel lanes and no shoulders. It is surfaced with asphalt. The road was widened and resurfaced in 1976-1980.

Kalahaku Overlook Parking Lot (non-contributing)
The parking area, originally built in 1954, was enlarged in 1976-1980 and edged with concrete curbs on the uphill side, asphalt curbs on the downhill side. The parking lot is irregular-shaped. It consists of two widened areas along the access road that provide parking spaces for perpendicular parking. It is surfaced with asphalt.

White Hill

White Hill Trail (contributing)
The White Hill Trail is a short, 0.2 mile trail to the summit of White Hill (Pa Kaoao) built by the CCC in 1934. The trail follows its historic alignment. Historically, the surface of the trail was

smooth and surfaced with crushed rock. The edges were lines with neat lines of rock. Today, the trail has an uneven surface with exposed rocks jutting out from the ground. In many areas, rocks have tumbled down the slope into the trail bed and the width of the trail varies from 3' to 6' wide.

White Hill Parking Lot (non-contributing)
Historically, the White Hill parking lot was a large, open, rectangular area edged with a mortared stone curb that could hold 90 cars. It measured approximately 215' by 132'. During the 1976-1980 road work, the parking lot was enlarged to 275' by 180'. It was also reshaped into an oval. The edges are lined with concrete sidewalks and curbs. The current parking stall configuration accommodates 50 cars and 13 buses or trucks with trailers.

White Hill Sidewalks (non-contributing)
The concrete sidewalks along the edges of the parking lot are 6.5' wide and were constructed in conjunction with the parking lot.

White Hill Walkways (non-contributing)
Historically, a single walkway ran between the parking lot and the White Hill Observatory. The walkway left the parking lot from the center of the eastern end of the lot and followed a slightly curved alignment to the Observatory. The White Hill Trail intersected the main walkway at a wye-intersection. Since the period of significance, new walkways have been added. With the construction of the 1954 comfort station, a trail was added from the northeasternmost corner of the parking lot to access it. When the women's comfort station was added circa 2002, the walkway was reconstructed as a concrete sidewalk. It was also extended with an asphalt section continuing to the Observatory building. When the parking lot was expanded in the late 1970s, an additional walkway to the Observatory was added from the southeasternmost corner. One of the branches of the White Hill Trail wye-intersection is no linger in use, but the location of the old branch is still discernable by the arrangement of the rocks. Near the crater's edge, a line of cut stones edges the asphalt walkway. This is the remains of the original White Hill Trailhead built by the CCC during the period of significance.

Red Hill
During the Mission 66-era, the observatory at Red Hill was designed by Cecil Doty, a prominent NPS architect during the Mission-66 era. The development at Red Hill was constructed in 1963 and is nearly intact as originally designed and constructed.

Red Hill Road (built 1963) – contributing
In 1941, the army constructed a spur road that linked the terminus of the Haleakala Highway with Haleakala's summit at Red Hill. The alignment of the army's spur road spiraled up the side of the Red Hill cinder cone following the ridgeline around the cone's depression to its highest point. In the early 1960s, the park redeveloped Red Hill under the Mission 66 program and changed the terminus of the army's road. The road followed the original alignment to the

base of the hill. Then instead of spiraling along the ridgeline around the cinder cone's depression, the road was truncated to turn directly into the depression where a new parking lot was constructed. The old road alignment along the ridgeline was incorporated into the new development as a walkway and trail system. During the 1976-1980 road work, the beginning section of the road was realigned and in 1990, a parking lot was added to the same section. Today the road is surfaced with asphalt, is 20' wide with two travel lanes. The road does not have shoulders, but is edged with asphalt curbs on both sides. It is curvilinear and the grade varies from approximately 7% to over 13%.

Red Hill Parking Lot (built 1963) – contributing
The parking lot at Red Hill was constructed in the early 1960s. It is located in a natural depression below the summit of the cinder cone. It is tear-shaped with a tear-shaped plant bed in the middle, creating a looped drive through the lot. The lot is surfaced with asphalt.

Red Hill Walkway, asphalt (built 1963, reconstructed 1993) – contributing
At the top of the hill, a 5-foot wide, asphalt-surfaced walkway connects the stairs from the parking lot to the Observation building and continues along the ridge line of the cinder cone and slopes back down into the southwestern end of the parking lot. The alignment of this walkway appears in the original design drawings for the area and appear in photographs from 1963. Historically, this path was surfaced with asphalt. In 1993, the walkway was resurfaced and repaired.

Red Hill Sidewalks (built 1963, resurfaced in 1970s or 80s) – non-contributing
Five-foot wide cement sidewalks line the edges of the parking lot. They were originally constructed in conjunction with the parking lot in the early 1960s, but appear in historic photos to have been surfaced with asphalt and edged with a concrete curb.

Walkway through plant bed (built post-1963) – non-contributing
Since the Mission 66-era, a newer concrete walkway has been added across the plant bed in the parking lot. This walkway was not part of the original design of Red Hill.

Red Hill Trail, unpaved – non-contributing
From the asphalt walkway, an informal, unpaved trail branches off to continue along the ridgeline, providing views of the northside of the island. It is surfaced with the native, red cinders of Red Hill. It varies in width from 3' to 5' wide. It is lined in some areas by red lava stones and rock outcroppings. In other areas there is no edging. Ariel photographs from the 1970s show desire paths along the ridge, but they do not appear to follow the same alignment as today.

Haleakala Observatories Access Road Intersection (non-contributing)

In mid-1954, park road crews constructed an access road from the Red Hill access road to the

then, Civilian Aeronautics Administration's (CAA) "Science City" (today it is the Haleakala Observatories, owned by the University of Hawaii" to "owned by the State of Hawaii and managed by the University of Hawaii) at the Kolekole just outside the park boundaries. The park service built the road on a reimbursable basis for the CAA and park visitors were allowed access to this scenic skyline drive. The beginning section of the road was realigned during the 1976-1980 road work. This spur road is not located within the historic district boundary beyond its intersection with the Red Hill Road.

Turnouts and pull-outs (non-contributing)

Historic construction documents of the Haleakala Highway do not indicate any pullouts were built along the road during the period of significance. Over time, some pullouts have been added as the road was widened. Some of the more prominent pull outs or turnouts along the road include a pullout to access a water tank at MP 1.652, slow vehicle turnouts along both travel lanes at MP 2.955, the Hitchhiker's pullout at MP 4.454, and two additional slow vehicle turnouts at MP 6.790 and 8.272. These turnouts and pullouts are paved with asphalt.

Less formalized, gravel pullouts are located at the following mile points: MP 0.843, MP 1.412, MP 1.432, MP 2.827, MP 3.840, MP 4.400, MP 4.768, MP 4.950, MP 6.019, and MP 6.500.

Summary

The road was designed to have as little visual impact on the landscape as possible with narrow travel lanes, no shoulders, and no guard rails. Since the period of significance, travel lanes have been widened and several intersections, spur roads, and pullouts have been added. However, the road continues to feel narrower and less intrusive than typical roads constructed today. The road has limited shoulders and no guardrails, other than boulder barriers on some of the switchback turns. The road continues to zigzag up the slope of the volcano with nine switchbacks. Parking and trails are located at White Hill, the historic terminus of the road. The White Hill Trail still follows the historic alignment as established by the CCC. The Red Hill Road was constructed to access the Mission 66 development at the summit and was designed in a similar fashion as the highway. It is narrow, windy, and has few embellishments along its path. The parking lot and sidedwalks at Red Hill are also intact. The sidewalks and trail at Kalahaku Overlook also retain integrity to the Mission 66 era. Together, these features help to convey the historic circulation patterns that were developed over the period of significance from the early rustic era to the later modern era .

Character-defining Features:

Feature: Haleakala Highway

Feature Identification Number: 131190

Type of Feature Contribution: Contributing

Feature: White Hill Trail

Feature Identification Number: 131192

Type of Feature Contribution: Contributing

Feature: Red Hill Road

Feature Identification Number: 131194

Type of Feature Contribution: Contributing

Feature: Red Hill Parking Lot

Feature Identification Number: 131196

Type of Feature Contribution: Contributing

Feature: Red Hill Walkway, asphalt

Feature Identification Number: 131198

Type of Feature Contribution: Contributing

Feature: Kalahaku Overlook Walkways

Feature Identification Number: 131200

Type of Feature Contribution: Contributing

Feature: Silversword Trail at Kalahaku Overlook

Feature Identification Number: 131202

Type of Feature Contribution: Contributing

Feature: Halemau'u Trailhead Access Road

Feature Identification Number: 131204

Type of Feature Contribution: Non Contributing

Feature: Halemau'u Trailhead Parking Lot

Feature Identification Number: 131206

Type of Feature Contribution: Non Contributing

Feature: Leleiwi Overlook Parking Lot

Feature Identification Number: 131208

Type of Feature Contribution: Non Contributing

Feature: Leleiwi Overlook Sidewalk

Feature Identification Number: 131210

Type of Feature Contribution: Non Contributing

Feature: Leleiwi Overlook Trail

Feature Identification Number: 131212

Type of Feature Contribution: Non Contributing

Feature: Kalahaku Overlook Access Road

Feature Identification Number: 131214

Type of Feature Contribution: Non Contributing

Feature: Kalahaku Overlook Parking Lot

Feature Identification Number: 131216

Type of Feature Contribution: Non Contributing

Feature: White Hill Parking Lot

Feature Identification Number: 131218

Type of Feature Contribution: Non Contributing

Feature: White Hill Sidewalks

Feature Identification Number: 131220

Type of Feature Contribution: Non Contributing

Feature: White Hill Walkways

Feature Identification Number: 131222

Type of Feature Contribution: Non Contributing

Feature: Red Hill Sidewalks (concrete)

Feature Identification Number: 131224

Type of Feature Contribution: Non Contributing

Feature: Red Hill Walkway (through plant bed)

Feature Identification Number: 131226

Type of Feature Contribution: Non Contributing

Feature: Red Hill Trail (unpaved)

Feature Identification Number: 131228

Type of Feature Contribution: Non Contributing

Feature: Haleakala Highway Turnouts/Pullouts (15)

Feature Identification Number: 131230

Type of Feature Contribution: Non Contributing

Landscape Characteristic Graphics:

White Hill parking lot. (PWRO 2006)

White Hill walkways. (PWRO 2006)

Red Hill Road. (PWRO 2006)

Red Hill parking lot, sidewalks, and stairs. (PWRO 2006)

Topography

For purposes of the CLI, topography is defined as that topography that has been manipulated by human activity. (For a description of natural topography, see the Natural Systems and Features section.) The majority of manipulation of topography within the historic district is associated with the construction of the Haleakala Highway, which is still evident along the entire length of the road. The volcano's west slope is cut by deep gullies, lava dykes, and spurs, requiring engineering techniques to create a pleasant, scenic road for park visitors. As with any road construction, the Haleakala Highway required grading. Although great care was taken to minimize disturbance to the surrounding landscape, the use of rock cuts and cut and fill sections was required to negotiate the rough, sloping terrain.

Grading
The average grade on the Haleakala Highway was 5.367%. Every effort was made to keep the controlling grade down to 6% and the grade on all curves was "compensated" from 6%. Although there were a few short stretches of 6.8% grade on the road, these were not considered as adverse grades. The road had nine switchbacks. The minimum radius on the park road was 75' and this minimum was used only three times. There were five switchbacks

with radii of 100'; one had a 42 degree curve. A curve of 100-foot radius with a central angle of 90 degrees led into the parking lot at the end of the road.

Rock Cuts

Rock cuts are sculpted rock faces of varying heights created through the construction of a road bed through steep, rocky terrain, typically involving a near-vertical cut on the interior, uphill side of the road. In keeping with the principles of naturalistic landscape architecture, NPS landscape architects specified several measures to be undertaken in order to ensure that the artificial rock cuts blended seamlessly with their natural environment. Rock cuts were not made perfectly vertical, but were battered at an angle, or blasted to leave overhanging ledges, to simulate a natural rock outcropping. Masons were directed to work the faces of the cuts in order to hide the drill scars that remained after the initial blasting and cutting process. The top edges of the rock cuts were typically tapered into the natural slope and re-vegetated in order to further enhance the naturalistic properties of the cuts.

Both during and after the period of significance, many of the rock cuts along the Haleakala Highway were altered for safety concerns. In June 1936, the district ranger reported that large rocks on the road banks had been blasted and removed because they appeared dangerous. He predicted, "Continual freezing and thawing will necessitate more or less constant work of this nature" (Wingate, 1936 and 1936). Park workers frequently blasted and removed rocks from the upper banks along the road after they had been undermined by the weather. Eighteen years after construction, rockslides continued to be a problem and retaining walls were constructed to prevent the road from sliding. In addition, some rock cuts were altered to accommodate road widening projects over the years. In 1959 crews blasted and widened cuts in the upper three miles of the Haleakala Highway. Surplus material was used to reinforce fills and build up narrow shoulders.

Despite these alterations, naturalistic rock cuts still characterize the Haleakala Highway today. They continue to appear as natural lava rock outcroppings and rock walls along the road's edge. Although, they may have been somewhat altered to improve safety conditions, their appearance and locations remain.

Cuts and Fills

Cuts and fills, integral to the geometry of an engineered road, are found along the entire length of the Haleakala Highway. A typical cross section of the road features a cut-side travel lane that is carved into the adjacent slope. The material gained from the cut was then used to create the fill-side travel lane. To the greatest extent possible, the designers and builders of the road attempted to equalize the amount of cut with the amount of fill material. Where the excavation of large rock cuts resulted in an excess of fill material, the surplus was often piled to create berms on the fill side of the road on dangerous curves or where fill slopes were likely to erode during storm events.

Despite some alterations to the cut and fill slopes to improve safety conditions and

accommodate road widening, cuts and fills are still characteristic of the Haleakala Highway today. They continue to be the main engineering technique that characterizes the cross-section of the road as it winds up the steep slope of the volcano.

Landscape Characteristic Graphics:

Road alignment winding through a rock cut. (PWRO 2006)

Views and Vistas

Views play one of the most critical roles of the visitor experience within the Haleakala Highway historic district. On a clear day, the drive to Haleakala's summit provides sweeping views of Maui's central valley, the West Maui mountains, the Pacific Ocean, and the islands of Lanai, Molokai, and Kahoolawe. Once they reach the summit, visitors are rewarded with amazing views into the crater itself. However, more often than not, clouds envelop the slopes near the middle elevations of Haleakala. In this situation, visitors experience the sensation of being above the clouds – a perspective most people only experience from the windows of an airplane.

Before the Haleakala Highway was constructed, most visitors experienced views into the crater from the Kalahaku Overlook area. After the construction of the road, the most popular view of the crater was from the observatory station at White Hill or from the summit of White Hill accessible via a short trail (0.2 miles). The visitor is rewarded with magnificent views of the crater, cinder cones, clouds, and, in the distance, the summits of Mauna Kea and Mauna Loa on the island of Hawaii. Viewing sunrises and sunsets from the summit area is one of the

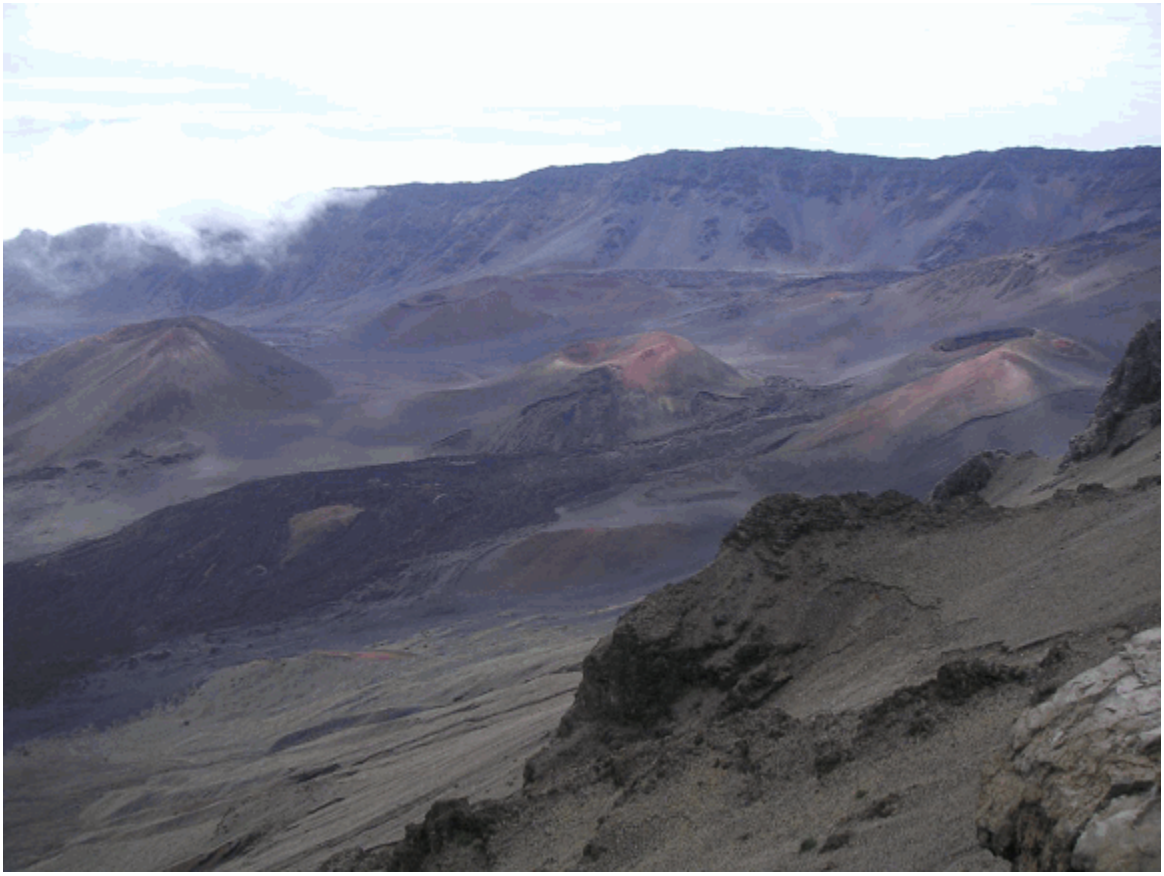
most popular activities among visitors to the park. Both of the historically significant views from Kalahaku and White Hill are still easily accessible by vehicle via the Haleakala Highway.

Additional viewing points have been added at Leleiwi Overlook and Red Hill since the period of significance that provide additional opportunities for visitors to appreciate the views of both the crater and island. At Red Hill, there is the Pu'u'ula'ula Observatory and a short trail that follows the ridge of the hill and, depending on the weather, provides views of clouds or the Pacific Ocean and Maui. The University of Hawaii's facilities at the Haleakala Observatories are also visible from Red Hill.

Besides the views from the designated lookout points, views of the ocean and island below are a critical part of the experience of driving along the Haleakala Highway. Historically, the road was designed to capture views of the island and ocean below with minimal distraction from the road itself. The color of the surface material was chosen to blend in with the native lava stone landscape, guardrails were purposefully omitted to prevent blocking of views, and the switchbacks were aligned tightly to try to minimize visibility of the road downhill. In addition, the natural low-growing nature of the native vegetation on the crater ensures that views will not be blocked by their growth.

Because the views that originally inspired the original design and alignment of the road still remain and continue to be enjoyed by park visitors today, views and vistas is a landscape characteristic that contributes to the historic character and integrity of the Haleakala Highway historic district.

Landscape Characteristic Graphics:



View of cinder cones in the Haleakala Crater from the Kalahaku overlook. (PWRO 2006)

Archeological Sites

Archeological site inventories by the CLI include the location of ruins, traces, or deposited artifacts in the landscape that are associated with the period of significance and are evidenced by the presence of either surface or subsurface features. The CLI takes every precaution not to disclose the location of sensitive archeological sites to preserve the resources.

Along the Haleakala Highway there are several pre-historic and historic archeological sites that predate the period of significance. While these locations may be archeological significant in their own right, they are not directly linked to the significance of the Haleakala Highway for their contribution to the history of a scenic highway built between 1933 and 1941. As a result, they do not contribute to the significance of the Haleakala Highway historic district.

One archeological site that has the potential to reveal information regarding the construction of the road is the Kalahaku Overlook site. This was the location of both the 1894 and 1914 crater rest houses and, early in the planning phase of the highway project, was recommended to be the terminus of the Haleakala Highway. Although the road was extended to White Hill, the road's alignment was designed to provide access to the Kalahaku observation point. The 1914

crater rest house, built by the Chamber of Commerce, was a Maui landmark until it was demolished in 1957. In addition to its link to development of tourism, the same area was used as a CCC camp while a crew constructed the White Hill trail and cleared the area for construction of the White Hill Observation Station. No archeological survey has been conducted at this site, as of the writing of this CLI.

Other archeological sites associated with the construction of the road are three caves (Hawaii State Inventory of Historic Places Site # 50-20-11-3600, 3644 and 3688) located near the road that contain historic materials such as empty dynamite boxes, sawed wood, and ceramic serving plates and vessels (Carson and Mintmier 2007). These sites may have been used as temporary campsites by workers engaged in the construction of the road.

Condition

Condition Assessment and Impacts

Condition Assessment: Fair

Assessment Date: 09/30/1999

Condition Assessment: Good

Assessment Date: 03/16/2006

Condition Assessment Explanatory Narrative:

Haleakala Highway historic district has been assessed as a landscape in good condition. Although individual features within the district may be in fair or poor condition, the majority of the road and its features are in good condition. The bridge, all 11 box culverts, and a majority (83%) of small culverts, both historic and non-historic were in good condition in 2006. The inventory unit's cultural and natural values are as well preserved as can be expected under the given environmental conditions. Other than reroofing the Red Hill (Pu'u'ula'ula) Observatory, which is anticipated to be completed before the end of fiscal year 2008, no immediate corrective action is required to maintain the district's current condition.

Stabilization Measures:

Buildings: A storm in 2007 damaged the roof of the Red Hill (or the Pu'u'ula'ula Summit) Observatory and needs to be repaired.

Culverts: Approximately half of the 82 historic and non-historic culverts were partially filled with sediment or had minor vegetation growing at the base or on top of the headwall, impacts that should be kept in check with regular maintenance. Those culverts that were in fair to poor condition, required repair of cracked mortar, resetting of loose stones, and/or vegetation removal. These culverts were located at Mile Points 2.010, 2.428, 2.700, 2,787, 5.570, 5.720. 6.000, 6.663, 6.951, 7.315, 8.152, and 10.500.

Impacts

Type of Impact: Exposure To Elements

External or Internal: Internal

Impact Description: Exposure to inclement weather has caused mortar in some of the culvert headwalls to crack. A severe storm blew the sheathing material off the Red Hill Observatory roof in 2007.

Type of Impact: Vegetation/Invasive Plants

External or Internal: Internal

Impact Description: Woody vegetation has grown close to some culvert headwalls, causing the mortar to crack and stones to become loose. Vegetation has also caused water to back up and create erosion that is undermining the headwall at MP 8.152.

Treatment

Treatment

Approved Treatment: Undetermined

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Bibliography

Citation Title: For bibliography see "Supplemental Information".

Supplemental Information

Title: Bibliography

Description: Bibliography

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Title: Haleakala Highway Site Plan

Description: A larger version of the site plan is available from the park or the CLI Coordinator at the Pacific West Regional Office.

Title: Halekala Highway Features Chart

Description: A chart providing additional detail about individual features is available from the park or the CLI Coordinator at the Pacific West Regional Office.

Supplemental Information

Title: Haleakala Highway feature location chart.

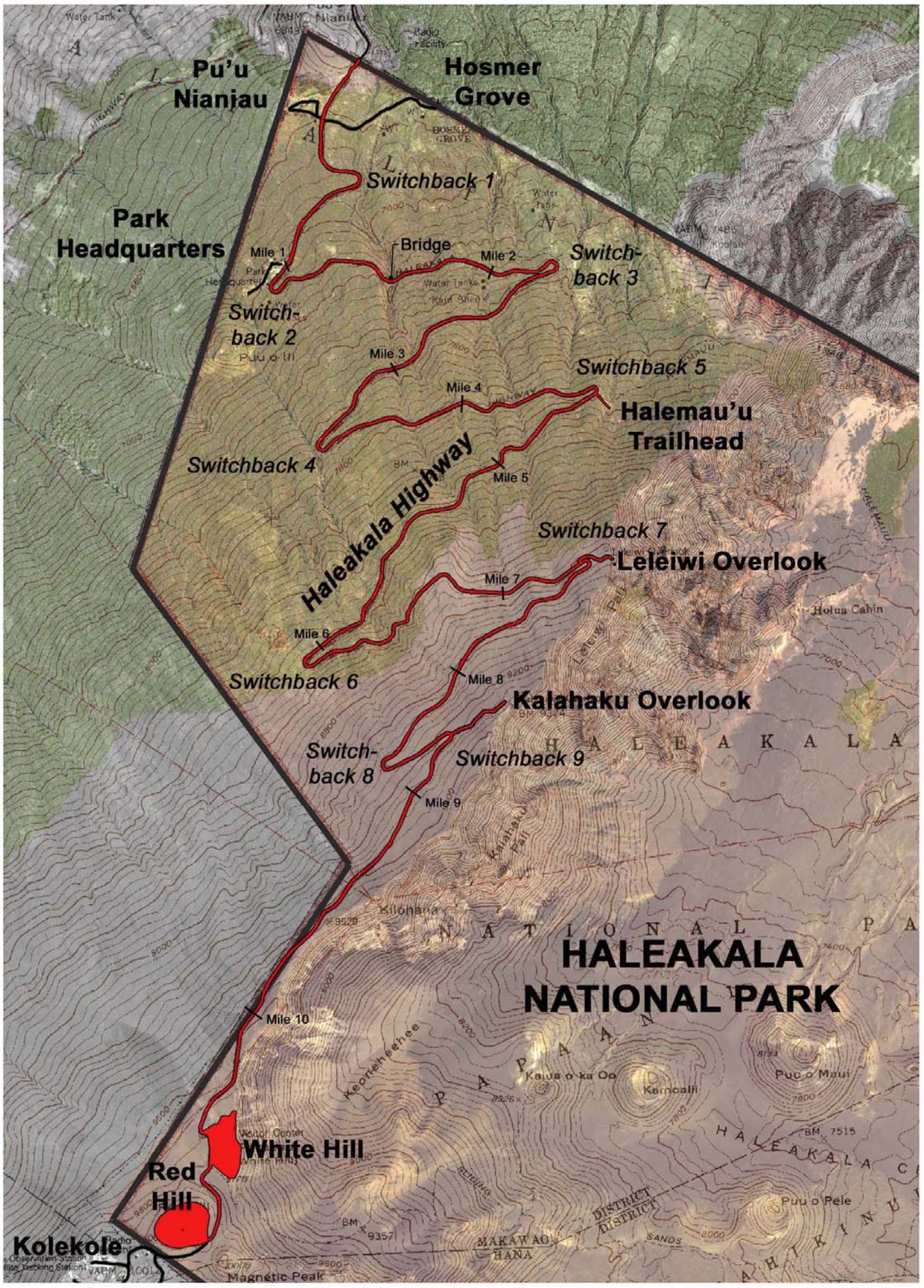
MP	Feature Type	Contributing (C)/ Non-contributing (NC)	Note
0.080	Culvert	NC	
0.627	Culvert	C	
0.804	Culvert	NC	
0.844	Culvert	C	
0.883	Culvert	C	
0.993	Culvert	C	One headwall is historic, the other is non-historic
1.025	Retaining wall	NC	
1.158	Culvert	NC	
1.296	Culvert	C	
1.361	Culvert	C	
1.411	Culvert	NC	
1.55	Culvert	C	
1.558	Culvert	C	One headwall is historic, the other is non-historic
1.612	Bridge	C	
1.651	Culvert	NC	
1.705	Culvert	C	
1.777	Culvert	C	
1.847	Culvert	C	
1.993	Box culvert	C	
2.010	Culvert	C	One headwall is historic, the other is non-historic
2.113	Culvert	C	One headwall is historic, the other is non-historic
2.195	Culvert	C	One headwall is historic, the other is non-historic, but compatible
2.428	Culvert	C	
2.497	Culvert	C	
2.574	Culvert	NC	
2.590	Culvert	NC	
2.621	Box culvert	C	
2.700	Culvert	C	One headwall is historic, the other is non-historic
2.787	Culvert	NC	
2.855	Culvert	C	
2.863	Culvert	C	
2.937	Box culvert	C	
2.950	Box culvert	C	Modified headwall on the upslope side of the road to accommodate road widening.

3.345	Culvert	C	
3.513	Culvert	C	
3.583	Culvert	C	
3.698	Culvert	C	The historic headwalls have been enlarged with a non-historic extension.
3.789	Culvert	C	
3.863	Culvert	NC	
3.966	Box culvert	C	
4.097	Culvert	NC	
4.209	Box culvert	C	Modified headwall on the upslope side of the road to accommodate road widening.
4.250	Culvert	C	
4.300	Culvert	C	The historic headwalls have been enlarged with a non-historic extension.
4.421	Culvert	NC	
4.768	Culvert	NC	
4.800	Culvert	C	
4.873	Culvert	C	One headwall is historic, the other is non-historic
4.900	Retaining wall	NC	
4.940	Culvert	NC	
4.985	Box culvert	C	
5.183	Retaining wall	NC	
5.212	Box culvert	C	Modified headwall on the upslope side of the road to accommodate road widening.
5.570	Culvert	NC	
5.720	Culvert	NC	
5.790	Culvert	NC	
5.819	Box culvert	C	
5.840	Box culvert	C	
5.875	Retaining wall	NC	
5.910	Box culvert	C	Modified headwall on the upslope side of the road to accommodate road widening.
5.990	Culvert	NC	
6.000	Culvert	NC	
6.010	Culvert	NC	
6.100	Culvert	NC	
6.109	Retaining wall	NC	
6.200	Culvert	NC	
6.269	Culvert	C	One headwall is historic, the other is non-historic
6.400	Culvert	Unknown	
6.499	Culvert	C	

6.550	Retaining wall	NC	
6.599	Culvert	C	One headwall is historic, the other is non-historic
6.663	Culvert	NC	
6.700	Culvert	NC	
6.904	Culvert	NC	
6.951	Culvert	NC	
7.007	Culvert	NC	
7.175	Culvert	NC	
7.315	Culvert	NC	
7.499	Culvert	NC	
7.650	Culvert	NC	
7.673	Culvert	NC	
7.700	Culvert	NC	
7.806	Culvert	NC	
7.917	Culvert	NC	
8.067	Culvert	NC	
8.152	Culvert	NC	
8.311	Culvert	NC	
8.547	Culvert	C	One headwall is historic, the other is non-historic. The historic headwall has been enlarged with a non-historic extension.
8.700	Culvert	NC	
9.239	Culvert	NC	
9.308	Culvert	NC	
10.016	Culvert	NC	
10.271	Catch basin	NC	
10.386	Catch basin	NC	
10.500	Culvert	C	One headwall is historic, the other is non-historic
10.600	Culvert	NC	

Supplemental Information

Title: Haleakala Highway Site Plan



HALEAKALA HIGHWAY SITE PLAN
Cultural Landscapes Inventory, 2008

Mile Point (MP)	Feature Type	Contributing/ Non-contributing
0.080	Culvert	NC
0.627	Culvert	C
0.804	Culvert	NC
0.844	Culvert	C
0.883	Culvert	C
0.993	Culvert	C
1.025	Wall	NC
1.158	Culvert	NC
1.296	Culvert	C
1.361	Culvert	C
1.411	Culvert	NC
1.55	Culvert	C
1.558	Culvert	C
1.612	Bridge	C
1.651	Culvert	NC
1.705	Culvert	C
1.777	Culvert	C
1.847	Culvert	C
1.993	Box culvert	C
2.010	Culvert	C
2.113	Culvert	C
2.195	Culvert	C
2.428	Culvert	C
2.497	Culvert	C
2.574	Culvert	NC
2.590	Culvert	NC
2.621	Box culvert	C
2.700	Culvert	C
2.787	Culvert	NC
2.855	Culvert	C
2.863	Culvert	C
2.937	Box culvert	C
2.950	Box culvert	C
3.345	Culvert	C
3.513	Culvert	C
3.583	Culvert	C
3.698	Culvert	C
3.789	Culvert	C
3.863	Culvert	NC
3.966	Box culvert	C
4.097	Culvert	NC
4.209	Box culvert	C
4.250	Culvert	C
4.300	Culvert	C
4.421	Culvert	NC
4.768	Culvert	NC
4.800	Culvert	C
4.873	Culvert	C
4.900	Wall	NC
4.940	Culvert	NC
4.985	Box culvert	C
5.183	Wall	NC
5.212	Box culvert	C
5.570	Culvert	NC
5.720	Culvert	NC
5.790	Culvert	NC
5.819	Box culvert	C
5.840	Box culvert	C
5.875	Wall	NC
5.910	Box culvert	C
5.990	Culvert	NC
6.000	Culvert	NC
6.010	Culvert	NC
6.100	Culvert	NC
6.109	Wall	NC
6.200	Culvert	NC
6.269	Culvert	C
6.400	Culvert	Unknown
6.499	Culvert	C
6.550	Wall	NC
6.599	Culvert	C
6.663	Culvert	NC
6.700	Culvert	NC
6.904	Culvert	NC
6.951	Culvert	NC
7.007	Culvert	NC
7.175	Culvert	NC
7.315	Culvert	NC
7.499	Culvert	NC
7.650	Culvert	NC
7.673	Culvert	NC
7.700	Culvert	NC
7.806	Culvert	NC
7.917	Culvert	NC
8.067	Culvert	NC
8.152	Culvert	NC
8.311	Culvert	NC
8.547	Culvert	C
8.700	Culvert	NC
9.239	Culvert	NC
9.308	Culvert	NC
10.016	Culvert	NC
10.271	Catch basin	NC
10.386	Catch basin	NC
10.500	Culvert	C
10.600	Culvert	NC