Joshua Tree National Park

National Park Service
U.S. Department of the Interior

Joshua Tree National Park
California

Environmental Assessment / Assessment of Effect

Keys View Road Reconstruction

April 2005

ENVIRONMENTAL ASSESSMENT / ASSESSMENT OF EFFECT
Keys View Road Reconstruction

Prepared For:
National Park Service

Prepared By:
engineering-environmental Management, Inc.

Joshua Tree National Park
California

U.S. Department of the Interior, National Park Service

Environmental Assessment: / Assessment of Effect
Keys View Road Reconstruction

Joshua Tree National Park
Riverside and San Bernardino Counties, California

Summary

The National Park Service is considering widening and realigning the existing 5.6-mile Keys View Road from the intersection with Route 12 (Park Boulevard near Cap Rock) to Keys View Overlook, applying a fog seal to the newly laid road surface and parking areas, chip sealing and striping previously rehabilitated road sections, including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from Keys View Road junction to the Geology Tour Road junction, Route 12 from the North Entrance to the intersection with Pinto Basin Road, as well as chip sealing or slurry sealing and re-striping of previously rehabilitated parking areas in Joshua Tree National Park, Riverside and San Bernardino Counties, California. The project is part of a phased effort to rehabilitate many of the park's primary roadways. This action is needed because Keys View Road has many abrupt vertical and horizontal curves; the parking area, curbs, and sidewalks at Keys View are deteriorated; the Keys View Road surface is in poor condition; the pavement is thin and inadequate for the traffic the road receives; and the lack of adequate turnouts at popular trails and climbing areas along Keys View Road results in visitors parking along the soft shoulder and on vegetation. The fog sealing, chip sealing, and slurry sealing are needed to prolong the life of the recently rehabilitated road surfaces; striping would provide safety for vehicles traveling on the roads.

This environmental assessment / assessment of effect examines in detail two alternatives: no action and the National Park Service preferred alternative. The preferred alternative includes widening and realigning Keys View Road, rehabilitating pavement at Keys View parking area, applying a fog seal to the new road and slurry sealing the new parking area surface, and reconstructing the sidewalks and walls. Parking for Cap Rock area and Juniper Flats backcountry registration board would be rehabilitated, and turnout parking would be added. The preferred alternative also includes chip sealing and striping of previously rehabilitated road sections, as well as chip sealing or slurry sealing and re-striping previously rehabilitated parking areas.

The preferred alternative would have no or negligible impacts to wetlands and floodplains, designated critical habitat, ecologically critical areas, wild and scenic rivers and other unique natural areas, geology and geologic hazards, water quality, prime and unique farmland, park operations, socioeconomics, land use, environmental justice, ethnographic resources, historic structures, cultural landscapes, museum objects, Indian trust resources, or natural soundscapes.

The preferred alternative would contribute short-term, negligible, adverse impacts to air quality and health and safety; short-term, negligible to minor, adverse impacts to wildlife; short-term, minor, adverse impacts to soils; and short-term, moderate, adverse impacts to vegetation and visitor use and experience. There would be long-term, negligible to minor, adverse impacts to wildlife; long-term, minor, adverse impacts to visual resources; long-term, moderate, adverse impacts to soils and vegetation; long-term, negligible to minor, beneficial impacts to archeological resources; and long-term, moderate, beneficial impacts to visitor use and experience and health and safety.

For threatened and endangered species, both federally listed and state or other agency listed, the overall, impacts to the desert tortoise would be short and long term, moderate and adverse. Impacts to the flat-tailed lizard (California special concern species) would be short term, minor, and adverse and long term, negligible, and adverse. Impacts to the desert bighorn sheep (BLM sensitive), mountain quail (Audubon watch list), Bendire's thrasher (California special concern species), and Le Conte's thrasher (California special concern species) would be short term, negligible, and adverse. There would be no long-term impacts to these species. Impacts to special-status plant species would be short term, negligible, and adverse.

Notes to Reviewers and Respondents

If you wish to comment on the environmental assessment / assessment of effect, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their name and home address from the record, which we will honor to the extent allowable by law. *If you want us to withhold your name and address, you must state this prominently at the beginning of your comment.* We will make all submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please address comments to: Superintendent; Joshua Tree National Park; Attn: Keys View Road Reconstruction; 74485 National Park Drive; Twentynine Palms, CA 92277.
E-mail: JOTR_publiccomments@nps.gov [Please reference Keys View Road Reconstruction in the subject line.]

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ACRONYMS AND ABBREVIATIONS

e^2M	engineering-environmental Management, Inc.
km	Kilometer
NRHP	National Register of Historic Places
PL	Public Law
RV	Recreational Vehicle
USC	United States Code

INTRODUCTION

PURPOSE AND NEED FOR ACTION

The National Park Service (NPS) is considering widening and realigning the existing 5.6-mile Keys View Road from the intersection with Route 12 (Park Boulevard near Cap Rock) to Keys View Overlook in Joshua Tree National Park (figure 1). The reconstructed road would have a 30- to 35-mile per hour design speed. The parking areas for Keys View Overlook, Cap Rock area, and Juniper Flats backcountry registration board would be rehabilitated and turnout parking would be added. The newly laid Keys View Road segments and parking areas would be sealed with a fog seal upon completion. Seventeen miles of previously rehabilitated road sections and parking areas, including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from Keys View Road junction to the Geology Tour Road junction, Route 12 from the north entrance to the intersection with Pinto Basin Road would be chip sealed and striped. Cap Rock, Juniper Flats, and Keys View parking areas would be reconstructed. Cap Rock and Keys View parking areas would receive a fog seal. Other parking areas along these previously rehabilitated roadways would be chip sealed or slurry sealed and re-striped. The project is part of a phased effort to rehabilitate many of the park's primary roadways in accordance with the *General Management Plan / Development Concept Plans / Environmental Impact Statement* (*General Management Plan*) (NPS 1995).

The purpose of the project is to provide a safe driving surface for park visitors, provide adequate parking in designated parking areas and eliminate informal turnouts that are destroying vegetation and creating a network of social trails, extend the life of rehabilitated road segments, and provide adequate traffic safety and parking striping.

This action is needed because:

1. The parking areas and Keys View Road are deteriorated; in poor condition, and the pavement is thin and inadequate for the traffic the road receives.
2. The existing road has many abrupt vertical and horizontal curves.
3. There is not enough formal parking and turnouts along Keys View Road to accommodate visitor needs and protect resources, resulting in visitor parking along the soft shoulders and on undisturbed vegetation and soils.
4. Fog sealing, chip sealing, and slurry sealing would extend the life of road segments and parking areas.
5. Striping is necessary for safety of vehicles traveling on the roads and to provide effective use of parking areas.

An environmental assessment analyzes the preferred alternative and other alternatives and their impacts on the environment. This environmental assessment / assessment of effect has

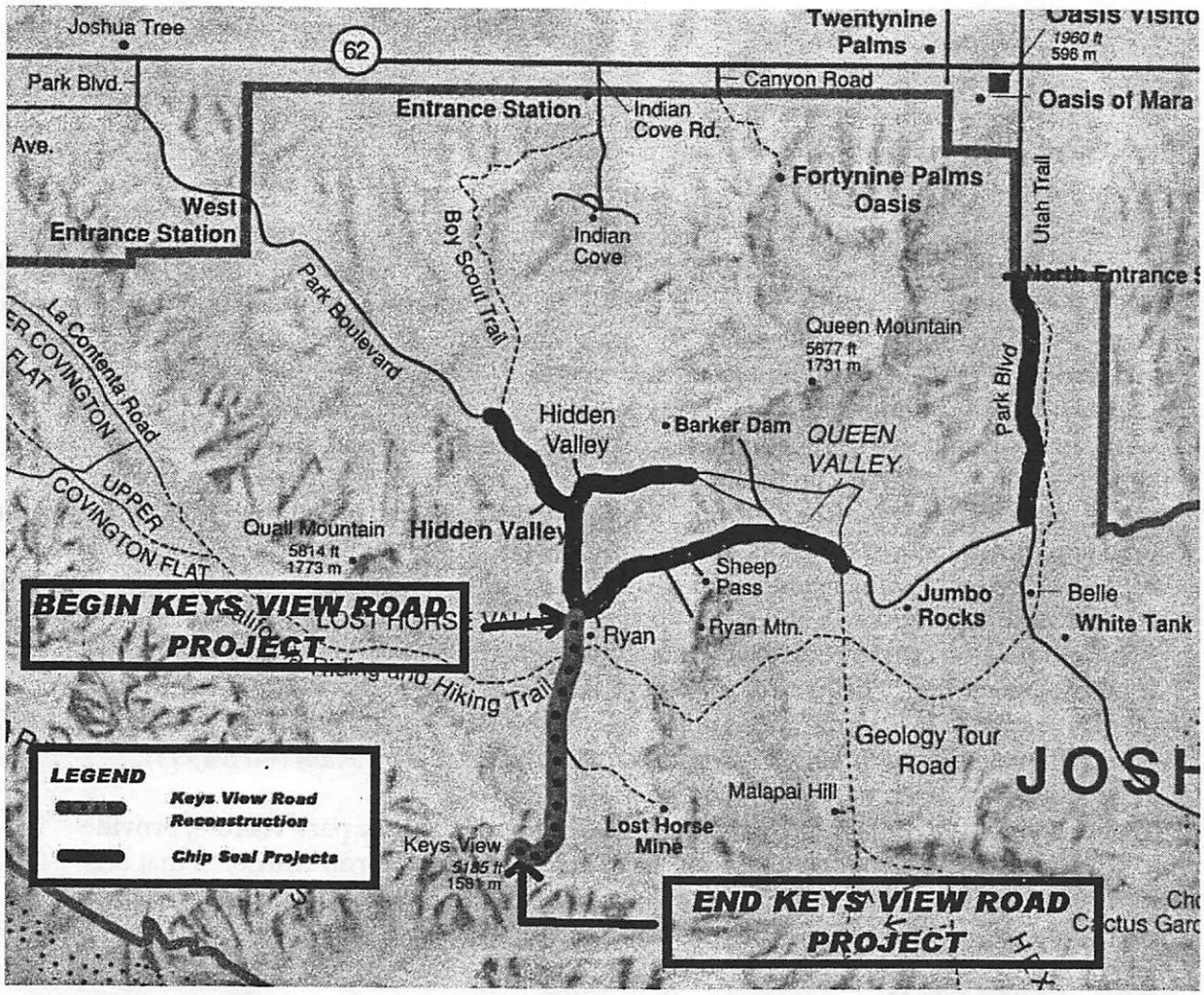

FIGURE 1. PROJECT LOCATION MAP

been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and regulations of the Council on Environmental Quality (40 *Code of Federal Regulations* (CFR) 1508.9); National Park Service Director's Order – 12: C*onservation Planning, Environmental Impact Analysis, and Decision-Making*; and the National Historic Preservation Act of 1966 (as amended).

PARK PURPOSE, SIGNIFICANCE, AND MISSION

An essential part of the planning process is to understand the purpose, significance, and mission of the park for which this environmental assessment / assessment of effect is being prepared.

Park Purpose

Park purpose statements are based on national park legislation, legislative history, and National Park Service policies. The statements reaffirm the reasons for which the national park was set aside as a unit of the national park system, and provide the foundation for national park management and use.

- Preserve and protect all natural and significant cultural resources.
- Serve as a natural laboratory for scientific research for improved understanding and management of the Mojave / Colorado Deserts ecosystems.
- Preserve the character and values of wilderness while providing recreational opportunities that are compatible with the protection and appreciation of park resources for diverse groups.
- Provide educational opportunities to foster understanding and appreciation of the natural and human history of the region.

Park Significance

Park significance statements capture the essence of the national park's importance to the natural and cultural heritage of the United States of America. Significance statements do not inventory park resources; rather, they describe the park's distinctiveness and help place the park within the regional, national, and international context. Defining park significance helps park managers make decisions that preserve the resources and values necessary to accomplish the purpose of the national park.

- Two major life zones, the lower Colorado Desert and the upper Mojave Desert, converge within the park and create a dramatic transition between the two ecosystems.
- Joshua Tree National Park, the best preserved representative example of southern California deserts, provides almost 600,000 acres of wilderness within a 3-hour drive of 19 million people.
- The variety of environments, wilderness experiences, scenic landscapes, and geologic formations provide unparalleled opportunities for solitude, education, and recreation.
- As protected enclave for numerous plants and animals endemic to the Mojave and Colorado Deserts, Joshua Tree National Park illustrates the adaptation of plants and animals to environmental extremes.
- Designated a "Man and the Biosphere Reserve," Joshua Tree National Park's outstanding archeological and historic resources demonstrate cultural interaction and the varied ways that humans have adapted to the desert environment.

Park Mission

Park purpose describes the specific reason the park was established. Park significance is the distinctive features that make the park different from any other. Together, purpose and significance lead to a concise statement—the mission of the park. Park mission statements describe conditions that exist when the legislative intent for the park is being met.

The National Park Service at Joshua Tree National Park preserves and protects a representative area of the Colorado and Mojave Deserts and their natural and cultural resources for the benefit and enjoyment of present and future generations. The park includes rich biological and geological diversity, cultural history, recreational resources, and outstanding opportunities for scientific study.

THE PURPOSE OF PARK ROADS

An objective of this action is to maintain the purpose of a national park road as summarized in the "Park Road Design" memorandum dated February 20, 1986, from William Penn Mott, then director of the National Park Service.

The purpose of park roads remains in sharp contrast to that of the federal and state highway systems. Park roads are not intended to provide fast and convenient transportation; they are intended to enhance visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management access needs.

As stated in the 1984 *NPS Park Roads Standards*, roads in national parks serve a distinctly different purpose from most other road and highway systems. Among all public resources, those of the national park system are distinguished by their unique natural, cultural, scenic, and recreational qualities. Those values are dedicated and set aside by public law to be preserved for the benefit and enjoyment of people in a manner that will leave them unimpaired for future generations.

Pragmatically, the protection, use, and enjoyment of park resources in a world of modern technology have necessitated the development of a system of public park roads. In most parks today, the basic means of providing for visitor and park administrative access is the park road system. For visitors, a road is both a means and an end—it enables one visitor to reach a desired goal; for another, it is the goal. Park roads also provide essential management access.

Safeguarding visitor safety, providing quality recreation opportunities, and conducting sound planning and resource protection and management are paramount to National Park Service goals. It is with these principles that National Park Service road standards have been developed to provide definitive guidelines for those involved in making decisions affecting traffic and park visitor circulation.

The fundamental purpose of national parks is to balance resource values and preservation with visitor use and experience, which dictates that the quality of the park experience must be a primary consideration. Full use and enjoyment of a national park visit depends on its being a

safe and leisurely experience. The distinctive character of park roads plays a basic role in setting this essential unhurried pace.

Park roads, which are constructed only where necessary, are designed with extreme care and sensitivity to provide access for the protection, use, and enjoyment of the resources that constitute the national park system. They generally are planned for leisurely sightseeing. Park roads are often narrow, winding, and hilly, but therein may lie their appeal. Sound planning and resource preservation practices dictate that park roads lay lightly on the land. Where terrain and safety conditions permit, and where such uses are advocated by the park's approved master plan or general management plan, opportunities may be provided for random stopping to enable visitors to experience park resources more completely.

Park roads cannot accommodate all types of vehicles, nor can they accommodate all levels of speed. The use of park roads by recreational vehicles (RVs), bicycles, tour buses, minivans, and smaller, less powerful automobiles has increased substantially in the past few decades. The greater dimensions and slower operation of RVs and tour buses and the fact that drivers of these vehicles are sometimes inexperienced in management of large vehicles can result in serious safety concerns.

Large numbers of wide, long vehicles operating on relatively narrow roads can represent a significant element in the traffic service and road design requirements for park roads. Increased numbers of repeated heavy-axle loadings can be detrimental to the service life of road pavements that were not originally designed for continuous use by large, heavy vehicles. Although new kinds of vehicles are continually being developed, the National Park Service is not obliged to construct roads or to manage traffic so that all forms of modern transportation technology can be accommodated. Where such vehicles are permitted, the design of park roads should reflect, to the extent possible, the fact that operational and safety characteristics of RVs differ from those of automobiles.

When the condition of park roads is examined, a determination of the sizes and types of vehicles that can be safely accommodated is calculated, and vehicle sizes and limits are sometimes established. In some instances it is preferable to prohibit vehicles that exceed these limits on a particular road or road segment rather than to reconstruct roads to higher standards. Such reconstruction could result in unacceptable consequences to park resources. Where vehicle restrictions are encouraged, appropriate alternatives include restricting vehicle traffic beyond specific points, providing turnarounds, turnouts, and parking areas for larger vehicles, reducing speed limits, or providing alternate means of transportation.

Functional Classifications of Park Roads

A park road system includes the roads within and the roads providing access to a national park or other unit of the national park system that is administered by the National Park Service, separately or in cooperation with other agencies. For purposes of functional classification, the routes that constitute a park road system are broadly grouped on the basis of use into three principal categories: (1) public use park roads, (2) administrative park roads, and (3) urban parkways and city streets. Each category has further subdivisions or classes based on the assignment of a functional classification to a park road. Road classification is not based on

traffic volumes or design speed, but on the intended use or function of that particular road or route.

Public Use Park Roads

Public use park roads are all roads that are intended principally for the use of visitors for access into and within a park. This includes all roads that provide vehicle passage for visitors or access to such representative park areas as points of scenic or historic interest, campgrounds, picnic areas, trailheads, and similar features. This category also includes county, state, and federal numbered highways that are maintained by the National Park Service.

Administrative Park Roads

Administrative park roads are all public and nonpublic roads intended to be used principally for the administrative purposes necessary to carry out the management objectives for a particular area. This category includes roads that serve employee residential areas, maintenance areas, and other administrative developments, as well as patrol roads, truck trails, and similar administrative roads.

Urban Parkways and City Streets

The classification of urban parkways and city streets applies to facilities that serve high volumes of park-related and nonpark-related traffic. These facilities are restricted, limited-access facilities in an urban area.

Functionally, because it provides access for visitor use and administrative needs, Keys View Road in Joshua Tree National Park is classified as a public use and administrative park road.

PROJECT BACKGROUND, PREVIOUS PLANNING, SCOPING, AND VALUE ANALYSIS

Project Background

The segment of Keys View Road proposed for rehabilitation, restoration, and resurfacing begins at the intersection with Route 12 (Park Boulevard near Cap Rock) and ends at Keys View Overlook. The Keys View Road project is part of a multi-phase effort to rehabilitate many of the park's primary roadways. Phase I, which consisted of the construction of 6.6 miles of new roadway and associated turnouts and parking lots from Quail Springs picnic area to Cap Rock on Park Boulevard, and from Hidden Valley Campground to the Barker Dam trailhead, has recently been completed. Phase II is currently underway and includes the reconstruction of 5.5 miles of Park Boulevard from Cap Rock to a point just past the intersection with Geology Tour Road and the rehabilitation of approximately 4.5 miles from Pinto Wye to the North Entrance Station.

Keys View Road was originally an old mining road, but is now a two-way road leading to Keys View in Joshua Tree National Park. It is considered one of the most scenic and easily accessible roads, as well as the highest elevation road (5,185 feet at Keys View), in the park.

Previous Planning

The Federal Lands Highway Program was created with the 1982 Surface Transportation Assistance Act (Public Law [PL] 97-424; 23 *United States Code* (USC) 202). The primary purpose of the Federal Lands Highway Program is to provide funding for a coordinated network of public roads that serve the transportation needs of federal lands, which are not a state or local government responsibility. Federal Lands Highway Program roads serve recreational, travel, and tourism uses; protect and enhance natural resources; provide sustained economic development in rural areas; and provide needed transportation access for American Indians.

The Federal Highway Administration, through interagency agreements with federal land managing agencies including the National Park Service, administers a coordinated federal lands program consisting of forest highways, public lands highways, park roads and parkways, refuge roads, and reservation roads. This program provides funding for more than 90,000 miles of federally owned and public authority-owned roads that serve federal lands. There are approximately 8,000 miles of park roads and parkways under jurisdiction of the National Park Service. Program funds may only be used on public roads under the jurisdiction of the National Park Service. General program tenets include:

- The National Park Service develops a priority program of projects within available funding.
- The program is jointly administered by the National Park Service and the Federal Highway Administration, in accordance with interagency agreements.
- The Federal Highway Administration undertakes a majority of the design and construction and the National Park Service is responsible for planning, environment, and protection of park values.

In 1985, the National Park Service prepared a Transportation Study / Road System Evaluation for Joshua Tree National Monument (the unit became a national park in 1994) in response to stipulations of the 1982 Surface Transportation Assistance Act.

In 1987, a 6.5-mile section of Route 12 was rehabilitated immediately east of the Geology Tour Road intersection. A 1991 environmental assessment addressed further rehabilitation of the road. The environmental assessment was not approved and the decision on how to best design the road was left to the general management planning process. The current *General Management Plan* was approved in 1995. It helped address park road and circulation issues and needs within the park, proposed park road design guidelines, and recommended phasing for park road and parking area improvements. The *General Management Plan* found deficiencies with the existing road system. Much of the road system was inadequate and in poor condition. Roads were originally built by miners to accommodate wagons and teams and have been

improved through the years. The sequence of improvements has resulted in roads too narrow for present use, an inadequate base, alignment and drainage problems, an insufficient number of turnouts and parking areas, and safety hazards (especially for recreational vehicles along curves). The *General Management Plan* presented a phased approach to road improvements and contained environmental design criteria for park roads including:

- All paved spur roads (including Keys View Road) would have a 20- to 22-foot paved top width. All major paved roads (Park Boulevard, Pinto Basin Road, and Indian Cove Road) would have a 24-foot paved top width.

- Rounding of slopes (cutting farther up slope to obtain sufficient angle of repose to lessen soil movement) results in greater impacts. Revegetation in areas where slopes have been rounded has proven marginally successful. Revegetation difficulty would be taken into consideration, along with safety factors in determining use of slope rounding.

- No slope rounding would be used where the road passes through rock formations.

- Revegetation would be used to accelerate recovery of land disturbed during road construction and to minimize colonization of invasive plant species.

- Revegetation practices would include salvage and replacement of topsoil.

- The roads would follow natural contours more closely to emulate the original character of wagon road alignments.

- Curve widening would be used only where necessary and held to a maximum of 2 to 4 feet.

- The road profile should be kept as low as possible to blend in with the environment while maintaining adequate drainage.

- Parking areas and turnouts would be provided at popular visitor destinations. The edges of parking areas would be delineated by curbing, rock and vegetation barriers, fencing, etc.

- Drainage would be handled in almost all instances by low-water crossings. The use of culverts would be minimal. Efforts to remove sand deposited from runoff in those crossing would be limited to the road. Occasional maintenance would be done on the downstream side of the low-water crossings to prevent scouring and undermining of the roadway by floodwater.

- Roadside and shoulder parking would be controlled through curbing, barriers, signs, etc. (NPS 1995).

The *General Management Plan* goes on to discuss how Keys View Road would be reconstructed. The plan states that it would be reconstructed at its present width of 20 feet (10-foot lanes, no shoulders) since widening of this road would have the greatest impacts on

Joshua trees of all the roads in the road improvements outlined in the *General Management Plan*. Because of safety concerns, advisories would be posted. Vehicles over 20 feet long or 7 feet wide would be advised not to proceed to Keys View Overlook. A turnout with gauging station and RV turnaround would be provided near the parking area for the California Riding and Hiking Trail to allow for measuring large vehicles. Interpretation would be provided at the parking area to explain the need for the advisory and available activities at Keys View Overlook (NPS 1995).

As previously discussed and envisioned in the *General Management Plan*, the Keys View Road project is part of a multi-phase effort to rehabilitate many of the park's primary roadways. Phase I, the section of Route 12 between Quail Springs and Cap Rock was completed in 2002 as well as the road out to Barker Dam. In 2003–2004, a 5.5-mile section of Route 12 was rehabilitated from the Cap Rock intersection to the Geology Tour intersection and 4.5 miles from Pinto Wye to the North Entrance Station (Phase II).

Scoping

Scoping is an effort to involve agencies and the general public in determining issues to be addressed in this environmental assessment / assessment of effect. Scoping is used to determine important issues to be given detailed analysis in the environmental assessment and eliminate issues not requiring detailed analysis; allocate assignments among the inter-disciplinary team members and/or other participating agencies; identify related projects and associated documents; identify permits, surveys, consultations, etc. required by other agencies; and create a schedule that allows adequate time to prepare and distribute the environmental assessment for public review and comment before a final decision is made. Scoping includes any interested agency, or any agency with jurisdiction by law or expertise (including the State Historic Preservation Office and American Indian tribes) to obtain early input.

To begin the planning process, staff of Joshua Tree National Park and resource professionals of the National Park Service – Denver Service Center conducted internal scoping. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the proposed action to other planning efforts at Joshua Tree National Park.

A press release initiating scoping and describing the proposed action was issued on September 19, 2003 (appendix A). Comments were solicited during a public scoping period that ended October 22, 2003. No comments were received. The public and American Indian groups traditionally associated with the lands of Joshua Tree National Park will also have an opportunity to review and comment on this environmental assessment / assessment of effect.

Value Analysis and Value-Based Decision Summary

Value analysis is an organized team effort directed at analyzing the functions of facilities, processes, systems, equipment, services, and supplies for the purpose of achieving essential functions at the lowest life-cycle cost consistent with required performance, reliability, quality, safety, and achievement of National Park Service mission priorities such as resource

protection, sustainability, and quality visitor experience. Value analysis is typically applied at facility programming and pre-design stages of construction (Director's Order – 90: *Value Analysis*).

A value-based decision summary was completed on January 14, 2004. It included a thorough review of existing value analysis on road projects within the park, as well as new information pertaining to Keys View Road.

The rehabilitation of Keys View Road is the third phase of a three-phase road rehabilitation project at Joshua Tree National Park. Value analyses for the previous projects generated several value-based decisions that have resulted in cost effective, environmentally sensitive, more functional, aesthetically improved, sustainable, and safer road segments. Several previous value-based decisions would be incorporated into the current project.

The team also made new value-based decisions as a result of project reviews, the examination of factors unique to Keys View Road, and following the goals and objectives of previous value analyses to ensure that the project and its specific functions are cost-effective and responsive to the mission of the National Park Service and the needs of Joshua Tree National Park. The resulting project is discussed as alternative B.

ISSUES AND IMPACT TOPICS

Issues and concerns affecting this environmental assessment / assessment of effect were identified from past National Park Service planning efforts and internal and external scoping.

The issues identified include conformance of the proposed project with the *General Management Plan*; protection of the unique vegetation types along Keys View Road, including both the Joshua trees and the juniper woodlands vegetation type; protection and habitat for small wildlife that use existing rock piles close to Keys View Road for cover; protection of the threatened desert tortoise; the number of social trails caused by park visitors pulling onto soft road shoulders throughout the length of Keys View Road; protection of archeological sites in close proximity to Keys View Road; and providing a safe travel route to the Keys View Overlook.

Impact topics are the resources that could be affected by the issues and concerns within the range of alternatives. Specific impact topics were developed for analysis and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and executive orders; 2001 *NPS Management Policies*; project issues; and National Park Service knowledge of limited or easily impacted resources. A brief rationale for the selection of each impact topic is given below, as well as the rationale for dismissing specific topics from further consideration. Resource areas that have no or negligible impact are dismissed from further analysis.

Impact Topics Selected for Detailed Analysis

Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 *et seq.*), requires land managers to protect air quality. Section 118 of the Clean Air Act requires national parks to meet all federal, state, and local air pollution standards. *NPS Management Policies* address the need to analyze potential impacts to air quality during park planning.

Joshua Tree National Park is classified as a Class I air quality area under the Clean Air Act, as amended. This classification is the most pristine and imposes an affirmative responsibility to protect the air quality-related values (including visibility) of Class I areas (NPS 1999).

Should the preferred alternative be selected, local air quality would be temporarily affected by construction activities. Since the preferred alternative could have an affect on air quality, it is addressed as an impact topic in this environmental assessment / assessment of effect.

Soils

The proposed action would involve widening the road and realignment of curves, relocation of parking areas, and other activities that would cause disturbance outside of the existing road-way limits, potentially causing compaction and enhancing soil erosion during construction. Since the proposed action involves ground-disturbing activities on previously undisturbed areas and impacts could be more than minor, soils are addressed as an impact topic in the environmental assessment / assessment of effect.

Vegetation

It is the policy of the National Park Service to protect the components and processes of naturally occurring biotic communities, including the natural abundance, diversity, and ecological integrity of plants and animals (*NPS Management Policies* 2001). One of the unique characteristics of the park is the presence of large numbers of Joshua trees. In addition, the juniper woodlands represent a unique vegetation type for this desert area. The proposed action has the potential to affect vegetation through vegetation removal, relocation, and revegetation, and impacts have the potential to be more than minor; therefore, vegetation is addressed in detail in the environmental assessment / assessment of effect.

Wildlife

As previously discussed, the policy of the National Park Service is to protect the components and processes of naturally occurring wildlife communities, including the natural abundance, diversity, and ecological integrity of animals (*NPS Management Policies 2001*). Road rehabilitation would involve activities with the potential to affect wildlife or their habitat through noise, habitat disturbing activities, and incidental death or injury. Impacts have the potential to

be more than minor; therefore, wildlife is addressed in detail in the environmental assessment / assessment of effect.

Threatened, Endangered, and Species of Special Concern

The Endangered Species Act of 1973, as amended, requires an examination of impacts on all federally listed threatened or endangered species and the habitat on which they depend. National Park Service policy also requires examination of the impacts on federal candidate species as well as state-listed threatened, endangered, candidate, rare, declining, and sensitive species. Such species could be affected by the proposed action through noise, habitat disturbing activities and incidental death or injury and impacts have the potential to be more than minor; therefore, threatened, endangered, and species of special concern is addressed in the environmental assessment / assessment of effect.

Archeological Resources

Joshua Tree National Park is rich in prehistoric and historic archeological resources. Humans have occupied the area encompassed by Joshua Tree National Park for at least 5,000 years. The first group known to inhabit the area was the Pinto Culture, followed by the Serrano, the Chemehuevi, and the Cahuilla. The Mohave used the eastern portion of the park. Projectile points and other artifacts of the Pinto Culture are well known by archeologists. These artifacts come from the Pinto Basin area and other sites in the park. After about A.D. 1000, occupation of the area increased considerably based on the number of sites dating within the last thousand years. The boundaries of three American Indian groups—the Cahuilla, Chemehuevi, and Serrano—intersect at points now in the park. Descendants of these Indian groups continue to live in the area.

There are approximately 583 archeological sites recorded with state site numbers in the park. Baseline data, however, is limited. In 2004, about 3% of the park had been surveyed to varying degrees. Joshua Tree National Park archeological resources include village and milling sites, pithouses, rock alignments, rock shelters, lithic and ceramic scatters, and rock art sites (NPS 1999a). The majority of prehistoric sites are related to the Lake Mojave-Pinto periods, the Gypsum period, and the Saratoga Springs period. Protohistoric sites include those associated with American Indian activity and mining and agriculture.

There are archeological sites near the road, and within a 100-meter (328 foot) corridor surveyed along the road. Because there would be ground-disturbing activities with the potential to affect archeological resources and impacts have the potential to be more than minor, this topic is retained for further analysis in the environmental assessment / assessment of effect. In addition, this environmental assessment will evaluate the effects of the proposed action on archeological resources in accordance with section 106 of the National Historic Preservation Act.

Visual Resources

The scenic viewscapes, for which Joshua Tree National Park is renowned would not be affected by the proposed project. However, visual resources on either side of Keys View Road would be affected by the changes in the roadway profile, namely the addition of curbing. Visual impacts would also occur during construction to areas close to the road construction. Therefore, visual resources is included as an impact topic in the environmental assessment / assessment of effect.

Visitor Experience

Enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks. The purpose, statement of significance, and mission of Joshua Tree National Park reaffirm the importance of recreational values, public experience, and public understanding. The experience of the park visitor could be affected by the no-action alternative through accidents as a result of the poor pavement conditions; and the damage to natural resources as a result of the increase in informal turnouts. The experience of the park visitor could be affected by the preferred alternative through the closure of Keys View Road during mid-week for road construction, and the overall improvements to the road upon completion of construction and impacts have the potential to be more than minor. Therefore, visitor use and experience is addressed in the environmental assessment / assessment of effect.

Health and Safety

Safety is currently affected by poor pavement conditions and accident potential on Keys View Road. The preferred alternative would improve the pavement conditions and reduce the potential for increased accidents on the roadway. Safety could be affected by both the no-action and preferred alternatives and impacts have the potential to be more then minor. Therefore, safety is addressed in the environmental assessment / assessment of effect.

Impacts Dismissed from Detailed Analysis

Wetlands and Floodplains

Executive Order 11988 (*Floodplain Management*) requires an examination of impacts to floodplains and potential risk involved in placing facilities within floodplains. *NPS Management Policies*, Director's Order – 2: *Planning Guidelines*, and Director's Order – 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* provide guidelines for proposed actions in floodplains. Executive Order 11990 (*Protection of Wetlands*) requires an examination of impacts to wetlands.

Based on a vegetation survey conducted by engineering-environmental Management, Inc. (e^2M 2004), there were no jurisdictional or National Park Service-defined wetlands or riparian habitat identified within project area, nor would the project activities affect any floodplains. There are several locations where existing intermittent water channels currently cross the

road. The road design would allow the water to cross over the road at these locations by providing an opening in the curb. Therefore, wetlands and floodplains were dismissed as an impact topic in the environmental assessment / assessment of effect.

Designated Critical Habitat, Ecologically Critical Areas, Wild and Scenic Rivers, Other Unique Natural Areas

No areas within the project have been designated as ecologically critical, nor are there any existing or potential wild and scenic rivers or other unique natural areas (www.nps.gov/rivers/wildriverslist.html). Critical habitat, designated under the Endangered Species Act of 1973, as amended, is considered with the threatened and endangered species and species of concern. This topic was, therefore, dismissed from detailed analysis.

Geology and Geologic Hazards

Although ground-disturbing activities would occur under the preferred alternative, impacts to the geology and geologic hazards (e.g., faults and seismic activity such as earthquakes) in the project area are not anticipated. Therefore, geology and geologic hazards were dismissed from detailed analysis.

Water Quality

The 1972 Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters; to enhance the quality of water resources; and to prevent, control, and abate water pollution. *NPS Management Policies* 2001 provide direction for the preservation, use, and quality of water in national park units. Water used during road construction would be purchased from outside the park. Moreover, erosion control measures would be implemented where applicable and sediment traps, erosion check structures, and/or filters would be considered. With sediment control mitigation measures (see the "Mitigation Measures" section of this environmental assessment / assessment of effect), the preferred alternative would have a negligible effect on water quality. Therefore, water quality was dismissed as an impact topic.

Prime and Unique Farmland

In 1980, the Council on Environmental Quality directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the United States Department of Agriculture, Natural Resources Conservation Service. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed. Unique farmland produces specialty crops such as fruits, vegetables, and nuts. Soil types in the project area are not used for crop production (see "Affected Environment" section); therefore, there are no prime or unique farmlands associated with the project area. This topic was dismissed from detailed analysis in the environmental assessment / assessment of effect.

Land Use

Keys View Road is located within the boundaries of Joshua Tree National Park and is completely surrounded by national park lands. Neither the no-action nor preferred alternatives would affect present or future park land use. The proposed road reconstruction would not increase the road's traffic capacity; therefore, land use was dismissed as an impact topic in the environmental assessment / assessment of effect.

Park Operations

Effects on park operations from the proposed action would be negligible. Increased staff or additional equipment would not be required, nor would additional maintenance activities or law enforcement. Therefore, park operations was dismissed as an impact topic in the environmental assessment / assessment of effect.

Socioeconomic Environment and Land Use

Neither the no-action or preferred alternatives would change local or regional land use, nor would they appreciably affect local businesses outside Joshua Tree National Park. Implementation of the preferred alternative could provide increased employment opportunities for the construction work force and revenues for local businesses and government related to construction activity in nearby communities. The project is relatively small, thus the duration of construction activity for the preferred alternative would be 6 months. Benefits to the local economy would be temporary (lasting only during construction) and most likely imperceptible. Impacts to local businesses through closure of Keys View Road during construction have been mitigated by limiting complete closure to mid-week and limiting construction delays to a maximum of 30 minutes. In addition, reconstruction of Keys View Road would not affect concessions within the park. Therefore, socioeconomics was dismissed as an impact topic in the environmental assessment / assessment of effect.

Environmental Justice

Executive Order 12898 (*General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) requires all agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations or communities. There would be no long-term impacts to any populations as a result of this project. No alternative would have disproportionate health or environmental effects on minorities or low-income populations or communities as defined in the Council on Environmental Quality's *Environmental Justice: Guidance Under the National Environmental Policy Act* (CEQ 1998); therefore, environmental justice was dismissed as an impact topic in the environmental assessment / assessment of effect.

Historic Structures

The park list of classified structures (an evaluated inventory of all prehistoric and historic structures with historical or architectural significance) contains 95 structures, 87 of which are certified. These include elements of six sites representative of ranching and mining operations that are listed on the National Register of Historic Places (NRHP). Ranch sites are: Ryan House and Lost Horse Well, Barker Dam, Cow Camp, and Desert Queen Ranch (Keys Ranch). Wall Street Mill and Desert Queen Mine represent mining operations. The Twentynine Palms Oasis (Oasis of Mara) and Cottonwood Oasis, known especially for their historical significance, have been nominated and declared eligible for inclusion to the NRHP. Five mining sites have been determined eligible for listing in the NRHP: Pinyon Historical Mining District, Lost Horse Mine, Eagle Cliff Mine, El Dorado Mine, and Pinto Wye Arrastra (NPS 1999a). The portion of the Lost Horse Mine Road near the paved Keys View Road is not part of the Lost Horse Mine district and; therefore, construction at the intersection of that road with Keys View Road would not affect the resource. Keys View Road, although historically used as a mining and ranching access road, is not listed as a historic structure (Linda Greene 1983). The "John Lang" gravesite (CA-RIV-1958), a potentially eligible burial, is discussed under the "Archeological Resources" section. Therefore, this topic was dismissed as an impact topic in the environmental assessment / assessment of effect.

Ethnographic Resources

Ethnographic resources are defined by the National Park Service as any "site, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Director's Order – 28).

The Cahuilla, Chemehuevi, Mojave, and Serrano Tribes maintain strong interests in the park. The Agua Caliente Band of the Cahuilla, Cahuilla Tribe of the Morongo Indian Reservation, Fort Mojave Indian Tribe, Chemehuevis and Mohaves of the Colorado River Indian Tribes, Serrano Tribe of the Morongo Indian Reservation, and Twentynine Palms Band of the Mission Tribe are in regular contact with the park. Their main concerns are the ability to gather traditional plants, pray in a sacred area, and the study of archeological and ethnographic artifacts in park collections.

Because no known ethnographic resources were identified that would be affected by project activities, ethnographic resources was dismissed as an impact topic in the environmental assessment / assessment of effect (Sabala 2004).

The National Park Service would consult with these tribes and copies of the environmental assessment / assessment of effect would be forwarded to each affiliated tribe or group for review or comment. If subsequent issues or concerns are identified, appropriate consultation would be undertaken. Because it is unlikely that ethnographic resources would be affected, and because appropriate steps would be taken to protect any human remains, funerary objects, sacred objects, or objects of cultural patrimony inadvertently discovered, ethnographic resources was dismissed from detailed analysis.

Cultural Landscapes

According to the National Park Service's *Cultural Resource Management Guideline* (Director's Order – 28), a cultural landscape is

> "... a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined by both physical materials such as roads, buildings, walls, and vegetation, and by use reflecting cultural values."

Thus, cultural landscapes are the result of the long interaction between man and the land and the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land-use and management practices, as well as politics and property laws, levels of technology, and economic conditions, cultural landscapes provide a living record of an area's past and a visual chronicle of its history. The dynamic nature of modern human life, however, contributes to the continual reshaping of cultural landscapes, making them a good source of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

There are no known cultural landscapes in the project area; therefore, this topic was dismissed as an impact topic in the environmental assessment / assessment of effect (Sabala 2004).

Museum Objects

Museum collections include historic artifacts, natural specimens, and archival and manuscript material. They may be threatened by fire, vandalism, natural disasters, and careless acts. The preservation of museum collections is an ongoing process of preventative conservation, supplemented by conservation treatment when necessary. The primary goal is preservation of artifacts in a stable condition to prevent damage and minimize deterioration. The proposed activities along Keys View Road would not affect known museum objects of Joshua Tree National Park; therefore, museum objects was dismissed as an impact topic in the environmental assessment / assessment of effect (Sabala 2004).

Indian Trust Resources

Secretarial Order 3175 requires that any anticipated impacts to Indian trust resources from a proposed project or action by Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United Sates to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. There are no Indian trust resources in Joshua Tree National Park. The lands comprising the park are not held in trust by the Secretary of the Interior for the benefit of Indians due to their status as Indians (Sabala 2004). Therefore, Indian trust resources was dismissed as an impact topic in the environmental assessment / assessment of effect.

Soundscapes

In accordance with *NPS Management Policies* 2001 and Director's Order – 47: *Sound Preservation and Noise Management*, an important part of the National Park Service mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequency, magnitude, and duration of human-caused sound considered acceptable varies among National Park Service units, as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas. Noise associated with road reconstruction would be short term and localized, and construction activities would be scheduled so as to minimize effects on visitor experience. Road reconstruction would not result in a measurable increase in traffic noise. Consideration of noise impacts on threatened, endangered, and species of special concern are addressed under that impact topic. Therefore, noise was dismissed from detailed analysis as a separate topic.

ALTERNATIVES

INTRODUCTION

The alternatives section describes two management alternatives for Keys View Road at Joshua Tree National Park. Alternatives for this project were developed to resolve issues associated with narrow travel lanes, drop-off shoulders, limited site distances on curves, deteriorated road conditions, and inadequate parking.

No-Action Alternative (Alternative A)

The no-action alternative describes the action of continuing the present management operation and condition, it does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. The no-action alternative provides a basis for comparing the management direction and environmental consequences of the preferred alternative. Should the no-action alternative be selected, the National Park Service would respond to future needs and conditions associated with Keys View Road at Joshua Tree National Park without major actions or changes in course.

Preferred Alternative (Alternative B)

The preferred alternative presents the National Park Service proposed action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, costs, and other applicable factors.

Additional alternatives considered and dismissed from detailed analysis are also discussed in this section. A summary table comparing the environmental consequences of each alternative is presented at the end of the "Alternatives" section.

ALTERNATIVE A: NO-ACTION ALTERNATIVE

The no-action alternative would be a continuation of existing conditions of Keys View Road in Joshua Tree National Park. The travel lanes would remain at the current width; pavement would be patched as needed, but the overall condition would continue to be poor; vehicles would continue to create informal turnouts along the length of the road disturbing new areas.

Implementation of the no-action alternative means that overall reconstruction would not occur. With this alternative, the park would continue operations related to the road such as spot repairs and accident response. The no-action alternative would include short-term, minor repair or improvement activities for the road that would be part of routine maintenance for continuing operations.

ALTERNATIVE B: PREFERRED ALTERNATIVE

Alternative B is the National Park Service preferred alternative. The preferred alternative presents the National Park Service's proposed action and defines the rationale for the action in terms of resource protection and management, visitor and operational use, and costs. The preferred alternative meets the Joshua Tree National Park planning objective of providing an adequate and safe transportation route to Keys View, and opportunities for visitors to stop and experience the park along the route. The preferred alternative would be designed for a 20-year service life, meeting current and anticipated future needs during that period.

The Federal Highway Administration / Central Federal Lands Highway Division is a cooperating agency on this project with the National Park Service. The Central Federal Lands Highway Division would prepare the plans, specifications, and engineer's estimate; provide technical assistance; advertise and award the project for construction; and administer the contract during construction.

General Description of Road Rehabilitation Work

The Keys View Road reconstruction would begin near the Cap Rock intersection with Route 12 and extend south for approximately 5.6 miles to the Keys View Overlook (see figure 1). The existing roadway varies from 18- to 20-feet wide and has many vertical and horizontal curves that would be smoothed out to provide a safer alignment. The existing road pavement is thin and in poor condition with numerous patches. Paving would occur to provide a smooth travel surface suitable for the number and types of vehicles traveling on the road (figure 2). The road alignment would be smoothed to consistently accommodate a design speed of 30- to 35-miles per hour. The paved road surface would be widened to 22 feet, with an additional curve widening of up to 3 to 4 feet for short radius curves. The road would be curbed on each side to minimize impacts to resources, delineate the road, control unauthorized parking on the shoulders that impacts vegetation, improve aesthetics, reduce problems like roadway edge chipping, eliminate the potential for rollover accidents, and eliminate recurring grading of the road shoulders. The curbing would have tortoise trots (notches in the curb to allow tortoises to exit the road) every 30 meters (98 feet) (figure 3). The lip of the tortoise trots would be no more than 0.5-inch high adjacent to the road pavement. The existing pavement would either be recycled for use as new road subbase or hauled from the site.

The roadwork would consist of replacing the existing road surface, the existing aggregate base, and shaping, compacting, and finishing the roadbed to the required road template. A hot asphalt concrete pavement would be placed over the prepared base in two lifts. Material that is too soft, unstable, or otherwise unsuitable, adjacent to the new road surface, would be removed and replaced with roadway aggregate. Unsuitable material would be buried within the road subbase and replaced with aggregate, or used as part of the curb backfill.

Areas disturbed by the project would be revegetated, and previously disturbed areas removed from roadway use would be rehabilitated (e.g., informal turnouts). The contractor staging areas would be at the Cap Rock and Juniper Flats parking areas. Staging would also occur at the Sheep Pass Borrow Pit outside the project limits.

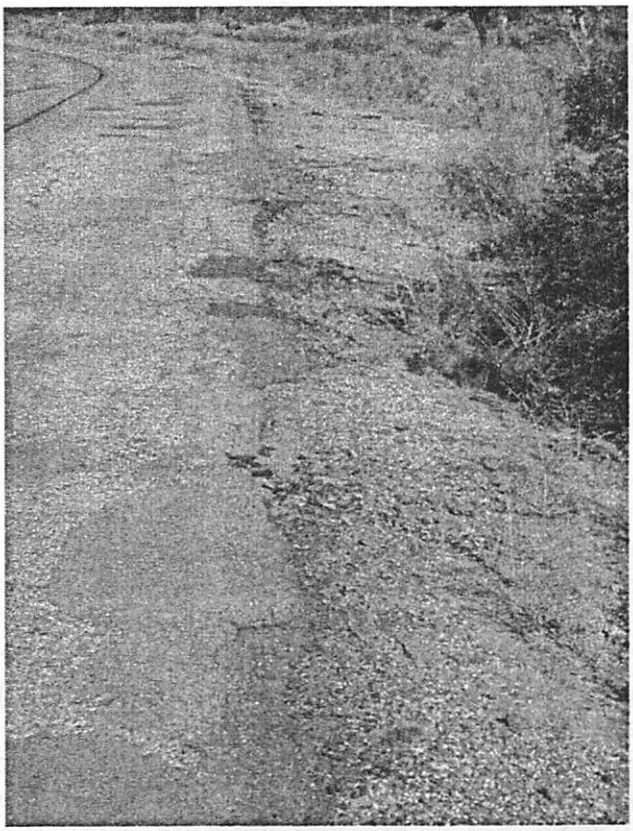

FIGURE 2. EXISTING PAVEMENT CONDITIONS

The overall new disturbance associated with the Keys View Road reconstruction would be 5.0 acres. Areas of previous disturbance to be reclaimed would be approximately 0.37 acre.

The construction work would result in closure of Keys View Road to visitor access beginning Monday at 6:00 a.m. through Friday 6:00 p.m. between January 2 and February 14, and June 2 and September 30. The road would be open Friday 6:00 p.m. through Monday 6:00 a.m. June 2 through September 30 and all days of the week the remainder of the time, with a maximum delay of 30 minutes in one direction. No road construction work would occur on holidays.

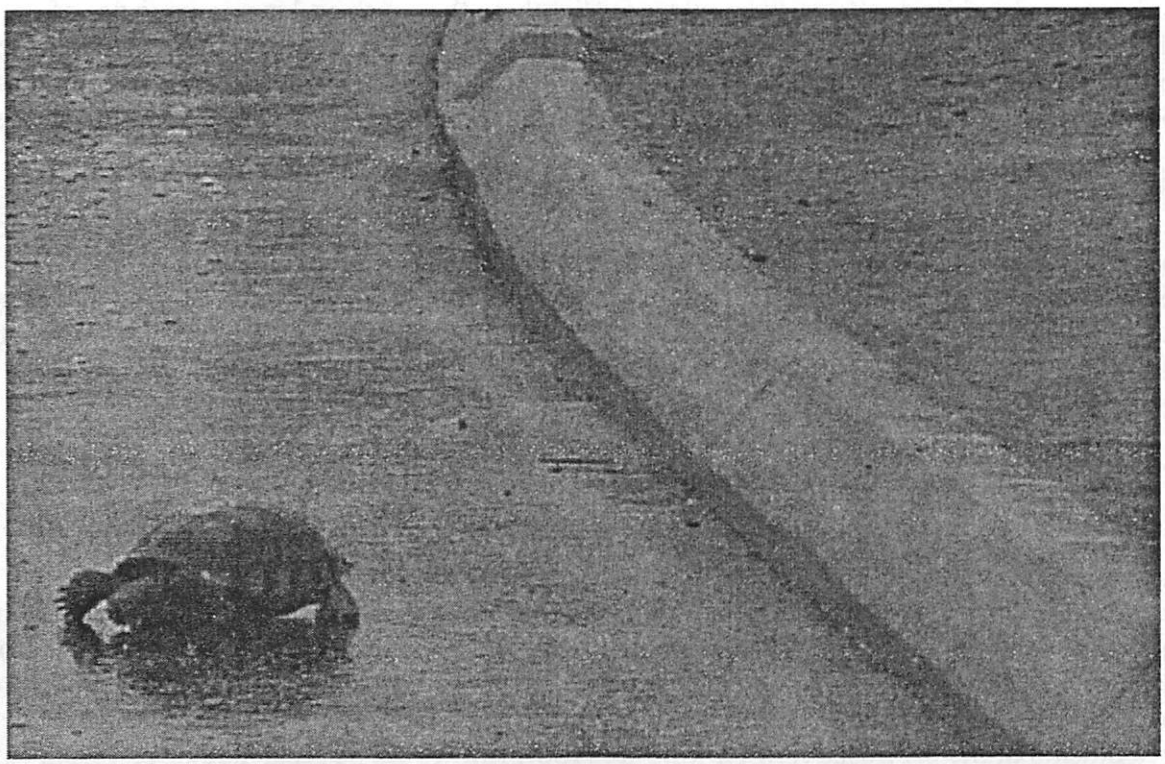

FIGURE 3. TORTOISE TROTS

The 1995 *General Management Plan* calls for reconstruction of Keys View Road at its present 20-foot paved top width, in order to minimize impacts to Joshua trees. However, preliminary design and engineering work on the reconstruction project determined that many Joshua trees would be impacted by the associated reconstruction of roadside ditches, needed to prevent ponding and shoulder erosion caused by storm water runoff. The design was refined to better serve the intent of the *General Management Plan* prescription; a curbed roadway section was adopted, thereby placing the drainage ditch on the roadway, and eliminating the need for ditch grading on the road shoulders. The proposed roadway section is a 22-foot paved top width, curb face to curb face. The limit of disturbance has been narrowed to less than that required for a roadway with graded ditches, however, and consequently the number of Joshua trees impacted has been reduced.

Cap Rock Parking Area

The existing Cap Rock parking area is partially paved with asphalt, the remainder of the parking area is compacted soil. Parking spaces exist for 15 vehicles and six RVs, but the spaces are not well delineated. Joshua trees (*Yucca brevifolia*) are scattered throughout the parking area with rock barriers protecting some, but not all, of the trees. Restroom facilities lie on the east side of the parking area with a maintenance / access road leading to the facilities. The Cap Rock parking area (figure 4) would be expanded to the south and redesigned. The proposed parking area would be paved and would have striped parking stalls. Since Joshua Tree National Park would post signs advising large vehicles such as large RVs, against traveling on Keys View Road, the Cap Rock parking area would serve as a turnaround for those large vehicles that enter Keys View Road. The design of the parking area would minimize removal and loss of Joshua trees by shifting the parking entrance slightly to the south and maximizing use of disturbed areas within the existing parking area. A 12-foot-wide curb cut would provide access to the existing maintenance road. The maintenance road would be left as natural ground. The existing gate at the maintenance road entrance would remain or be replaced with a new gate.

The decomposed granite sidewalk with Trex (a material made from recycled wood and plastic) edging on the east side of the parking lot would be tied to the existing Trex-edged walk. The existing parking area that is outside the footprint of the proposed parking area would be reclaimed or restored including salvaging impacted Joshua Trees and transplanting them back to the project site after construction. The parking area would not be shifted any farther north, saving the existing Joshua trees near the entrance.

Juniper Flats Parking Area

The Juniper Flats parking area currently lies directly adjacent to Keys View Road and is not large enough to safely unload and park a horse trailer or other vehicles for a multi-day backcountry trip. The existing parking area is gravel. The Juniper Flats parking area would be moved to the west (away from the road) and north, and expanded to provide parking for horse trailers (figure 5). The new parking area would be gravel with concrete curbing. The proposed location minimizes disturbance and loss of Joshua trees. The existing Juniper Flats parking area outside of the proposed new parking area footprint would be reclaimed or restored. An accessible interpretive exhibit would be placed at the Juniper Flats trailhead parking area.

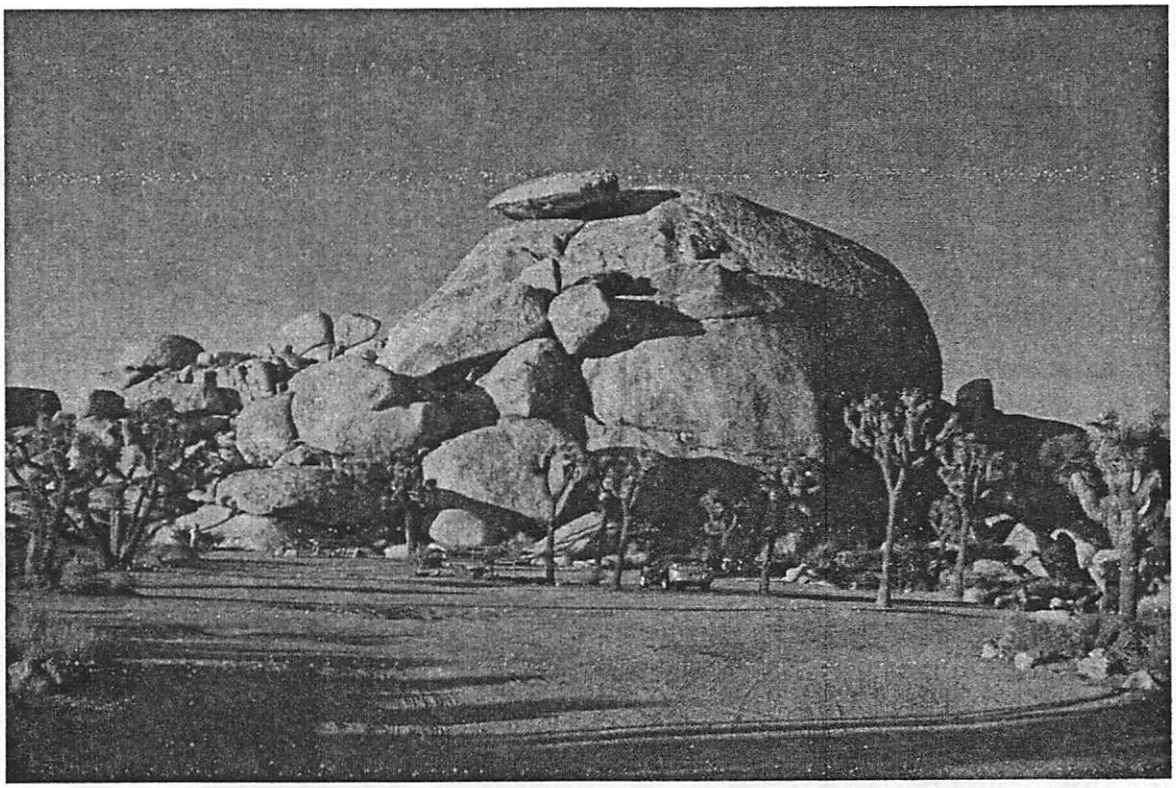

FIGURE 4. CAP ROCK PARKING AREA (LOOKING NORTH)

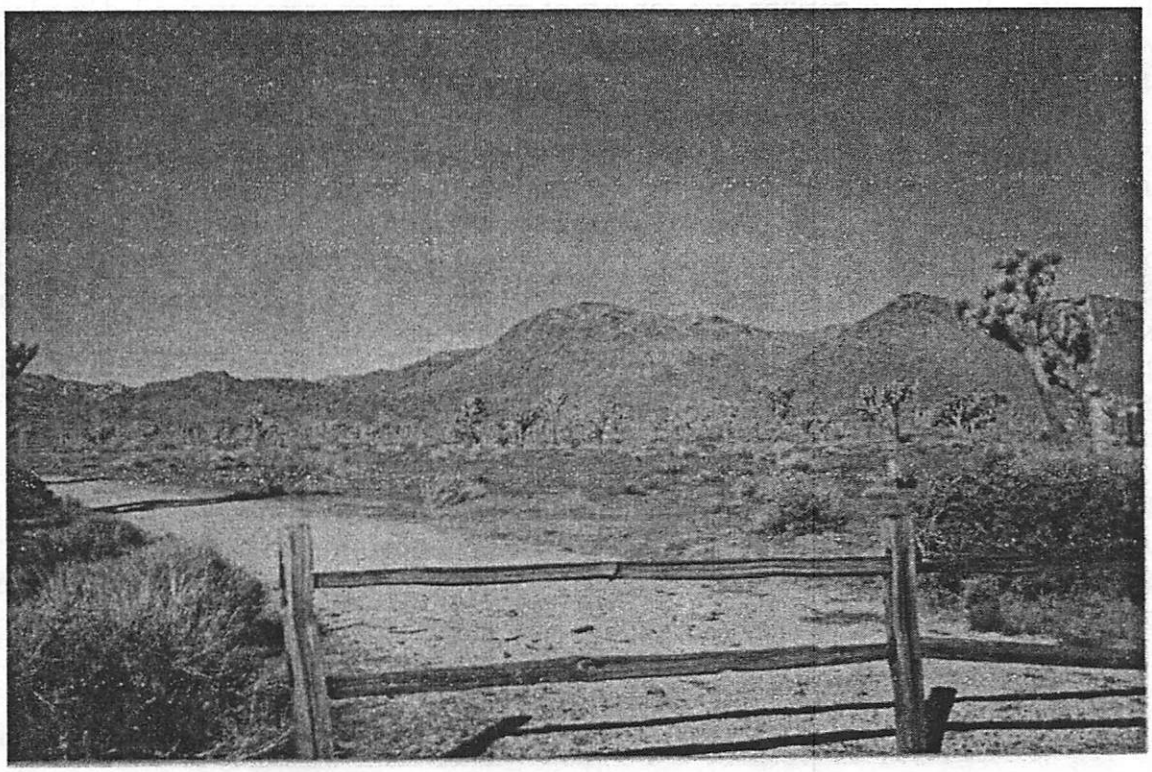

FIGURE 5. PROPOSED JUNIPER FLATS PARKING AREA (LOOKING WEST FROM KEYS VIEW ROAD)

Lost Horse Mine Road

A typical access road apron would be provided at the Lost Horse Mine Road turnoff. The apron would be a paved transition from the paved Keys View Road to the gravel Lost Horse Mine Road to prevent vehicles from kicking gravel onto the Keys View Road surface. The Lost Horse Mine Road provides access to the Lost Horse Mine parking area and hiking trail that leads to the old mine. The access road apron would not be large enough to allow parking at the turnoff. The apron would be constructed within the existing Lost Horse Mine Road disturbance and would not disrupt new ground.

U.S. Geological Survey Monitoring Station Access

Access to the old borrow pit containing a U.S. Geological Survey monitoring station and located approximately 1 mile from Keys View Overlook would be provided by a 12-foot curb cut with gravel behind a flush curb to match the existing grade. The curb cut would be created in the new road construction curbing. A new gate at the monitoring station access road would also be installed. The old borrow area would not be used for any staging or hauling of material for the project, but continued access to this area is needed due to U.S. Geological Survey monitoring equipment located at the old borrow area.

Keys View Parking Area

The existing Keys View parking area consists of curbed parking areas surrounded by a low wall with a walkway to Keys View Overlook located on a nearby high knoll (figure 6). The existing deteriorated parking area, adjacent curbs, sidewalks, and walls would be reconstructed. The parking area layout would be revised to provide for angled car parking and parallel parking would be extended into the existing island. The parking stalls would generally be 18-feet long instead of the standard 20-foot-long stalls in order to minimize new disturbance. Parallel parking spaces (striped only for cars) would also accommodate large vehicles. The parallel parking spaces on the north side of the parking lot would be striped for cars, but will also be signed for RVs and buses, although large vehicles would be discouraged from traveling on Keys View Road. The Keys View parking area would be constructed with curbing, but no gutters. The existing wall (figure 7) would be replaced with a concrete or masonry wall. The existing concrete drainage swale on the hillside (figure 8) would be removed and the area re-contoured and revegetated.

The concrete sidewalk at the comfort station would be extended toward the road and a universally accessible ramp added. The new concrete sidewalk would be 6-feet wide, approximately the same width as the existing sidewalk—the sidewalk would be adjusted as necessary to reduce impacts.

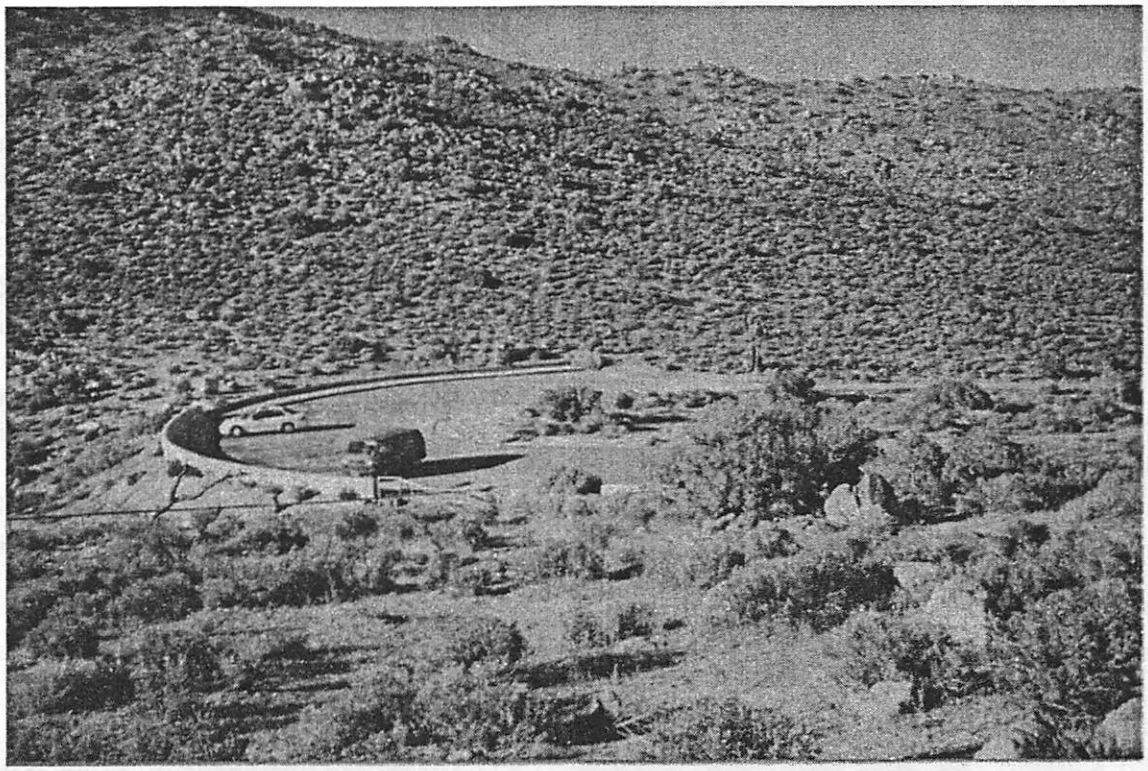

FIGURE 6. KEYS VIEW PARKING AREA OVERVIEW (LOOKING NORTH FROM KEYS VIEW OBSERVATION POINT)

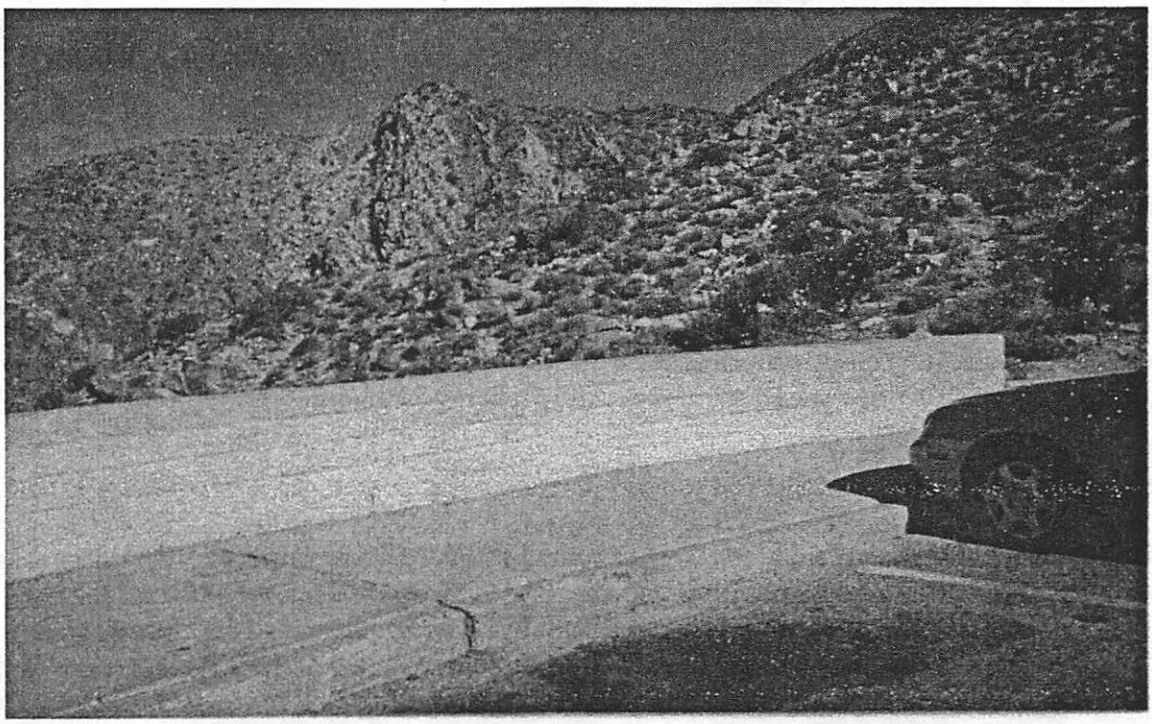

FIGURE 7. EXISTING WALL

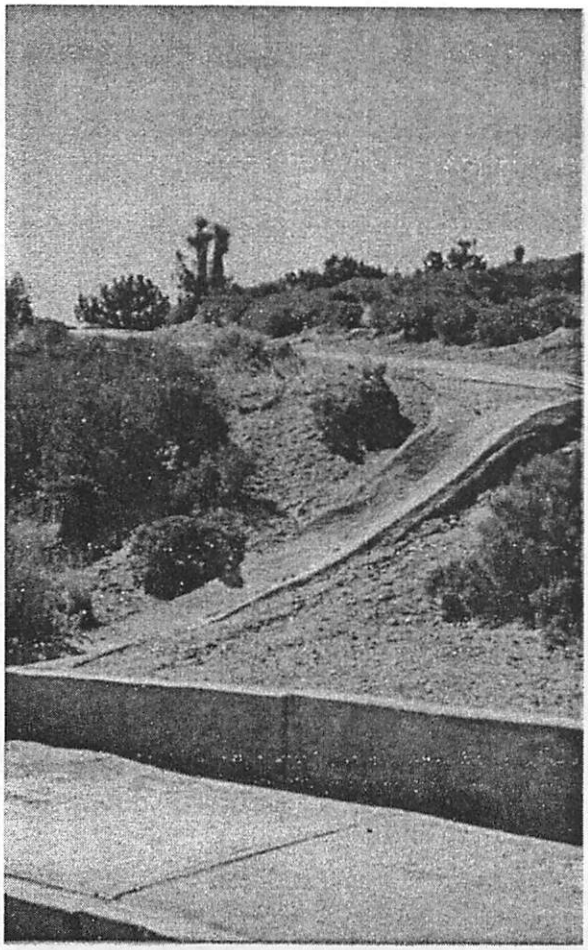

FIGURE 8. EXISTING DRAINAGE SWALE (LOOKING SOUTH FROM KEYS VIEW PARKING AREA)

Wayside Exhibits

Four wayside exhibits / turnouts would be constructed as part of the proposed project. These exhibits / turnouts would include: (1) interpretation of the Quail Mountain fire, (2) the existing exhibit on Joshua trees (Tree of Life exhibit), (3) Wonderland of Rocks, and (4) Juniper Flats. Each of these exhibits / turnouts would require a turnout or parking area, except for Juniper Flats, which would utilize the proposed Juniper Flats parking area. The wayside exhibits / turnouts would be constructed with accessible curb cuts and decomposed granite pads. Following is a description of each wayside exhibit / turnout area.

Quail Mountain Fire

The proposed turnout at approximately mile 0.6 would have a planned exhibit about the fire. There would be a decomposed granite sidewalk along the turnout as well as a curb cut for access to the wayside exhibit.

Tree of Life

The proposed turnout just after the Juniper Flats parking area at approximately mile 1.4 would have an exhibit entitled, "A Tree of Life." This turnout would have a decomposed granite sidewalk along the turnout, as well as a curb cut for access to the wayside exhibit. The standard turnout detail would be revised to minimize impacts to Joshua trees in this area.

Wonderland of Rocks / Lost Horse Valley

This turnout would be developed at approximately mile 4.3 and connected to a viewing area with an exhibit. The exhibit, entitled "Valued Spaces," would be placed adjacent to this turnout at the end of an approximately 400-foot by 6-foot-wide area. This area would be constructed from decomposed granite and a soil stabilizer to harden the surface, allowing for wheelchair access. There would be a decomposed granite sidewalk along the turnout, as well as a curb cut for access to the trail.

Juniper Flats

This wayside exhibit would be developed at the Juniper Flats parking area. Parking area details are described under the "Juniper Flats Parking Area" discussion above. An exhibit would be placed at the parking area and trailhead access.

Turnouts

Three turnouts, in addition to the wayside exhibit turnouts, would be constructed along the length of the road. One would be a reconstruction of the existing universally accessible turnout near Keys View Overlook and the remaining two would be slow vehicle turnouts along the length of the road. The turnouts would be large enough to accommodate two or three vehicles or a long vehicle and would allow slower-moving vehicles to pull over and let traffic pass.

Drainage

Low-water crossings and curb cuts would be designed to maintain the existing drainage patterns. Curb cuts for drainages would be 3-foot openings, or would be adjusted based on the existing width of each drainage. The curb openings would have a riprap blanket at the exit point to minimize erosion in the downgradient drainage. Some reestablishment of existing drainage channels outside of the roadway bench would be required to improve drainage.

Surface Treatment

Upon completion of the Keys View Road surface, a fog seal would be laid down to lock in fines and fill surface voids, extending the life of the pavement surface. Fog seal is a sprayed liquid emulsion that typically dries within several hours. It would be applied to one lane of the roadway, allowed to dry, and then applied to the other lane. This would allow one lane to remain open to check for the presence of desert tortoises.

Chip sealing and striping would be applied to 17 miles of previously rehabilitated road sections including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from Keys View Road junction to the Geology Tour Road junction, Route 12 from the North Entrance to the intersection with Pinto Basin Road. Parking areas and access drives leading to parking areas along these roadways would be slurry sealed and restriped.

To begin chip sealing, an asphalt binder is sprayed on the pavement, then immediately covered by a single layer of uniformly sized chips. The new surface treatment would be rolled to set the aggregate, and then broomed to remove any loose chips. The road would be opened to traffic after sweeping or may be opened to slow moving traffic almost immediately. Chips consist of aggregate as close to single size as possible. Chip seal work would occur only on the road surface and would not create or require disturbance outside of the road prism. Once chip sealing is complete, a fog seal would be applied to those previously rehabilitated road sections described above.

Slurry seal work would occur on previously rehabilitated parking areas, and would not create or require disturbance outside of the road prism. Slurry seal work occurring on the parking areas would not create or require disturbance outside of the road prism. Slurry seal is a mixture of emulsified asphalt, mineral aggregate, water, and special additives uniformly spread over a prepared pavement surface. A machine specifically designed and manufactured to lay slurry seal would be used. The slurry seal would be spread evenly on the roadway by means of a surfacing spreader box attached to the slurry delivery machine. Rolling or compacting would not normally be required with a slurry seal operation, but the slurry seal must be completely cured before opening the area to traffic. The cure time depends upon the weather and the type of emulsified asphalt used and can range from a few hours to overnight.

The actual duration of the work would be as scheduled by the contractor. However, the contractor would be required to complete the chip seal and slurry seal simultaneously within the approved schedule for the reconstruction of Keys View Road. The work must comply with Federal Standard Specification for Construction of Roads and Bridges on Federal Highway Projects FP-96.

Staging Areas

Staging areas would make use of the expanded portions of the Cap Rock and Juniper Flats parking areas and the Sheep Pass borrow area outside of the project area. The existing parking areas at Cap Rock and Juniper Flats would continue to remain open to the public for parking. Vehicles could also be parked overnight along the roadway in active work areas.

MITIGATION MEASURES

Mitigation measures are presented as part of the preferred alternative. These actions have been developed to lessen the adverse effects of the preferred alternative.

Resource Area	Mitigation
General Considerations	The National Park Service project manager would ensure that the project remains confined within the parameters established in the compliance documents and that mitigation measures are properly implemented.
	Construction zones outside of the existing disturbed area would be identified and fenced with construction tape or some similar material prior to any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction.
	All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone, as defined by the construction zone fencing. This does not exclude necessary temporary structures such as erosion control fencing.
	All tools, equipment, barricades, signs, surplus materials, and rubbish would be removed from the project work limits upon project completion. Any asphalt surfaces damaged due to work on the project would be repaired to original condition. All demolition debris would be removed from the project site, including all visible concrete and metal pieces.

Resource Area	Mitigation
General Considerations	Construction activities would be coupled with water sprinkling to reduce fugitive dust emissions.
	Idling of construction vehicles would be limited to reduce construction equipment emissions.
	Contractors would be required to properly maintain construction equipment (i.e., mufflers) to minimize noise.
	A hazardous spill plan would be in place, stating what actions would be taken in the case of a spill and preventive measures to be implemented, such as the placement of refueling facilities, storage, and handling of hazardous materials, etc.
	All equipment on the project would be maintained in a clean and well-functioning state to avoid or minimize contamination from automotive fluids; all equipment would be checked daily.
Sediment Control	Best management practices for drainage and sediment control, as identified and utilized by the Federal Highway Administration and the National Park Service, would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. Use of best management practices in the project area for drainage area protection would include all or some of the following actions, depending on site-specific requirements: ▪ Keep disturbed areas as small as practical to minimize exposed soil and the potential for erosion. ▪ Locate waste and excess excavated materials outside of drainages to avoid sedimentation. ▪ Install silt fences, temporary earthen berms, temporary water bars, sediment traps, stone check dams, or other equivalent measures (including installing erosion-control measures around the perimeter of stockpiled fill material) prior to construction. ▪ Conduct regular site inspections during the construction period to ensure that erosion-control measures were properly installed and are functioning effectively. ▪ Store, use, and dispose of chemicals, fuels, and other toxic materials in an appropriate manner. ▪ Revegetate disturbed areas as soon as possible after construction is completed.
Soils	Erosion and sediment control would be required. Topsoil would be removed from areas of construction and stored for later reclamation use. The topsoil would be redistributed in as near the original location as possible and supplemented with scarification, mulching, seeding, and/or planting with species native to the immediate area.
Vegetation	A variety of native plants would be removed, stored in temporary nurseries, and relocated to reclaimed areas, both during the project and following completion of the project.
	For much of the corridor, revegetation work would be minimized because construction would be completed in previously disturbed areas of the roadway template. Staging areas would utilize previously disturbed areas such as the Cap Rock and Juniper Flats parking areas.
	Revegetation work would use soil conserved along the corridor and native species from genetic stocks originating in Joshua Tree National Park. Revegetation efforts would also attempt reconstruction of the natural spacing, abundance, and diversity of native plant species.
	Vegetation impacts and potential compaction and erosion of bare soils would be minimized by replacement of topsoil in as near the original location as possible, scarification, mulching, and seeding/planting with species native to the immediate area.

Resource Area	Mitigation
	Reclaimed areas would be monitored after construction to determine if reclamation efforts are successful or if additional remedial actions are necessary.
Vegetation	Remedial actions could include installation of erosion-control structures, reseeding and/or replanting the area, and controlling non-native plant species.
	In an effort to avoid introduction of non-native / noxious plant species, no imported topsoil or hay bales would be used during revegetation. On a case-by-case basis the following materials may be used for any erosion-control dams that may be necessary: certified weed-free rice straw, cereal grain straw that has been fumigated to kill weed seed, and wood excelsior bales.
	Undesirable plant species would be controlled in high-priority areas and other undesirable species would be monitored and controlled, as necessary. To prevent the introduction and minimize the spread of non-native vegetation and noxious weeds, the following measures would be implemented during construction: ▪ Minimize soil disturbance. ▪ Pressure wash and/or steam clean all construction equipment to ensure that all equipment, machinery, rocks, gravel, or other materials are cleaned and weed free before entering Joshua Tree National Park. ▪ Cover all haul trucks bringing asphalt or other fill materials from outside the park to prevent seed transport. ▪ Limit vehicle parking to existing roadways, parking lots, or access routes. ▪ Limit disturbance to roadsides and culvert areas, including limiting equipment to the roadbed area; no machinery or equipment should access areas outside the construction zone. ▪ Obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, obtaining weed-free sources from National Park Service approved sources outside the park would be required. ▪ Initiate revegetation of disturbed sites immediately following construction activities. ▪ Monitor disturbed areas following construction to identify growth of noxious weeds or non-native vegetation. Treatment of non-native vegetation would be completed in accordance with NPS-13, *Integrated Pest Management Guidelines*.
	To maximize vegetation restoration efforts after completion of construction activities, the following measures would be implemented: ▪ Salvage topsoil from construction areas for reuse during restoration on disturbed areas. ▪ Salvage native vegetation for subsequent replanting in disturbed areas. ▪ Monitor revegetation success following construction, implementing remedial and control measures as needed.
Wildlife	If the rosy boa (*Lichanura trivirgata*) or speckled rattlesnake (*Crotalus mitchelli*) are observed during construction, monitoring, capture, and release away from the project area would occur.
	The contractor would be required to maintain strict garbage control so that scavengers (e.g., corvids) are not attracted to the project area. No food scraps would be discarded or fed to wildlife.
	Potential roadside habitat for small species consisting of downed trees and rock piles would be replaced upon completion of project construction activities.

Resource Area	Mitigation
Threatened and Endangered Species and Species of Special Concern	Only qualified and/or authorized biologists, as appropriate, would be utilized for oversight of all activities within the roadway corridor. The National Park Service would submit the names and qualifications of proposed authorized biologists to the U.S. Fish and Wildlife Service for review and approval at least 15 days prior to initiation of surface-disturbing events. No project-related activity would commence unless one or more authorized biologists have been selected.
	An individual would be designated the field contact representative to oversee project compliance and coordination. The field contact representative would coordinate with the U.S. Fish and Wildlife Service and be authorized to halt any activity that may endanger desert tortoises.
	The field contact representative would be present during all monitoring / survey efforts, road reconstruction, and parking / turnout area construction.
	Only the authorized biologists, approved by the U.S. Fish and Wildlife Service, would be allowed to handle / relocate desert tortoises.
	Presence / absence surveys have been conducted (April–June 2003) and would be conducted again just prior to construction. Clearance surveys would be conducted one week prior to commencement of any construction / rehabilitation activities. All potential desert tortoise burrows within 100 feet of the designated routes, parking / turnout sites (existing or proposed), or staging areas would be examined. At the completion of the road reconstruction, all materials used to mark or identify the tortoise burrows would be promptly removed.
	Any desert tortoise relocated or otherwise removed from areas undergoing road reconstruction would be handled in accordance with the procedures described in *Guidelines for Handling Desert Tortoises During Construction Projects* (DTC 1994, revised 1996). All desert tortoises would be translocated the minimum distance practicable, within appropriate habitat, to facilitate the animal's safety and survival.
	Temporary tortoise-proof fencing would be established around all staging areas. The fence would consist of a non-breachable barrier and support structures. Galvanized hardware cloth of 0.5-inch diameter, and at least 18-inches high would be firmly secured along the base of the fence in direct contact with the ground. Fence placement and construction would be supervised and approved by the field contact representative. All tortoise fencing would be dismantled and transported from the site following project completion.
	Temporary fencing established around staging areas would be inspected at least weekly, and corrective action taken to maintain the integrity of the tortoise barrier.
	Fenced staging areas would be gated with a desert tortoise exclusion device. This gate would remain closed at all times, except when vehicles are entering or leaving the staging area. If it is deemed necessary to leave the gate open for extended periods of time (e.g., during high traffic periods), the gate may be left open as long as a monitor is present. This monitor would report any tortoise activity to the authorized biologist who, in turn, would take appropriate remedial actions.
	Construction vehicles parked overnight along the side of the road in pre-existing turnouts would be checked for the presence of desert tortoises prior to moving the vehicle in the morning. Construction crew workers would survey under the vehicles, from all four directions, to assure that a tortoise did not move under the vehicle. If a tortoise is found, the authorized biologist would be contacted to remove the tortoise and place it outside the construction area.
	Any project-related vehicle or equipment operating on unpaved roads would not exceed a speed limit of 25-miles per hour.
	Cross-country (off road) travel would not be authorized, except under life-threatening / emergency situations.
	The field contact representative would conspicuously stake, flag, or mark work area boundaries (including the new access roads, realignments, and parking / turnout areas) to minimize surface disturbance to the surrounding habitat. Material stockpiling, machinery storage, and vehicle parking would only be permitted in designated areas.

Resource Area	Mitigation
	The contractor must protect against intrusion by the desert tortoise at sites with potential hazards (auger holes, steep-sided depressions, etc.).
	A desert tortoise education program would be presented by the field contact representative to all construction personnel prior to any construction activities. Following the onset of construction activities, any new employees would be required to formally complete the tortoise education program prior to working onsite. As a minimum, the tortoise education program would cover the following topics: (1) desert tortoise distribution / occurrence, (2) general behavior and ecology, (3) sensitivity of the species to human activities, (4) legal protection, (5) penalties for violation of state or federal laws, (6) reporting requirements, and (7) project protective mitigation measures.
	The field contact representative would maintain a complete record of all desert tortoise encounters. The record would include location, date, time, life history, general condition, identification numbers, and action taken. Within 90 days following the completion of this project, a report of all field contact representative activities and actions would be submitted to the U.S. Fish and Wildlife Service.
	No pets or firearms would be permitted inside the project's construction boundaries, or other associated work areas, at any time.
	Temporary silt fencing would be installed around the parking areas scheduled for slurry sealing. The silt fence would be at ground level and placed in such a manner as to prohibit animals, specifically tortoises, from crawling under the fencing. The fencing would be left in place until the slurry seal hardens. The fencing would be periodically monitored by authorized biologists.
	During fog sealing, one lane of traffic would remain open at all times. Biological monitors (approximately one monitor per mile of fog sealed roadway) would patrol their sections on foot and in vehicles to assure that no tortoise enters the roadway.
	Upon completion of this project, all materials and vehicles / equipment would be removed from the project area.
	The estimated 5.0 acres of habitat disturbance would be mitigated through restoration of 0.37 acre in the project area, and through 10.0 acres of purchased land.
	A litter control program would be implemented during construction to eliminate the accumulation of trash to avoid attracting common ravens that may prey on juvenile desert tortoise. All trash and food items would be promptly contained in raven- and coyote-proof containers provided by the contractor. These containers would be transported off park lands on a daily basis.
	The road curbing would include the use of tortoise trots to allow passage of the desert tortoise across the road and to provide an exit point for the tortoise should any move onto the road surface.
	A 3-year, post-construction monitoring program would be implemented for the Keys View Road rehabilitation using the same procedures as previously reviewed and approved for Joshua Tree National Park. The program would assess the potential effects of curbing on tortoise movement / survival. Annual reports, submitted to the U.S. Fish and Wildlife Service would summarize findings, evaluate curb / trot effectiveness and adequacy, and provide recommendations, as appropriate, to facilitate tortoise passage across the newly improved roadways.
Air Quality	To control fugitive dust, water sprinkling would occur, as needed, on active work areas where dirt or fine particles are exposed.
	Concrete and asphalt plants would be located outside Joshua Tree National Park. No overnight storage of these materials would be permitted.
	Construction debris would be immediately hauled from the park to an appropriate disposal location.

Resource Area	Mitigation
Archeology	Should unknown archeological resources be uncovered during construction, work would be halted in the discovery area, the site secured, and Joshua Tree National Park would consult according to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990.
	In compliance with the Native American Graves Protection and Repatriation Act of 1990, the National Park Service would also notify and consult concerned American Indian tribal representatives for the proper treatment of human remains, funerary, and sacred objects should these be discovered during the project.
	An archeological monitor would be present during periods when ground-disturbing activities are occurring in the vicinity of the "John Lang" gravesite (IDLCS058503), and the Juniper Flats parking area.
	The "John Lang" gravesite, located within the area of potential effects for the road construction, would be fenced during construction activities.
	Archeological specimens found within the construction area would be removed only by the National Park Service or their designated representatives.
Visitor Experience	Traffic delays that result from construction activities would be limited to a 30-minute maximum in one direction.
	From June 1st through September 30th, road closures would be implemented south of Cap Rock from Monday 6:00 a.m. through Friday 6:00 p.m. No road closures would occur on the weekends from Friday 6:00 p.m. through Monday 6:00 a.m. No work would occur on holidays.
Health and Safety	Work hours would be from dawn to dusk to avoid the increased potential for accidents after dark.
	Mid-week road closures would allow work to occur without potential for traffic safety concerns.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order 12, the National Park Service is required to identify the environmentally preferred alternative in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the Council on Environmental Quality. The Council on Environmental Quality provides direction that "[t]he environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in Section 101 of NEPA, which considers:

1. fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations
2. assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings
3. attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences
4. preserving important historic, cultural, and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice
5. achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities

6. enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources" (NEPA, section 101).

The no-action alternative is not the environmentally preferred alternative because it would not:

- address the deteriorating road surface and poor visibility that creates safety hazards for employees and visitors (criteria 2, and 3 not met)
- reduce the need for road maintenance that consumes depletable resources (criteria 1 and 6 not met)
- ensure access to park facilities (e.g., wayside exhibits) for all individuals (criteria 2 and 4 not met)

The environmentally preferred alternative in this environmental assessment / assessment of effect is the National Park Service preferred alternative. This alternative was selected based on the following criteria:

- protects public and employee health, safety, and welfare by addressing safety concerns associated with a deteriorated road surface and poor visibility while selecting a design that minimizes the impacts to Joshua trees (criteria 2, 3, and 5)
- protects desert tortoise habitat by curbing the road to prevent damage to habitat from informal turnouts; incorporates tortoise trots into the road to allow tortoises to exit the road (criteria 1, 3, and 4)
- prevents damage to natural and potential cultural resources by providing larger formal turnouts in high use areas (criteria 1, 3, and 4)
- improves operational efficiency and sustainability by reducing the need for ongoing road maintenance and the consumption of depletable resources associated with such maintenance (criteria 1 and 6)

Sustainability

The National Park Service has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The preferred alternative subscribes to and supports the practice of sustainable planning, design, and use of Keys View Road.

General Construction Schedule and Costs

Construction to rehabilitate Keys View Road is currently scheduled for 2006. The project is estimated to cost between $3 and $7 million.

Alternatives Considered but Dismissed

For Keys View Road, an option of reconstructing the road with two 10-foot travel lanes and drainage ditches on each side was evaluated. The reconstruction of drainage ditches along the improved alignment would have created a significantly wider zone of disturbance, impacted a greater number of Joshua trees, and, unlike the curbs in the preferred alternative, would not prevent vehicles from leaving the road in undesignated areas and impacting soils, vegetation and wildlife habitat. This option was dismissed as a result.

An option of implementing a 20–25 mph speed limit along Keys View Road was evaluated to reduce the amount of straightening and widening of the road corridor proposed in the preferred alternative. This option would result in a minimal reduction of impacts to resources and the limited sight distance would not be completely addressed. Shortened sight distances would negatively impact road safety and, therefore, this option was dismissed.

COMPARATIVE SUMMARY OF NO-ACTION AND PREFERRED ALTERNATIVES

No-Action Alternative	Preferred Alternative
The no-action alternative would be a continuation of the existing conditions of Keys View Road in Joshua Tree National Park. The travel lanes would remain at the current width; pavement would be patched as needed, but the overall condition would continue to be poor; vehicles would continue to create informal turnouts along the length of the road disturbing new areas. The park would continue operations related to the road such as spot repairs that would be part of routine maintenance for continuing operations.	The preferred alternative would widen and realign the existing 5.6-mile Keys View Road from the intersection with Route 12 (Park Boulevard near Cap Rock) to Keys View Overlook in Joshua Tree National Park (figure 1). The road would be widened to a paved road surface of a 20- or 22-foot width (with curve widening) and a 30- to 35-mile per hour design speed limit. The road would be curbed on each side to minimize sand blowing or washing onto the road and to eliminate informal turnouts. The curbing would have tortoise trots (notches in the curb to allow tortoises to exit the road) every 30 meters (98 feet). The proposal also includes paving the Keys View parking area and reconstructing the sidewalks and walls. Parking for the Cap Rock area and Juniper Flats backcountry registration board would be rehabilitated and turnout parking would be added. The Keys View Road surface would be fog sealed upon completion and the Keys View parking areas would be slurry sealed. Chip sealing and striping of 17 miles of previously rehabilitated road sections, including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from the Keys View Road junction to the Geology Tour Road junction, Route 12 from the North Entrance to the intersection with Pinto Basin Road would also be part of the project. Parking areas along these roadways would be slurry sealed or chip sealed and re-striped as part of this project.
Meets project objectives?	Meets project objectives?
No. Continuing the existing conditions does not protect the safety of visitors or provide for a good visitor experience due to the poor road conditions. The continued development of informal turnouts would not protect natural or cultural resources.	**Yes.** The preferred alternative meets the Joshua Tree National Park planning objective of providing a safe transportation route to Keys View and opportunities for visitors to stop and experience the park along the route, thus protecting the natural and cultural resources. The preferred alternative also provides protection for roadside vegetation and soils by eliminating the ability to informally leave the road and park.

COMPARATIVE SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

Potential Environmental Impacts		
Impact Topic	**No-Action Alternative**	**Preferred Alternative**
Air Quality	No new emissions from vehicles or fugitive dust would occur under the no-action alternative. The existing impacts from park activities would continue to be negligible and adverse.	Air quality impacts form construction related emissions would be short term, negligible and adverse.
Soils	No new impacts to soils would occur from the no-action alternative. The existing condition would constitute short- and long-term, moderate, adverse impacts to soils in the vicinity of the roadway from informal turnouts and social trails.	The overall adverse impacts to soils would be local, short term, moderate, and adverse due to new disturbance associated with road reconstruction and long term, moderate, and adverse due to continued social trailing.
Vegetation	The existing conditions constitute short- and long-term, minor, adverse impacts to vegetation from informal turnouts and social trails.	The estimated effects to the project area vegetation in the short term during construction would occur to between 10% to 30% of the overall plant populations indicating moderate, adverse impacts. In the long term, less than 10% of the vegetation would be affected and the long-term impacts from the preferred alternative would be minor and adverse.
Wildlife	There would be no new impacts to wildlife. The existing conditions constitute a long-term, negligible, adverse impact to wildlife.	The impacts to wildlife from the preferred alternative would be short and long term, negligible to minor, and adverse.
Threatened, Endangered, and Special-Status Species	There would be no new impacts to special-status species. The existing conditions constitute a long-term, negligible, and adverse impact.	Overall, impacts to the desert tortoise would be short and long term, moderate and adverse. Impacts to the flat-tailed lizard short term, minor, and adverse and long term, negligible, and adverse. Impacts to the desert bighorn sheep, mountain quail, Bendire's thrasher, and Le Conte's thrasher would be short term, negligible, and adverse. There would be no long-term impacts to these species. Impacts to special-status plant species would be short term, negligible, and adverse.
Archeological Resources	Impacts to archeological resources would remain negligible to minor, and adverse from disturbance related to visitor activities.	During construction and with mitigation, there would be no impact to archeological resources and the integrity of the archeological site within the area of potential effects would not be expected to experience a loss. After construction, visitor related activities at Juniper Flats parking area could produce minor to moderate impact because of the proximity of an archeological site just outside of the area of potential effect. There would be negligible to minor, beneficial impacts from the elimination of informal turnouts.
Visual Resources	There would be no impacts to visual resources.	The visual impacts from the installation of curbing would be long term, minor, and adverse.

Potential Environmental Impacts		
Impact Topic	**No-Action Alternative**	**Preferred Alternative**
Visitor Use and Experience	The existing condition would constitute a short- and long-term, minor to moderate, adverse impact to visitor experience driving Keys View Road.	Overall effects to visitor use and experience from the preferred alternative would be short term, moderate, and adverse and long term, moderate, and beneficial.
Health and Safety	There would be no change to existing health and safety; however, the existing condition of the road creates a detectable, but not appreciable, effect on health and safety and constitutes a short- and long-term, minor, adverse impact.	Under the preferred alternative, reconstruction to Keys View Road and associated parking areas would constitute a long-term, moderate, beneficial effect on health and safety. As a result of implementation of mitigation measures, short-term impacts to worker and visitor health and safety as a result of construction activities would be nonexistent or barely detectable and would be negligible and adverse.

AFFECTED ENVIRONMENT

Detailed information on resources in Joshua Tree National Park may be found in the *General Management Plan* (NPS 1995) and in other plans and documents referenced throughout the following discussions. A summary of the resources associated with this project follows.

LOCATION AND GENERAL DESCRIPTION OF THE PARK

Joshua Tree National Park is located in the Mojave and Colorado Deserts of southern California and lies along the east-west transverse ranges of the Little San Bernardino Mountains. The southern boundary follows the base of these mountains along the northern perimeter of the Coachella Valley; the Morongo Basin defines the north boundary. The park is in Riverside and San Bernardino Counties (NPS 2002).

Of the park's 794,000 acres, 593,490 are legislated wilderness—set aside for the preservation of natural, cultural, historic, and scenic resources. The compressed transition zone between the Mojave and Colorado Deserts makes it possible to cross from one desert to the other in less than 65 miles. The park contains all or portions of numerous mountain ranges including the San Bernardino, Cottonwood, Hexie, Pinto, Coxcomb, and Eagle. The eastern portion of the park averages 2,000 feet above sea level while the western half is mostly above 4,000 feet in elevation. Extremes in elevation range from 1,000 feet above sea level at Pinto Well to 5,900 feet above sea level at Quail Mountain. Major valleys include the Pinto Basin, Juniper Flats, Covington Flats, Pleasant, Queen, and Lost Horse (NPS 2002).

AIR QUALITY

Joshua Tree National Park is classified as a Class I air quality area under the Clean Air Act, as amended. This classification is the most pristine and imposes an affirmative responsibility to protect the air quality-related values (including visibility) of Class I areas and to remedy any existing impairment to visibility from human-caused pollution (NPS 1995).

Air quality problems in Joshua Tree National Park are associated with the regional airshed, which contains major population centers and power plants. Air pollution is detectable on most days. Summer months have the worst levels, and visibility is frequently impaired. During the winter months, air quality is generally good when the prevailing air flows are not from the Los Angeles basin. Very small amounts of air pollutants are generated in the park and are primarily from automobiles and dust. Automobile exhaust and the emissions from diesel generators contribute only minor amounts of pollutants. Vehicle traffic on dirt roads is very light and does not contribute significantly to reduced visibility (NPS 1995).

SOILS

Soil formation is related to erosional and depositional environments. Millions of years ago the landscape had rolling hills covered with a soil mantle that had developed in a hot, semiarid to humid climate with 80% more precipitation and 30% less evaporation than is typical today. Changes in climate have resulted in present-day erosion rates that exceed the rates of soil formation. Erosion removes the soil and vegetation from steeper hillsides and creates the huge subangular and spheroidal granitic boulders and boulder piles evident at Cap Rock. The eroded soils are deposited in bajadas and broad channels. The channels, in turn, undergo periodic entrenchment and filling (NPS 1999).

The surface geology along Keys View Road consists primarily of volcanic intrusions, ranging in age from middle Proterozoic to Cretaceous, into the metamorphic complex of rocks that is recognized within Joshua Tree National Park. Proterozoic gneiss and Cretaceous White Tank monzogranite are the two primary volcanic intrusions that comprise the geology along the project corridor, exposed as rock outcrops and boulder piles (NPS 2004).

Most soils in the park are poorly developed. The eastern half of the park is mostly alluvial (granitic fill that ranges from boulders to gravel and coarse sand) with no true soil structure. There are no known rare or unique soils in Joshua Tree National Park (NPS 1999).

Cryptobiotic soils are present in the park. A single vehicle can cause damage that can take decades or hundreds of years to restore. During desert maneuvers in Joshua Tree National Park in the 1940s, armored vehicles left tracks that are still visible today (NPS 1999).

VEGETATION

A vegetation and wildlife inventory was conducted along the Keys View Road corridor during December 1 – 4, 2003, by e^2M biologists. The purpose of this field inventory was to: (1) identify and describe plant communities adjacent to the road corridor; (2) prepare a preliminary plant species list for the Keys View Road corridor; (3) record the presence / absence of selected non-native species and rare plant species along the corridor; and (4) identify and record important wildlife habitat consisting of rock piles, woody snags, and downed wood—principally, toppled Joshua trees. The discussion of vegetation provided below was taken from the report written for the field survey (NPS 2004).

Herbaceous Vegetation and Wooded Herbaceous Vegetation

The herbaceous vegetation types present at Joshua Tree National Park do not fit existing National Vegetation Classification System classifications. The following herbaceous types are growing on sites that have been disturbed historically by fire, road construction and maintenance, and runoff.

Annual Graminoids / Joshua Tree Wooded Herbaceous Vegetation (post burn)

A large area recovering from wildfire occupies a portion of the alluvial fan that lies adjacent to the western edge of Keys View Road. The burn area encompasses the project area from the intersection with Park Road 12 to near the California Hiking Trail crossing. This vegetation type occurs between 4,280 and 4,323 feet in elevation, occupies nearly flat slopes of 1% to 2%, and is oriented to a northerly aspect from 5 degrees to 10 degrees. The unvegetated surface cover predominantly includes large and small rocks and bare soil. Evidence of the fire is abundant and includes charred stumps of shrubs and trunks of trees, in addition to standing dead shrubs. A few Joshua trees occupying this area and possibly weakened by the fire have toppled, presumably due to wind-throw following the burn.

Annual herbaceous vegetation present includes grass species six-weeks grama (*Bouteloua barbatus*) and needle grama (*B. aristidoides*). These species contribute from 4% to 5% foliar cover on the approximately 5-year-old burn area. The perennial graminoid big galleta (*Pleuraphis rigida*) contribute less than or equal to 1% foliar cover while the forb species present (e.g., fringed amaranth (*Amaranthus fimbriatus*), filaree (*Erodium cicutarium*), cinchweed (*Pectis papposa*), and apricot mallow (*Sphaeralcea ambigua*)) contribute less than 1% foliar cover per species. Short shrubs associated with this type, along with their contribution to foliar cover, include Nevada joint-fir (*Ephedra nevadensis*) (≤1%), buckhorn cholla (*Opuntia acanthocarpa*) (<1%), Joshua tree (<1%), and tetracoccus (*Tetracoccus hallii*) (<1%). Creosote bush (*Larrea tridentata*; <1% foliar cover) was also observed within this vegetation type, but the species is uncommon along Keys View Road. Joshua trees comprise a sparse canopy layer contributing 1% to 2% foliar cover over the burned alluvial fan. There are several dead, standing Joshua trees. Fire-weakened Joshua trees are subject to blow-down by wind-throw.

Mixed Forb / Mixed Graminoid Herbaceous Vegetation

The Keys View Road shoulders, which carry runoff from the road surface during precipitation events, support a largely forb-dominated community of weedy native and non-native plant species. This habitat is typically 3- to 6-feet in width and subject to disturbance by vehicles leaving the paved road surface and grading for roadway maintenance. Foliar cover values for this community are variable from site to site, influenced primarily by the amount of runoff water received. A few dwarf and short shrubs of sticky snakeweed (*Gutierrezia microcephala*), brittlebush (*Encelia actoni*), cheesebush (*Hymenoclea salsola*), and California buckwheat (*Eriogonum fasiculatum*) have become established and persist on the road shoulders. The more common native annual and perennial graminoids and forbs that have become established on the shoulder and drainages adjacent to the roadway include three-awn (*Aristida* sp.) and squirreltail (*Elymus elymoides*), in addition to annual bursage (*Ambrosia acanthicarpa*), desert trumpet (*Eriogonum inflatum*), annual wild buckwheat (*Eriogonum* sp.), wire-lettuce (*Stephanomeria exigua*), amaranth, blazing-star (*Mentzelia* sp.), apricot mallow, lupine (*Lupinus* sp.), and chia (*Salvia columbariae*). Annual forbs and graminoids that have invaded this disturbed habitat include tall tumblemustard (*Sisymbrium altisissimum*), filaree, ripgut grass (*Bromus diandrus*), red brome (*Bromus madritensis* ssp. *rubens*), and cheatgrass (*Bromus tectorum*). The park controls populations of tall tumblemustard using manual methods (e.g., hand pulling) (LaDoux, pers. comm., 2003).

Shrubland

Shrublands and wooded shrublands grow throughout the Keys View Road corridor, occupying alluvial fans, sandy washes, rock outcrops, hills, and ridges. At lower elevations, the shrublands support sparse Joshua trees; in the middle elevations individual and small stands of Joshua trees; California juniper (*Juniperus californica*); and single-leaf pinyon pine (*Pinus menofila*) may be present, and at higher elevations shrublands support individual California juniper trees and shrubs, with a few Joshua trees present. Many individual shrubs have succumbed to the recent drought affecting the park region.

Blackbrush Shrubland Alliance

The highest elevations of the Keys View Road corridor, including Keys View Overlook and parking area, support stands of blackbrush (*Coleogyne ramosissima*) on ridges, hills, rock outcrops, and coarse-grained alluvium composed of gneiss. The blackbrush shrubland alliance extends to some of the lowest elevations of the northern portion of the road corridor, where hills, ridges, and associated coarse alluvium are present. This shrubland was recorded from 4,399 to 5,166 feet in elevation on moderately sloping terrain (2% to 10% slopes), and aspects ranging from 20 degrees to 135 degrees. The unvegetated surface cover within blackbrush shrublands consists primarily of litter, large rocks, and bare soil. A few Joshua trees and California juniper shrubs grow within the blackbrush shrubland, but typically contribute less than 1% cover. The short shrubs, and their contribution to foliar cover within this type include blackbrush (15% – 45%), Nevada joint-fir (≤1%), spiny hopsage (*Grayia spinosa*; 0% – 1%), linear-leaved rabbitbrush (*Ericameria linearifolia*), fourwing saltbush (*Atriplex canescens*; 0% – <1%), Joshua tree (0% – <1%), buckhorn cholla (0% – <1%), hedge-hog cactus (*Echinocereus triglochidiatus*; 0% – <1%), wolfberry (*Lycium* sp.; 0% – <1%), and spiny horsebrush (*Tetradymia spinosa*; 0% – <1%). The understory of blackbrush shrubland consists of perennial and annual plant species that provide only sparse foliar cover. The perennial bunchgrasses, one-sided bluegrass (*Poa secunda;* 0% – 1%), and big galleta (0% – 1%) were present on southeastern and northeastern exposures, respectively. Annual herbaceous species, along with foliar cover recorded in this type, included six-weeks grama (0% – 4%), red brome (<1%), cheatgrass (0% – 2%), filaree (1% – 2%), fringed amaranth (0% – <1%), *Calycoseris parryi* (0% – <1%), *Cryptantha* sp. (0% – <1%), *Loeseliastrum* sp. (0% – <1%), and unknown forb rosettes (0% – 1%). A small amount of crustose lichen (0% – <1%) occupied rocks on one northeastern exposure.

Fourwing Saltbush Shrubland Alliance

A steep fill slope supporting the Keys View Road template has recovered to a Fourwing Saltbush / Cheatgrass Shrubland stand at 5,012 feet in elevation near the southern terminus of the roadway. The fill material originated from the toe slope of a ridge that was cut away to build the roadbed. The borrow material was formerly dominated by Blackbrush Shrubland Alliance species located immediately across the road. The resultant fill slope is moderately steep at 9% and was oriented to a northwestern aspect (340 degrees). The unvegetated surface of the fill slope is composed of litter, large rocks, and small rocks, primarily. Fourwing saltbush also forms small, linear stands along the corridor and adjacent to the road where sandy soils

occur. Short shrubs (0.5 to 1 meter) (1.6 to 3.3 feet) contribute greater than 10% foliar cover within this type. These shrubs include fourwing saltbush (10%), blackbrush (<1%), white cheesebush (*Hymenoclea salsola*; <1%), Anderson wolfberry (*Lycium andersonii*; <1%), and Joshua tree (<1%). Graminoids (less than 0.5 meter (1.6 feet)) are also present and their contribution to foliar cover includes the herbaceous non-native annual cheatgrass (4%), and the perennial bunchgrasses threeawn (*Aristida* sp.; <1%), Sandberg bluegrass (*Poa secunda*; <1%), and Indian ricegrass (*Achnatherum hymenoides*; <1%). Species of forbs (<0.5 meter (1.6 feet) tall) include, along with foliar cover, Parry calycoseris (*Calycoseris parryi*; 1%), amaranth (<1%), *Cryptantha* sp. (<1%), and apricot mallow (<1%).

Rubber Rabbitbrush Shrubland

Small stands or patches of the short shrub rubber rabbitbrush (*Chrysothamnus nauseosus*) grow adjacent to the Keys View Road pavement, in the shallow roadside drainage ditch, and a ditch carrying runoff water from the roadway. Due to the patchy nature of the stands, no foliar cover is included. The understory is similar to that described in the Mixed Forb / Mixed Graminoid Herbaceous Vegetation community. The number of rubber rabbitbrush shrubs present is estimated between 25 to 50, and they would all be removed by the placement of curb and gutter for the road-widening project, as proposed.

White Cheesebush – Bladder-Sage Shrubland

Desert washes with fine, sandy substrates support a mixed shrub community on their banks and terraces. These washes are small, the channels are typically less than 3.3-feet wide (presence of terraces along the channel may double this width), and are uncommon within the corridor. One wash sampled at the elevation of 4,881 feet had a 3% slope and was oriented to an aspect of 330 degrees. The unvegetated surface was primarily covered by litter and large and small rocks. Short shrubs contributed to wash foliar cover as follows: white cheesebush (30%), bladder-sage (*Salazaria mexicana;* 15%), Nevada joint-fir (3%), spiny horsebrush (3%), and California buckwheat (2%). Graminoids contributed the following foliar cover values: Indian ricegrass (*Oryzopsis contracta* <1%), cheatgrass (3%), and red brome. Annual forb species present in one wash and their contribution to foliar cover included annual bursage (2%) and wire-lettuce (1%).

Wooded Shrublands and Wooded Herbaceous Vegetation

Sparse woodlands are present throughout the Keys View Road corridor and are comprised of Joshua tree, California juniper, and single-leaf pinyon pine trees that generally contribute from 1% to 10% cover in the canopy stratum. The sparsely distributed trees are always associated with understory short shrub and herbaceous species that are typically the dominant plants in a given stand. These wooded shrubland and wooded herbaceous stands are found on most of the substrates adjacent to the road corridor, including alluvial fans, rock outcrops, hills, ridges, drainages, and slopes. Some regeneration of Joshua trees and California juniper is occurring near the road corridor, but no regeneration of single-leaf pinyon pine was observed during the field survey. Many individual California juniper and single-leaf pinyon pine are showing stress or are dying due to drought, parasitism (mistletoe infestations of California juniper), and

possibly insect damage. There is relatively common evidence of small mammals foraging on Joshua tree leaves and also stripping the outer bark of some trees. It is presumed that this activity produces moisture for the small mammals, in addition to forage and materials with which to build nests.

California Juniper Wooded Shrubland Alliance

A wooded shrubland characterized by California juniper, Joshua tree, single-leaf pinyon pine, and blackbrush occupied the mid-elevations of the Keys View Road corridor. This vegetation type grew on ridges, hills, rock outcrops, and coarse alluvium from 4,549 to 5,169 feet in elevation. Slopes supporting this type were moderate to steep (4% – 45% slopes) and were oriented to aspects ranging from 0 degrees to 345 degrees. The unvegetated surface of these stands was predominantly composed of large and small rocks, litter, and bare soil. A sparse woodland canopy composed of California juniper (2% – 7% foliar cover), Joshua tree (<1% – 3% foliar cover), and single-leaf pinyon pine (0% – 8% foliar cover) typifies this wooded shrubland. The tall shrub stratum was present in some stands and was composed of California juniper (0% – 3% foliar cover), bitterbrush (*Purshia tridentata*) (0% – <1% foliar cover), John Tucker oak (*Quercus john-tuckeri*; 0% – <1%), and Joshua tree (0% – <1% foliar cover). Short shrubs were common in this type and included, along with contribution to foliar cover, blackbrush (0% – 25%), Nevada joint-fir (0% – 2%), California juniper (0% – <1%), Joshua tree (0% – <1%), fourwing saltbush (0% – 1%), cheesebush (0% – <1%), buckhorn cholla (0% – <1%), beavertail cactus (*Opuntia basilaris*; 0% – <1%), bladder-sage (0% – <1%), turpentine-broom (*Thamnosma montana*; 0% – <1%), California buckwheat (0% – 1%), Acton's brittlebush (0% – <1%), and linear-leaved rabbitbrush (0% – 2%). Graminoids associated with this type and their contribution to foliar cover included big galleta (0% – 7%), desert needlegrass (*Achnatherum speciosum*; 0% – 2%), red brome (0% – 2%), cheatgrass (0% – 4%), and six-weeks grama (0% – <1%). Forbs comprising a portion of the understory and their contribution to foliar cover included wire-lettuce (0% – 1%), *Calycoseris parryi* (0% – 4%), chia (0% – 1%), *Eriastrum* sp. (0% – 1%), *Phacelia* sp. (0% – 2%), *Physalis crassifolia* (0% – <1%), filaree (0% – <1%), amaranth (0% – 1%), and *Cryptantha* sp. (0% – <1%).

Joshua Tree Wooded Shrubland Alliance

Alluvial fans of lower and middle elevations along the Keys View Road corridor supported a mixed shrub community interspersed with Joshua trees. Drought related die-off of shrubs and perennial graminoids was common within this vegetation type; however, annual graminoids were present and sometimes abundant in most stands. Sampled sites occupied elevations of 1,313 meters (4,308 feet) and 1,369 meters (4,491 feet) with a mild slope of 3%. The stands were oriented to northeastern and northwestern aspects (5 degrees and 330 degrees). Unvegetated surfaces within the stands were predominantly composed of large rocks and bare soil. The canopy layer (0.5 meters to 15.0 meters tall) (16.4 to 49.2 feet) was composed of sparse Joshua trees that contributed 2% to 3% foliar cover. A variety of short shrubs (0.5 meter to 1 meter tall) (1.6 to 3.3 feet) were present in these stands and included, along with foliar cover contribution, Nevada joint-fir (4%), blackbrush (0% – 2%), cheesebush (0% – 1%), California buckwheat (0% – <1%), buckhorn cholla (<1%), wolfberry (0% – <1%), and Joshua tree (0% – <1%). Graminoids (<0.5 meter tall) (1.6 feet) also contributed to the foliar cover of

this community and included big galleta (<1% – 2%), bush muhly (*Muhlenbergia porteri*) (0% – <1%), six-weeks grama (3% – 6%), cheatgrass (<1% – 2%), and red brome (0% – <1%). A few forbs (<0.5 meter tall) (1.6 feet) were observed within this type and contributed foliar cover as follows: fringed amaranth (0% – <1%), *Calycoseris parryi* (0% – <1%), and unknown forb rosettes (0% – <1%). Crustose lichens that were black in color contributed ground cover (0% – <1%) in one stand.

Joshua Tree Wooded Herbaceous Alliance

Alluvial fans of lower elevations along the Keys View Road corridor support a graminoid community interspersed with Joshua trees. This community occupies elevations between 4,306 feet and 4,339 feet that grow on mild slopes (2% to 3%). The stands are oriented predominantly to the northwest, with aspects ranging from 325 degrees to 335 degrees. Unvegetated surface cover is composed largely of bare soil, large rocks, and litter. The understory vegetation, particularly graminoids and shrubs, are severely drought-affected with dead vegetation. The canopy layer is composed of the Joshua tree that contributes 1% to 4% foliar cover to the stands. The tall shrub, Anderson wolfberry, contributes 5% foliar cover. Short shrubs contribute to stand foliar cover as follows: Nevada joint-fir (0% – 3%), fourwing saltbush (<1% – 2%), spiny horsebrush (0% – <1%), beavertail cactus (0% – <1%), buckhorn cholla (<1%), and wolfberry (0% – <1%). Although graminoids are common in this type, their contribution to foliar cover has been reduced by drought, and their contributions are as follows: big galleta (<1% – 6%), six-weeks grama (4% – 6%), cheatgrass (0% – 2%), and red brome (0% – <1%). Species of forbs for this type and their contribution to foliar cover include amaranth (0% – <1%), filaree (0% – <1%), cinchweed (0% – 1%), *Eriastrum* sp. (0% – <1%), *Calycoseris parryi* (0% – <1%), and unknown forb rosettes (<1% – 1%).

Non-Native Species

Non-native species occur in Joshua Tree National Park, primarily along roadways and trails. Non-native species are carried into the park by vehicles from outside the park. Horse manure also contains many seeds that could include seeds of non-native species. Road work areas for the completed Phases I and II tend to show increased presence of certain non-native species, including Tournefort's mustard (*Brassica tournefortii*), Russian thistle (*Salsola tragus*), and tall tumblemustard.

WILDLIFE

Joshua Tree National Park's wildlife ecologist provided a list of wildlife species and their status within the project area (appendix B) (Fesnock 2003). The park's species list contained 103 species, including 3 amphibian species, 45 reptile species, and 55 mammal species.

Of the three amphibian species listed in the park, the red-spotted toad (*Bufo punctatus*) is the only species likely to occur in the project area. Of the 45 reptile species listed for the park, 30 species are likely to occur in the project area. The Mojave black-collared lizard (*Crotaphytus bicinctores*) is likely to occur in the upper section of the project corridor. The Western

chuckwalla (*Sauromalus obesus*), Southern desert horned lizard (*Phrynosoma platyrhinos*), San Diego alligator lizard (*Elgaria multicarinata webbii*), and Western leaf-nosed snake (*Phyllorhynchus decurtatus*) are likely to occur in the lower section of the project corridor.

Reptiles likely to occur along the entire project corridor include the Mojave glossy snake (*Arizona occidentalis candida*), Great Basin whiptail (*Aspidoscelis tigris*), Mojave Desert sidewinder (*Crotalus cerastes cerastes*), Southern Pacific rattlesnake (*Crotalus helleri*), Southwestern speckled rattlesnake (*Crotalus mitchelli*), red diamond rattlesnake (*Crotalus ruber*), Mojave rattlesnake (*Crotalus scutulatus*), Western red-tailed skink (*Eumeces gilberti rubricaudatus*), desert night snake (*Hypsiglena torquata*), California king snake (*Lampropeltis getula*), desert rosy boa (*Lichanura trivirgata gracia*), red coachwhip (*Masticophis flagellum piceus*), California striped racer (*Masticophis lateralis*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), desert gopher snake (*Pituophis catenifer deserticola*), Western leaf-nosed snake (*Rhinocheilus lecontei lecontei*), desert patch-nosed snake (*Salvadora hexalepis hexalepis*), Mojave patch-nosed snake (*Salvadora hexalepis mojavensis*), Great Basin fence lizard (*Sceloporus biseriatus*), yellow-backed spiny lizard (*Sceloporus magister uniformis*), California lyre snake (*Trimorphodon biscutatus*), desert side-blotched lizard (*Uta stansburiana*), and desert night lizard (*Xantusia vigilis*). Special-status species, the Mojave Desert tortoise (*Gopherus agassizii agassizii*) and flat-tailed horned lizard (*Phrynosoma mcallii*) are also likely to occur in the project corridor and are discussed further in the "Special-Status Species" section of this environmental assessment / assessment of effect.

Of the 55 mammals listed to occur within the park, 32 species are likely to occur within the project corridor. The ringtail (*Bassariscus astutus*), pocket mouse (*Chaetodipus fallax*), long-tailed weasel (*Mustela frenata*), Western spotted skunk (*Spilogale gracilis*), desert cottontail (*Sylvilagus audubonii*), and kit fox (*Vulpes macrotis arsipus*) are likely to occur in the lower section of the project corridor. The mammals likely to occur within the entire project corridor include the white-tailed antelope squirrel(*Ammospermophilus leucurus*), coyote (*Canis latrans*), desert kangaroo rat (*Dipodomys deserti*), Merriam's kangaroo rat (*Dipodomys merriami*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), desert woodrat (*Neotoma lepida*), desert shrew (*Notiosorex crawfordi*), mule deer (*Odocolieus hemionus*), grasshopper mouse (*Onychomys torridus*), desert bighorn sheep (*Ovis canadensis nelsoni*), little pocket mouse (*Perognathus longimembris*), canyon mouse (*Peromyscus crinitus*), cactus mouse (*Peromyscus eremicus*), pinyon mouse (*Peromyscus truei*), deer mouse (*Peromyscys maniculatus*), Western pipistrelle (*Pipistrellus hesperus*), mountain lion (*Puma concolor*), harvest mouse (*Reithrodontomys megalotisl*), California ground squirrel (*Spermophilus beecheyi*), Mohave ground squirrel (*Spermophilus mohavensis*), dusky chipmunk (*Tamias obscurus*), badger (*Taxidea taxus*), Mojave pocket gopher (*Thomomys bottae mohavensis*), and gray fox (*Urocyon cinereoargenteus*).

Joshua Tree National Park wildlife biologists conducted a small mammal survey along the project corridor and the species captured included the deer mouse, desert kangaroo rat, desert woodrat, and Merriam's kangaroo rat (Fesnock 2003). A second small mammal survey occurred in January 2004 (Collins 2004). The species captured included Merriam's kangaroo rat, grasshopper mouse, desert woodrat, and white-tailed antelope squirrel.

Joshua Tree National Park wildlife biologists conducted point counts to determine occurrence and abundance of bird species along the project corridor on three separate mornings (November 10, 17, and 18, 2003) (appendix C) (Collins 2003).

Census methods used follow closely those described in Ralph et al. (1993) *Handbook of Field Methods for Monitoring Landbirds.* A distance of 500 meters (1,640 feet) between each roadside point count station was used, starting approximately 500 meters (1,640 feet) south of Cap Rock, along Keys View Road to the end of the road, resulting in a total of 17 individual point count stations. Time spent at each count point collecting data was 5 minutes, and data were separated into individuals seen or heard during the first 3 minutes and additional individuals heard in the remaining 2 minutes. All bird species heard or seen within each 5-minute time period were recorded. For each species, the number of individuals within a circle of 50 meters (164 feet) around the census point was recorded separately from all those outside the circle, out to an unlimited distance. Birds that were detected flying over the point, rather than detected from within the vegetation, were recorded separately.

Species recorded in the point count surveys included black-throated sparrow (*Amphispiza bilineata*), scrub jay (*Aphelocoma coerulescens*), red-tailed hawk (*Buteo jamaicensis*), cactus wren (*Campylorhynchus brunneicapillus*), Northern flicker (*Colaptes auratus*), common raven (*Corvus corax*), American kestrel (*Falco sparverius*), pinyon jay (*Gymnorhinus cyanocephalus*), loggerhead shrike (*Lanius ludovicianus*), ladder-backed woodpecker (*Picoides scalaris*), spotted towhee (*Pipilo maculates*), ruby-crowned kinglet (*Regulus calendula*), rock wren (*Salpinctes obsoletus*), Say's phoebe (*Sayornis saya*), mountain bluebird (*Sialia currucoides*), Brewer's sparrow (*Spizella breweri*), Western meadowlark (*Sturnella neglecta*), Bewick's wren (*Thryomanes bewickii*), and white-crowned sparrow (*Zonotrichia leucophrys*).

A walking survey was conducted of the project corridor in early December 2003, and important wildlife habitats were documented. Three important habitat types were observed along the project corridor consisting of downed trees (woodpiles), small burrows, and rock piles or outcrops. Dead toppled Joshua trees were the most abundant of the important habitat types observed along the corridor. Toppled Joshua trees represent important habitat for many small mammals, reptiles, and insects. Dead Joshua trees that remain standing are suitable perching, foraging, and nesting sites for several species of birds.

THREATENED, ENDANGERED, AND SPECIES OF SPECIAL CONCERN

Under the Endangered Species Act of 1973, as amended, an endangered species is defined as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range.

The Joshua Tree National Park wildlife biologist provided a list of wildlife species of concern and the likelihood of occurrence in the project corridor. This list is presented in appendix D, table D-1. Table D-1 includes a discussion of the species, likely occurrence in the project area, listing status, and typical habitat.

The Joshua Tree National Park botanist provided a list of special-status plant species. This list is contained in appendix D as table D-2 (LaDoux 2003). Table D-2 includes a discussion of the plant species likely occurrence in the project area and listing status. The California status of each species and the federal status determined by the U.S. Fish and Wildlife Service are presented in the list.

Following analysis of potential habitat and species in the project area based on communication with the U.S. Fish and Wildlife Service and lists provided by the park, the Mojave Desert tortoise, flat-tailed horned lizard, desert bighorn sheep (*Ovis Canadensis nelsoni*), mountain quail (*Oreortyx pictus*), Bendire's thrasher (*Toxostoma bendirei*), Le Conte's thrasher (*Toxostoma lecontei*), spearleaf (Matelea parvifolia), Robison's monardella (*Monardella robisonii*), and Hall's tetracoccus are the species discussed below in further detail. Other species were eliminated due to the lack of habitat in the project area in the case of wildlife. In the case of plants, species were eliminated based on lack of habitat or lack of historical sitings. Appendix D, table D-1 contains the full list and explains why some listed species were not considered further in this document. In the case of plant species, the site was surveyed in December 2003, for the presence of rare plant species and species were eliminated based on the absence of these species during that inventory (e^2M 2004).

Desert Tortoise

Desert tortoises are distributed from southeastern California, southern Nevada, and extreme southwestern Utah, through western and southern Arizona and northern Mexico. They generally occupy habitat receiving an average annual rainfall in excess of 4 inches (10.0 centimeters) and below 12 inches (30.0 centimeters). In the northern periphery of their range, they typically occur at elevations between 3,500 and 5,000 feet. The desert tortoise exhibits significant morphological and genetic variation throughout the range. Populations occurring west of the Colorado River are thought to be distinct from those east of the river in morphology, genetics, behavior, and ecology (NatureServe 2003). The U.S. Fish and Wildlife Service

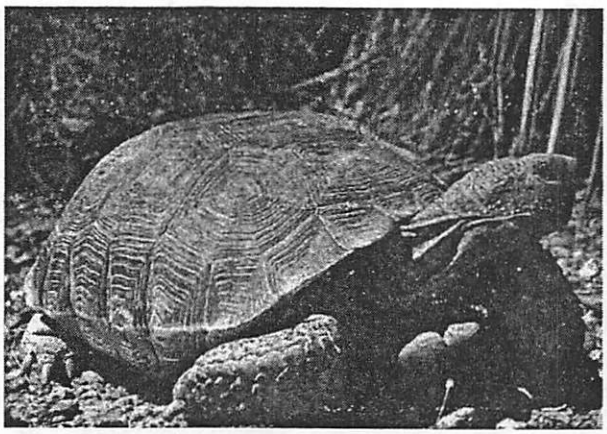

FIGURE 9. DESERT TORTOISE

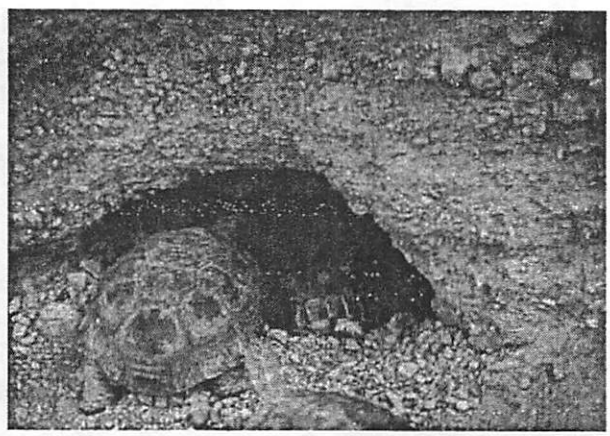

FIGURE 10. DESERT TORTOISE DEN CONSTRUCTED UNDER CALICHE

listed the Mojave population of the desert tortoise (north and west of the Colorado River) as endangered under emergency listing procedures enacted in August 1989. In 1990, the desert tortoise was listed as threatened under normal listing procedures.

The herbivorous desert tortoise predominantly occupies creosote bush scrub and the creosote bush – white bursage community of warm upland plateaus and mountain slopes in the Mojave Desert. The native grass, big galleta, is often present where the desert tortoise is most abundant. In general, desert tortoises forage primarily on native winter and summer annual plants (dicots and grasses), perennial grasses, cacti, and perennial shrubs in descending order of preference. Insects, caterpillars, and other insect larvae may also be eaten, and desert tortoises have been observed biting road-killed anurans and lizards (Brown 1968, NatureServe 2003). It has been suggested that an active adult desert tortoise requires about 45 pounds of herbaceous forage per month (NatureServe 2003).

Adult desert tortoises in the Mojave Desert are typically active from March through September in habitat that is most often associated with well-drained sandy loam soils of plains, alluvial fans, and bajadas (although they may also occur along the edges of basaltic flow and other rock outcrops). The desert tortoise has a tendency to excavate and utilize more than one burrow. Juveniles are particularly prone to excavate multiple burrows (mostly under large shrubs) and also use abandoned rodent burrows (NatureServe 2003). Burrows often extend from 1- to 8-feet in length and have a single opening. For the Mojave Desert, burrows most often open under a creosote bush (59% to 77% of the time) or white bursage shrub (21% of the time).

Winter burrows are more properly called dens and are extensive, up to 30-feet in length. These dens open to southern exposures and are often subject to communal use by several individuals. Dens are typically excavated beneath caliche or sandstone rock shelves along wash banks (NatureServe 2003).

Mating occurs from August through October and again in April and May. Desert tortoise eggs are laid mainly from May to early July in shallow depressions, often 3- to 4-inches deep. Clutch sizes are normally 3 to 7 eggs, but up to 15 eggs have been observed in a nest. Newly hatched desert tortoises emerge from the nests in September.

Habitat Assessment and Survey Results. Desert tortoise densities in Joshua Tree National Park range from zero in rugged mountain areas to 240 per square mile in the Pinto Basin (well east of the project area). Most areas in the park do contain some desert tortoises.

Clearance surveys and zones of influence belt-transect surveys, extending up to 2,400 feet from the construction zone, were accomplished from April 1 to June 12, 2003. One adult desert tortoise, seven burrows, and two scats were found, all in lower elevations of the proposed project area. No desert tortoises or tortoise sign were found within the 30-foot construction footprint zone. The only recent signs of desert tortoise activity (desert tortoise sightings and active burrows) were found on the 2,400-foot zone of influence line. This location is approximately 0.75 kilometer (km) (0.47 mile) away from Park Route 13, just north of Juniper Flats Road.

Some desert tortoises, especially males, make long-range (typically >1 km) movements outside their usual home ranges. There appears to be two groupings of sign in fairly close proximity to

each other (> 0.75 km), the recent and active group out at the 2,400-foot zone, and another inactive group much closer to the road at the 100-foot zone (in two burrows and one scat, all within fairly close proximity to each other). Considering these locations and the lack of desert tortoise sign found elsewhere throughout the survey area, it appears that just north of Juniper Flats Road is the likeliest area for desert tortoise movements to occur across or in close proximity to the road.

A second desert tortoise survey was conducted in the proposed construction zone from March 24 to June 1, 2004 (NPS 2004a). The survey found that the recent and active sign at the 2,400 zone in the 2003 survey was no longer active. The two burrows that surveyors were able to locate from the previous survey were abandoned and in poor condition. No recent sign of tortoise was found in this area. The 2004 survey found two burrows and one scat. A potentially active burrow was found between the road and the 100-foot zone of influence, a second burrow, probably inactive, was found between the 300-foot and 600-foot zone of influence, and scat was found on the 2,400-foot zone of influence line. The 2003 and 2004 survey results indicate that the most likely area for tortoise activity is in proximity to the Juniper Flats Road and extending 2 km southward.

Flat-Tailed Horned Lizard (*Phrynosoma mcallii*)

Typical habitats include sandy desert flatlands with sparse vegetation. Favorable vegetation includes creosote bush, saltbush, bursage, and ocotillo. This species tends to burrow in soil or loose sand to escape cold temperatures or extreme heat. Reproduction occurs during May and June (NatureServe 2003). This species is a state of California species of concern and could occur along the project corridor due to favorable habitat, although it has not been recorded in the project area

Desert Bighorn Sheep (*Ovis Canadensis nelsoni*)

Desert bighorn sheep are not a federally listed species; however, they are listed as a "sensitive" species by the Bureau of Land Management in the state of California because of their low numbers and their sensitivity to human disturbance. Herd populations in the park appear to be in good condition. The park intends to continue to monitor the park's bighorn sheep population and public use activities within sheep habitat (NPS 2003 – Road EA). The road corridor contains suitable habitat for the desert bighorn sheep so this species could occur in the vicinity.

Mountain Quail (*Oreortyx pictus*)

The mountain quail is on the Audubon watch list. Typical habitat for this species in arid conditions is sagebrush and pinyon and juniper. It is a year-round resident at lower elevations. The mountain quail nests on the ground in a scrape lined with plant material, usually under a protective covering (trees, shrubs, fallen branches, etc.). Nesting occurs from April to the middle of July. This species of concern is likely to occur along the project corridor (NatureServe 2003).

Bendire's Thrasher (*Texostoma bendirei*)

Bendire's thrasher is a state of California species of concern. This species occupies a variety of desert habitats including large shrubs, cacti, and open ground or open woodlands at elevations of 0 to 550 meters (1,804 feet). This species nests in low trees or shrubs, typically mesquite, juniper, and Joshua trees (NatureServe 2003). This species of concern could occur along the project corridor due to favorable habitat, although it has not been recorded in the project area.

Le Conte's Thrasher (*Toxostoma lecontei*)

This species is a California state species of concern and Partners in Flight Watch List species. LeConte's thrashers are a non-migratory species with a limited range throughout the southwestern United States. The core of its range is in the California portion of the Mojave Desert, but nowhere throughout its range is it common (NPS 2003). Nesting occurs in cholla cactus, sagebrush, small trees, or shrubs from February to June, usually approximately 2 to 12 feet above ground. The Le Conte's thrasher occupies habitats that include desert scrub, particularly creosote bush associations (NatureServe 2003). This species of concern could occur along the project corridor due to favorable habitat, although it has not been recorded in the project area.

Spearleaf (*Matelea parvifolia*)

Habitat for the spearleaf is Mojavean and Sonoran desert scrub at elevations of 1,450 feet to 3,600 feet. The nearest locality of this species is in the Cottonwood Spring and Indian Cove quadrangles. The spearleaf has no federal status, but has been placed on the California Native Plant Society List 2 as a plant that is rare, threatened, or endangered in California, but more common elsewhere. This species was not observed during the walking survey of the project corridor; however, appropriate habitat for this species is present.

Robison's Monardella (*Monardella robisonii*)

Habitat for this species includes desert scrub and pinyon / juniper woodland at elevations of 2,000 feet to 4,900 feet. The nearest locality of Robison's monardella are on Malapai Hill, Keys View, Cadiz Valley, Dale Lake, Indian Cove, Queen Mountain, Yucca Valley North, Joshua Tree South, and Morongo Valley quadrangles. This species was not observed during the walking survey of the project corridor; however, appropriate habitat for this species is present.

Hall's Tetracoccus (*Tetracoccus hallii*)

Hall's tetracoccus is present on rocky slopes and in washes, occupying habitats of Mohavean Desert scrub, Sonoran Desert scrub, and creosote bush scrub at elevations of 0 to 3,900 feet. This species was present within Keys View Road survey limits, occupying sandy wash and rock outcrop habitat. It has no federal status, but has been placed on the California Native Plant Society watch list (CNPS List 4) as a plant species of limited distribution. Hall's tetracoccus is also considered Rarity 1 (rare but found in sufficient numbers and distributed widely enough

that the potential for extinction is low at this time), Endangerment 1 (not endangered), and Distribution 1 (more or less widespread outside California) (CNPS 2003).

ARCHEOLOGICAL RESOURCES

The area surrounding and including Joshua Tree National Park has been the subject of sporadic archeological investigations and the sequence of human occupation is not fully understood. Projectile points associated with Paleo-Indians have been discovered in the region. These projectile points date back to at least 9000 B.C. Artifacts of the Dieguito and Lake Mohave complexes of the early Archaic period (9,000 to 5,000 years ago) are known to exist in the region, as well. In the park itself, there is archeological evidence of occupation in the middle and late Archaic periods (5,000 to 900 years ago). Sites dating from the late Archaic to Historic period are relatively numerous. Many of the sites are associated with the Cahuilla, Chemehuevi, and Serrano cultures (NPS 1995).

European contact with the area began in 1772, when Spanish explorers crossed the region. Later, explorers and settlers from the United States entered the area, but it was not until the 1860s that any activity resembling settlement occurred. In the early 1860s, cattlemen and their herds were spending winters in the region. This trend continued well into the next century. In 1865, the first mining claim was filed in what became Joshua Tree National Park. It was for a gold mine called the Jeff Davis Mine, located in Rattlesnake Canyon (NPS 1995).

Homesteading began in the park in the 1920s, and continued through the 1940s. The Keys – Desert Queen Ranch is a relic of this period, as are many of the historic wells, dams, reservoirs, and other structures in the park (NPS 1995).

Archeological sites from all periods tend to be small and not obvious. Pre-historic sites include campsites, scatters of chipped stone, groundstone, occasional sherds, rock art sites, quarries, artifact caches, and remnant trails. Historic sites are usually trash dumps, ruins, or unrecorded features (NPS 1995). Surveys by the Western Archeological and Conservation Center archeologists in 1979 and 2001, and a survey by Warren and Schneider in 1992 identified pre-historic and historic archeological sites along Keys View Road (Hinton 2003).

A more extensive survey conducted in 2003, by Western Archeological and Conservation Center archeologists identified five sites within a 100-meter (328 feet) wide corridor along Keys View Road (appendix F). Four of the five sites appear to be surface historical / modern trash scatters, none of which are considered NRHP eligible, while the fifth site, a historic burial known as the "John Lang" gravesite (CA-RIV-1958), is considered potentially eligible. The survey also identified 19 isolated finds consisting of such items as historical cans and tins, two sherds, and a two-track road remnant. None of the isolated finds were considered eligible for the NRHP. The artifacts of all the sites and isolated finds were analyzed in the field (appendix F) (White 2004). The previously recorded site (CA-RIV-6731) was isolated outside the survey corridor and the area of potential effect.

VISUAL RESOURCES

Joshua Tree National Park contains several critical desert vistas such as the 360-degree panorama from Ryan Mountain and the view of the Salton Sea from Keys View Overlook. Many subtle earth colors are displayed in the desert, and plants have adopted subdued photochemical colorations, exchanging dark greens for grays and browns.

Standard visual range averages 50 miles and is highest during winter, lower during fall and spring, and lowest during the summer. While natural levels of desert haze associated with fine dust particles is frequently mentioned in historical literature, there is little doubt that most visual degradation has taken place in the past decade (NPS 1995).

VISITOR EXPERIENCE

Visitation in Joshua Tree National Park has steadily increased since 1993, to more than 1.4 million visitors in 1998. Visitation in 2002 was 1,174,142. With the change in designation from national monument to national park, visitor use has expanded from primarily local and regional residents to users from around the nation and the world. Peak visitation occurs during the months of March, April, and May (38.9% of annual visitation). About 24% of visitors come during the autumn (September through November), 22% in the winter (December through February), and 16% in the summer (June through August) (NPS 1999). Joshua Tree National Park is largely a day-use destination. Visitor activities include hiking, picnicking, rock climbing, interpretive walks and talks, and camping.

HEALTH AND SAFETY

The average annual daily traffic on Keys View Road is 600 vehicles. Visibility along the road is limited due to the presence of vertical and horizontal curves. While limited records exist concerning accidents along the road, there were seven accidents of an unspecified nature between 1997 and 1999. Between 2000 and 2003, there was one single vehicle accident and two multiple vehicle accidents. In other locations, soft shoulders have resulted in drivers drifting off the road causing single vehicle accidents.

Widening of similar roads at Lake Mead National Recreation Area resulted in as much as a 68% reduction of accidents related to the provision of wider margins of pavement, which reduce the likelihood of vehicles drifting onto the soft shoulder (NPS 2002).

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This section describes the environmental consequences associated with the alternatives. It is organized by impact topics that distill the issues and concerns into distinct topics for discussion analysis. These topics focus on the presentation of the environmental consequences, and allow a standardized comparison between alternatives based on the most relevant topics. NEPA requires consideration of context, intensity, and duration of impacts, direct or indirect impacts, cumulative impacts, and measures to mitigate for impacts. National Park Service policy also requires that "impairment" of resources be evaluated in all environmental documents.

METHODOLOGY

Overall, the National Park Service based these impact analyses and conclusions on the review of existing literature and Joshua Tree National Park studies, information provided by experts within Joshua Tree National Park and other agencies, professional judgments and park staff insights; interested local American Indian tribes; and public input.

The following definitions were used to evaluate the context, intensity, type, duration, and cumulative nature of impacts associated with project alternatives:

- *Context.* Context is the setting within which an impact is analyzed such as local, parkwide, or regional. The Council on Environmental Quality requires that impact analysis include discussions of context.

- *Impact Intensity.* Impact intensity is the degree to which a resource would be beneficially or adversely affected. The criteria that were used to rate the intensity of the impacts for each resource topic are presented later in this section under each resource topic heading.

- *Type of Impact.* Impacts can be beneficial or adverse. Beneficial impacts would improve resource conditions while adverse impacts would deplete or negatively alter resources.

- *Duration.* The duration of the impacts in this analysis is defined as short term or long term. The duration for each resource topic is presented later in this section under each resource topic heading.

The following definitions of direct and indirect impacts are considered:

- direct – an effect that is caused by an action and occurs at the same time and place

- indirect – an effect that is caused by an action, but is later in time or farther removed in distance, but still reasonably foreseeable

Potential impacts are described in terms of context, intensity, type, duration, and impairment.

IMPACT INTENSITY

Air Quality

The 1963 Clean Air Act, as amended (42 USC 7401 *et seq.*), requires land managers to protect air quality. Section 118 of the Clean Air Act requires national parks to meet all federal, state, and local air pollution standards. *NPS Management Policies* address the need to analyze potential impacts to air quality during park planning. In order to assess the magnitude of air quality impacts under the various alternatives air quality standards governing the park were examined and compared to expected changes due to construction activities. The thresholds of change that define the impact intensities are discussed below.

Impact Intensity	Intensity Definition
Negligible	Impacts (chemical, physical or biological) would not be detectable, would be well below air quality standards or criteria, and would be within historical or desired air quality conditions.
Minor	Impacts (chemical, physical, or biological effects) would be detectable, but would be below air quality standards or criteria and within historical or desired air quality conditions.
Moderate	Impacts (chemical, physical, or biological effects) would be detectable, but would be at or below air quality standards or criteria; however, historical baseline or air quality standards would be periodically, but not continuously, exceeded by less than 20% of the standard or historical value.
Major	Impacts (chemical, physical, or biological effects) would be detectable and would be frequently altered from the historical baseline or desired air quality conditions; and/or air quality standards or criteria would be continuously exceeded or exceeded by more than 20% of the standard or historical value.

The duration of air quality impacts is considered short term if the impacts last only during construction activities and long term if the impacts last longer than the construction period.

Soils

All available information on soils potentially impacted in various areas of the park was compiled. Predictions about short- and long-term site impacts were based on previous projects with similar soils and recent studies. The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Intensity Definition
Negligible	Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Soil erosion potential would be nonexistent or very low. Any effects to soils would be slight and within the project area. The area of impacted soils would make up less than 5% of the total project area.
Minor	The effects to soils would be detectable. Effects to soil area, including potential erosion, would be small and localized and within the project area. The area of impacted soils would make up between 5% and 25% of the total project area. Mitigation may be needed to offset adverse effects and would be relatively simple to implement and likely be successful.
Moderate	The effect on soils would be readily apparent and result in a change to the soil character over a relatively wide area both within and outside of the project area. The area of impacted soils would be between 25% and 50% of the total project area, including the soils impacted outside of the project area. Erosion could readily occur and would result in soil loss, but could be mitigated. Mitigation measures would be necessary to offset adverse effects and likely be successful.
Major	The effect on soils would be readily apparent and substantially change the character of the soils over a large area both within and outside of the project area. The area of impacted soils would be more than 50% of the total project area, including the soils impacted outside of the project area. Significant erosion could occur. Mitigation measures to offset adverse effects would be needed, extensive, and their success could not be guaranteed.

Soil impacts would be considered short term if the soils recover in less than 3 years and long term if the recovery takes longer than 3 years.

Vegetation

All available information on vegetation and vegetation communities potentially impacted in the park project area was compiled. Predictions about short- and long-term site impacts were based on previous projects with similar vegetation and recent studies. The thresholds of change for the intensity of an impact to vegetation are defined as follows:

Impact Intensity	Intensity Definition
Negligible	No native vegetation would be affected or some individual native plants could be affected as a result of the alternative, but there would be no effect on native species populations. The effects would be within the project area.
Minor	The alternative would affect some individual native plants and would also affect a relatively limited portion of that species' population making up less than 10% of the species population for the project area. Effects would be localized to the project area. Mitigation to offset adverse effects could be required and would be effective.
Moderate	The alternative would affect some individual native plants and would also affect a sizeable segment of the species' population over a relatively large area, making up between 10% and 30% of the species population for the project area. Mitigation to offset adverse effects could be extensive, but would likely be successful.
Major	The alternative would have a considerable effect on native plant populations and affect plants both in and out of the project area. Impacts would affect more than 30% of the population in the project area. Mitigation measures to offset the adverse effects would be required, extensive, and success of mitigation measures would not be guaranteed.

Duration of vegetation impacts is considered short term if the vegetation recovers in less than 3 years and long term if the vegetation takes longer than 3 years to recover.

Wildlife

The National Park Service Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native wildlife should be protected and perpetuated as part of the park's natural ecosystem. Natural processes are relied on to control populations of native species to the greatest extent possible; otherwise, they are protected from harvest, harassment, or harm by human activities. According to *NPS Management Policies* 2001, the restoration of native species is a high priority (sec. 4.1). Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems including natural abundance, diversity, and the ecological integrity of plants and animals. Information on Joshua Tree National Park wildlife was taken from park documents and records. The Joshua Tree National Park natural resource management staff, and the U.S. Fish and Wildlife Service also provided wildlife information. The thresholds of change for the intensity of an impact to wildlife are defined as follows:

Impact Intensity	Intensity Definition
Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
Minor	Impacts would be detectable, but they would not be expected to be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Breeding animals of concern are present; animals are present during particularly vulnerable life-stages such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

The duration of wildlife impacts is considered short term if the recovery is less than 1 year and long term if the recovery is longer than 1 year.

Special-Status Species

The Endangered Species Act (16 USC 1531 *et seq.*) mandates that all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the National Park Service determines that an action may affect a federally listed species, consultation with the U.S. Fish and Wildlife Service is required to ensure that the action will

not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat. *NPS Management Policies* 2001 state that potential effects of agency actions will also be considered on state or locally listed species. The National Park Service is required to control access to critical habitat of such species, and to perpetuate the natural distribution and abundance of these species and the ecosystems upon which they depend. The U.S. Fish and Wildlife Service was contacted for a list of special-status species and designated critical habitats that may be within the project area or affected by any of the alternatives. Information on possible threatened, endangered, candidate species, and species of special concern was gathered from published sources. Information from prior research at Joshua Tree National Park was also incorporated. Known impacts caused by development and human use were also considered. The thresholds of change for the intensity of an impact to special-status species are defined as follows:

Impact Intensity	Intensity Definition
Negligible	The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence and would be well within natural variability. This impact intensity equates to a U.S. Fish and Wildlife Service "no affect or may affect, not likely to adversely affect" determination.
Minor	The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable, but small and localized and not outside the range of natural variability. Mitigation measures, if needed to offset the adverse effects, would be simple and successful. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, not likely to adversely affect" or may affect, likely to adversely affect determination.
Moderate	Impacts on special-status species, their habitats, or the natural processes sustaining them would be detectable and occur over a large area. Breeding animals of concern are present; animals are present during particularly vulnerable life-stages such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, likely to adversely affect" determination.
Major	The action would result in a noticeable effect to viability of a population or individuals of a species or resource or designated critical habitat. Impacts on a special-status species, critical habitat, or the natural processes sustaining them would be detectable, both in and out of the park. Loss of habitat might affect the viability of at least some special-status species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. This impact intensity equates to a U.S. Fish and Wildlife Service "may affect, likely to jeopardize the continued existence of a species or adversely modify critical habitat for a species" determination.

Special-status species' impacts are considered short term if the species recovers in less than 1 year and long term if it takes longer than 1 year for the species to recover.

Archeological Resources

For purposes of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based on the potential of the site(s) to yield information important in

prehistory or history, as well as the probable historic context of the affected site(s). Definitions of intensity levels are as follows:

Impact Intensity	Impact Type	Intensity Description
Negligible	Adverse or Beneficial	Impact is at the lowest levels of detection with neither adverse or beneficial consequences. The determination of effect for section 106 would be *no adverse effect.*
Minor	Adverse	Disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for section 106 would be *no adverse effect.*
	Beneficial	Maintenance and preservation of a site(s). The determination of effect for section 106 would be no *adverse effect.*
Moderate	Adverse	Disturbance of a site(s) results in loss of integrity. The determination of effect for section 106 would be *adverse effect.* A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memorandum of agreement to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
	Beneficial	Stabilization of a site(s). The determination of effect for section 106 would be no *adverse effect.*
Major	Adverse	Disturbance of a site(s) results in loss of integrity. The determination of effect for section 106 would be *adverse effect.* Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or advisory council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).
	Beneficial	Active intervention to preserve a site(s). The determination of effect for section 106 would be *no adverse effect.*

Archeological resources are not considered short or long term because once the resource is impacted the integrity is irreversibly damaged and would not recover.

Visual Resources

The National Park Service strives to preserve and protect visual resources to ensure a quality visitor experience. Visual resources include the sweeping landscape views for which many parks are distinguished and visual intrusions onto the more ordinary views as one drives through a park by buildings, structures, and other features. Visual intrusions were evaluated for Keys View Road before and after construction to determine potential visual impacts. Impact intensities are discussed below.

Impact Intensity	Intensity Definition
Negligible	The visual quality of the landscape would not be affected or the effects would be at or below the level of detection and the changes would not be of any measurable or perceptible consequence to the visitor experience.
Minor	Effects to the visual quality of the landscape would be detectable, although the effects would be of little consequence to the visitor experience. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate	Effects to the visual quality of the landscape would be readily detectable and confined to the project area, with potential consequences at the regional level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Effects to the visual quality of the landscape would be obvious and would have substantial consequences to the visitor experience in the region. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

The duration of impacts to visual resources is considered short term if the impact occurs only during the construction period and long term if the impact continues after the construction is completed.

Visitor Use and Experience

National Park Service Management Policies 2001 state that the enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the National Park Service is committed to providing appropriate, high-quality opportunities for people to enjoy the parks.

Part of the purpose of Joshua Tree National Park is to offer opportunities for recreation, education, inspiration, and enjoyment. Consequently, one of the park's management goals is to ensure that visitors safely enjoy and are satisfied with the availability, accessibility, diversity, and quality of park facilities, services, and appropriate recreational opportunities.

Public scoping input and observation of visitation patterns, combined with an assessment of what is available to visitors under current management, were used to estimate the effects of the actions in the various alternatives of this document. The impact on the ability of the visitor to experience a full range of Joshua Tree National Park resources was analyzed by examining resources and objectives presented in the park significance statement. The potential for change in visitor use and experience proposed by the alternatives was evaluated by identifying projected increases or decreases in use of Keys View Road and other visitor uses, and determining how these projected changes would affect the desired visitor experience, and to what degree and for how long. The thresholds of change for the intensity of an impact to visitor experience are defined as follows:

Impact Intensity	Intensity Definition
Negligible	The visitor would not be affected or changes in visitor use and/or experience would be below or at the level of detection. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Changes in visitor use and/or experience would be detectable, although the changes would be slight. Some of the visitors would be aware of the effects associated with the alternative, but the effects would not be noticeable by most visitors.
Moderate	Changes in visitor use and/or experience would be readily apparent to most of the visitors. Visitors would be aware of the effects associated with the alternative and might express an opinion about the changes.

Major	Changes in visitor use and/or experience would be readily apparent to all visitors, severely adverse or exceptionally beneficial. Visitors would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

Impacts to visitor use and experience are considered short term if the effects last only as long as the construction period. Impacts are considered long term if the effects last longer than the construction period.

Health and Safety

The impact assessment for health and safety focuses on the number of potential individuals impacted and the severity of the impact. The thresholds of change for the intensity of an impact are defined as follows:

Impact Intensity	Intensity Definition
Negligible	Health and safety would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect on visitor or employee health and safety.
Minor	The effect would be detectable, but would not have an appreciable effect on health and safety. If mitigation were needed, it would be relatively simple and would likely be successful.
Moderate	The effects would be readily apparent and would result in substantial, noticeable effects to health and safety on a local scale. Mitigation measures would probably be necessary and would likely be successful.
Major	The effects would be readily apparent and would result in substantial, noticeable effects to health and safety on a regional scale. Extensive mitigation measures would be needed, and their success would not be guaranteed.

The effects to safety are considered short term if the effects last for the period of construction and long term if the effects last beyond the period of construction.

CUMULATIVE EFFECTS

Cumulative effects are the impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such action. Cumulative effects can result from individually minor, but collectively major, actions taking place over a period of time.

Council on Environmental Quality regulations, which implement NEPA, require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7).

Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion analysis.

Projects that Make Up the Cumulative Impact Scenario

To determine potential cumulative impacts, projects in the area surrounding Joshua Tree National Park were identified. The area included Joshua Tree National Park and nearby lands administered by federal, state, local, and private entities. Projects were determined by meetings and telephone calls with county and town governments and state land managers. Potential projects identified as cumulative actions included any planning or development activity that was currently being implemented or that would be implemented in the reasonably foreseeable future.

These cumulative actions are evaluated in the cumulative impact analysis in conjunction with the impacts of each alternative to determine if they would have any additive effects on a particular natural resource, cultural resource, visitor use, or the socioeconomic environment. Because some of these cumulative actions are in the early planning stages, the evaluation of cumulative effects was based on a general description of the project.

Past Actions

The following past actions could contribute to cumulative effects:

- The park recently completed replacement of 139 older pit toilet facilities with 75 new restroom facilities throughout the park.
- In 2003, reconstruction similar to that proposed for Keys View Road was completed for Route 12 (Park Boulevard) from the intersection with Keys View Road to Geology Tour Road.

Current and Future Actions

Current actions and those projected for the future could also contribute to cumulative effects. These include:

- controlled burns on the Covington Flats area of the park (west side of the park)
- development of approximately 140 wayside exhibits in accordance with the wayside exhibit plan, mostly along trailheads and roadways
- replacement of many headquarters buildings with newer buildings
- repaving of Pinto Basin Road from Gold Point to Cottonwood Visitors Center
- repair to flooding damage on sections of Pinto Basin Road
- increased development pressures for private lands outside the park boundary

IMPAIRMENT OF JOSHUA TREE NATIONAL PARK RESOURCES OR VALUES

In addition to determining the environmental consequences of the preferred and other alternatives, the 2001 *NPS Management Policies* and Director's Order – 12, require analysis of potential effects to determine if actions would impair Joshua Tree National Park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park and monument resources and values. However, the laws do give National Park Service management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given National Park Service management discretion to allow certain impacts within parks, that discretion is limited by statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. However, an impact would more likely constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park
- identified as a goal in the Joshua Tree National Park *General Management Plan* or other relevant National Park Service planning documents

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. In this "Environmental Consequences" section, a determination on impairment is made in the conclusion statement of the appropriate impact topics for each alternative. The National Park Service does not analyze visitor use and experience (unless impacts are resource-based), or health and safety for impairment.

IMPACTS TO CULTURAL RESOURCES AND SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

In this environmental assessment / assessment of effect, impacts to cultural resources are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and section 106 of the National Historic Preservation Act. In accordance with the Advisory Council on Historic Preservation's regulations implementing section 106 of the

National Historic Preservation Act (36 CFR Part 800, *Protection of Historic Properties*), impacts to archeological and cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed in or eligible to be listed in the NRHP; (3) applying the criteria of adverse effect to affected cultural resources, either listed in or eligible to be listed in the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected NRHP eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP, e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the NRHP.

Council on Environmental Quality regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order – 12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect, as defined by section 106, is similarly reduced. Although adverse effects under section 106 may be mitigated, the effect remains adverse.

A section 106 summary is included in the impact analysis sections for archeological resources under the preferred alternative. The section 106 summary is intended to meet the requirements of section 106, and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based on the criterion of adverse effect found in the Advisory Council's regulations.

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE A: NO ACTION

Air Quality

No major construction would be undertaken in the no-action alternative; therefore, no new emissions from vehicles or fugitive dust would occur. Automobile emissions from existing vehicle travel on park roads contribute only minor amounts of pollutants to the air quality of the park (NPS 1995). The primary air quality impacts come from sources outside of the park. The existing impacts from park activities would continue to be negligible and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future construction development projects within the park and the surrounding region would contribute to air quality

emissions during the period that the construction was being completed. Impacts from construction activities would likely be within historic values or air quality standards and would represent negligible to minor impacts to air quality in the area of construction with undetectable impacts away from the area of construction. The controlled burns at the Covington Flats area would also result in increased air emissions during the period that the burns were occurring. Such burning could increase the air quality so that standards or historic values would be exceeded periodically, resulting in the potential for moderate, adverse impacts to air quality during the burns. The overall cumulative impacts on air quality would be short term, negligible to moderate, and adverse. The no-action alternative would provide only negligible contributions to the overall cumulative air quality impacts in the short and long term.

Conclusion. No new impacts to air quality would occur from the no-action alternative. The existing condition would constitute short- and long-term, negligible impacts to air quality. The overall cumulative impacts on air quality would be short term, negligible to moderate, and adverse. The no-action alternative would provide only negligible contributions to the overall cumulative air quality impacts in the short and long term.

Impairment of Park Resources and Values. Because the no-action alternative would not result in major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of air quality.

Soils

No action would be taken in this alternative; therefore, there would be no new impacts to soils. The existing conditions allow for vehicles to easily leave the roadway creating informal parking areas. Such informal parking disturbs and compacts native soils along the roadway. In addition, social trails have been created from the informal turnouts compacting native soils along the trails. The estimated area of the informal turnouts is 2.81 acres and the estimated area of the social trails is 1.83 acres. The soils impacts are localized to these informal parking areas and social trails occurring along the length of the roadway. The area of roadway disturbance, not including the informal turnouts and social trails, is approximately 13.6 acres. The informal turnouts and social trails increase the disturbance area by 34%. Based on the intensity definitions, this represents a short- and long-term, moderate, adverse impact to soils in the vicinity of the roadway.

Cumulative Impacts. Past, present, and reasonably foreseeable future construction development projects within the park and the surrounding region would contribute to increased soil erosion and compaction. Past, present, and reasonably foreseeable future projects with the potential to affect soils include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer

buildings and the private lands outside the park are being subjected to increased development. Ground disturbance associated with construction activities such as regrading and resurfacing roads, shoulder reconstruction, culvert replacements / extensions, pipeline installation, and facility improvement / construction, would have localized effects, but the soil character over a large area would not change. The cumulative impacts on regional soils would be short and long term, minor, and adverse. The no-action alternative would contribute short- and long-term, moderate, adverse impacts on a local basis and the overall regional impacts to soils would be continue to be short and long term, minor, and adverse.

Conclusion. No new impacts to soils would occur from the no-action alternative. The existing condition would constitute short- and long-term, moderate, adverse impacts to soils in the vicinity of the roadway from informal turnouts and social trails. Cumulative regional impacts, including the no-action alternative, would be short and long term, minor, and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of soils.

Vegetation

The existing roadside vegetation is affected by the ability of motorists to turn off the road to create informal parking areas and the social trailing that occurs from the informal parking areas. Vegetation is trampled, crushed, and could be destroyed by repeated use. Individual native plants are impacted, but large numbers of the population are likely not affected. A total of 4.64 acres of vegetation is impacted by existing informal turnouts and social trails. The typical distance for the social trails is less than 1,000 feet from the roadway. Individual plants would be destroyed, but less than 10% of the plant population in the area of social trails is impacted. The existing conditions constitute short- and long-term, minor, adverse impacts to vegetation.

Cumulative Impacts. Past, present, and reasonably foreseeable future construction development projects within the park and the surrounding region would contribute to temporary and permanent vegetation loss. Past, present, and reasonably foreseeable future projects with the potential to affect vegetation include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings and the private lands outside the park are being subjected to increased development. Once construction is completed, projects within the park would have a revegetation component, which would reestablish native vegetation. Development outside the park may not include revegetation using native species. The cumulative effects of these actions

are short and long term, minor, and adverse since the activities would affect individual plants and a limited portion of the population as a whole.

The no-action alternative would contribute short- and long-term, minor, adverse impacts to vegetation. The overall cumulative impacts from past, present, and reasonably foreseeable future impacts, in combination with the no-action alternative, would be short and long term, minor, and adverse.

Conclusion. The existing conditions constitute short- and long-term, minor, adverse impacts to vegetation from informal turnouts and social trails. The overall cumulative impacts from past, present, and reasonably foreseeable future impacts, in combination with the no-action alternative, would be short and long term, minor, and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of vegetation.

Wildlife

No action would be taken in this alternative; therefore, there would be no new impacts to wildlife. Small mammals would continue to be attracted to road edge habitat. The vegetation is thicker closer to the roadway in certain areas due to increased water availability from roadside runoff. The use of this roadside habitat by small mammals increases the likelihood of road crossing and increased injury or death by vehicles and exposure to predators through lack of cover on the road surface. Such injury or death would be well within the natural fluctuations of the species and would not affect the viability of any species. The existing conditions would constitute a long-term, negligible, adverse impact to wildlife.

Cumulative Impacts. Generally, past, present, and reasonably foreseeable future construction and development projects within the park and the surrounding region would contribute to habitat loss affecting the abundance and diversity of wildlife by changing the capacity of habitat to provide necessary food, shelter, and reproduction sites. Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings and the private lands outside the park are being subjected to increased development. Once construction is completed, projects within the park would have a revegetation component, which would reestablish native habitat over the long term. Development outside the park may not include native habitat restoration. The cumulative impacts to wildlife would be detectable, but within the natural range of variability and would be short and long term, minor, and adverse.

The no-action alternative would provide negligible contributions to cumulative impacts to wildlife. Overall cumulative impacts from past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would be short and long term, minor, and adverse.

Conclusion. There would be no new impacts to wildlife. The existing conditions constitute a long-term, negligible, adverse impact to wildlife. Overall cumulative impacts from past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would be short and long term, minor, and adverse. The no-action alternative would provide negligible contributions to cumulative impacts to wildlife.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of wildlife.

Threatened, Endangered, and Special-Status Species

No action would be taken in this alternative; therefore, there would be no new impacts to special-status species. There is a negligible potential for traffic to provide an impact on species crossing the road through injury or death. In addition, as with general wildlife, special-status species would be vulnerable to attack by predators during any road crossings. The impacts would be long term, negligible, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect special-status species include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings and the private lands outside the park are being subjected to increased development. As with the general wildlife discussion above, these cumulative actions would have the potential to temporarily disrupt native habitats, affecting the abundance and diversity of wildlife by changing the capacity of habitats to provide necessary food, shelter, and reproduction sites. Once construction is completed, projects within the park would have a revegetation component that would reestablish native habitat over the long term. Development outside the park may not include native habitat restoration. The cumulative impacts to special-status species could result in detectable changes to special-status species, but such changes would be small and localized. Cumulative effects would be short and long term, minor, and adverse.

The no-action alternative would provide negligible contributions to cumulative impacts in the long term. Overall cumulative impacts would be short and long term, minor, and adverse.

Conclusion. The impacts to special-status species from the no-action alternative would be long term, negligible, and adverse. The no-action alternative would provide negligible contributions to cumulative impacts in the long term. Overall cumulative impacts would be short and long term, minor, and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of threatened, endangered, and special-status species.

Archeological Resources

As no action would be taken in this alternative, construction would not occur; therefore, the informal turnouts would remain and archeological sites would continue to be inadvertently disturbed by activities (hiking, picnicking, site-seeing) associated with the turnouts along the road. The only known potentially eligible sites are the "John Lang" gravesite, which is actively interpreted by the National Park Service, and site CA-RIV-6731, which is near the road corridor.

Impacts to archeological sites would be negligible to minor, and adverse. Archeological resources are not considered short or long term because once the resource is impacted the integrity is irreversibly damaged and would not recover.

Cumulative Impacts. Archeological resources are subject to damage from a variety of natural events and human activities. Development, park maintenance, vandalism, theft, traditional visitor use, and natural processes all pose a threat to resources. It would be expected that past development in the surrounding region has damaged archeological resources. Past, present, and reasonably foreseeable future projects with the potential to affect archeological resources include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park; the current rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection, controlled burns on the Covington Flats area of the park, and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings. Ground disturbance associated with construction activities would generally occur in previously disturbed areas. Greater impacts would be mitigated through management practices, project design, and consultation, as applicable. Visitors may also inadvertently disturb archeological sites near the road and in other areas of the park through trampling, artifact collection, and other recreational activities. The cumulative impact of these past, present, and reasonably foreseeable future actions would be minor to moderate and adverse, depending on the integrity and significance of the resource.

The no-action alternative would contribute negligible to minor, adverse impacts to cumulative impacts. Overall, cumulative impacts would remain minor to moderate and adverse.

Conclusion. No action would be taken in this alternative; therefore, impacts to archeological resources would remain negligible to minor and adverse from disturbance related to visitor activities. Cumulative impacts would be minor to moderate and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of archeological resources.

Visual Resources

The Keys View Road is one of the most scenic drives in Joshua Tree National Park. Under the no-action alternative, visual resources would not be disrupted and there would be no impacts to visual resources.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to impact visual resources include the replacement of 139 pit toilet facilities with 75 new restroom facilities, reconstruction of Route 12 from the intersection with Keys View Road to Geology Tour Road, construction development projects within the park and the surrounding region, and development of wayside exhibits. These projects could create adverse impacts, changing the view within the park by constructing objects that intrude on the scenery such as the replacement toilets, curbing along Route 12, and wayside exhibits. Removal of the existing pit toilet facilities would have a beneficial impact on visual resources. Development projects in areas surrounding the park could also have an adverse impact on the overall regional viewscape in the park. The overall visual impacts from these past, present, and reasonably foreseeable future actions would be long term, minor, and adverse, since there would be little consequence to the overall visitor experience. The no-action alternative would not contribute to the overall visual impacts.

Conclusion. There would be no impacts to visual resources under the no-action alternative. The overall visual impacts from past, present, and reasonably foreseeable future actions would be long term, minor, and adverse. The no-action alternative would not contribute to the overall visual impacts.

Impairment of Park Resources and Values. Because the no-action alternative would not result in major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of visual resources.

Visitor Experience

Visitors that travel Keys View Road experience deteriorated road conditions, narrow travel lanes, lack of shoulders, and lack of adequate parking at turnouts. Because of these conditions, visitors must pay close attention to the road surface rather than enjoying the beauty of the scenic drive. The lack of curbing allows drivers to pull off and create informal parking areas, destroying native vegetation and compacting soil. In addition, some drivers may only partially leave the road, creating obstacles to moving traffic that could cause inattentive drivers to lose control and drive off the road onto the soft shoulder. Visitors driving large vehicles such as RVs can access Keys View Overlook, however, the narrow roadway condition may force oncoming vehicles off the side of the road. Under the no-action alternative, cracking of the deteriorated road surface would be remedied by ongoing patching, while other road and parking conditions would continue. The existing condition would constitute a short- and long-term, minor to moderate, adverse impact to visitor experience driving Keys View Road.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect visitor experience include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Development outside the park and replacement of park buildings would not be expected to affect visitor use and experience of the park. The short-term effects to visitor use and experience would be related to construction noise, the presence of construction equipment, and construction-related traffic delays or facility closures. Since the cumulative projects are spread throughout the park area and would not occur at the same time, these impacts would be noticeable to some visitors. These activities would have short-term, minor, adverse impacts on visitor experience for the duration of construction activities.

However, improvements associated with each of these projects (e.g., rehabilitated road surfaces, improved accessibility and parking, improved infrastructure, and new or rehabilitated facilities) would improve the overall visitor use and experience throughout the park, and the improvements would be apparent to some visitors. The improvements would have long-term, minor, beneficial effects on visitor experience.

The no-action alternative would provide minor to moderate, adverse contributions to cumulative effects in the short and long term. The overall cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short-term, minor, adverse impacts on visitor experience, and long-term, minor, beneficial impacts.

Conclusion. The existing condition would constitute a short- and long-term, minor to moderate, adverse impact to visitor experience. The overall cumulative effects of past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would have short-term, minor, adverse impacts on visitor experience, and long-term, minor, beneficial impacts.

Health and Safety

The no-action alternative would leave the road in its present condition with many vertical and horizontal curves, deteriorated curbs and sidewalks, thin and inadequate pavement, and the lack of adequate turnouts at popular trails and climbing areas resulting in visitors parking along the soft shoulder. The existing conditions could cause vehicle collisions as a result of driving too fast for the narrow road width; vehicles involved in accidents as a result of the improperly banked curves in the road; and drivers losing control of their vehicles when they drop onto the soft shoulders. Accident rates would be expected to remain at about the same levels as the current accident rates of two to three per year. There would be no change to existing health and safety impacts from implementing the no-action alternative; however, the existing condition of the road creates a detectable, but not appreciable, effect on health and safety and constitutes a short- and long-term, minor, adverse impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect health and safety include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Construction related to these projects could have a short-term, negligible, adverse impact to health and safety assuming that appropriate employee training, warning signs for visitors, and other mitigation measures are implemented. Long-term reconstruction associated with these projects would have long-term, minor, beneficial effects on health and safety. The no-action alternative would provide minor, adverse contributions to cumulative effects in the short and long term. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would result in short-term negligible to minor, adverse impacts to health and safety, and long-term, negligible to minor, beneficial impacts.

Conclusion. There would be no change to existing health and safety impacts from implementing the no-action alternative; however, the existing condition of the road creates a detectable, but not appreciable effect on health and safety and constitutes a short- and long-term, minor, adverse impact. The cumulative effects of the past, present, and reasonably foreseeable future actions, in conjunction with the no-action alternative, would result in short-term, negligible to minor, adverse impacts to health and safety and long-term, negligible to minor, beneficial impacts.

ENVIRONMENTAL CONSEQUENCES—ALTERNATIVE B: PREFERRED ALTERNATIVE

Air Quality

Under the preferred alternative, construction activities would occur over the period of approximately 6 months. During that period, local air quality would be affected by construction vehicle emissions as well as fugitive dust from exposed soils. Hauling material

and operating equipment during the construction period would result in increased vehicle exhaust and emissions. Based on typical air flow patterns, hydrocarbons, nitrogen oxide, and sulfur dioxide emissions would be dissipated. Fugitive dust plumes from construction equipment would intermittently increase airborne particulates in the area near the project side, but loading rates are not expected to be considerable. If fugitive dust becomes a problem due to dry weather, the site would be subjected to periodic water sprinkling or use of a dust palliative to reduce airborne particulates.

The preferred alternative would not increase the capacity of Keys View Road, thus, no long-term change in traffic volumes, or resultant vehicle emissions would be expected.

Overall, there would be slight and temporary degradation of local air quality due to dust generated from construction activities and emissions from construction equipment. These impacts would be limited in area and would not affect the overall air quality. The primary and overriding air quality impacts would continue to come from sources outside the park. Air quality impacts from construction-related emissions would be short term, negligible, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future construction development projects within the park and the surrounding region would contribute to air quality emissions during the period that the construction was being completed. Impacts from construction activities would likely be within historic values or air quality standards and would represent negligible to minor impacts to air quality in the area of construction with undetectable impacts away from the area of construction. The controlled burns at the Covington Flats area would also result in increased air emissions during the period that the burns were occurring. Such burning could impact the air quality so that standards or historic values would be exceeded periodically, resulting in the potential for moderate, adverse impacts to air quality during the burns. The overall cumulative impacts on air quality would be short term, negligible to moderate, and adverse. The preferred alternative would provide only negligible contributions to the overall cumulative air quality impacts in the short term.

Conclusion. Air quality impacts from construction-related emissions would be short term, negligible, and adverse. The overall cumulative impacts on air quality would be short term, negligible to moderate, and adverse. The no-action alternative would provide only negligible, short-term contributions to the overall cumulative air quality impacts.

Impairment of Park Resources and Values. Because the preferred alternative would not result in major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of air quality.

Soils

The implementation of the preferred alternative would result in the disturbance of 5.0 acres of previously undisturbed soil. This disturbance includes any work (paving, shoulder support,

cut/fill slopes, ditches) that extends beyond the existing road edge and the roadside berms for Keys View Road reconstruction. The chip sealing, fog sealing, slurry sealing, and striping activities would take place within the existing road prism and would not create disturbances to soils.

Approximately 0.37 acre of previously disturbed soil would be revegetated. Restoration and revegetation efforts would reduce scarring and loss of soil through erosion. Natural soil processes would be restored only over the long term, as soil structure slowly returns to a more natural condition in this desert environment.

No blasting activities should be required; however, some trampling and soil compaction by equipment and workers within the construction zone is expected. Soils occupying much of the construction zone have been previously disturbed by road-related activities. Local soil compaction would temporarily decrease permeability, alter soil moisture content, and diminish the water storage capacity of these generally xeric soils. Surface disturbance to desert soils would also increase susceptibility to erosion during precipitation events. Activities associated with the construction activities associated with the preferred alternative impacting soils would be detectable, but small and localized, and would have short-term, minor, adverse impacts on desert soils. In the long term, soil impacts would be at or below the level of detection and would be negligible and adverse.

The concentration of social trailing at designated turnouts, as well as the potential for an increase in horseback riding at the improved Juniper Flats parking area, could create additional soil compaction. Use of the existing network of social trails would likely cease when the new curbing blocks use of the informal turnouts. The existing social trails and turnouts represent approximately 4.64 acres of disturbance, with 1.83 disturbed acres a result of social trails and 2.81 disturbed acres a result of informal turnouts. While it is difficult to predict an exact acreage for future social trails at the designated turnouts along the reconstructed Keys View Road, it is reasonable to assume that total turnout acreage would be revegetated over time and social trailing would be somewhat reduced (since the number of turnouts would be reduced). The reduction in social trails would be offset by an expected increase in informal horse trails at Juniper Flats. Overall, it is expected that affected acreage would remain the same as the existing 1.83 acres.

The total short-term disturbed acreage is 5.0 acres of previously undisturbed soils. Based on the impact intensity definitions, this constitutes a short-term, moderate, adverse impact to soils.

In the long term, upon completion of the roadway, approximately 0.37 acre of previously disturbed soils would be reclaimed. Although social trailing would likely discontinue at the informal turnouts, new social trailing would occur at the new turnouts. The overall adverse impacts to soils would continue to be long term, moderate, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future construction development projects within the park and the surrounding region would contribute to increased soil erosion and compaction. Past, present, and reasonably foreseeable future projects with the potential to affect soils include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap

Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings, and the private lands outside the park are being subjected to increased development. Ground disturbance associated with construction activities such as re-grading and resurfacing roads, shoulder reconstruction, culvert replacements / extensions, pipeline installation, and facility improvement / construction, would have localized effects, but the soil character over a large area would not change. The cumulative impacts on soils would be short and long term, negligible to minor, and adverse.

The preferred alternative would have moderate, adverse contributions to the cumulative impacts on soils in the local area. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have long-term, negligible to minor, adverse impacts on soils.

Conclusion. The overall adverse impacts to soils would be short and long term, minor, and adverse. The cumulative effects of these cumulative actions, in conjunction with the preferred alternative, would have long-term, negligible to minor, adverse impacts on soils.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of soils.

Vegetation

The total road reconstruction would result in 5.0 acres of new disturbance to accommodate parking, curve realignment, and road widening. This disturbance is within or near the existing road corridor or in current areas of high visitor activity and informal turnouts. It is anticipated that about 0.37 acre of existing disturbance would be eventually revegetated for the Keys View Road reconstruction. The chip sealing, fog sealing, slurry sealing, and striping activities would take place within the existing road prism and would not create disturbances to vegetation.

Road edge vegetation is enhanced by extra moisture from road run-off. Species like fourwing saltbush and burro bush responded well to this moisture regime and created very dense habitat for small mammals, birds, etc. This would be largely lost to construction, as proposed. The new template with tall curbs would preclude the availability of run-off water to roadside vegetation, except where it is released to drainages. This would likely reduce the density of vegetation immediately adjacent to the road. The curbing would, however, minimize the amount of informal parking and social trails that now exist along the length of Keys View Road, thereby reducing disturbance to biotic communities, and would concentrate the social trailing in parking and turnout areas.

Approximately 10 to 15 California junipers would be removed to accommodate a wider road template. Additional junipers may require pruning to make room for the road work. No replacement or transplanting of these trees is planned due to the difficulties in establishing transplanted junipers and the natural reseeding that is likely to occur over time. Pruned trees would undergo stress and that they may not survive; additionally, less water would be available to roadside junipers following construction of the curbing, potentially causing further loss.

Approximately 100 to 110 Joshua trees would be removed to accommodate the wider road. Joshua trees would be carefully removed, stored, and transplanted as much as possible in order to avoid destruction of the trees. It is anticipated that up to 80% of the removed Joshua trees would be transplanted along the road upon completion of construction. Transplanted trees would undergo stress and may not survive; additionally, less water would be available in most areas from roadside runoff following construction of the curbing, potentially causing further loss.

Road work in other areas has increased the presence of non-native species in the regraded and reclaimed areas. These non-native species include Tournefort's mustard, Russian thistle, and tall tumblemustard. Mitigation measures discussed for control of non-native species would limit the potential for their continued existence and spread, but these measures would need to be implemented with monitoring to ensure success.

Overall, if the preferred alternative were to be implemented, plants would be affected along the length of the roadway due to drainage changes. Most impacted Joshua trees would be transplanted, although some impacts to the overall numbers of trees along the road corridor would occur. A limited number of California junipers along the road corridor would also be impacted. Impacts to the overall populations of Joshua trees and California junipers would be minimal. The estimated effects to the project area vegetation in the short term during construction would occur to 10% to 30% of the overall plant population indicating moderate, adverse impacts. Over the long term, vegetation would be re-established on 0.37 acre of previously disturbed area and old social trails would revegetate naturally; however, some new social trails would be created. Roadside vegetation would be reduced due to the reduction in run-off from the road surface, however, such reduction would be a return to more natural conditions along much of the roadside where past run-off has encouraged an unnaturally dense stand of vegetation. Less than 10% of the vegetation would be affected and the long-term impacts from the preferred alternative would be minor and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future construction development projects within the park and the surrounding region would contribute to temporary and permanent vegetation loss. Past, present, and reasonably foreseeable future projects with the potential to affect vegetation include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings and the private lands outside the park are being subjected to increased development. Once construction is completed, projects within the park would have a revegetation component that would reestablish native vegetation. Development outside the park may

not include revegetation using native species. The cumulative effects of these actions are short and long term, minor, and adverse since the activities would affect individual plants and a limited portion of the population as a whole.

The preferred alternative would contribute short-term, moderate, and long-term, minor, adverse impacts to vegetation. Overall cumulative impacts, including the preferred alternative, would be short and long term, minor, and adverse.

Conclusion. The estimated effects to project area vegetation in the short term during construction would occur to 10% to 30% of the overall plant populations indicating moderate, adverse impacts. In the long term, less than 10% of the vegetation would be affected and the long-term impacts from the preferred alternative would be minor and adverse. Overall cumulative impacts, including the preferred alternative, would be short and long term, minor, and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of vegetation.

Wildlife

The new road edge curbing along Keys View Road would prevent water runoff to roadside vegetation, except where it is released to drainages. This would likely reduce small animal habitat and presence immediately adjacent to the road in the long term. Currently, these species are attracted to the road edge, increasing the likelihood of injury or death by motorists and exposure to predators through lack of cover on the road surface.

During construction, larger wildlife would likely avoid the construction zone. Some small animals such as rodents may be killed or forced to relocate to areas outside the construction zone. Overall, populations of affected species might be slightly and temporarily reduced. The chip sealing process would potentially affect wildlife for the period of time that construction equipment was in the area and while the pavement was sticky and not sealed with aggregate chips. Fog sealing and slurry sealing would have similar effects until the application dried; however, effects of the sealing activities would be mitigated by having a tortoise monitor present while the pavement dried.

In the long term, vegetation restoration and replacement of downed trees and rock piles as roadside habitat would allow some recovery of wildlife species living along the roadside. However, overall habitat would be reduced due to changes in roadside vegetation. Speeds on the roadway would also increase and the presence of curbing may prevent small animals from quickly exiting the roadway to escape oncoming traffic.

Overall, if the preferred alternative was implemented, there would be short-term and long-term, negligible to minor, adverse impacts to wildlife.

Cumulative Impacts. Generally, past, present, and reasonably foreseeable future construction and development projects within the park and the surrounding region would contribute to habitat loss affecting the abundance and diversity of wildlife by changing the capacity of habitats to provide necessary food, shelter, and reproduction sites. Past, present, and reasonably foreseeable future projects with the potential to affect wildlife include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings and the private lands outside the park are being subjected to increased development. Once construction is completed, projects within the park would have a revegetation component that would reestablish native habitat over the long term. Development outside the park may not include native habitat restoration. The cumulative impacts to wildlife would be detectable, but within the natural range of variability and would be short and long term, minor, and adverse.

The preferred alternative would contribute short- and long-term, negligible to minor, adverse impacts to the cumulative impacts to wildlife. Overall, cumulative impacts, including the preferred alternative, would remain short and long term, minor, and adverse.

Conclusion. If the preferred alternative was implemented, there would be short- and long-term, negligible to minor, adverse impacts to wildlife. Overall cumulative impacts, including the preferred alternative, would remain short and long term, minor, and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of wildlife.

Threatened, Endangered, and Special-Status Species

Threatened, endangered, and special-status species likely to occur in the project vicinity and potentially be affected by project activities under the preferred alternative include the following wildlife species: desert tortoise, flat-tailed horned lizard, desert bighorn sheep, mountain quail, Bendire's thrasher, and Le Conte's thrasher. Other threatened, endangered, and special-status wildlife species were eliminated due to the lack of suitable habitat in the project area. Plant species include spearleaf, Robinson's monardella, and Hall's tetracoccus. Plant species were eliminated or included based on the results of the December 2003 survey for the presence of these species in the project area.

The proposed project would occur in an area of the park that does not support high densities of desert tortoise. All activities would occur within a zone that, due to past and current disturbance, is considered to be low-quality habitat that is minimally inhabited.

During the Keys View Road reconstruction, some short-term, adverse effects would be anticipated from increased levels of human activity, noise, and the ground vibrations produced by vehicles and heavy equipment. Surveys would be completed prior to construction and any tortoises in the project area would be removed by a qualified biologist. A tortoise monitor would also be present during construction activities to monitor for tortoise movement into the construction area. Long-term, adverse impacts would result due to continued road use and the road widening and curve straightening that would likely increase speeds on the road. Long-term, adverse impacts may also result if social trails become established from new turnouts.

Beneficial impacts would occur over both the short and long term as a result of various erosion control measures, as well as installation of curbing and consequent reduction of informal turnouts and associated impacts (e.g., social trailing). Long-term, beneficial impacts would also result from reclamation of potential desert tortoise habitat at various sites within the project area. A biological assessment was prepared to evaluate impacts of the proposed project on desert tortoise in accordance with the Endangered Species Act (1973). A copy of the biological assessment is included as appendix E. The determination of effect in the Biological Assessment for the desert tortoise, considering potential impacts of the reconstruction project and proposed conservation measures, was *may affect, likely to adversely affect.* This determination equates to a short- and long-term, moderate, adverse impact to desert tortoises from the preferred alternative.

The flat-tailed horned lizard would experience short-term, negligible, adverse effects from increased levels of human activity, noise, and the ground vibrations produced by vehicles and heavy equipment during the road construction project. The road construction would cause any of these species living within the corridor to be temporarily displaced and could result in some loss of theses species during the road work. Overall, the short-term impacts from road construction could result in a small and localized change to the population and would be minor and adverse. In the long term, habitat restoration in the form of fallen trees and small rock piles would restore lost habitat. However, the loss of drainage from the roadside would change the vegetative character of the road edge and could provide a long-term, negligible, adverse impact to these species within the immediate vicinity of the road corridor.

The desert bighorn sheep is monitored in Joshua Tree National Park. The road project is not likely to have a large impact on the species as the sheep would likely avoid the noise and human activities associated with the construction. Short-term impacts would be negligible and adverse. Over the long term, the bighorn sheep would not be affected by the road improvements.

The mountain quail, Bendire's thrasher, and Le Conte's thrasher all are likely to occur in the project area. These species would be temporarily displaced during the construction activities and some nesting trees could be disrupted or destroyed causing a shift in nesting in those areas. These actions are likely to cause an adverse effect to individuals, but would not affect the population as a whole. The effects would be short term, negligible to minor, and adverse. Over the long term, the species would return to the area and there would be no long-term impacts.

Special-status plant species likely to occur in the project area include the spearleaf, Robison's monardella, and Hall's tetracoccus. These species could be affected by the proposed road work. Some individuals could be removed as part of the disturbance, but the population as a

whole would not be affected. The short-term impacts would be negligible and adverse. In the long term, the habitat for these species would be restored and would not preclude the establishment of these species in the future.

Overall, impacts to the desert tortoise would be short and long term, moderate and adverse. Impacts to the flat-tailed lizard would be short term, minor, and adverse, and long term, negligible, and adverse. Impacts to the desert bighorn sheep, mountain quail, Bendire's thrasher, and Le Conte's thrasher would be short term, negligible, and adverse. There would be no long-term impacts to these species. Impacts to special-status plant species would be short term, negligible, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect threatened, endangered, and species of special concern include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park, the current rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection, and controlled burns on the Covington Flats area of the park. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings. The continued development of private lands around the park and associated loss and degradation of habitat is expected to continue to adversely affect the special-status species, depending on habitat located in these areas of cumulative projects. Cumulative impacts are long term, minor to moderate, and adverse.

The preferred alternative would contribute short-term, negligible to minor, adverse effects and long-term, negligible, adverse, except the desert tortoise, which would be long-term, negligible to minor, and beneficial effects to cumulative impacts. Overall, cumulative impacts would remain long term, minor to moderate, and adverse.

Conclusion. Overall, impacts to threatened, endangered, and special-status species would be short term, minor to moderate, and adverse. Long-term impacts would be negligible to minor and beneficial for the desert tortoise, primarily through the restoration of 10.0 acres of habitat elsewhere, and long-term, negligible, adverse to no impact for other species. Cumulative effects, including the preferred alternative, would be long term, minor to moderate, and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of threatened, endangered, and species of special concern.

Archeological Resources

The proposed action includes ground disturbance and other activities that have the potential to affect archeological sites. However, the only known potentially eligible site in the area of potential effects is the "John Lang" gravesite. According to park staff, the gravesite has previously been moved and has been disturbed by vandals. In order to mitigate potential

adverse effects to the site from the proposed project, the National Park Service would have an archeologist monitoring work in the vicinity of the site to ensure the grave was not disturbed. Moreover, the grave would be marked and fenced off during construction. There is a known archeological site outside of the area of potential effect but near the Juniper Flat parking area that would require an archeological monitor during the ground disturbance and construction at the parking area. With mitigation, there would be no impact to archeological resources from construction activity, and the integrity of the archeological site within the area of potential effect would not be expected to experience a loss.

The elimination of informal turnouts could potentially benefit archeological resources because visitor entry points into the backcountry would be consolidated (as opposed to diffuse). The beneficial effects would be negligible to minor because some sites would be protected from inadvertent disturbance, thereby preserving the archeological resources.

Archeological resource impacts are not considered short or long term because once the resource is impacted, the integrity is irreversibly damaged and would not recover. In compliance with the National Historic Preservation Act, should previously unidentified archeological resources be discovered during construction, work in that location would stop until a qualified archeologist could inventory and evaluate the resource and appropriate measures could be implemented, either to avoid further resource impacts or to mitigate their loss or disturbance in consultation with the California State Historic Preservation Office. Should human remains or cultural items subject to the Native American Graves Protection and Repatriation Act be discovered, the National Park Service would follow the appropriate provisions of the act and its implementing regulations, 43 CFR Part 10.

Cumulative Impacts. Archeological resources are subject to damage from a variety of natural events and human activities. Development, park maintenance, vandalism, theft, traditional visitor use, and natural processes all pose a threat to resources. It would be expected that past development in the surrounding region has damaged archeological resources. The Juniper fire exposed and potentially damaged archeological resources in the project vicinity. Past, present, and reasonably foreseeable future projects with the potential to affect archeological resources include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park, the current rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection, controlled burns on the Covington Flats area of the park, and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Moreover, many of the headquarters buildings are in the process of being replaced with newer buildings. Ground disturbance associated with construction activities would generally occur in previously disturbed areas. Impacts would be mitigated through management practices, project design, and consultation, as applicable. Visitors may also inadvertently disturb archeological sites near the road and in other areas of the park through trampling, artifact collection, and other recreational activities. The cumulative impact of these past, present, and reasonably foreseeable future actions would be minor to moderate and adverse, depending on the integrity and significance of the resource.

The preferred alternative would contribute negligible to minor, beneficial impacts to cumulative impacts. Overall, cumulative impacts would remain minor to moderate and adverse.

Conclusion. With mitigation there would be no impact to archeological resources from construction activities and the integrity of the archeological sites within the area of potential effect would not be expected to experience a loss. There would be negligible to minor, beneficial impacts from the elimination of informal turnouts. Overall, cumulative impacts would remain minor to moderate and adverse.

Impairment of Park Resources and Values. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of archeological resources.

Section 106 Summary. Under the preferred alternative, mitigation would be effective in eliminating potential impacts to the archeological sites within the area of potential effects. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the National Park Service proposes that implementing the preferred alternative would result in a determination of *no adverse affect.*

Visual Resources

The preferred alternative would not alter the sweeping scenic viewscapes for which Keys View Road is renowned. During construction activities, views could be impacted by the presence and movement of construction equipment; however, visitors can easily move away from the active construction zones and view the scenic vistas without interference. Fugitive dust emissions from construction activities may also affect viewing by creating dust plumes; however, these emissions would be mitigated through water sprinkling during construction. Over the long term, the road reconstruction would add curbing. The curbing would not blend with the natural surroundings and would be readily visible to most visitors. The rehabilitated Route 12 leading to Keys View Road would also have curbing, so the visual intrusion created by the curbing on Keys View Road would not be new to the visitor. In addition, although the curbing would be noticed by visitors, it would have minimal effects on the overall visitor experience since the sweeping scenic vistas would be unaffected. The visual impacts from construction and the installation of curbing would be short and long term, minor, and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to impact visual resources include the replacement of 139 pit toilets with 75 new restroom facilities, reconstruction of Route 12 from the intersection with Keys View Road to Geology Tour Road, construction development projects within the park and the surrounding region, and development of wayside exhibits. These projects could create adverse impacts, to the views within the park by constructing objects that intrude on the scenery such as the replacement toilets, curbing along Route 12, and wayside exhibits. Removal of the existing pit toilets would have a beneficial impact on visual resources. Development projects in areas surrounding the park could also have an adverse impact on the overall regional viewscape. The overall visual impacts from these past, present, and reasonably foreseeable future actions would be long term, minor, and adverse, since there would be little consequence to the overall visitor experience. The preferred alternative would provide additional minor adverse impacts

to the cumulative impacts and the overall cumulative impacts would be long term, minor, and adverse.

Conclusion. The visual impacts from construction and the installation of curbing would be short and long term, minor, and adverse. The preferred alternative would provide additional minor adverse impacts to the cumulative impacts and the overall cumulative impacts would be long term, minor, and adverse.

Impairment of Park Resources and Values. Because the no-action alternative would not result in major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents, there would be no impairment of visual resources.

Visitor Experience

During construction, visitors would experience some delays and/or the inability to travel on Keys View Road due to mid-week closures. Mitigation requires, however, that the delays be limited to 30 minutes and that road closures do not occur during periods of higher visitation. Short-term impacts would be moderate and adverse in nature as most visitors would be aware of the road closures. An estimated 75% of all park visitors travel on Keys View Road.

Upon completion of the preferred alternative, the repaired road surface, wider travel lanes, improved turnouts, and better sight lines, would improve driving conditions. Although it is not anticipated that the road condition would have any impact on visitation numbers, the driving experience would be improved for visitors traveling on Keys View Road. The reconstruction would affect all visitors who use the road (an estimated 75% of park visitors); however, the reconstruction would likely be detectable to only those visitors familiar with the previous road conditions. The construction of formal turnouts to accommodate recreational use and improvements to the Juniper Flats and Keys View parking areas would benefit visitors by providing improved access to trails, popular recreational areas, interpretive exhibits, and scenic overlooks. New interpretive wayside exhibits along the road would expand opportunities for self-directed visitor education. The overall visitor experience would be improved, most visitors would be aware of the changes and respond favorably to them, resulting in a long-term, moderate, beneficial effect.

The prohibition of large vehicles such as RVs would constitute a long-term, negligible, adverse effect on visitor experience since there would be limited enforcement of the prohibition and it is expected that some RVs would continue to use the road.

Overall effects to visitor use and experience from the preferred alternative would be short term, moderate, and adverse, and long term, moderate, and beneficial.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect visitor use and experience include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route

12 near the Cap Rock intersection and the Geology Tour Road intersection, controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin, and proposed development of approximately 140 wayside exhibits, mostly along trailheads and roadways. Development outside the park and replacement of park buildings would not be expected to affect visitor use and experience in the park. The short-term effects to visitor use and experience would be related to construction noise, the presence of construction equipment, and construction-related traffic delays or facility closures. Since the cumulative projects are spread throughout the park area and would not occur at the same time, these impacts would be noticeable to some visitors. These activities would have short-term, minor, adverse impacts on visitor experience for the duration of the construction activities.

However, improvements associated with each of these projects (e.g., rehabilitated road surfaces, improved accessibility and parking, improved infrastructure, and new or rehabilitated facilities) would improve the overall visitor use and experience throughout the park, and the improvements would be apparent to some visitors. The improvements would have long-term, minor, beneficial effects on visitor experience.

The preferred alternative would have moderate, adverse contributions to cumulative effects in the short term, and long-term, moderate, beneficial effects. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short-term, minor to moderate, adverse impacts on visitor experience, and long-term, minor to moderate, beneficial impacts.

Conclusion. Overall effects to visitor use and experience from the preferred alternative would be short term, moderate, and adverse, and long term, moderate, and beneficial. The cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would have short-term, minor to moderate, adverse impacts on visitor experience, and long-term, minor to moderate, beneficial impacts.

Health and Safety

The preferred alternative would include widening of the road to 20 to 22 feet with associated widening and smoothing of the curves. The road would have a design speed of 30- to 35-miles per hour. Curbing on each side would prevent inattentive drivers from accidentally leaving the road surface and could reduce accidents. Construction of parking areas and turnouts would provide adequate parking within designated areas, eliminating informal turnouts and associated safety hazards with vehicles not pulling completely off the road. Designated turnouts would also allow slower vehicles to pull over. Large vehicles would be encouraged to not drive on Keys View Road, and the Cap Rock parking area would be enlarged to allow large vehicles the opportunity to safely turn around. These improvements would result in substantial noticeable effects to health and safety on a local scale and would constitute a long-term, moderate, beneficial impact to health and safety.

In the short term, during construction activities, workers could be subject to increased health and safety concerns that would be mitigated through proper training and following of safety procedures. Health and safety of visitors could also be subjected to increased concerns as a result of the road construction and associated construction hazards. These concerns would be

mitigated through road closures, signage, and control of traffic through the construction zone. As a result of implementation of these mitigation measures, short-term impacts to worker and visitor health and safety would be nonexistent or barely detectable and would be negligible and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future projects with the potential to affect health and safety include the recently completed replacement of 139 pit toilets with 75 new restroom facilities throughout the park and rehabilitation of Route 12 from near the Cap Rock intersection to the Geology Tour Road intersection; controlled burns on the Covington Flats area of the park, and proposed road improvements in Pinto Basin; and proposed development of approximately 140 wayside exhibits, along trailheads and roadways. Construction related to these projects could have a short-term, negligible, adverse impact to health and safety assuming that appropriate employee training, warning signs for visitors, and other mitigation measures are implemented. Long-term improvements associated with these projects would have minor, beneficial effects on health and safety. The preferred alternative would have short-term, negligible, and adverse impacts, and long-term, moderate, beneficial contributions to cumulative effects. The overall cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would be short term, negligible, and adverse, and long term, minor to moderate, and beneficial.

Conclusion. Under the preferred alternative, the reconstruction of Keys View Road and associated parking areas would constitute a long-term, moderate, beneficial effect on health and safety. As a result of implementation of mitigation measures, short-term impacts to worker and visitor health and safety as a result of construction activities would be nonexistent or barely detectable and would be negligible and adverse. The overall cumulative effects of these past, present, and reasonably foreseeable future actions, in conjunction with the preferred alternative, would be short term, negligible, and adverse, and long term, minor to moderate, and beneficial.

CONSULTATION AND COORDINATION

SCOPING

Staff of Joshua Tree National Park, the Federal Highway Administration, and resource professionals of the National Park Service, Denver Service Center, conducted internal scoping. This interdisciplinary process defined the purpose and need, identified potential actions to address the need, determined the likely issues and impact topics, and identified the relationship of the proposed action to other planning efforts at Joshua Tree National Park.

A press release initiating public scoping and describing the proposed action was issued September 19, 2003 (appendix A). Comments were solicited during a public scoping period that ended October 22, 2003. No comments were received.

The undertakings described in this document are subject to section 106 of the National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*). An extensive survey conducted in 2003, by Western Archeological and Conservation Center archeologists identified five sites within a 100-meter (328 feet) wide corridor along Keys View Road. Four of the five sites appear to be surface historical / modern trash scatters, none of which are considered NRHP eligible, while the fifth site, a historic burial known as the "John Lang" gravesite, is considered potentially eligible. The grave would be flagged and fenced during construction activities and an archeologist would be present monitoring all work in the area of the site. A copy of this environmental assessment / assessment of effect would be sent to the California State Historic Preservation Office for concurrence on the proposed project activities and historic resource protection. Should unknown archeological resources be uncovered during construction, work would be halted in the discovery area, the site secured, and Joshua Tree National Park would consult according to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990.

In accordance with section 7(c) of the Endangered Species Act of 1973, as amended (16 USC 1531 *et seq.*), it is the responsibility of the federal agency proposing the action (in this case the National Park Service) to determine whether the proposed action would adversely affect any listed species or designated critical habitat. This determination of *may affect, likely to adversely effect* is documented in the biological assessment prepared and delivered to the U.S. Fish and Wildlife Service on March 23, 2004.

Regulatory Citations

- Act of August 25, 1916 (National Park Service Organic Act), Public Law (PL) 64-235, 16 USC § 1 *et seq.* as amended.
- National Historic Preservation Act, as amended, PL 89-665, 80 Stat. 915, 16 USC § 470 *et seq.* and 36 CFR 18, 60, 61, 63, 68, 79, 800.
- Native American Graves Protection and Repatriation Act, PL 101-601, 104 Stat. 3049, 25 USC §§ 3001-3013.
- Presidential Memorandum of April 29, 1994 "Government-to-Government Relations with Native American Tribal Governments," 59 FR 85.

- Clean Air Act, as amended, PL Chapter 360, 69 Stat. 322, 42 USC § 7401 *et seq.*
- Endangered Species Act of 1973, as amended, PL 93-205, 87 Stat. 884, 16 USC § 1531 *et seq.*
- Executive Order 11988: Flood Plain Management, 42 FR 26951, 3 CFR 121 (Supp 177).
- Executive Order 11990: Protection of Wetlands, 42 FR 26961, 3 CFR 121 (Supp 177).
- Executive Order 11991: Protection and Enhancement of Environmental Quality.
- Executive Order 13007, Indian Sacred Sites (61 CFR 26771)
- Farmland Protection Policy Act of 1982, PL 97-98.
- Federal Water Pollution Control Act (commonly referred to as Clean Water Act), PL 92-500, 33 USC § 1251 *et seq.*, as amended by the Clean Water Act, PL 95-217.
- Fish and Wildlife Coordination Act of 1958, as amended, PL 85-624, 72 Stat. 563, 16 USC § 661 *et seq.*
- National Environmental Policy Act of 1969, PL 91-190, 83 Stat. 852, 42 USC § 4321 *et seq.*
- Programmatic Memorandum of Agreement among the National Park Service, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995).
- Protection and Enhancement of Environmental Quality, Executive Order 11514, as amended, 1970, Executive Order 11991, 35 *Federal Register* 4247; 1977, 42 *Federal Register* 26967.
- Resource Conservation and Recovery Act, PL 94-580, 30 Stat. 1148, 42 USC § 6901 *et seq.*
- Secretarial Order 3175, Departmental Responsibility for Indian Trust Resources.
- Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (36 CFR 68).
- Soil and Water Resources Conservation Act of 1977.
- Watershed Protection and Flood Prevention Act, PL 92-419, 68 Stat. 666, 16 USC § 100186.

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BIBLIOGRAPHY

Brown, P.R.

1968 Residents of the Golden State. International Turtle and Tortoise Society Journal. 2(6):28-9.

Collins, Chris

2003 Bird Census Results for Road Project 13 (1), Road Rehabilitation from Cap Rock to Keys View, November 24, 2003.

2004 Small Mammal Trapping at Lower Elevation Site off of Keys View Road, January, 2004.

environmental-engineering Management, Inc. (e^2M)

2004 Biological Assessment: Keys View Road Reconstruction. March 2004.

Fesnock, Amy

2003 Wildlife Species Lists, 2003.

Hinton, Sarah

2003 "Archeological Sites Along Keys View Road, Joshua Tree National Park (as of September 2003), unpublished notes.

National Park Service (NPS)

1995 General Management Plan: Development Concept Plan: Environmental Impact Statement, Joshua Tree National Park, California. 1995.

1999 Final General Management Plan Amendment and Environmental Impact Statement: Backcountry And Wilderness Management Plan, Joshua Tree National Park, Riverside and San Bernardino Counties, California. 1999

1999a Joshua Tree National Park Natural and Cultural Resources Management Plan. 1999.

2002 Environmental Assessment: Rehabilitation of Main Park Road Cap Rock Intersection to Geology Tour Road. August 2002.

2003 Joshua Tree National Park, Resources Management. Desert Tortoise Clearance Surveys for Project 13(1): Road Rehabilitation from Cap Rock to Keys View.

2004 Joshua Tree National Park. Keys View Road Plant and Wildlife Inventories Report. 2004.

2004a Desert Tortoise Presence / Absence Surveys for Desert Tortoise, August 2004.

NatureServe
2003 NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8 NatureServe, Arlington, VA. Available at http://www.natureserve.org/explorer.

Sabala, Jan
2004 Personal communication, August 2004.

White, Charney L.
2004 Trip Report: WACC Project No. JOTR 2003 I: Survey and site assessments for road project Cap Rock to Keys View Pkg. Joshua tree National Park, Riverside County, CA.

APPENDIX A

NATIONAL PARK SERVICE PRESS RELEASE

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Twentynine Palms, CA 92277

contact Joe Zarki
phone 760 367-5520

Joshua Tree National Park News Release

Park Seeks Input on Keys View Road Reconstruction Project

Joshua Tree National Park seeks comment from interested members of the public and affected agencies in the preparation of an Environmental Assessment (EA) to evaluate the environmental effects of a proposed road construction project under the Federal Lands Highways Program. The proposed project (Package 292) will rehabilitate and upgrade park roadways between Cap Rock and the Keys View Overlook in Joshua Tree National Park. The project is part of a phased effort to rehabilitate many of the park's primary roadways.
Joshua Tree National Park recently completed Phase I of a multi-year Federal Highway Project to improve roads throughout the park. A total of 6.6 miles of new roadway, associated turnouts and parking lots were constructed from Quail Springs Day Use Area to Cap Rock Intersection, and from the Hidden Valley Day Use Area to the Barker Dam Trailhead.

Planning for the second phase of the multi-year road improvement project is currently underway. Phase II will provide for reconstruction of 5.5 miles of park roads from the Cap Rock Intersection to a point just pass the intersection with Geology Tour Road.

Package 292 proposes to realign the existing 5.6-mile, 18-20 foot wide Keys View Road. The reconstructed paved road will be 20-22 foot wide with a 30-35 mph design speed. The proposal includes curbing and paving the Cap Rock and Keys View parking areas. The Juniper Flats and Lost Horse parking areas will be redesigned as gravel with concrete curbing. Wonderland of Rocks and Blackbrush Hillsides parking areas will be limited to 2-3 car pull-offs whose location will be determined by November, 2003. The Keys View parking area sidewalks and walls will be reconstructed. None of the parking areas will have designated parking spaces for recreational or other large vehicles. One option under consideration is the possible closure of the Keys View Road for the duration of the construction, tentatively planned for November, 2004 to March, 2005.

Anyone wishing to ask questions or provide comments pertaining to the Package 292 Road Improvement Project, or wishing to provide future comments on the Environmental Assessment, should write to:

Joshua Tree National Park
Package 292 Road Improvement Project
74485 National Park Drive,
Twentynine Palms, CA 92277.

Comments may also be submitted via e-mail to jotr_publiccomments@NPS.GOV. Please reference "Package 292" in the subject line. To receive further information, please call and leave your contact information at (760) 367-5502. Comments are due by October 22, 2003.

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9/19/03

APPENDIX B

JOSHUA TREE NATIONAL PARK WILDLIFE SPECIES LIST

Joshua Tree National Park
Wildlife Species and
Likely Occurrence With Keys View Road Project Corridor

Common Names		Scientific Names	Occurrence (Y/N/Likely)
Amphibians			
	California Toad	*Bufo halophilus*	N
	Red-spotted Toad	*Bufo punctatus*	likely in lower part of project
	California Treefrog	Hyla cadaverina	N
Reptiles			
	Mojave Desert Tortoise	*Gopherus agassizii agassizii*	Y
	Desert Banded Gecko	*Coleonyx variegatus*	N
	Desert Iguana	*Dipsosaurus dorsalis*	N
	Mojave Black-collared Lizard	*Crotaphytus bicinctores*	likely in upper part of project
	Long-nosed Leopard Lizard	*Gambelia wislizenii*	N
	Western Chuckwalla	*Sauromalus obesus*	likely in lower part of project
	Mojave Zebra-tailed Lizard	*Callisaurus draconoides*	N
	Mojave Fringed-toed Lizard	*Uma scoparia*	N
	Yellow-backed Spiny Lizard	*Sceloporus magister uniformis*	Y
	Great Basin Fence Lizard	*Sceloporus biseriatus*	Y
	Desert Side-blotched Lizard	*Uta stansburiana*	Y
	Western Brush Lizard	*Urosaurus graciosus*	N
	San Diego Horned Lizard	*Phrynosoma coronatum blainvillei*	Y
	Flat Tailed Horned Lizard	*Phrynosoma mcallii*	likely
	Southern Desert Horned Lizard	*Phrynosoma platyrhinos calidiarum*	likely in lower part of project
	Desert Night Lizard	*Xantusia vigilis*	Y
	Great Basin Whiptail	*Aspidoscelis tigris*	Y
	Western Red-tailed Skink	*Eumeces gilberti rubricaudatus*	Y
	San Diego Alligator Lizard	*Elgaria multicarinata webbii*	likely in lower part of project
	Silvery Legless Lizard	*Anniella pulchra*	N
	Southwestern Blind Snake	*Leptotyphlops humilis humilis*	N
	Desert Blind Snake	*Leptotyphlops humilis cahuilae*	N
	Desert Rosy Boa	*Lichanura trivirgata gracia*	Y
	Red Coachwhip	*Masticophis flagellum piceus*	Y
	California Striped Racer	*Masticophis lateralis*	Y
	Mojave Patch-nosed Snake	*Salvadora hexalepis mojavensis*	Y
	Desert Patch-nosed Snake	*Salvadora hexalepis hexalepis*	Y
	Western Leaf-nosed Snake	*Phyllorhynchus decurtatus*	likely in lower part of project
	Mojave Glossy Snake	*Arizona occidentalis candida*	Y
	Desert Glossy Snake	*Arizona occidentalis eburnata*	N
	Desert Gopher Snake	*Pituophis catenifer deserticola*	Y

Common Names		Scientific Names	Occurrence (Y/N/Likely)
	Sonoran Gopher Snake	*Pituophis catenifer affinis*	N
	California King Snake	*Lampropeltis getula*	Y
	Western Long-nosed Snake	*Rhinocheilus lecontei lecontei*	likely
	Mojave Shovel-nosed Snake	*Chionactis occipitalis*	N
	Desert Night Snake	*Hypsiglena torquata*	Y
	California Lyre Snake	*Trimorphodon biscutatus*	Y
	Southwestern Black-headed Snake	*Tantilla hobartsmithi*	N
	Western Diamondback Rattlesnake	*Crotalus atrox*	N
	Southern Pacific Rattlesnake	*Crotalus helleri*	Y
	Red Diamond Rattlesnake	*Crotalus ruber*	Y
	Mojave Rattlesnake	*Crotalus scutulatus*	Y
	Southwestern Speckled Rattlesnake	*Crotalus mitchelli*	Y
	Mojave Desert Sidewinder	*Crotalus cerastes cerastes*	Y
	Colorado Desert Sidewinder	*Crotalus cerastes laterorepens*	N
Mammals			
	Desert Shrew	*Notiosorex crawfordi*	Y
	California Leaf-nosed Bat	*Macrotus californicus*	N
	Pallid Bat	*Antrozous pallidus*	N
	Big Brown Bat	*Eptesicus fuscus*	N
	Spotted Bat	*Euderma maculatum*	N
	Hoary Bat	*Lasiurus cinereus*	N
	Western Yellow Bat	*Lasiurus xanthinusq*	N
	California Bat	*Myotis californicus*	N
	Northern Fringed Bat	*Myotis thysanodes*	N
	Long-legged Bat	*Myotis volans*	N
	Western Pipistrelle	*Pipistrellus hesperus*	Y
	Townsend's Big-eared Bat	*Corynorhinus townsendii*	N
	Western Mastiff	*Eumops perotis*	N
	Coyote	*Canis latrans*	Y
	Gray Fox	*Urocyon cinereoargenteus*	Y
	Kit Fox	*Vulpes macrotis arsipus*	likely in lower part of project
	California Black Bear	*Ursus americanus*	N
	Ringtail	*Bassariscus astutus*	likely in lower part of project
	Western Spotted Skunk	*Spilogale gracilis*	likely in lower part of project
	Long-tailed Weasel	*Mustela frenata*	likely in lower part of project
	Badger	*Taxidea taxus*	Y
	Mountain Lion	*Puma concolor*	Y
	Bobcat	*Lynx rufus*	Y
	Mule Deer	*Odocolieus hemionus*	Y

Common Names	Scientific Names	Occurrence (Y/N/Likely)
Desert Bighorn Sheep	*Ovis canadensis nelsoni*	Y
White-tailed Antelope	*Ammospermophilus leucurus*	Y
California Ground Squirrel	*Spermophilus beecheyi*	Y
Round-tailed Ground Squirrel	*Spermophilus tereticaudus*	N
Mohave Ground Squirrel	*Spermophilus mohavensis*	Y
Dusky Chipmunk	*Tamias obscurus*	Y
Mojave Pocket Gopher	*Thomomys bottae mohavensis*	Y
Coachella Valley Pocket Gopher	*Thomomys bottae rupestris*	N
Pocket mouse	*Chaetodipus fallax*	likely in lower part of project
Mohave Long-tailed Pocket Mouse	*Chaetodipus formosus mohavensis*	N
Narrow-nosed Pocket Mouse	*Chaetodipus pencillatus*	N
Spiny Mouse	*Chaetodipus spinatus*	N
Desert Kangaroo Rat	*Dipodomys deserti*	Y
Merriam's Kangaroo Rat	*Dipodomys merriami*	Y
Stephen's Kangaroo Rat	*Dipodomys stephensi*	N
Chisel-toothed Kangaroo Rat	*Dipodomys microps*	N
Little Pocket Mouse	*Perognathus longimembris*	Y
White-throated Woodrat	*Neotoma albigula*	N
Dusky-footed Woodrat	*Neotoma fuscipes*	N
Desert Woodrat	*Neotoma lepida*	Y
Grasshopper Mouse	*Onychomys torridus*	Y
Harvest Mouse	*Reithrodontomys megalotis*	Y
Brush Mouse	*Peromyscus boylii*	N
Canyon Mouse	*Peromyscus crinitus*	Y
Cactus mouse	*Peromyscus eremicus*	Y
Deer Mouse	*Peromyscys maniculatus*	Y
Pinyon Mouse	*Peromyscus truei*	Y
House Mouse	*Mus musculus*	N
Black-tailed Jackrabbit	*Lepus californicus*	Y
Desert Cottontail	*Sylvilagus audubonii*	likely in lower part of project

Prepared by Amy Fesnock, wildlife biologist, Joshua Tree National Park, 2003, based on reports , "Amphibians and Reptiles of Joshua Tree," "Birds of Joshua Tree," and "Mammals of Joshua Tree" all by Harold De Lisle.

APPENDIX C

WILDLIFE SURVEYS

United States Department of the Interior
National Park Service
Joshua Tree National Park

Resources Management

November, 24, 2003

Memorandum

To: Anne Baldrige, E2M
Amy Fesnock, Wildlife Ecologist, JOTR

From: Chris Collins, Biological Science Technician, JOTR

Subject: Bird census results for Road Project 13(1):
Road Rehabilitation from Cap Rock to Keys View

Point counts to determine occurrence and abundance of bird species along Route 13 in Joshua Tree National Park was completed on three separate mornings, on November 10, 17, and 18, 2003.

Census methods selected and used follow closely those described in Ralph et al's (1993) Handbook of Field Methods for Monitoring Landbirds. A distance of 500 m between each roadside point count station was decided and the first station (Station #1) was located approximately 500 m south of Cap Rock, along Park Route 13. The minimum distance of 500 m between point counts was continued until the end of the road was reached, at Keys View, resulting in a total of 17 individual point count stations. Time spent at each count point was 5 minutes. Data was separated into those individuals seen or heard during the first 3 minutes and those additional individuals heard in the remaining 2 minutes. All bird species heard or seen within each 5-minute time period were recorded. For each species, the number of individuals within a circle of 50 m around the census point was recorded separately from all those outside the circle, out to an unlimited distance. Birds that were detected flying over the point, rather than detected from within the vegetation, were recorded separately.

Bird species list from point count surveys, November, 2003, Park Route 13, JOTR

American Kestrel

Bewick's Wren

Black-throated Sparrow

Brewer's Sparrow

Cactus Wren

Mountain Bluebird

Common Raven

Ladder-backed Woodpecker

Loggerhead Shrike

Mountain Bluebird

Northern Flicker

Pinyon Jay

Red-tailed Hawk

Rock Wren

Ruby-crowned Kinglet

Say's Phoebe

Scrub Jay

Spotted Towhee

Western Meadowlark

White-crowned Sparrow

Reference

Ralph, C. John; Geupel, Geoffrey R.; Pyle, Peter; Martin, Thomas E.; DeSante, David F. 1993. Handbook of Field Methods for Monitoring Landbirds. USDA Forest Service General Technical Report PSW-GTR-144.

APPENDIX D

THREATENED, ENDANGERED, AND SPECIAL-STATUS SPECIES LISTS

TABLE D-1. SPECIAL-STATUS WILDLIFE SPECIES
(SPECIES LIST AND OCCURRENCE PROVIDED BY AMY FESNOCK, WILDLIFE BIOLOGIST, JOSHUA TREE NATIONAL PARK)

Common Names	Scientific Names	Occurrence (Y/N/Likely)	Status	Habitat
Mojave fringed-toed lizard	Uma scoporia	N	CA Special Concern Species	Prefers windblown sand dunes with low-growing vegetation. Burrows into sand or soil for protection from predators and when inactive.
Flat-tailed horned lizard	Phrynosoma mcallii	Likely	CA Special Concern Species	Typical habitat includes sandy desert flatlands with sparse vegetation. Favorable vegetation includes creosote bush, saltbush, bursage, and ocotillo. This species tends to burrow in soil or loose sand to escape cold temperatures or extreme heat.
Western big-eared bat	Corynorhinus townsendii	N	CA Special Concern Species	Habitats include cultivated valleys bordered by broad-leafed trees and dense thickets of brush; nearby hills with extensive grassy slopes, groves of oaks, areas of chaparral, and forests of coniferous trees and madrone; oak-covered hills just below the juniper and pinyon belt. Recorded in Mohave Desert in caves and tunnels near the boundary between the yucca belt of the lower slopes and the pinyon-juniper belt of the upper slopes.
California Leaf-nosed Bat	Macrotus californicus	N	CA Special Concern Species	Lowland desert scrub. Uses caves or abandoned mine tunnels for rest site during day. Small groups may also use natural rock shelters in canyon walls. Uses shelter of open buildings, bridges, rocks, and mines for temporary night roosts. Old mine tunnels or caves may be used as nurseries.
Greater western mastiff Bat	Eumops perotis californicus	N	Federal Species of Concern	Habitat includes arid and semiarid, rocky canyon country habitats in the Chihuahuan Desert; roosts in crevices and shallow caves on the sides of cliffs and rock walls, and occasionally buildings. Roosts usually high above ground with unobstructed approach. Most roosts are not used throughout the year. May alternate between different day roosts.
Pallid bat	Antrozous pallidus	N	CA Special Concern Species	Arid deserts and grasslands, often near rocky outcrops and water. Less abundant in evergreen and mixed conifer woodland. Usually roosts in rock crevice or building, less often in cave, tree hollow, mine, etc.
Palm Springs pocket mouse	Perognathus longimembris	Unlikely	CA Special Concern Species	Sandy soil in valleys; firm sandy soil, overlain with pebbles, on slopes with widely spaced shrubs. In sagebrush, creosote bush, and cactus communities in Lower and Upper Sonoran life zones. Young are born in a nest in an underground burrow.
Desert Bighorn Sheep	Ovis canadensis nelsoni	Likely	BLM Sensitive	Mesic to xeric, alpine to desert grasslands or shrub-steppe in mountains, foothills, or river canyons Distribution is correlated with low precipitation levels, especially in winter and spring. Elevation varies considerably, both geographically and seasonally, from as low as 450 meters (1,476 feet) to over 3300 (10,827 feet).

Common Names	Scientific Names	Occurrence (Y/N/Likely)	Status	Habitat
Mojave Desert tortoise	Gopherus agassizii agassizii	Likely	Federally Threatened	Generally occupy habitat receiving an average annual rainfall in excess of 4 inches (10.0 centimeters and below 12 inches (30.0 centimeters). In the northern periphery of their range, they typically occur at elevations between 3,500 and 5,000 feet. Predominantly occupies creosote bush scrub and the creosote bush-white bursage community of warm uland plateaus and mountain slopes in the Mojave Desert.
Golden Eagle	Aquila chrysaetos	N	CA Special Concern Species	Generally open country, in prairies, arctic and alpine tundra, open wooded country, and barren areas, especially in hilly or mountainous regions. Nests on rock ledge of cliff or in large tree (e.g., oak or eucalyptus in California, white pine in eastern North America).
Prairie Falcon	Falco mexicanus	N	CA Special Concern Species	Primarily open situations, especially in mountainous areas, steppe, plains or prairies. Typically nests in pot hole or well-sheltered ledge on rocky cliff or steep earth embankment, 10 to more than 100 meters (328 feet) above base. Vertical cliffs with rock structure overhanging the site are preferred. Nests typically are placed on south-facing aspects, with overhangs offering some protection from solar radiation. May use old nest of raven, hawk, eagle, etc. In Mojave Desert, remote nests had higher productivity than did nests that were closer to human activity.
Sharp-shinned Hawk	Accipiter striatus	N	CA Special Concern Species	Forest and open woodland, coniferous, mixed, or deciduous, primarily in coniferous in more northern and mountainous portion of range. Young, dense, mixed or coniferous woodlands are preferred for nesting. Where conifers are scarce, as in the prairie regions, cottonwoods, poplars, and other members of the Betulaceae may be used. Nests generally seem to be in a stand of dense conifers near a forest opening.
Eagle Mountain Scrub Jay	Aphelocoma coerulescens cana	N	CA Special Concern Species	Scrub (especially oak, pinyon and juniper), brush, chaparral and pine-oak associations; also riparian woodland, gardens, orchards, mangroves (southern Baja California), and tropical deciduous forest (southern Mexico) (Subtropical and Temperate zones, upper Tropical Zone in southern Mexico).
California Horned Lark	Eremophilia alpestris	N	CA Special Concern Species	Open areas dominated by sparse low herbaceous vegetation or widely scattered low shrubs. Nests in hollow on ground often next to grass tuft or clod of earth or manure.
Long-eared Owl	Asio otus	N	CA Special Concern Species	Deciduous and evergreen forests, orchards, wooded parks, farm woodlots, river woods, desert oases. Wooded areas with dense vegetation needed for roosting and nesting, open areas for hunting.
Mountain Quail	Oreortyx pictus	Likely	Audubon Watchlist	During breeding season, Mountain Quail are found in shrub-dominated areas with dense vegetative cover. They are most common in pine-oak woodland, coniferous forest, and chaparral. Their range stretches continuously from southern Washington to southern California, and the species also has separate, disjunctive populations in central Washington and Baja California.

Common Names	Scientific Names	Occurrence (Y/N/Likely)	Status	Habitat
Vaux's Swift	Chaetura vauxi	N	Federal Species of Concern	Found in mature forests but also forages and migrates over open country (Tropical to Temperate zone). Prefers late seral stages of coniferous and mixed deciduous/coniferous forests; more abundant in old-growth forests than in younger stands.
Bendire's Thrasher	Texostoma bendirei	Likely	CA Special Concern Species	This species occupies a variety of desert habitats including large shrubs, cacti, and open ground or open woodlands at elevations of 0-550m. Nests in low trees or shrubs, typically mesquite, juniper, and Joshua trees.
Le Conte's Thrasher	Toxostoma lecontei	Likely	CA Special Concern Species	The core of its range is in the California portion of the Mojave Desert, but nowhere throughout its range is it common Nesting occurs in cholla cactus, sagebrush, small trees, or shrubs from February to June usually 0.5-3.5m above ground. The Le Conte's thrasher occupies habitats that include desert scrub, particularly creosote bush associations
Gray Vireo	Vireo vicinior	Unlikely	CA Special Concern Species	In Joshua Tree National Monument and eastern Mojave Desert, California, occurred in pinyon-juniper or pinyon-juniper mixed with sagebrush. Arrives in nesting areas in California in March.

TABLE D-2. SPECIAL-STATUS PLANT SPECIES
(PROVIDED BY TASHA LADOUX, BOTANIST, JOSHUA TREE NATIONAL PARK, 2003)

Species	Common Name	CNPS Rank	R-E-D Code	Federal Listing	Status	Quads Listed in CNPS*
Allium parishii	Parish's onion	4	1-1-2		voucher	
Ammoselinum giganteum	desert sand-parsley	2	3-1-1		potential	Hayfield, Hayfield Springs
Androstephium brevifolium	small-flowered androstephium	2	3-1-1		potential	Cadiz Valley SE
Arabis dispar	pinyon rock cress	2	2-1-1		voucher	Joshua Tree South
Astragalus lentiginosus var. coachellae	Coachella Valley milk-vetch	1B	2-2-3	Endangered	voucher	Seven Palms Valley
Astragalus nutans	Providence Mountains milk-vetch	4	1-1-3		doc/obs	
Astragalus tricarinatus	triple-ribbed milk-vetch	1B	3-2-3	Endangered	voucher	?
Ayenia compacta	ayenia	2	2-1-1		voucher	Desert Center, Hayfield, Buzzard Spring
Castela emoryi	crucifixion thorn	2	2-1-1		doc/obs	Hayfield, Hayfield Springs
Colubrina californica	Las Animas colubrina	2	2-1-1		voucher	Desert Center, Hayfield, Hayfield Spring, Victory Pass, Porcupine Wash?
Condalia globosa pubescens	spiny abrojo	4	1-2-1		voucher	
Cryptantha costata	ribbed cryptantha	4	1-1-2		voucher	
Cryptantha holoptera	winged cryptantha	4	1-1-2		doc/obs	
Cynanchum utahense	Utah vine milkweed	4	1-1-1		voucher	
Delphinium parishii subglobosum	Colorado Desert larkspur	4	1-1-2		voucher	
Ditaxis serrata var. californica	California ditaxis	3	?-2-3		voucher	(Jepson does not split var.) Desert Center, Hayfield hayfield Springs, Cottonwood Spring, Victory Pass

TABLE D-2. SPECIAL-STATUS PLANT SPECIES (PROVIDED BY TASHA LADOUX, BOTANIST, JOSHUA TREE NATIONAL PARK, 2003)

Species	Common Name	CNPS Rank	R-E-D Code	Federal Listing	Status	Quads Listed in CNPS*
Erigeron parishii	Parish's daisy	1B	2-3-3	Threatened	voucher	Yucca Valley South
Galium angustifolium gracillimum	slender bedstras	4	1-2-3		voucher	
Gilia caruifolia	caraway-leaved gilia	4	1-1-1		voucher	
Hulsea vestita callicarpha	beautiful hulsea	4	1-2-3		voucher	
Hulsea vestita parryi	Parry's sunflower	4	1-1-3		voucher	
Lasthenia glabrata coulteri	Coulter's goldfields	1B	2-3-2		voucher	?
Leptodactylon jaegeri	San Jacinto prickly phlox	1B	2-2-3		voucher	only reported for San Jacinto Peak in CNPS
Linanthus maculatus	Little San Bernardino Mountains linanthus	1B	3-2-3		potential	Seven Palms Valley, Joshua Tree South
Lycium parishii	Parish's desert-thorn	2	2-1-1		potential	Porcupine Wash
Matelea parvifolia	spearleaf	2	3-1-1		voucher	Cottonwood Spring, Indian Cove
Mentzelia tridentata	creamy blazing star	1B	2-1-3		potential	Thermal Canyon
Monardella robisonii	Robison's monardella	1B	3-1-3		voucher	Malapai Hill, Indian Cove, Joshua Tree South
Penstemon thurberi	Thurber's beardtongue	4	1-2-1		voucher	
Physalis lobata	lobed ground-cherry	2	3-1-1		voucher	Clark's Pass
Polygala acanthoclada	thorny milkwort	2	2-1-1		voucher	Porcupine Wash
Portulaca halimoides	desert portulaca	4	1-2-1		voucher	
Proboscidea althaeifolia	desert unicorn-plant	4	1-1-1		doc/obs	
Salvia eremostachya	desert sage	4	1-1-1		doc/obs	

TABLE D-2. SPECIAL-STATUS PLANT SPECIES (PROVIDED BY TASHA LADOUX, BOTANIST, JOSHUA TREE NATIONAL PARK, 2003)

Species	Common Name	CNPS Rank	R-E-D Code	Federal Listing	Status	Quads Listed in CNPS*
Selaginella eremophila	desert spike-moss	2	3-2-1		doc/obs	?
Senna covesii	Cove's cassia	2	2-2-1		potential	Desert Center, Hayfield,
Sidalcea neomexicana	salt spring checkerbloom	2	2-2-1		doc/obs	?
Streptanthus campestris	southern jewel-flower	1B	2-1-2		voucher	nearest locality in CNPS Toro Peak, San Jacinto Peak
Stylocline sonorensis	mesquite neststraw	1A			potential	known in CA from only one collection at Hayfield's Dry Lake (Hayfield)
Tetracoccus hallii	Hall's purple bush	4	1-1-1		voucher	
Tetradymia argyraea	stiped horsebrush	4	1-1-1		doc/obs	
Wislizenia refracta refracta	jackass-clover	2	3-2-1		voucher	nearest locality in CNPS Palen Lake, Twentynine Palms
Xylorhiza cognata	Mecca-aster	1B	2-2-3		potential	Cottonwood Spring, Cottonwood Basin, Thermal Canyon, West Berdoo Canyon,
Xylorhiza orcutti	Orcutt's woody-aster	1B	2-2-2		potential	Hayfield

*If the species is vouchered or doc/obs on our current species list, then the quads listed are only quads within Jtree,
if the species is a potential, it's because the quad listed in CNPS is within Jtree but our current list doesn't have it,
if the species is listed on our current list as doc/obs or voucher but no Quads within Jtree are listed in CNPS a "?" is indicated.

California Native plant Society List: 1A = Plants presumed extinct in California; 1B = Plants rare, threatened, or endangered in California and elsewhere; 2 = Plants rare, threatened, or endangered in California, but more common elsewhere; 3 = Plants about which we need more information – a review list; 4 = Plants of limited distribution – a watch list.

California Native Plant Society R-E-D Code: *Rarity*: 1 = Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time; 2 = Distributed in a limited number of occurrences, occasionally more if each occurrence is small; 3 = Distributed in one to several highly restricted occurrences, or present in such small numbers that it is seldom reported. *Endangerment*: 1 = Not endangered; 2 = Endangered in a portion of its range; 3 = Endangered throughout its range. *Distribution*: 1 = More or less widespread outside California; 2 = Rare outside California; 3 = Endemic to California.

APPENDIX E

ARCHEOLOGICAL SURVEY

United States Department of the Interior

NATIONAL PARK SERVICE
Western Archeological and Conservation Center
255 N. Commerce Loop Drive
Tucson, Arizona 85745

Received
MAR 22 2004
DSC-T

A2215
(INTM-WCA)

January 14, 2004

Memorandum

To: Acting Chief, Division of Archeology

From: Archeologist, Division of Archeology

Subject: Trip Report, WACC Project No. JOTR 2003 I: Survey and site assessments for road project Cap Rock to Keys View Pkg., Joshua Tree National Park, Riverside County, California.

Archeologists from the Western Archeological and Conservation Center (WACC), National Park Service (NPS), conducted archeological survey and site assessments in Joshua Tree National Park (JOTR), for Federal Highway Package Number: *PRA-JOTR 13(1) Route 13-Keys View Road, NPS PMIS number 51920, Joshua Tree National Park (JOTR) California*, (Figure 1). This project is the next phase of an on-going series of road construction and improvement projects in the Park administered by the NPS, Denver Service Center (DSC). The current construction project, or Federal undertaking, is needed because of the deterioration of the current Park road (Cap Rock to Keys View/Route 13) caused by the dramatic increases in park visitation, especially during recent years.

The primary goal of the survey project was to identify and record the cultural resources in the Right-of-Way (ROW) of the road construction to assist the Park in meeting its compliance requirements under section 106 of the National Historic Preservation Act (NHPA), as amended. In addition to identifying and recording previously unrecorded cultural resources within and near the road-construction ROW, the WACC survey included relocating the previously recorded sites near the road segment. Once relocated, the sites were field checked to make condition and significance assessments. The field checking also allowed the map coordinates of previously recorded sites to be corrected and updated using Global Positioning System (GPS) technology, which was unavailable when several of the sites were originally recorded.

In order to assist the Park in meeting its compliance requirements for the Federal undertaking, all identified cultural resources within and near the road-construction ROW were recorded and evaluations made of their eligibility for inclusion in the National Register of Historic Places (NRHP). Site condition assessments were made so that they can be incorporated into the NPS Archeological Site Management Information System (ASMIS) database to assist Park planners and to help the Park meet other important goals as the Park evolves.

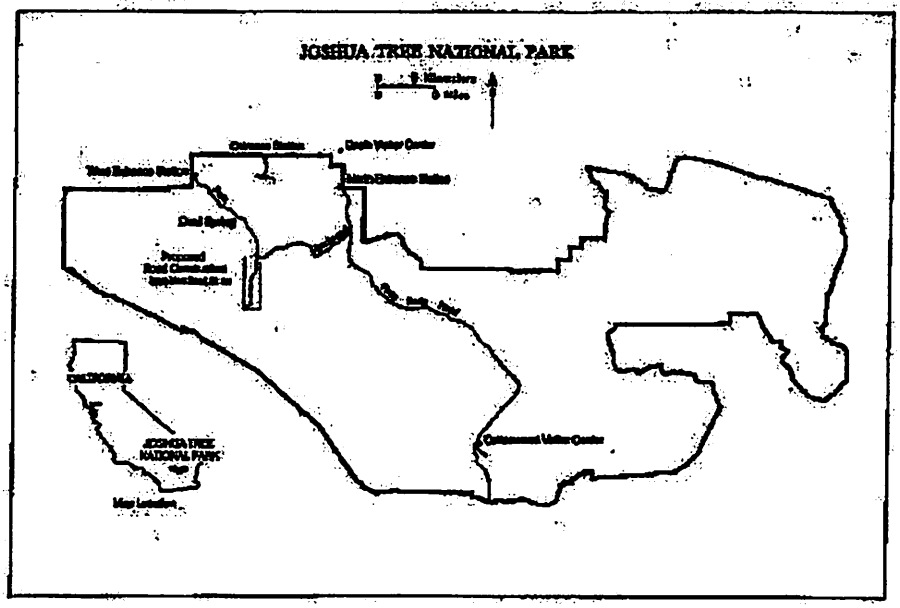

Figure 1. Map depicting the area of the WACC project, JOTR 2003 I, in the northwestern park, Joshua Tree National Park, California.

PROJECT DESCRIPTION

Fieldwork for the WACC survey project, JOTR 2003 I, was conducted from October 14 to October 20, 2003. The WACC field team that completed survey and recording during this project included WACC archeologists Karen Bell and Cherry White, who served as Field Director. Loy Neff served as Supervisory Archeologist for this project under the direction of Susan Wells, Acting Chief of the Archeology Division, WACC. Neff assisted in the initial stages of the survey with evaluations of the previously recorded sites. Sarah Hinton, JOTR Cultural Resources staff member, assisted with the survey from October 15 to 17. In addition to facilitating Ms. Hinton's contribution to the survey, Jan Sabula, Branch Chief of Cultural Resources, JOTR, contributed technical support during the project. Romorno Coney, of the NPS – DSC, is the road-construction project manager.

The JOTR 2003 I survey and site assessment project was conducted according to NPS standards, as outlined in Director's Order, NPS Cultural Resources Management Guideline, Revision 5 (formerly identified as NPS-28) (DO-28; NPS 1997) and in the Secretary of the Interior's Standards and Guidelines for Archeological and Historical Preservation (U.S. DOI 1983).

Figure 2. Archeological sites (CA-RIV-# or JOTR-3) identified along Keys View Road.

The fieldwork was accomplished under the requirements of section 106 of the National Historic Preservation Act (NHPA), as amended. The assessments of site significance to identify the eligibility of the resources for listing in the National Register followed NRHP guidelines, as developed in National Register Bulletins 15 (NPS 1990a), 36 (NPS 1993), 38 (NPS 1990b), and 39 (NPS 1998).

The survey project included intensive pedestrian survey and site assessments in a 100-meter wide corridor along the nearly 6-mile length of the proposed road construction (Figure 2).

In addition to surveying the roadway corridor, the WACC field team covered the proposed locations of parking lots and roadside pullouts along the survey corridor as depicted in the 15-percent design drawings of the undertaking provided by DSC (Technical Information Center Drawing Number 156/41,906). During the survey, all cultural resources within the 100-meter corridor of the proposed road construction were identified and recorded, including previously recorded sites and isolated finds of archeological and historical materials and features. Recording included plan maps and site condition assessments for inclusion in the ASMIS database.

PRELIMINARY PROJECT RESULTS

A search of archival records prior to the fieldwork revealed five previously recorded sites adjacent to or near the proposed roadway corridor. These sites were recorded during three different survey projects; WACC survey JOTR 1979-A; University of Nevada, Las Vegas Department of Anthropology survey 1991(Schneider and Warren 1993, 2000); and survey by JOTR Cultural Resources Manager Jan Keswick in 2001. Discrepancies between the site plots on the WACC base maps and the original site records were identified during preliminary research, however, and additional errors and inconsistencies were found in the recorded site data. The problems with the recorded site data indicated the need for a new survey of the road-construction ROW.

During the 2003 WACC survey, both sites and isolated finds were identified and recorded. The five sites recorded within the survey project road corridor during the 2003 WACC survey include CA-RIV-1957, CA-RIV-1958, and three newly recorded sites. In addition, 19 isolated finds were recorded in the road corridor.

Two of the five previously recorded sites near the road were not in the project survey corridor. Site CA-RIV-6731 was isolated outside the 100-meter survey corridor and outside the APE as depicted in the 15% design drawings (Technical Information Center Drawing Number 156/41,906). The other site, CA-RIV-4887, was originally recorded as a surface artifact scatter (Site Record, on file, JOTR) but could not be relocated because all surface artifacts were collected in 1991. The UTMs of the sites recorded in the survey corridor, CA-RIV-6731 and CA-RIV-4887 are listed in Table 1.

The Recorded Sites

Five archeological sites were identified within the road corridor. These sites include previously recorded and newly recorded cultural resources. Table 2 presents a summary of the recorded sites.

Site JOTR 2003 I-1. This site is a historic-period can scatter composed of 28 metal cans on the surface. The cans are widely dispersed over an area of approximately 3, 500 m^2.

Table 1. List of UTMs for sites recorded during JOTR 2003 I Archeological Survey Cap Rock to Keys View Road

Table Removed

Table 2. Summary of the sites recorded during WACC survey project JOTR 2003 I.

WACC field Number, CA Site Number, Site Name	Summary of Cultural Resources	Site Condition *	NRHP Significance	Fieldwork Tasks Accomplished
JOTR 2003 I-1	Historic can scatter	Good	Not significant	Systematic surface recording and mapping, photos, GPS
JOTR 2003 I-2	Historic can scatter and old road segment	Good	Not significant	Systematic surface recording and mapping, photos, GPS
JOTR 2003 I-3	2 historic can dumps, prehistoric sherds (n=7)	Good	Not significant	Systematic surface recording and mapping, photos, GPS
JOTR 2003 I-4 CA-RIV-1957	Historic can scatter, one piece of SCA glass	Good	Not significant	Systematic surface recording and mapping, photos, GPS
JOTR 2003 I-5 CA-RIV-1958 John Lang Grave	"John Lang" Gravesite LCS No. 058503	Fair (disturbed in 1994, Park placed cement cap over grave)	Possibly significant under criterion B (additional research needed)	Systematic surface recording and mapping, photos, GPS

* Site condition: excellent (no disturbance); good (0-25% disturbance); fair (25-50% disturbance); poor (50-75%) disturbance); destroyed (75-100% disturbance).

Site JOTR 2003 I-2. A segment of old road and a few sparsely scattered cans comprise this site. The road is 2 meters wide and runs for approximately 125 meters nearly parallel to the existing Keys View Road. The cans are scattered across the surface, including three sanitary food cans, three "Schlitz" brand beer cans, a condensed milk can, and a "Kipper Herrings" brand sardine can.

Site JOTR 2003 I-3. This site has two concentrations of cans recorded as two loci, along with a sparse scatter of historical trash and prehistoric sherds. The Keys View Road runs between the site loci. Locus 1 is on the east side of the road and includes approximately 35 cans covering an area of about 3 m^2. Most of the cans in Locus 1 are condensed milk cans, but other cans are present, including sardine, beverage, meat, and sanitary food cans. No glass fragments or other artifacts were observed. Locus 2 is on the west side of the road and is a trash dump with about 185 cans covering an area of 9 m^2. Evaporated milk, meat, coffee, and sanitary cans are present as well as 1-gallon paint cans, wire fragments, D-cell battery cores, and one bottleneck fragment of clear glass. Some cans are partially buried by wind-blown sand. Seven Tizon Brown Ware body sherds were observed on the surface near this trash dump. These sherds are within 5 meters of the paved road; no other prehistoric artifacts were observed. It is possible that Park visitors picked up these sherds elsewhere in the Park and discarded them along the road in this area.

Site JOTR 2003 I-4/CA-RIV-1957. This site is a small historical can scatter (Site Record on file, JOTR) that was first recorded in 1979 (WACC project JOTR 1979 A). It is a concentration of 32 cans (milk, food cans and meat tins), and one small fragment of sun-colored-amethyst glass in a 2 m diameter area. The remainder of the artifacts are spread out over 1,200 m^2. A piece of metal that appears to be a part of a stove pipe was also recorded.

Site JOTR 2003 I-5/CA-RIV-1958. This is the previously recorded gravesite of John Lang, which is on the Park's List of Classified Structures (LCS No. 058503). The gravesite has an inscribed headstone: front of headstone, "John Lang died here buried by W.F. Keys- Frank Kiler Jeff Peeden Mar 1925"; back of headstone "W.C.W. W.R.K., MR", (Site Record, on file, JOTR). The grave is marked and outlined with large rocks. No surface artifacts were found in association with the grave.

The Isolated Finds

As mentioned, the WACC survey team recorded 19 isolated finds (IFs) of archeological materials (Table 3) within the proposed roadway corridor (see Figure 2). The IFs include artifacts and isolated features such as a two-track road remnant, non-diagnostic historical cans and tins, and two sherds. No artifacts were collected during the survey. Instead, the artifacts were analyzed in the field and left in place.

Table 3. Summary of isolated finds within the road corridor, JOTR 2003 I survey.

Isolated Find #	Location	Description
1	West side, 10-m from road	4 milk cans, 1 tea can
2	South side, 10-m from road	Two-track road remnant, 2-m wide
3	East side, 45-m from road	1 beverage can
4	East side, 20-m from road	1 meat tin; 1 sanitary food can
5	East side, in wash 10-m from road	1 sherd, Tizon Brownware
6	East side of road, 30-m from road	1 beverage can
7	East side of road, 30-m from road	1 beverage can
8	East side of road, 15-m from road	1 meat can
9	East side of road, 30-m from road	1 beverage can
10	East side of road, 45-m from road	1 beverage can
11	East side, 40-m from road	1 sanitary food can
12	East side, 50-m from road	1 sherd Lower Colorado Buffware
13	East side, 30-m from road	1 sanitary food can
14	East side, 30-m from road	1 sanitary food can
15	East side, 30-m from road	1 metal strap iron piece
16	East side, 40-m from road	1 beverage can
17	East side, 25-m from road	2 sanitary food cans
18	West side, 30-m from road	1 beverage can
19	West side, 10-m from road	2 sanitary food cans

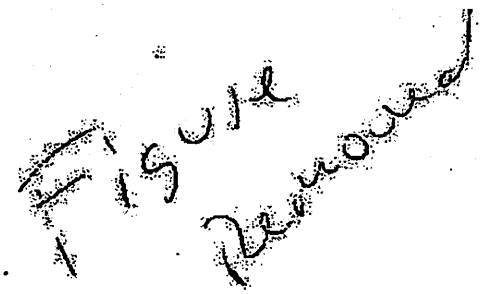

Figure 5. Recorded Isolated Finds (LF#) identified along Keys View Road.

PRELIMINARY RECOMMENDATIONS

Cultural resources staff of NPS – DSC, will complete the compliance documentation for the Federal undertaking. The management recommendations in this section should be sufficient to allow the necessary compliance documentation to be completed. The recommendations are based on the preliminary results of the survey, including site condition and significance evaluations of the recorded resources and they are intended to protect and preserve the cultural resources within the project APE. The recommendations include actions to protect the resources from the direct impacts resulting from the road construction as well as the indirect impacts to the resources that will be caused by increased visitor access provided by the improved road and parking facilities.

Inadvertent Discovery of Human Remains. The possibility of the inadvertent discovery of human remains and associated funerary objects during the construction must be addressed. With the exception of the historical gravesite, CA-RIV-1958, there is little likelihood that buried human remains will be encountered during the road construction.

A plan of action in the event of the inadvertent discovery of human remains and associated funerary objects was developed during previous archeological work related to the now-completed Pkg. 173 road construction (Neff and Wilson 1999: Appendix VII). The plan is in place at the Park and complies with the requirements of the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990.

In the unlikely event of the inadvertent discovery of human remains or funerary objects, all work at the location of the discovery will stop and the Joshua Tree National Park Superintendent or other officially designated NPS representative will be immediately notified. This official will notify the appropriate local authorities and Indian tribal representatives. The plan of action in place at the Park will then be enacted to satisfy the requirements of NAGPRA.

Evaluations and Recommendations for the Recorded Sites

Only one of the five sites recorded within or near the project APE is potentially significant under NRHP criteria. Site CA-RIV-1958 (JOTR 2003 I-5), the John Lang gravesite, may be significant under criterion B (association with a person significant in local history), but additional research is necessary to identify the importance of this historical character to the history of mining and ranching in the Park. The recommendations for each site are summarized below.

Site JOTR 2003 I-1. Although this site is within the archeological survey corridor, it is outside the project APE as indicated in the available design drawings. Furthermore, the site appears to be a surface scatter of historic trash and its research potential has been exhausted by the identification and mapping of the site and the in-field analysis of the artifacts. It is recommended that this site should not be considered eligible for inclusion in the NRHP. We do not recommend archeological testing before the road construction can commence.

Site JOTR 2003 I-2. This site is outside the project APE at this time. The road segment and scatter of cans appear to be a surface expression and does not possess NRHP significance. As with site JOTR 2003 I-1, its research potential has been exhausted by the identification and mapping of the site and the in-field analysis of the artifacts. This site is not considered eligible for inclusion in the NRHP. We do not recommend archeological testing before the road construction can commence.

Site JOTR 2003 I-3. This historical trash scatter lies well outside the project APE. It appears to be a surface scatter and lacks NRHP-significance under all criteria. As with sites JOTR 2003 I-1 and 2, its research potential has been exhausted by the identification and mapping of the site and the in-field

analysis of the artifacts. This site is not considered eligible for inclusion in the NRHP. We do not recommend archeological testing before the road construction can commence.

Site CA-RIV-1957 (JOTR 2003 I-4). This site is outside the project APE at this time. It appears to be a sparse surface scatter of historic trash and lacks NRHP-significant resources. As with sites JOTR 2003 I-1, 2, and 3, the research potential of this site has been exhausted by the identification and mapping of the site and the in-field analysis of the artifacts. This site is not considered eligible for inclusion in the NRHP. We do not recommend archeological testing before the road construction can commence.

Site CA-RIV-1958 (JOTR 2003 I-5). (John Lang's Gravesite) This site is on the Park's List of Classified Structures and is currently being interpreted to the visiting public. The site may be significant under criterion B, but additional archival research is necessary to establish the importance of John Lang to the history of mining and ranching in the Park. In addition, the presence of human remains in the grave means that the gravesite should be protected. There is no need for archeological testing; however, the gravesite is adjacent to the road and within the project APE, so it is recommended that the gravesite be fenced prior to the road construction to protect it. Additionally, it is recommended that a professional archeologist be present to monitor the initial ground-disturbing construction in the vicinity of the gravesite.

Recommendations Concerning the Isolated Finds

None of the recorded IFs represent archeologically or historically significant resources. The lack of diagnostic artifacts combines with the absence of patterning in the distribution of the modern, historical, and prehistoric materials to support this interpretation. The process of identifying, mapping, and analyzing the roadside IFs during the WACC survey has exhausted the research potential of these materials. Furthermore, all of the IFs are outside the proposed road-construction ROW and are not threatened by the construction. No further actions are recommended to protect the recorded IFs.

Summary Recommendations

No archeological testing is recommended for any of the recorded sites before the road construction begins. With the exception of John Lang's grave, the archeological sites recorded for this project appear to be surface scatters and do not meet the NRHP criteria of significance. A general recommendation to protect cultural resources is that a professional archeologist be present to monitor the initial ground-disturbing construction in the vicinity of John Lang's grave.

ADDITIONAL PROJECT GOALS

The tasks remaining to accomplish the goals of the WACC survey project include reviewing the in-field analysis of the artifacts recorded during the survey, preparing the plan maps of the sites within the survey project area, preparing the site forms for submission to the appropriate California repository, and completing the final project report.

Laboratory Analysis

No artifacts were collected during the WACC survey and the remaining tasks relevant to the recorded artifact analysis are currently underway. The tasks include reviewing and integrating the in-field analysis with the other survey results. The analyzed materials include modern, historical, and prehistoric artifacts occurring at the recorded sites and in isolation or small, non-site concentrations along the roadway. Preliminary analyses show that the historical artifacts have a date range from the early to middle 20th century. The distribution of the isolated finds appears to be random and, in the case of the modern and historical materials, probably represents casual road-side discard by park visitors.

Site Maps

Detailed field maps of the sites within the project area were made during the survey, using compass and tape/pace measurements. These maps are being used to prepare computer-generated plan maps and drawings for inclusion in the final report. These tasks are currently underway and on schedule.

Site Forms

Work on the California site forms for the newly recorded sites is in progress and on schedule. The forms will be completed and official site numbers obtained. The completed forms will be submitted to the appropriate state repository, with copies retained for the project records.

Project Report

The draft final report is in progress and will be ready for review within 90 days of the submission of this interim progress report. The report will include descriptions of the project and its goals, reviews of the pertinent research questions, summaries of the field and laboratory methods and procedures, results of the survey, and interpretations of the cultural resources. The management recommendations in the interim progress report will be included in the draft final report. The draft final report will be submitted for review to the Park, NPS – DSC, and the California SHPO. The project final report will be completed when the comments and corrections from the reviewers are received and can be incorporated into the document. The schedule for the completion of the project final report will be coordinated with the Park's cultural resources staff.

This report will be a useful reference in making management decisions regarding cultural resources in the vicinity of the road construction project. Additionally, the report will contribute to our knowledge of the archeology and history of the northwestern Park and the Mojave Desert.

Channy L. White

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cc:
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JOTR Branch Chief, Cultural Resources/Jan Sabala
DSC, Project Manager/Romorno Coney
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WACC Acting Division of Archeology Chief/Susan J. Wells
WACC Archeologist/Loy C. Neff

REFERENCES CITED

National Park Service (NPS)

1990a How to Apply the National Register Criteria for Evaluation. *National Register Bulletin 15*. Revised, 1991. U.S. Department of the Interior, National Park Service, Interagency Resources Division, Washington, D.C.

1990b Guideline for Evaluating and Documenting Traditional Cultural Properties. *National Register Bulletin 38*. National Register of Historic Places, National Park Service, Washington, D.C.

1993 *Guidelines for Evaluating and Registering Historical Archeological Sites and Districts*. National Register Bulletin 36. U.S. Department of the Interior, National Park Service, Washington, D.C.

1997 *Director's Orders – Cultural Resources Management Guideline Release No. 5*. (DO – 28). U.S. Department of the Interior, National Park Service, Washington, D.C.

1998 *Researching a Historic Property*. National Register Bulletin 39. U.S. Department of the Interior, National Park Service, Washington, D.C.

Neff, Loy C., and Meredith A. Wilson

1999 WACC Project No. JOTR 1999 A: Archeological Site Testing at Joshua Tree National Park, Riverside County, California. Ms. on file, National Park Service, Western Archeological and Conservation Center, Tucson.

Warren, Claude N., and Joan S. Schneider

1993 *Phase I, Ana Archaeological Inventory of Joshua Tree National Monument*. University of Nevada, Las Vegas, Las Vegas.

Warren, Claude N., and Joan S. Schneider

2000 *Phase II, An Archaeological Inventory of Joshua Tree National Park: Description and Analyses of the Results of a Stratified Random Sample Inventory conducted 1991-1992*. University of Nevada, Las Vegas, Las Vegas.

U.S. Department of Interior (US DOI)

1983 Archeological and Historic Preservation: Secretary of Interior's Guidelines. *Federal Register* 48(190): 44716ff (September 29, 1983).

White, Charny L.

2003 Scope of Work for Archeological Survey and Site Assessments in the Proposed Roadway Corridor, Joshua Tree Roads Project, Cap Rock to Keys View. Ms. on file, National Park Service, Western Archeological and Conservation Center, Tucson.

APPENDIX F
BIOLOGICAL ASSESSMENT

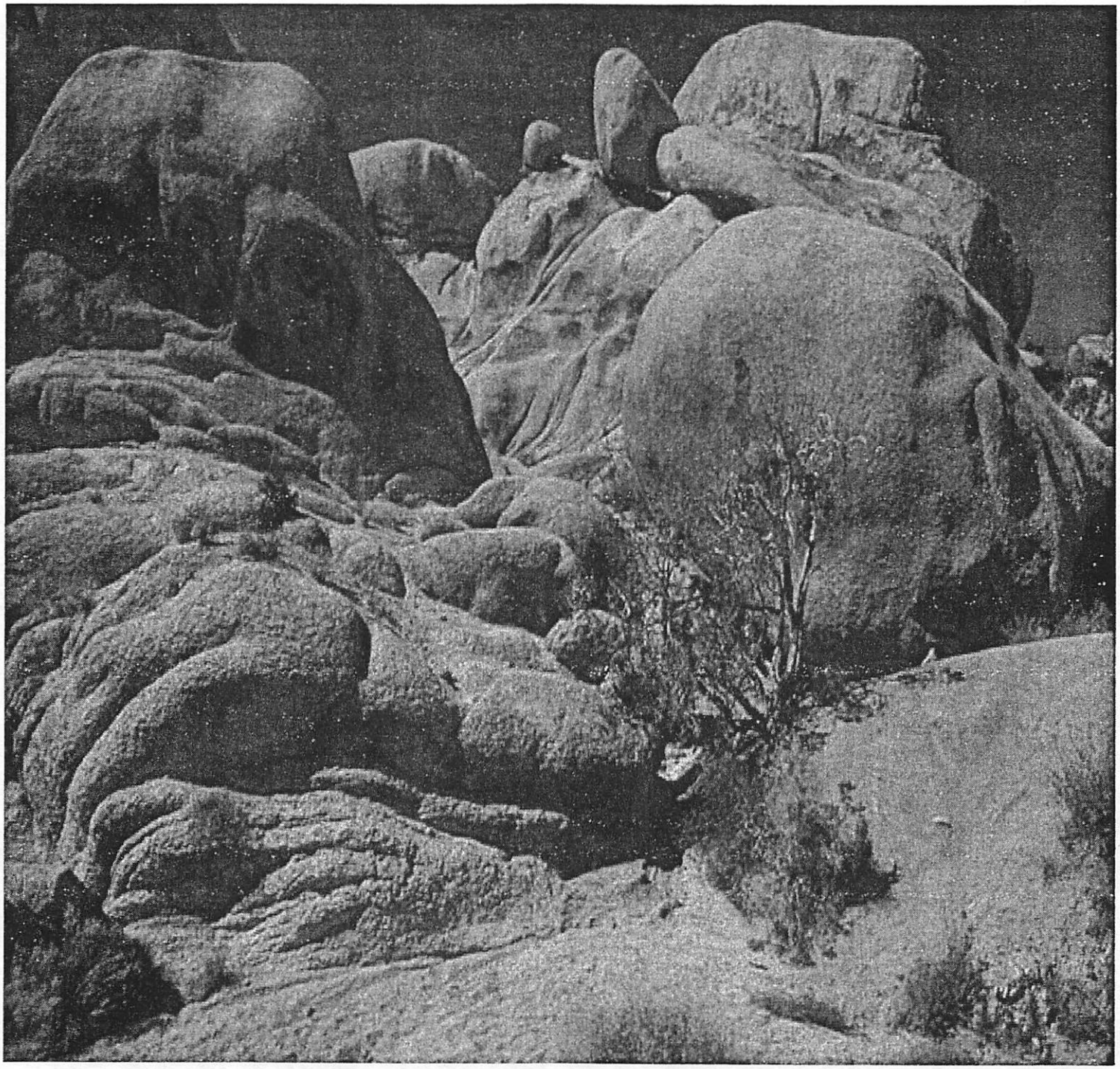
Joshua Tree National Park

National Park Service
U.S. Department of the Interior

Joshua Tree National Park
California

Biological Assessment

Keys View Road Reconstruction
March 2004



BIOLOGICAL ASSESSMENT

Keys View Road Reconstruction

Prepared For:
National Park Service

Prepared By:
engineering-environmental Management, Inc.

Joshua Tree National Park
California

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INTRODUCTION

In accordance with section 7(c) of the Endangered Species Act of 1973, as amended (16 USC 1531 *et seq.*), the National Park Service requested from the U.S. Fish and Wildlife Service a species list of threatened and endangered species, species of concern, and designated critical habitats that may be affected by the proposed action to reconstruct Keys View Road in Joshua Tree National Park. It is the responsibility of the federal agency proposing the action, in this case the National Park Service, to prepare a biological assessment, the objective of which is to determine whether the proposed action would adversely affect any listed species or designated critical habitat.

This biological assessment addresses the threatened desert tortoise (*Gopherus agassizii*), listed by the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act of 1973, as amended, relative to the Keys View Road reconstruction in Joshua Tree National Park. Keys View Road is proposed for reconstruction to better accommodate current and future park visitation, enhance visitor safety, and to protect natural resources. Reconstruction would occur from February through July 2005, along the entire 5.6-mile-long road segment from the Cap Rock intersection to Keys View Overlook (figure 1). Reconstruction would include widening, realigning, and resurfacing the road, installing curbs with tortoise "trots" (notches in the curb to allow tortoises to exit the road), providing formal parking turnouts, and redesigning the parking areas at Cap Rock, Juniper Flats, and Keys View. This project also includes striping and chip seal for roads and paved parking areas (totaling approximately 17 miles) for previous rehabilitation work, including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from Keys View Road junction to the Geology Tour Road junction, Route 12 from the North Entrance to the intersection with Pinto Basin Road, and access drives leading to parking areas along these roadways, as well as chip sealing and re-striping of those parking areas. While the project areas are included in the western Mojave recovery unit established by the Desert Tortoise (Mojave population) Recovery Plan (USFWS 1994), and more specifically in the Joshua Tree Desert Wildlife Management Area, they are not in or proximal to designated critical habitat for the desert tortoise. The determination of effect for the desert tortoise, considering impacts of the reconstruction project and proposed conservation measures, is *may affect, likely to adversely affect.*

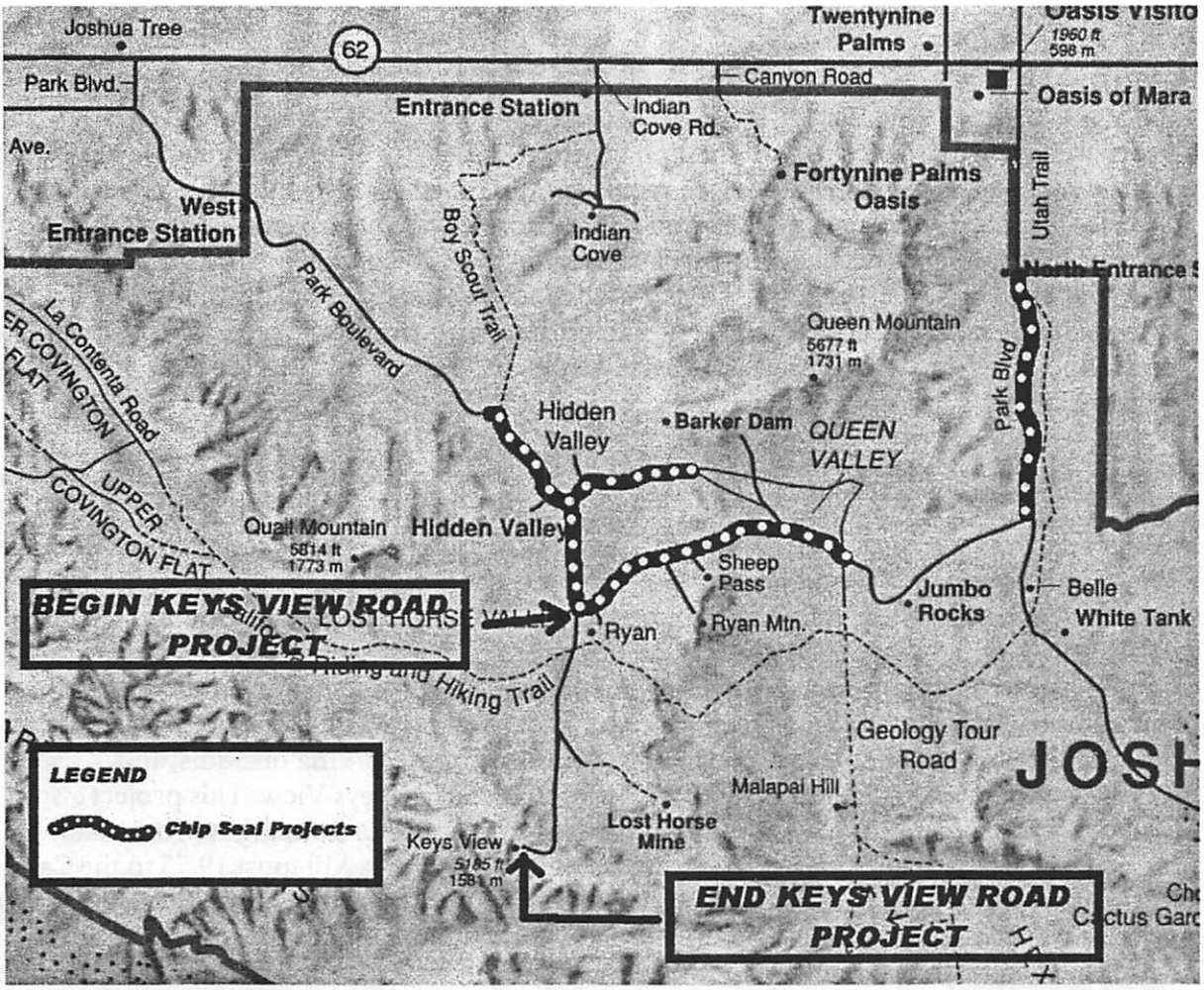

Figure 1. Project Location Map

BACKGROUND

CONSULTATION HISTORY

The U.S. Fish and Wildlife Service was contacted by letter dated February 18, 2004, to request a list of threatened and endangered species that may occur in or use the Keys View Road reconstruction area for habitat. The U.S. Fish and Wildlife Service previously confirmed that the only threatened and endangered species that may occur in or use the Keys View Road reconstruction area for habitat is the federally threatened species—desert tortoise (USFWS 2003, pers. comm.).

DESCRIPTION OF THE PREFERRED ALTERNATIVE

The National Park Service is considering reconstruction of Keys View Road (Route 13) within Joshua Tree National Park, Riverside and San Bernardino Counties, California. Reconstruction would occur from November 2004 through April 2005, along this approximately 5.6-mile stretch of road that extends from the intersection with Route 12 (Park Boulevard near Cap Rock) to the Keys View Overlook (figure 1). Chip sealing and striping of 17 miles of previously rehabilitated road sections and parking areas, including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from Keys View Road junction to the Geology Tour Road junction, Route 12 from the North Entrance to the intersection with Pinto Basin Road, and access drives leading to parking areas along these roadways, as well as chip sealing and re-striping of those parking areas. Any proposed action, such as the Keys View Road reconstruction, must comply with the primary management objectives of Joshua Tree National Park, as stated in the approved *General Management Plan* (NPS 1994). These management objectives promote the mission of the park, which is to preserve, unimpaired, the natural and cultural resources of the Mojave and Colorado Deserts so that they can be interpreted, understood, and enjoyed by present and future generations (NPS 1994).

General Description of Road Work

The existing roadway varies from 18- to 20-feet wide and has many abrupt vertical and horizontal curves that would be smoothed out to provide a safer alignment. The road would be widened to a paved road surface that is 22-feet wide with additional curve widening of up to 3 feet for short radius curves with a 30- to 35-miles per hour design speed limit. The existing pavement would either be recycled for use as part of the road subbase or hauled from the site. New pavement would be placed in two lifts. The road would be curbed on each side to minimize impacts to resources, delineate the road, control unauthorized parking on the shoulders that destroys vegetation, improve aesthetics, reduce problems like roadway edge chipping, eliminate the potential for rollover accidents, and eliminate recurring grading of the road shoulders. The curbing would have tortoise trots (notches in the curb to allow tortoises to exit the road) every 30 meters (98 feet) (figure 2). The lip of the tortoise trots would not be more than 0.5 inch higher than the adjacent pavement surface to assure easy access by desert tortoises.

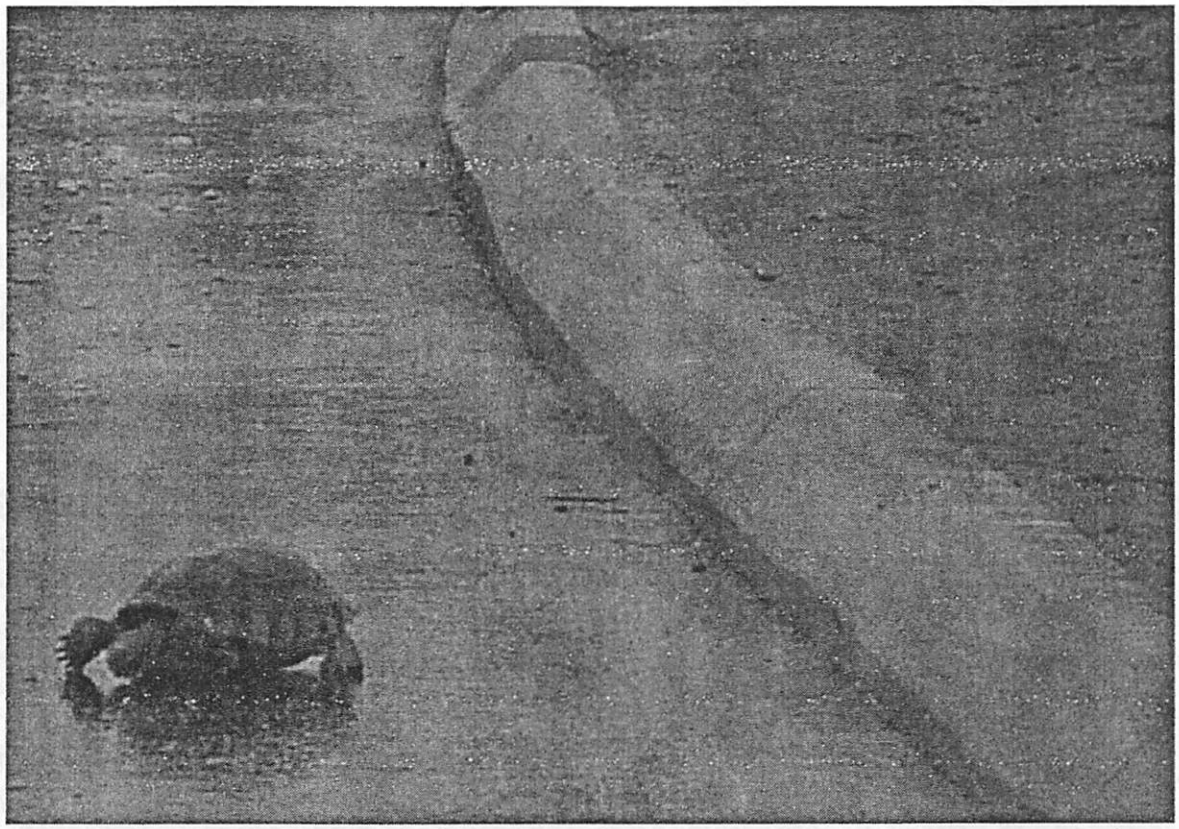

Figure 2. Desert Tortoise and Tortoise Trot

The roadwork would consist of reconstructing shoulders and ditches, pulverizing the existing surface treatment and base, and shaping, compacting, and finishing the roadbed to the required road template. Material that is too soft, unstable, or otherwise unsuitable for the road base would be removed and replaced with roadway aggregate. Unsuitable material would be buried within the road subbase and replaced with aggregate, or used as part of the curb backfill.

Areas disturbed by the project would be revegetated, and previously disturbed areas removed from roadway use (e.g., informal turnouts) would be rehabilitated. The contractor staging areas would be at the Cap Rock and Juniper Flats parking areas, and the Sheep Pass Borrow Pit. The overall new disturbance associated with the Keys View Road reconstruction would be 5.0 acres. Areas of previous disturbance to be reclaimed would be approximately 1.5 acres.

Cap Rock Parking Area

The existing Cap Rock parking area is partially paved with asphalt, the remainder of the parking area is soil. Parking spaces exist for 15 vehicles with six RVs, but the spaces are not well delineated. Joshua trees (*Yucca brevifolia*) are scattered throughout the parking area with rock barriers protecting some, but not all, of the trees. Restroom facilities lie on the east side of the parking area with a maintenance/access road leading to the facilities. The Cap Rock parking area (figure 3) would be expanded to the south and redesigned. The

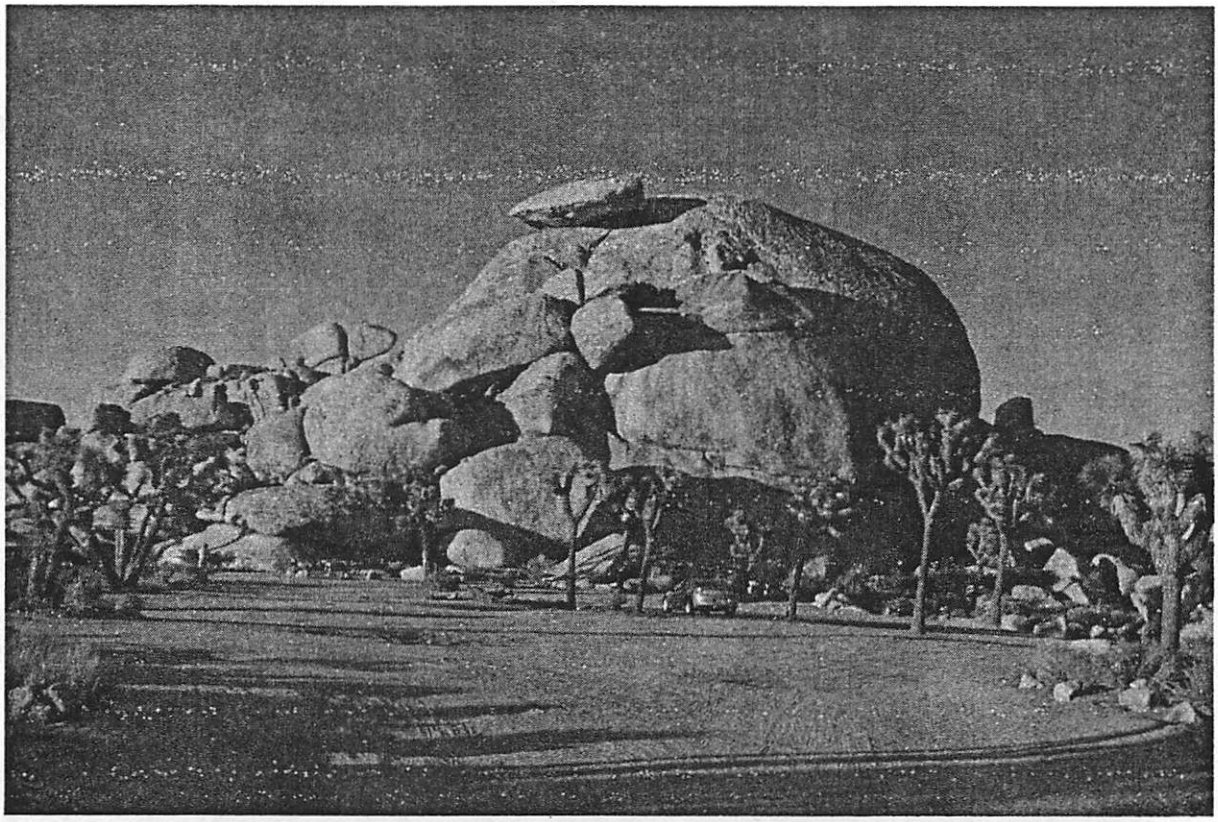

Figure 3. Cap Rock Parking Area

proposed parking area would be paved and would have striped parking stalls. The proposed paved parking area would accommodate maneuvers of large vehicles. Since Joshua Tree National Park would prohibit oversize vehicles, such as large RVs, from traveling on Keys View Road, the Cap Rock parking area would serve as a turnaround for those large vehicles that turn onto Keys View Road. The design of the parking area would minimize removal and loss of Joshua trees by shifting the parking entrance slightly to the south and maximizing use of disturbed areas within the existing parking area. A 12-foot-wide curb cut would provide access to the existing maintenance road. The maintenance road would be left as natural. The existing gate at the maintenance road entrance would remain or be replaced with a new gate during construction.

The decomposed granite sidewalk with Trex (a material made from recycled wood and plastic) edging on the east side would be tied to the existing Trex-edged walk. The existing parking area that is outside the footprint of the proposed parking area would be reclaimed or restored. The parking area would not be shifted any farther north, saving the existing Joshua trees near the entrance. Several Joshua trees in the parking area would be removed during construction.

Juniper Flats Parking Area

The Juniper Flats parking area currently lies directly adjacent to Keys View Road and is not large enough to unload and park a horse trailer or other vehicles for a multi-day backcountry trip. The existing parking area is gravel. The Juniper Flats parking area would be moved to the

west (away from the road) and north, and expanded to provide parking for horse trailers (figure 4). The new parking area would be gravel with concrete curbing. The proposed reconfiguration minimizes disturbance and loss of Joshua trees. The existing Juniper Flats gravel parking area outside of the proposed new footprint would be regraded, gravel removed, topsoil placed, and revegetated. An interpretive exhibit would be placed at the trailhead accessible to the parking area.

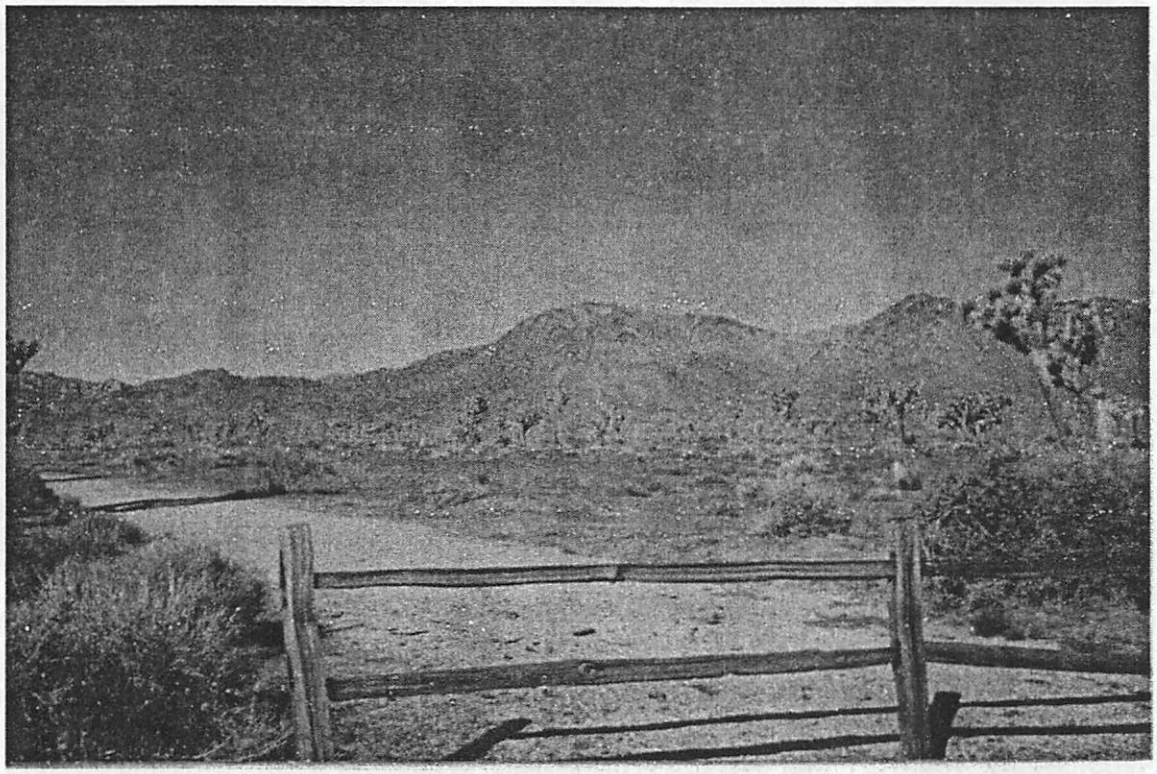

Figure 4. Proposed Area for Juniper Flats Parking Area

Lost Horse Mine Road

A typical access road paved apron would be provided at the turnoff to the Lost Horse Mine Road to prevent vehicles from kicking gravel onto the Keys View Road surface . The Lost Horse Mine Road provides access to the Lost Horse Mine parking area and hiking trail that leads to the old mine. The apron would be a paved transition from the paved Keys View Road to the gravel Lost Horse Mine Road. The access road apron would not be large enough to allow parking at the turnoff. The apron would be constructed within the existing Lost Horse Mine Road disturbance and would not disturb new acreage.

Old Borrow Area Access

Access to the borrow pit located approximately one mile from Keys View Overlook and at Sheep Pass would be provided by a 12-foot curb cut with gravel behind a flush curb to match the existing grade. The curb cut would be created in the new road construction curbing. A new gate at the borrow area access would also be installed. The borrow area would not be used for any staging but both Keys View and Sheep Pass borrow pits may be used for storage of excess

maerial. Continued access to this area is needed due to U.S. Geological Survey monitoring equipment located at the borrow area.

Keys View Parking Area

The existing Keys View parking area consists of curbed parking areas surrounded by a low wall with a walkway to the Keys View Overlook located on a nearby high knoll (figure 5). The existing deteriorated parking area and adjacent curbs, sidewalks, and walls would be reconstructed. The parking area layout would be extended into the existing island to provide for angled car parking. The parking stalls would generally be 18-feet long instead of the standard 20-foot-long stalls in order to minimize new disturbance. Parallel parking spaces (striped only for cars) would also accommodate large vehicles, although they would be discouraged from traveling on Keys View Road. The Keys View parking area would be constructed with curbing, but no gutters. The existing wall would be replaced with a concrete wall or a concrete block wall combined with a pedestrian railing (figure 6). The existing concrete drainage swale on the hillside (figure 7) would be removed and the area re-contoured.

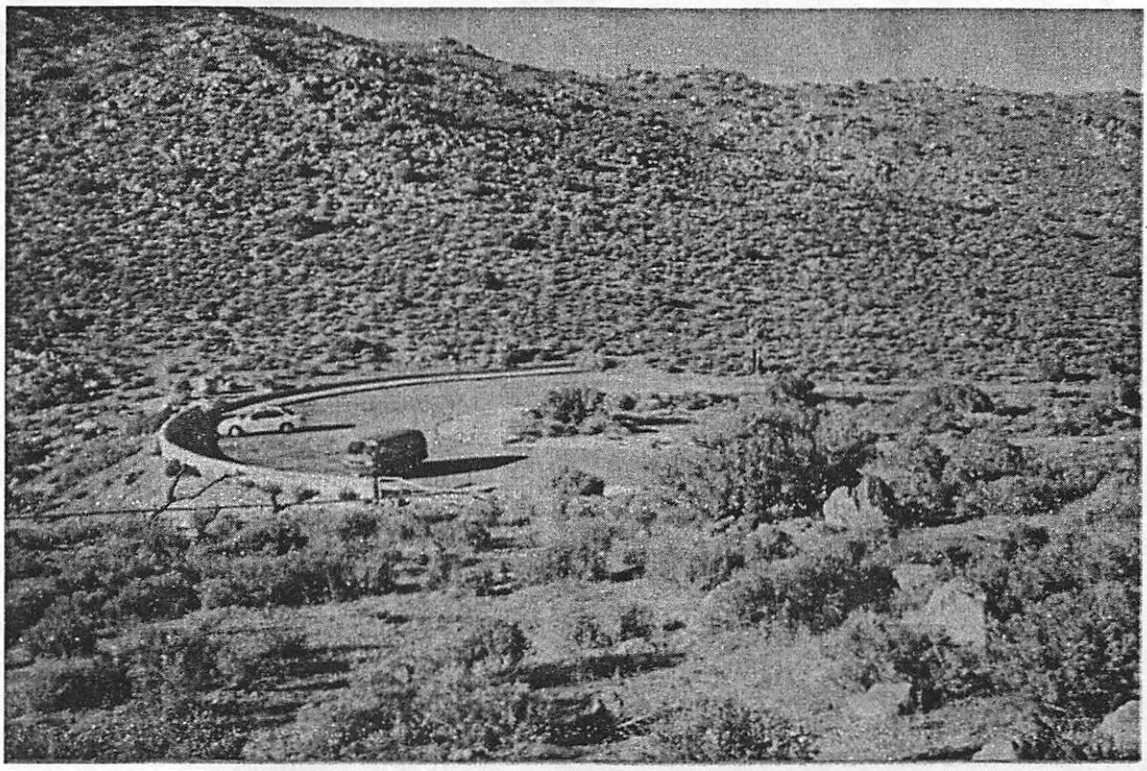

Figure 5. Keys View Parking Area Overview

The concrete sidewalk at the restroom would be extended toward the road and a universally accessible ramp added in order to allow better access for pedestrians coming down the hill. The new concrete sidewalk would be 6-feet wide, approximately the same width as the existing sidewalk.

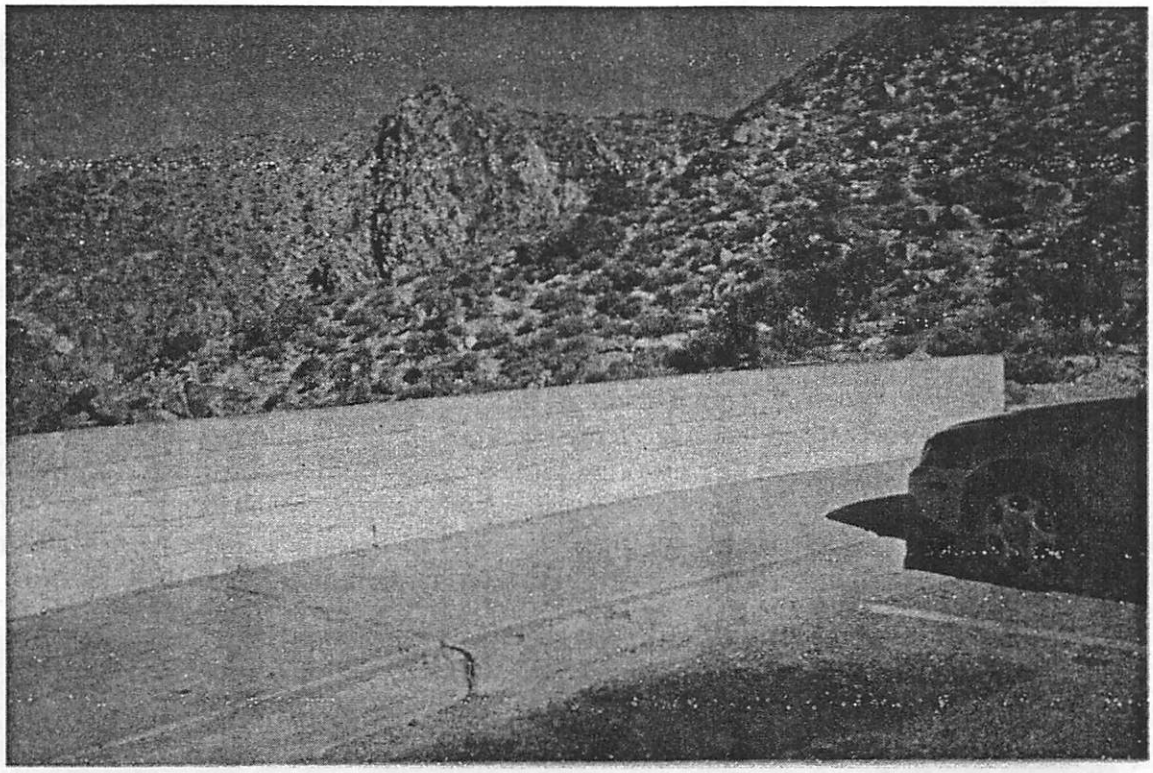

Figure 6. Existing Wall and Area of Proposed Observation Deck

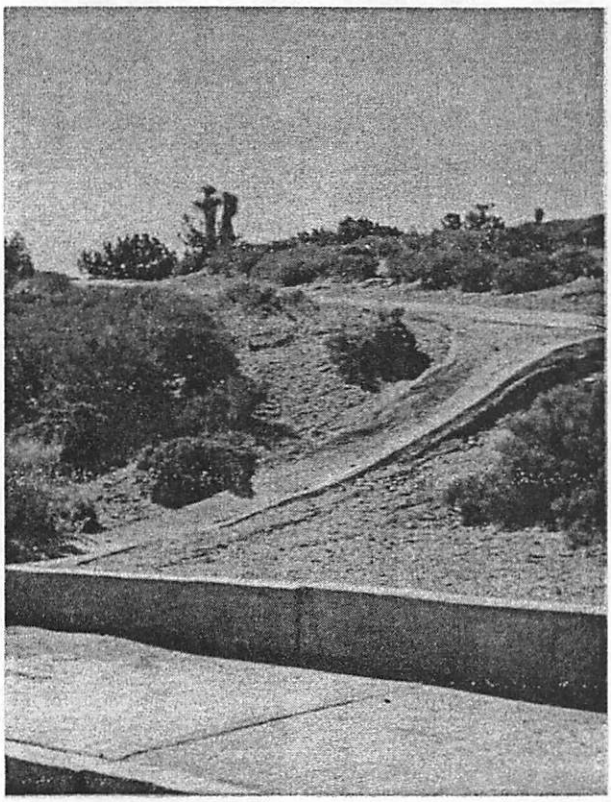

Figure 7. Existing Drainage Swale

An observation deck would replace the existing concrete wall on the southwest side of the Keys View parking area. The proposed deck would be constructed with steel column supports and composite decking composed of wood and recycled plastic . A railing would be placed around the deck. The deck would not disturb additional area, except where the column supports are placed in the ground. There would be no additional disturbance as a result of the work at the Keys View parking area.

Wayside Exhibits

Four wayside exhibits would be constructed as part of the proposed project. These exhibits would include: (1) interpretation of the Quail Mountain fire; (2) the existing exhibit on Joshua trees (Tree of Life exhibit); (3) Wonderland of Rocks; and (4) Juniper Flats. Each of these exhibits would require a turnout or

parking area, except for Juniper Flats, which would utilize the proposed Juniper Flats parking area. The wayside exhibits would be constructed with accessible curb cuts and decomposed granite pads. Following is a description of each new wayside exhibit area.

Quail Mountain Fire

The proposed turnout at approximately mile 0.6 would have a planned exhibit about the Quail Mountain fire. There would be a decomposed granite sidewalk along the turnout, as well as a curb cut for access to the wayside exhibit.

Tree of Life

The proposed turnout at mile 1.4 would have an exhibit entitled "A Tree of Life." This turnout would have a decomposed granite sidewalk along the turnout, as well as a curb cut for access to the wayside exhibit. The standard turnout detail would be revised to minimize impacts to the Joshua trees in this area.

Wonderland of Rocks / Lost Horse Valley

This turnout would be developed at mile 4.3 and connected to a viewing area. An exhibit would be placed at this turnout. There would be a decomposed granite sidewalk along the turnout, as well as a curb cut for access to the trail.

Juniper Flats

This wayside exhibit would be developed at the Juniper Flats parking area. An exhibit would be placed at the parking area and trailhead access.

Turnouts

Three turnouts, in addition to the wayside exhibit turnouts, would be constructed along the length of the road. One would be a reconstruction of the existing universally accessible turnout near Keys View Overlook and the remaining two would be slow vehicle turnouts along the length of the road. The turnouts would also be large enough to accommodate two to three vehicles or a long vehicle and would allow slower moving vehicles to pull over and let traffic pass.

Drainage

Low water crossings and curb cuts would be designed to maintain the existing drainage patterns. Curb cuts for drainages would be 3-foot openings, or would be adjusted based on the existing width of each drainage. The curb openings would have a riprap blanket at the exit point to minimize erosion in the downgradient drainage.

Surface Treatment

Chip sealing and striping would be applied to 17 miles of previously rehabilitated road sections and parking areas, including Route 12 from Milepost 19.55 to the Cap Rock intersection, Barker Dam Road, Route 12 from Keys View Road junction to the Geology Tour Road junction, Route 12 from the North Entrance to the intersection with Pinto Basin Road, and access drives leading to parking areas along these roadways, as well as chip sealing and re-striping of those parking areas.

To begin chip sealing, an asphalt binder would be sprayed on the pavement, then immediately covered by a single layer of uniformly sized chips. The new surface treatment would be rolled to seat the aggregate, and then broomed to remove any loose chips. The road would be opened to traffic after sweeping or may be opened to slow moving traffic almost immediately. Chips consist of aggregate as close to single size as possible. Chip seal work would occur only on the road surface and would not create or require disturbance outside of the road prism.

The actual duration of the work would be as scheduled by the contractor. However, the contractor would be required to complete the chip seal simultaneously within the approved schedule for the reconstruction of Keys View Road. The work must comply with Federal Standard Specification for Construction of Roads and Bridges on Federal Highway Projects FP-96.

Construction Plan Drawings

Detailed preliminary (70% complete) construction plans have been prepared and are included with this biological assessment as a separate document for reference, to more fully comprehend the project scale.

DESCRIPTION OF THE PROJECT AREA

Joshua Tree National Park is located in the Mojave and Colorado Deserts of southern California. It lies along the east-west traverse ranges of the Little San Bernardino Mountains, in San Bernardino and Riverside Counties. The south boundary follows the base of these mountains along the northern perimeter of the Coachella Valley, and the north boundary is defined by the Morongo Basin. Keys View Road is in the Mojave Desert biome of the western portion of the park. This section describes the existing environment along the Keys View Road reconstruction area. Only the natural resource elements relevant to desert tortoise population establishment and maintenance are addressed in this biological assessment. Other elements are addressed in a broader environmental assessment.

Climate

The park is located in an area characterized by an arid upland desert climate with annual extreme temperatures influenced by altitude. Temperatures in the eastern lowlands are frequently above 115 degrees Fahrenheit in the summer. The higher elevations in the western portion of the park have snow in winter and extended periods with nighttime lows well below freezing. Summer storms (July to September) from the southwest or southeast, although

typically local in coverage, can include high winds, lightning, and sometimes heavy rains, which cause flash flooding. While the typical summer humidity is only 20%, it can increase to over 40% with the approach of these storms. The humidity typically falls back to 20% within 12 hours of a storm, unless a large amount of rain results. The majority of the annual precipitation (1 to 7 inches) is from winter rain.

Geology and Soils

As is typical of the western Mojave Desert, Joshua Tree National Park has low, generally east-west trending mountains interspersed with valleys. It is dominated by a crystalline rock terrain with the valleys largely covered by unconsolidated or poorly consolidated Quaternary surface deposits. Rocks in the park are metamorphic assemblages that include Paleozoic and Precambrian rocks, widespread Mesozoic plutonic rocks that range from gabbro to quartz monzonite, and some local Cenozoic basalt. In some places, aplite and pegmatite dikes are associated with granitic plutons.

Keys View Road, a historic mining/ranching road, is the highest road in the park, extending from an elevation of approximately 4,249 feet at the intersection with Route 12 to 5,185 feet at the Keys View Overlook. The surface geology along Keys View Road consists primarily of plutons, ranging in age from middle Proterozoic to Cretaceous, that have intruded the metamorphic complex of rocks that is recognized within Joshua Tree National Park. The metamorphic complex is composed of granitic augen gneiss, the metasedimentary suite of quartzite and dolomite, a dark-colored porphyritic granodiorite-monzogranite, and a metasedimentary suite of quartzite, schist, granofels, and dolomite (NPS 2004). Proterozoic gneiss and Cretaceous White Tank monzogranite are the two primary plutons that comprise the geology along the project corridor, exposed as rock outcrops and boulder piles.

As indicated above, most soils in the park are poorly developed. The eastern half is mostly alluvial with no true soil structure. This granitic fill ranges from boulders to gravel and coarse sand. These are modern deposits consisting of fan gravel and other alluvium being deposited by drainage systems.

Vegetation

A vegetation and wildlife inventory was conducted along the Keys View Road corridor during December 1 – 4, 2003, by engineering-environmental Management, Inc., biologists. The purpose of this field inventory was to: (1) identify and describe plant communities adjacent to the road corridor; (2) prepare a preliminary plant species list for the Keys View Road corridor; (3) record presence/absence of selected non-native species and rare plant species along the corridor; and (4) identify and record important wildlife habitat consisting of rock piles, woody snags, and downed wood, principally, toppled Joshua trees. The discussion of vegetation provided below was taken from the report for this field survey (NPS 2004).

Herbaceous Vegetation and Wooded Herbaceous Vegetation

The herbaceous vegetation types present at Joshua Tree National Park do not fit existing National Vegetation Classification System classifications. These herbaceous types are growing

on sites that have been disturbed historically by fire, road construction and maintenance, and runoff.

Annual Graminoids / Joshua Tree Wooded Herbaceous Vegetation (post-burn). A large area recovering from wildfire occupies a portion of the alluvial fan that lies adjacent to the western edge of Keys View Road. The burn area encompasses the project area from the intersection with Park Road to near the California Hiking Trail crossing. This vegetation type occurred between 4,280 and 4,323 feet in elevation, occupied nearly flat slopes of 1% to 2%, and was oriented to a northerly aspect from 5 degrees to 10 degrees. The unvegetated surface cover predominantly included large and small rocks and bare soil. Evidence of the fire is abundant and includes charred stumps of shrubs and trunks of trees, in addition to standing dead shrubs. A few Joshua trees occupying this area and possibly weakened by the fire have toppled, presumably due to wind-throw following the burn.

Annual herbaceous vegetation present included six weeks grama (*Bouteloua barbatus*) and needle grama (*B. aristidoides*). These species contributed from 4% to 5% foliar cover on the approximately five-year-old burn area. The perennial graminoid big galleta (*Pleuraphis rigida*) contributed less than or equal to 1% foliar cover while the forb species present (e.g., fringed amaranth (*Amaranthus fimbriatus*), filaree (*Erodium cicutarium*), cinchweed (*Pectis papposa*), and apricot mallow (*Sphaeralcea ambigua*)) contributed less than 1% foliar cover per species. Short shrubs associated with this type, along with their contribution to foliar cover, included Nevada joint-fir (*Ephedra nevadensis*) (≤1%), buckhorn cholla (*Opuntia acanthocarpa*) (<1%), Joshua tree (*Yucca brevifolia*) (<1%), and tetracoccus (*Tetracoccus hallii*) (<1%). Creosote bush (*Larrea tridentata*; <1% foliar cover) was also observed within this vegetation type, but the species is uncommon along Keys View Road. Joshua trees comprised a sparse canopy layer contributing 1% to 2% foliar cover over the burned alluvial fan. There were several dead, standing Joshua trees and fire-weakened Joshua trees that are subject to blow-down by wind-throw.

Mixed Forb / Mixed Graminoid Herbaceous Vegetation. The Keys View Road shoulders, which carry runoff from the road surface during precipitation events, supported a largely forb-dominated community of weedy native and non-native plant species. This habitat was typically 3- to 6-feet in width and subject to disturbance by vehicles leaving the paved road surface and grading for roadway maintenance. Foliar cover values for this community were variable from site-to-site, influenced primarily by the amount of runoff water received. A few dwarf and short shrubs of sticky snakeweed (*Gutierrezia microcephala*), brittlebush (*Encelia actoni*), cheesebush (*Hymenoclea salsola*), and California buckwheat (*Eriogonum fasiculatum*) have become established and persist on the road shoulders. The more common native annual and perennial graminoids and forbs that have become established on the shoulder and drainages adjacent to the roadway include three-awn (*Aristida* sp.), squirreltail (*Elymus elymoides*), annual bursage (*Ambrosia acanthicarpa*), desert trumpet (*Eriogonum inflatum*), annual wild buckwheat (*Eriogonum* spp.), wire-lettuce (*Stephanomeria exigua*), amaranth, blazing-star (*Mentzelia* sp.), apricot mallow, lupine (*Lupinus* sp.), and chia (*Salvia columbariae*). Annual forbs and graminoids that have invaded this disturbed habitat include tumble or Jim Hill mustard (*Sisymbrium altissimum*), filaree, ripgut grass (*Bromus diandrus*), red brome (*Bromus madritensis* ssp. *rubens*), and cheatgrass (*Bromus tectorum*). The park controls populations of tumble or Jim Hill mustard using manual methods (e.g., hand pulling) (LaDoux, pers. comm., 2003).

Shrubland

Shrublands and wooded shrublands grow throughout the Keys View Road corridor, occupying alluvial fans, sandy washes, rock outcrops, hills, and ridges. At lower elevations, the shrublands support sparse Joshua trees, in the middle elevations individual and small stands of Joshua trees, California juniper (*Juniperus californica*), and single-leaf pinyon pine may be present, and at higher elevations shrublands support individual California juniper trees and shrubs, with a few Joshua trees present. Many individual shrubs have succumbed to the recent drought affecting the park region.

Blackbrush Shrubland Alliance. The highest elevations of the Keys View Road corridor, including the Keys View Overlook and parking area, supported stands of blackbrush (*Coleogyne ramosissima*) on ridges, hills, rock outcrops, and coarse-grained alluvium composed of gneiss. The blackbrush shrubland alliance extended to some of the lowest elevations of the northern portion of the road corridor, where hills, ridges, and associated coarse alluvium are present. This shrubland was recorded from 4,399 to 5,166 feet in elevation on moderately sloping terrain (2% to 10% slopes), and aspects ranging from 20 degrees to 135 degrees. The unvegetated surface cover within blackbrush shrublands consisted primarily of litter, large rocks, and bare soil. A few Joshua trees and California juniper shrubs grow within the blackbrush shrubland, but typically contribute less than 1% cover. The short shrubs (0.5 to 1.0 meter), and their contribution to foliar cover within this type, included blackbrush (15% – 45%), Nevada joint-fir (≤1%), spiny hopsage (*Grayia spinosa*; 0% – 1%), linear-leaved rabbit-brush (*Ericameria linearifolia*), fourwing saltbush (*Atriplex canescens*; 0% – <1%), Joshua tree (0% – <1%), buckhorn cholla (0% – <1%), hedge-hog cactus (*Echinocereus triglochidiatus*; 0% – <1%), wolfberry (*Lycium* sp.; 0% – <1%), and spiny horsebrush (*Tetradymia spinosa*; 0% – <1%). The understory of blackbrush shrubland consisted of perennial and annual plant species that provided only sparse foliar cover. The perennial bunchgrasses, one-sided blue-grass (*Poa secunda;* 0% – 1%), and big galleta (0% – 1%) were present on southeastern and northeastern exposures, respectively. Annual herbaceous species, along with foliar cover recorded in this type, included six weeks grama (0% – 4%), red brome (<1%), cheatgrass (0% – 2%), filaree (1% – 2%), fringed amaranth (0% – <1%), *Calycoseris parryi* (0% – <1%), *Cryptantha* sp. (0% – <1%), *Loeseliastrum* sp. (0% – <1%), and unknown forb rosettes (0% – 1%). A small amount of crustose lichen (0% – <1%) occupied rocks on one northeastern exposure.

Fourwing Saltbush Shrubland Alliance. A steep fill slope supporting the Keys View Road template has recovered to a Fourwing Saltbush / Cheatgrass Shrubland stand at 5,012 feet in elevation near the southern terminus of the roadway. The fill material originated from the toe slope of a ridge that was cut away to build the roadbed. The borrow material was formerly dominated by Blackbrush Shrubland Alliance species located immediately across the road. The resultant fill slope is moderately steep at 9% and was oriented to a northwestern aspect (340 degrees). The unvegetated surface of the fill slope was primarily composed of litter, large rocks, and small rocks. Fourwing saltbush also formed small, linear stands along the corridor and adjacent to the road where sandy soils occur. Short shrubs contributed greater than 10% foliar cover within this type. These shrubs included fourwing saltbush (10%), blackbrush (<1%), white cheesebush (*Hymenoclea salsola*; <1%), Anderson wolfberry (*Lycium andersonii*; <1%), and Joshua tree (<1%). Graminoids (less than 0.5 meter) were also present

and included the herbaceous non-native annual cheatgrass (4%), the perennial bunchgrasses threeawn (*Aristida* sp.; <1%), Sandberg bluegrass (*Poa secunda;* <1%), and Indian ricegrass (*Achnatherum hymenoides;* <1%). Species of forbs (<0.5 meter tall) included, along with foliar cover, *Calycoseris parryi* (1%), amaranth (<1%), *Cryptantha* sp. (<1%), and apricot mallow (<1%).

Rubber Rabbitbrush Shrubland. Small stands or patches of the short shrub rubber rabbitbrush (*Chrysothamnus nauseosus*) grow adjacent to the Keys View Road pavement, in the shallow roadside drainage ditch and a ditch carrying runoff water from the roadway. Due to the patchy nature of the stands, no foliar cover is included, and the understory is similar to that described in the Mixed Forb / Mixed Graminoid Herbaceous Vegetation community. The number of rubber rabbitbrush shrubs present is estimated between 25 to 50, and they would all be removed by the placement of curb and gutter for the road-widening project, as proposed.

White Cheesebush – Bladder-sage Shrubland. Desert washes with fine, sandy substrates supported a mixed shrub community on their banks and terraces. These washes are small, the channels are typically less than 3.3-feet wide (presence of terraces along the channel may double this width) and are uncommon within the corridor. One wash sampled at the elevation of 4,881 feet had a 3% slope and was oriented to an aspect of 330 degrees. The unvegetated surface was primarily covered by litter and large and small rocks. Short shrubs contributed to wash foliar cover as follows: white cheesebush (30%), bladder-sage (*Salazaria mexicana;* 15%), Nevada joint-fir (3%), spiny horsebrush (3%), and California buckwheat (2%). Graminoids contributed the following foliar cover values: Indian ricegrass (<1%), cheatgrass (3%), and red brome. Annual forb species present in one wash and their contribution to foliar cover included annual bursage (2%) and wire-lettuce (1%).

Wooded Shrublands and Wooded Herbaceous Vegetation

Sparse woodlands are present throughout the Keys View Road corridor and are comprised of Joshua tree, California juniper, and single-leaf pinyon pine trees that generally contribute from 1% to 10% cover in the canopy stratum. The sparsely distributed trees are always associated with understory short shrub and herbaceous species that were typically the dominant plants in a given stand. These wooded shrubland and wooded herbaceous stands were found on most of the substrates adjacent to the road corridor, including alluvial fans, rock outcrops, hills, ridges, drainages, and slopes. Some regeneration of Joshua trees and California juniper is occurring near the road corridor, but no regeneration of single-leaf pinyon pine was observed during the field survey. Many individual California juniper and single-leaf pinyon pine were showing stress or are dying due to drought, parasitism (mistletoe infestations of California juniper), and possibly insect damage. There is relatively common evidence of small mammals foraging on Joshua tree leaves and also stripping the outer bark of some trees. It is presumed that this activity produces moisture for the small mammals, in addition to forage and materials with which to build nests.

California Juniper Wooded Shrubland Alliance. A wooded shrubland characterized by California juniper, Joshua tree, single-leaf pinyon pine, and blackbrush occupied the mid-elevations of the Keys View Road corridor. This vegetation type grew on ridges, hills, rock outcrops, and coarse alluvium from 4,549 to 5,169 feet in elevation. Slopes supporting this type

were moderate to steep (4% – 45% slopes) and were oriented to aspects ranging from 0 degrees to 345 degrees. The unvegetated surface of these stands was predominantly composed of large and small rocks, litter, and bare soil. A sparse woodland canopy composed of California juniper (2% – 7% foliar cover), Joshua tree (<1% –3% foliar cover), and single-leaf pinyon pine (0% – 8% foliar cover) typified this wooded shrubland. The tall shrub stratum was present in some stands and was composed of California juniper (0% – 3% foliar cover), bitterbrush (*Purshia tridentata*; 0% – <1% foliar cover), John Tucker oak (*Quercus john-tuckeri*; 0% – <1%), and Joshua tree (0% – <1% foliar cover). Short shrubs were common in this type and included, along with contribution to foliar cover, blackbrush (0% – 25%), Nevada joint-fir (0% – 2%), California juniper (0% – <1%), Joshua tree (0% – <1%), fourwing saltbush (0% – 1%), cheesebush (0% – <1%), buckhorn cholla (0% – <1%), beavertail cactus (*Opuntia basilaris*; 0% – <1%), bladder-sage (0% – <1%), turpentine-broom (*Thamnosma montana*; 0% – <1%), California buckwheat (0% – 1%), Acton's brittlebush (0% – <1%), and linear-leaved rabbitbrush (0% – 2%). Graminoids associated with this type and their contribution to foliar cover included big galleta (0% – 7%), desert needlegrass (*Achnatherum speciosum*; 0% – 2%), red brome (0% – 2%), cheatgrass (0% – 4%), and six-weeks grama (0% – <1%). Forbs comprising a portion of the understory and their contribution to foliar cover included wire-lettuce (0% – 1%), *Calycoseris parryi* (0% – 4%), chia (0% – 1%), *Eriastrum* sp. (0% – 1%), *Phacelia* sp. (0% – 2%), *Physalis crassifolia* (0% – <1%), filaree (0% – <1%), amaranth (0% – 1%), and *Cryptantha* sp. (0% – <1%).

Joshua Tree Wooded Shrubland Alliance. Alluvial fans of lower and middle elevations along the Keys View Road corridor supported a mixed shrub community interspersed with Joshua trees. Drought related die-off of shrubs and perennial graminoids was common within this vegetation type; however, annual graminoids were present and sometimes abundant in most stands. Sampled sites occupied elevations of 1,313 meters and 1,369 meters with a mild slope of 3%. The stands were oriented to northeastern and northwestern aspects (5 degrees and 330 degrees). Unvegetated surfaces within the stands were composed of large rocks and bare soil, predominantly. The canopy layer (5 meters to 15 meters tall) was composed of sparse Joshua trees that contributed 2% to 3% foliar cover. A variety of short shrubs were present in these stands and included, along with foliar cover contribution, Nevada joint-fir (4%), blackbrush (0% – 2%), cheesebush (0% – 1%), California buckwheat (0% – <1%), buckhorn cholla (<1%), wolfberry (0% – <1%), and Joshua tree (0% – <1%). Graminoids (<0.5 meter tall) also contributed to the foliar cover of this community and included big galleta (<1% – 2%), bush muhly (*Muhlenbergia porteri*) (0% – <1%), six weeks grama (3% – 6%), cheatgrass (<1% – 2%), and red brome (0% – <1%). A few forbs (<0.5 meter tall) were observed within this type and contributed foliar cover as follows: fringed amaranth (0% – <1%), *Calycoseris parryi* (0% – <1%), and unknown forb rosettes (0% – <1%). Crustose lichens that were black in color contributed ground cover (0% – <1%) in one stand.

Joshua Tree Wooded Herbaceous Alliance. Alluvial fans of lower elevations along the Keys View Road corridor supported a graminoid community interspersed with Joshua trees. This community occupies elevations between 4,306 feet and 4,339 feet that grow on mild slopes (2% to 3%). The stands were oriented predominantly to the northwest, with aspects ranging from 325 degrees to 335 degrees. Unvegetated surface cover was composed largely of bare soil, large rocks, and litter. The understory vegetation, particularly graminoids and shrubs, were severely drought-affected with dead vegetation. The canopy layer was composed of the Joshua tree, which contributed 1% to 4% foliar cover to the stands. The tall shrub, Anderson

wolfberry, contributed 5% foliar cover. Short shrubs contributed to stand foliar cover as follows: Nevada joint-fir (0% – 3%), fourwing saltbush (<1% – 2%), spiny horsebrush (0% – <1%), beavertail cactus (0% – <1%), buckhorn cholla (<1%), and wolfberry (0% – <1%). Although graminoids are common in this type, their contribution to foliar cover has been reduced by drought, and their contributions to foliar cover, were as follows: big galleta (<1% – 6%), six-weeks grama (4% – 6%), cheatgrass (0% – 2%), and red brome (0% – <1%). Species of forbs for this type and their contribution to foliar cover included amaranth (0% – <1%), filaree (0% – <1%), cinchweed (0% – 1%), *Eriastrum* sp. (0% – <1%), *Calycoseris parryi* (0% – <1%), and unknown forb rosettes (<1% – 1%).

STATUS OF LISTED SPECIES / CRITICAL HABITAT WITHIN THE PROJECT VICINITY

The U.S. Fish and Wildlife Service has confirmed through personal communication that the only species of concern for this project is the desert tortoise. This species' habitat and status within the project area is discussed below.

Desert Tortoise

Background and Biology

Desert tortoises (figure 8) are distributed from southeastern California, southern Nevada, and extreme southwestern Utah, through western and southern Arizona and northern Mexico (NatureServe 2003). They generally occupy habitat receiving an average annual rainfall in excess of 4 inches (10.1 cm) and below 12 inches (30.4 cm). In the northern periphery of their range, desert tortoise typically occur at elevations between 3,500 and 5,000 feet (NatureServe 2003). The desert tortoise exhibits significant morphological and genetic variation throughout the range (NatureServe 2003). Populations occurring west of the Colorado River are thought to be distinct from those east of the river in morphology, genetics, behavior, and ecology (Lamb et al. 1989 and Lamb et al. 1994 in NatureServe 2003).

The U.S. Fish and Wildlife Service listed the Mojave population of the desert tortoise (north and west of the Colorado River) as endangered under emergency listing procedures enacted in August 1989. In 1990, the desert tortoise was listed as threatened under normal listing procedures (*Federal Register* April 2, 1990, and NatureServe 2003).

The desert tortoise is predominantly herbivorous and a semifossorial inhabitant of warm upland plateaus and mountain slopes in the Mojave Desert. In the Mojave Desert, the desert tortoise occupies creosote bush scrub and the creosote bush – white bursage communities. The native grass, big galleta, is often present where the desert tortoise is most abundant. In general, desert tortoises forage primarily on native winter and summer annual plants (dicots and grasses), perennial grasses, cacti, and perennial shrubs in descending order of preference. Insects, caterpillars, and other insect larvae may also be eaten, and desert tortoises have been observed biting road-killed anurans and lizards (Brown 1968, Okamoto 1995 in NatureServe 2003). It has been suggested that an active adult desert tortoise requires about 45 pounds of herbaceous forage per month (NatureServe 2003).

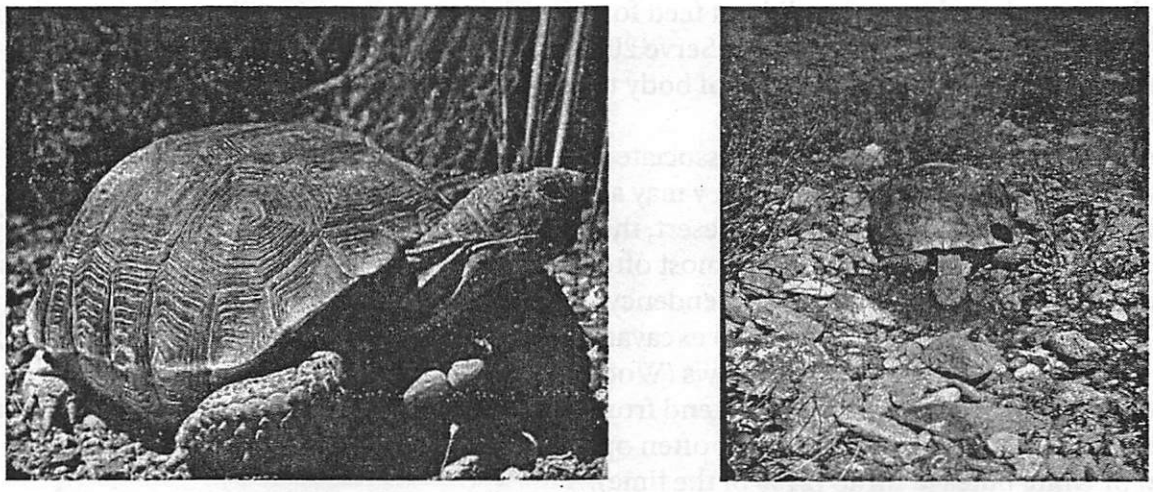

Figure 8. Desert Tortoise (Gopherus agassizii)

Optimal diet items include forbs, which are higher in protein, carbohydrate, lipids, calcium, crude fiber, and water. Forbs known in desert tortoise diets include *Eriogonum inflatum, Astragalus nuttallianus, Plantago insularis, Erodium cicutarium, Krameria parvifolia, Amsinckia* sp., *Camissonia* sp., *Descurainea* sp., *Lotus* sp., *Lupinus* sp., *Malacothrix* sp., *Gilia* sp., *Mentzelia nitens*, and *Nama* sp. Annual grasses important in desert tortoise diets are largely non-natives and include *Bromus rubens, Schizmus barbatus, Festuca octoflora*, and the native *Bouteloua barbata*. Perennial grasses provide food, but also provide shelter, soil retention, and a longer growing season; these species include *Hilaria (Plueraphis) rigida, Muhlenbergia porteri*, and *Oryzopsis hymenoides*. *Sphaeralcea ambigua*, a shrub, is regularly ingested by the desert tortoise, and *Opuntia basilaris* buds, flowers, and fruits are also seasonally ingested (Berry 1978 in NatureServe 2003).

Desert tortoises may sometimes ingest high-calcium materials such as limestone pebbles, caliche from layers along embankments, soil, and bones. The ingestion of calcium is most frequently observed in adult females and possibly in growing juveniles (Esque and Peters 1994, Marlow and Tollestrup 1982 in NatureServe 2003).

Desert tortoises generally forage on native winter and summer annuals (dicots and grasses), perennial grasses, cacti, and other vegetation including a few perennial shrubs. Big galleta provides significant forage for adults and, along with Indian ricegrass, is often associated with high tortoise densities. Forbs, which have been identified in the diet of desert tortoises and which were observed in the project area during the botanical survey, included *Eriogonum inflatum, Erodium cicutarium, Lupinus* sp., and *Mentzelia* sp. (NPS 2004). Perennial grasses provide food, shelter, soil retention, and a longer growing season; such species reported in this survey include *Hilaria (Plueraphis) rigida, Muhlenbergia porteri*, and *Achnatherum hymenoides*. *Sphaeralcea ambigua*, a shrub, is regularly ingested by the desert tortoise, and *Opuntia basilaris* buds, flowers, and fruits are also seasonally ingested (Berry 1978 in NatureServe 2003). Both of these taxa were present along Keys View Road (NPS 2004).

Adult desert tortoises in the Mojave Desert are typically active from March through September, with a total active period of about four to five months per year. During the spring season in the Mojave Desert, tortoises were observed to be active for about three hours every

fourth day, and some tortoises did not feed for several weeks following spring emergence from dens (Behler and King 1979 in NatureServe 2003). Desert tortoises were found to operate within the 25° – 35° Centigrade range of body temperatures.

Desert tortoise habitat is most often associated with well-drained sandy loam soils of plains, alluvial fans, and bajadas, although they may also occur along the edges of basaltic flow and other rock outcrops. In the Mojave Desert, the sandy loam soils may be obscured by a veneer of desert pavement, and burrows are most often proximate to washes and arroyos under these conditions. The desert tortoise has a tendency to excavate and utilize more than one burrow and juveniles are particularly prone to excavate multiple burrows (mostly under large shrubs) and also use abandoned rodent burrows (Woodbury and Hardy 1948, Luckenbach 1982 in NatureServe 2003). Burrows often extend from 1- to 8-feet in length and have a single opening. For the Mojave Desert, burrows most often open under a creosote bush (59% to 77% of the time) or white bursage shrub (21% of the time).

Winter burrows are more properly called dens and are extensive, up to 30-feet in length. These dens open to southern exposures and are often subject to communal use by several individuals. Dens are typically excavated beneath caliche or sandstone rock shelves along wash banks (figure 9) (Woodbury and Hardy 1948 in NatureServe 2003).

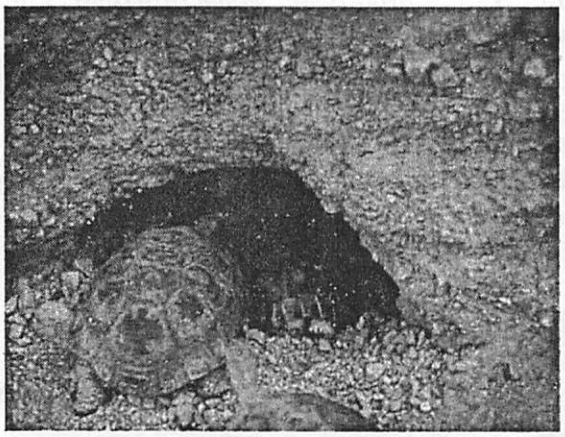

Figure 9. Desert Tortoise Den Constructed Under Caliche

Mating occurs from August through October, and again in April and May. The females may store sperm from the prior fall mating or even from prior years of mating. However, fertility declines as time since mating increases. Desert tortoise eggs are laid mainly from May to early July in shallow depressions, often 3- to 4-inches deep. Clutch sizes are normally 3 to 7 eggs, but up to 15 eggs have been observed in a nest. Most commonly, Mojave Desert tortoises construct egg nests inside the first 2 feet of the burrow floor, in the soil apron surrounding the burrow entrance, or in the shade of a shrub adjacent to the burrow. Newly hatched desert tortoises emerge from the nests in September and 83% of neonatal tortoises excavated new burrows or enlarged pre-existing rodent burrows in their first weeks (Niblick et al. 1994, Turner et al. 1984, Turner et al. 1986, USFWS 1994 in NatureServe 2003).

Habitat Assessment

Prior to the listing of the desert tortoise in 1990, two surveys were completed to determine the locations and densities of desert tortoise populations throughout the park (NPS 1994). Most areas in the park do contain some desert tortoises. Recent surveys by park staff have found that the desert tortoise is more widespread and densities in some areas are higher than previously thought. Desert tortoise densities in Joshua Tree National Park range from zero in rugged mountain areas to 240-per square mile in the Pinto Basin (well east of the project area).

In 1991, park staff established four 1-square kilometer permanent trend plots. A fifth was established in 1994. Each site is visited at least 10 times per season (one day per week). More than 400 desert tortoises have been marked and their age, sex, weight, and location have been recorded.

In 1992, a desert tortoise survey was completed along the corridor from the Quail Springs intersection to the Geology Tour Road intersection. This study included desert tortoise populations that might be affected by road reconstruction and other projects. Results indicated that few desert tortoises live in the surveyed area. Of the 80 transects line-walked, 62 had no tortoise sign. Very little sign was found in the remaining 18 transects, indicating low densities. Two of the locations showed fresh tortoise sign. The study concluded that the area was not very densely populated by desert tortoises and that road reconstruction could proceed. A more intense study of a 500-square meter area west of Hidden Valley in 1993 confirmed low desert tortoise density.

The Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994) recognized six evolutionarily significant units within the Mojave population, and subsequently referred to these evolutionarily significant units as the various recovery units. The desert tortoise populations at Joshua Tree National Park are within the western Mojave recovery unit. The recovery plan (USFWS 1994) also proposed two types of desert tortoise conservation areas, both of which have components that include Joshua Tree National Park. The first of these is a Desert Wildlife Management Area (DWMA)—an administrative area within the recovery unit that is managed so that reserve-level protection is afforded desert tortoise populations while maintaining and protecting other sensitive species and ecosystem functions. Joshua Tree National Park is included in the Joshua Tree DWMA. The second type of designation put forth by the recovery plan (USFWS 1994) is that of critical habitat. Critical habitat for listed species consists of: (1) the specific areas within the geographical area occupied by the species at the time it is listed, in accordance with the provisions of section 4 of the Endangered Species Act, on which are found those physical or biological features (constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species (Endangered Species Act, section 3 (5)(A)). The Pinto Mountain critical habitat unit lies to the north of Joshua Tree National Park. The northernmost reaches of the Chuckwalla critical habitat unit extend into the south-central portions of the park. The Keys View Road reconstruction area lies well outside either of these designated critical habitat units (substantially south of Pinto Mountain and west of Chuckwalla).

Keys View Road Habitat Survey Results

Methods. All clearance surveys (buffered 30 feet from the edge of the construction zone) and zones of influence belt-transect surveys, extending up to 2,400 feet from the construction zone, were accomplished from April 1 to June 12, 2003. The techniques applied in these surveys were based on information from *Field survey protocol for any federal action (or non-federal action) that may occur within the range of the desert tortoise* (USFWS 1992), and

Guidelines for Handling Desert Tortoises (DTC 1999). Parallel belt-transects were created at 100 feet, 300 feet, 600 feet, 1,200 feet, and 2,400 feet distances (the zone of influence distances recommended in USFWS 1992) from the road's centerline. In the construction footprint, a 30-foot adjoining buffer zone was examined using 100% survey techniques (USFWS 1992). Belt-transects were navigated using a Compaq iPAQ pocket PC with Global Positioning System capabilities (with accuracies of 2 to 5 meters) using Arcpad 6.01 mapping software.

One member of the survey crew navigated along each transect line using the Arcpad mapping screen, while the other followed, examining approximately 15 feet on each side of the line. All forms of tortoise sign were classified according to the U.S. Fish and Wildlife Service recommended information index for desert tortoise sign techniques (USFWS 1992). All signs of tortoise activity were recorded in Universal Transverse Mercator (UTM) coordinates in North American Datum 83 (NAD 83) and were entered into ArcView 3.2a for analysis. All tortoise sightings, including those from the surveys and the park's sighting database that fell within the zone of influence area, were considered for analysis. A 500-meter buffer, with intersecting edges being dissolved, was then created around all visitor sightings, tortoise survey sightings, and type-1 (active) burrow points. This buffer size was used based upon recommendations of biological technicians who worked on the previous two road projects. Using the clip tool in ArcView, all areas where the buffers intersected with the proposed construction footprint were classified as priority mitigation zones.

Results. One adult desert tortoise, seven burrows, and two scats were found, all in lower elevations of the proposed project area. No desert tortoises or tortoise sign were found within the 100% coverage area (i.e., 30-foot construction footprint zone). In the 100-foot zone of influence two type-2 burrows and one class-5 scat were found, all within fairly close proximity to each other. The 1,200-foot zone of influence produced only one type-4 burrow and one class-3 scat. Within the 2,400-foot zone of influence an adult male desert tortoise was located, and in the immediate vicinity of this location were three type-1 (active) burrows. Additionally, a type-4 burrow was found elsewhere along the 2,400-foot zone of influence. Since the only significant or more recent signs of desert tortoise activity (tortoise sightings and active burrows) were found on the 2,400-foot zone of influence line, the 500-meter buffer analysis applied around these points yielded no priority mitigation zones within the proposed construction footprint.

Discussion. The Keys View Road reconstruction area would traverse all of the vegetation types previously discussed. Construction along this existing roadway would primarily affect previously disturbed, rarely used habitat. Any desert tortoise population that may have historically occurred along the roadway has already experienced impacts, evidenced by the paucity of signs of current habitation. This area immediately adjacent to the roadway can be considered mostly uninhabited and abandoned habitat.

Although it is believed that much of the vegetation community bordering the area of proposed construction is poor habitat or of little value to the desert tortoise, there is still a small population of desert tortoises present at distance from the road. Survey results indicate an active desert tortoise area along the 2,400-foot zone of influence, just north of Juniper Flats Road (closed). This location is approximately 0.75 kilometer distant from Keys View Road. Some desert tortoises, especially males, make long-range (typically greater than1 kilometer) movements (Sazaki et al. 1994) outside their typical home ranges. Figure 10 shows the location

of this desert tortoise and the active burrows found in the immediate vicinity. It is also worth noting on the figure the signs (two type-2 burrows, one class-5 scat) found along the 100-foot zone of influence. There appears to be two groupings of sign in fairly close proximity to each other (> 0.75 kilometer), the recent and active group out at the 2,400-foot zone, and the other inactive group much closer to the road at the 100-foot zone. Considering these locations and the lack of desert tortoise sign found elsewhere throughout the survey area, it is most likely that desert tortoise movements would occur across or in close proximity to the proposed Keys View Road reconstruction area just north of Juniper Flats Road.

CONSERVATION MEASURES

The National Park Service project manager would ensure that the project is completed in accordance with the parameters established in the compliance documents and that conservation measures are properly implemented. The conservation measures discussed in this section are those related to minimizing impacts on desert tortoise populations. Effects to the desert tortoise from the proposed action have been evaluated assuming the implementation of these conservation measures.

Water and Air Quality

Best management practices for drainage and sediment control, as identified and utilized by the Federal Highway Administration and the National Park Service, would be implemented to prevent or reduce nonpoint source pollution and minimize soil loss and sedimentation in drainage areas. Use of best management practices in the project area for drainage area protection would include all or some of the following actions, depending on site-specific requirements:

- Keep disturbed areas as small as practical to minimize exposed soil and the potential for erosion.
- Locate waste and excess excavated materials outside of drainages to avoid sedimentation.
- Install silt fences, temporary earthen berms, temporary water bars, sediment traps, stone check dams, or other equivalent measures (including installing erosion-control measures around the perimeter of stockpiled fill material) prior to construction.
- Conduct regular site inspections during the construction period to ensure that erosion-control measures were properly installed and are functioning effectively.
- Store, use, and dispose of chemicals, fuels, and other toxic materials in an appropriate manner.
- Revegetate disturbed areas as soon as possible after construction is completed.

Fugitive dust would be reduced to the extent possible by periodic water sprinkling or the addition of an approved dust palliative.

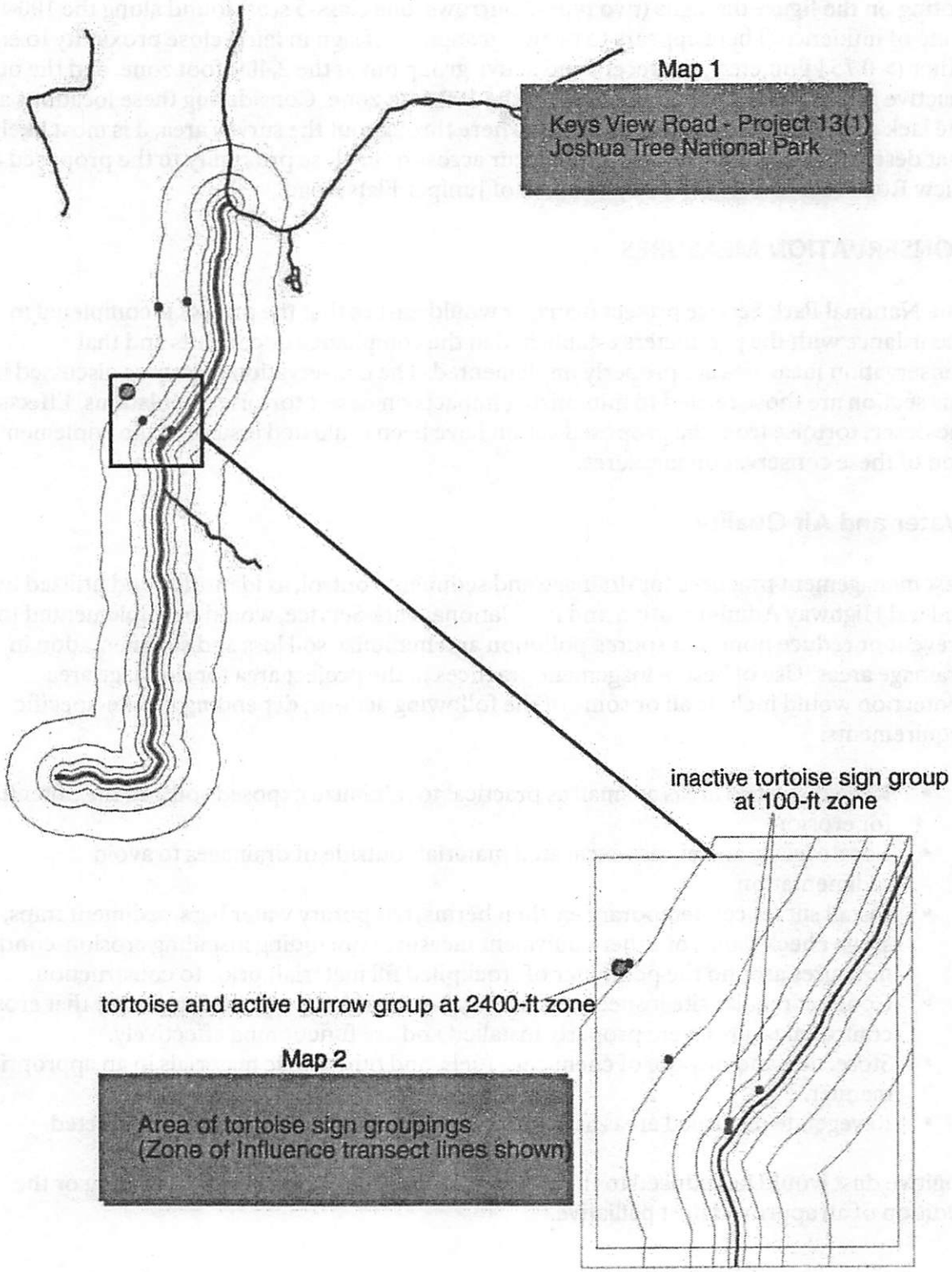

Figure 10. Location Map of Desert Tortoise and Burrows

Revegetation

For much of the corridor, construction would be completed in previously disturbed areas of the roadway template. Contractor staging would utilize previously disturbed areas such as the Cap Rock and Juniper Flats parking areas, where the soils and vegetation are already impacted by existing facilities and human activity. Areas disturbed by the project would be revegetated, and previously disturbed areas removed from roadway use, would be rehabilitated (e.g., informal turnouts). Revegetation would use desert soil conserved along the corridor and native species from genetic stocks originating in Joshua Tree National Park. Revegetation efforts would also attempt reconstruction of the natural spacing, abundance, and diversity of native plant species. A variety of native plants would be removed, temporarily placed in plant nurseries, and relocated onto reclaimed sites, both during the reconstruction and post-project. No imported topsoil (desert soil) or hay bales would be used during revegetation, in an effort to avoid introduction of non-native plant species or inappropriate genetic stock of native plant species. Vegetation impacts and potential compaction and erosion of bare soils would be minimized by replacement of topsoil in as near the original location as possible, scarification, mulching, and seeding/planting with species native to the immediate area. Desert soil crust replacement techniques would be implemented to reestablish desert crust surface and minimize impacts from invasive species that establish on disturbed sites. Revegetation success monitoring, as well as non-native species observation and management, would occur upon completion of reclamation.

Desert Tortoise

Conservation measures that would be implemented to minimize adverse effects to the desert tortoise, including habitat loss, degradation, and fragmentation; direct mortality from construction activity; common raven (*Corvus corax*) predation; and continued vehicle use on the project road, would include the following:

- Only qualified and/or authorized biologists, as appropriate, would be utilized for oversight of all activities within the roadway corridor. The National Park Service would submit the names and qualifications of proposed authorized biologists to the U.S. Fish and Wildlife Service for review and approval at least 15 days prior to initiation of surface-disturbing events. No project-related activity would commence unless one or more authorized biologists have been selected.

- An individual would be designated the field contact representative to oversee project compliance and coordination. The field contact representative would coordinate with the U.S. Fish and Wildlife Service and be authorized to halt any activity that may endanger desert tortoises.

- The field contact representative would be present during all monitoring/survey efforts, road improvements, and parking/turnout area construction.

- Only the authorized biologists, approved by the U.S. Fish and Wildlife Service, would be allowed to handle/relocate desert tortoises.

- Results of presence-absence surveys conducted in April to June 2003, will be over one year old by the time construction activities begin. Since the U.S. Fish and Wildlife Service considers survey results to be valid for no more than one year, additional presence-absence surveys would be conducted again by the authorized biologist(s) in the spring/early summer of 2004. Clearance surveys within the immediate zone of the project area would be conducted by the authorized biologist(s) immediately prior to surface disturbance. All potential desert tortoise burrows within 100 feet of the designated routes, parking/turnout sites (existing or proposed), or staging areas, would be examined. At the completion of the road reconstruction, all materials used to mark or identify the desert tortoise burrows would be promptly removed.

- Any desert tortoise relocated or otherwise removed from areas undergoing road reconstruction would be handled in accordance with the procedures described in *Guidelines for Handling Desert Tortoises During Construction Projects* (DTC 1994, revised 1996). All desert tortoise would be translocated the minimum distance practicable, within appropriate habitat, to ensure the animal's safety and survival.

- Temporary tortoise-proof fencing would be established around all staging areas. The fence would consist of a non-breachable barrier and support structures. Galvanized hardware cloth of 0.5-inch diameter, and at least 18-inches high, would be firmly secured along the base of the fence in direct contact with the ground. Fence placement and construction would be supervised and approved by the field contact representative. All desert tortoise fencing would be dismantled and transported from the site following project completion.

- Temporary fencing established around staging areas would be inspected at least weekly, and corrective action taken to maintain the integrity of the desert tortoise barrier.

- Fenced staging areas would be gated with a desert tortoise exclusion device. This gate would remain closed at all times, except when vehicles are entering or leaving the staging area. If it is deemed necessary to leave the gate open for extended periods of time (e.g., during high traffic periods), the gate may be left open as long as a desert tortoise monitor is present. This desert tortoise monitor would report any desert tortoise activity to the authorized biologist who, in turn, would take appropriate remedial actions.

- Tortoise trots, or notches cut in the curbing to allow tortoises to exit the paved road, would be constructed every 30 meters. The lip of each tortoise trot would not exceed one-inch in height from the pavement surface to facilitate egress by desert tortoises.

- The National Park Service would implement the monitoring program that was reviewed and approved by the U.S. Fish and Wildlife Service for the previous road project (JOTR 291). This program would monitor for three years following completion of the road work and would assess the potential effects of curbing on tortoise movement/survival. Annual reports, submitted to the U.S. Fish and Wildlife Service, would summarize findings (e.g., tortoise sightings and behaviors, any injuries or deaths, ongoing habitat changes/disturbance), evaluate curb/trot effectiveness and

adequacy, and provide recommendations, as appropriate, to facilitate tortoise passage across the newly improved roadways.

- Any project-related vehicle or equipment operating on unpaved roads would not exceed a speed limit of 25-miles per hour.

- Offroad, cross-country travel would not be authorized, except under life-threatening / emergency situations.

- The field contact representative would conspicuously stake, flag, or mark work area boundaries (including the new access roads, realignments, and parking/turnout areas) to minimize surface disturbance to the surrounding habitat. Material stockpiling, machinery storage, and vehicle parking would only be permitted in designated areas.

- The contractor must protect against intrusion by the desert tortoise at sites with potential hazards (auger holes, steep-sided depressions, etc.).

- A desert tortoise education program would be presented by the field contact representative to all construction personnel prior to any construction activities. Following the onset of construction activities, any new employees would be required to formally complete the desert tortoise education program prior to working onsite. At a minimum, the desert tortoise education program would cover the following topics: (1) desert tortoise distribution/occurrence; (2) general behavior and ecology; (3) sensitivity of the species to human activities; (4) legal protection; (5) penalties for violation of state or federal laws; (6) reporting requirements; and (7) project protective mitigation measures.

- The field contact representative would maintain a complete record of all desert tortoise encounters. The record would include location, date, time, life history, general condition, identification numbers, and action taken. Within 90 days following the completion of this project, a report of all field contact representative activities and actions would be submitted to the U.S. Fish and Wildlife Service.

- No pets or firearms would be permitted inside the project's construction boundaries or other associated work areas, at any time.

- Upon completion of this project, all materials and vehicles/equipment would be removed from the project area.

- The estimated 5.0 acres of habitat disturbance would be mitigated through the restoration of 1.5 acres in the project area and through the purchase of 10.0 acres of land (a previously uncommitted portion of the 80.0 acres already purchased by Joshua Tree National Park for the purpose of mitigating other road rehabilitation projects).

A palliative, approved by the U.S. Fish and Wildlife Service, would be used to mitigate fugitive dust.

- No chemicals or cleaning agents would be used in the road corridor without prior approval of the U.S. Fish and Wildlife Service.

- A litter control program would be implemented during construction to eliminate the accumulation of trash, to avoid attracting common ravens that may prey on juvenile desert tortoise. All trash and food items would be promptly contained in raven- and coyote-proof containers provided by the contractor. These containers would be transported to an appropriate disposal location outside the park on a daily basis.

EFFECTS OF THE ACTION

This section provides an analysis of the effects of the action to desert tortoise populations as a result of the Keys View Road reconstruction.

During the Keys View Road reconstruction, increased levels of human activity, noise, and the ground vibrations produced by vehicles and heavy equipment would increase the potential for desert tortoises to be disturbed or killed. Continued road use and the road widening and curve straightening that would likely increase speeds on the road may result in ongoing potential to harm or harass tortoises trying to cross the road. However, such potential would be considered to be minimal because this road has been in use for a long time, the tortoise density along the road is low, and the impacts would be present regardless of the road improvement. While the road is being widened, it is also being curbed, which would in effect reduce the lateral impacts of the road to tortoises. The construction of tortoise trots to facilitate passage of tortoises across the road would reduce the likelihood of tortoises becoming trapped on the road, further reducing the potential adverse impacts of the project. Social trailing from the new turnouts, which would have the potential to disturb tortoise and their habitat, would be discouraged. Beneficial impacts would occur over both the short and long term as a result of various erosion control measures. The reclamation of potential desert tortoise habitat at various sites within the project area total 1.5 acres and restoration of 10.0 acres of purchased land would compensate for the 5.0 acres of new disturbance associated with the project.

Table 1 provides a summary of environmental consequences related to specified activities within the Keys View Road reconstruction area. The reader is encouraged to review the construction plan drawings to fully understand the summary table.

CUMULATIVE EFFECTS

This section considers cumulative effects, as defined by both the National Environmental Policy Act and the Endangered Species Act. Past, present, and reasonably foreseeable future activities, whether privately funded or funded by some level of government (i.e., local, state, federal), and which have the potential to impact desert tortoises or their habitat in the vicinity of the project are considered. In addition, past, present, and future projects in or near the park are considered for their cumulative effect on desert tortoises or their habitat on a regional basis.

Activities Proximal to Project Area

Current and past activities, at least a portion of which were in the vicinity of Keys View Road, include:

- Rehabilitation of Park Boulevard (Route 12) from Quail Springs picnic area to Cap Rock intersection. Activities and impacts for this project are similar to those described for the Keys View Road reconstruction.

Table 1. Activity Table Depicting the Summary of Potential Environmental Consequences

Activity	Description	Short-Term Impacts	Long-Term Impacts
Cap Rock Parking Area	• expansion • shift to south • reclamation of abandoned portion	Short-term adverse effects possible due to increased activity, use of heavy equipment, and related disturbances.	Long-term adverse impact due to continued road and parking area use, and to reduction of potential habitat. Long-term beneficial impact due to potential habitat restoration.
Juniper Flats Parking Area	• movement and expansion to west and north • installation of exhibit • recovery of abandoned portion	Short-term adverse impacts possible due to movement of machinery along road to reach the site, and to increased activity, use of heavy equipment, and related disturbances.	Long-term adverse impact due to continued road and parking area use and to reduction of potential habitat. Long-term beneficial impact due to habitat restoration.
Lost Horse Mine Road	• pave access road apron	This improvement would occur within the current footprint of the access road. Short-term adverse impacts possible due to movement of machinery along road to reach this site. Beneficial impacts may result from erosion control and reduced spread of impact.	All activities within current footprint. Long-term impact due to continued road use. Beneficial impacts due to long-term erosion control.
Borrow Pit Access Road	• 12-foot curb cut and gravel to grade	No potential for adverse impacts as this area would not be used for staging or material storage or hauling.	No staging or long-term use of this area expected related to this project.
Keys View Parking Area	• reconstruction • sidewalk extension • remove drainage swale and recontour • build deck	Short-term adverse impacts possible due to movement of machinery along road to reach the site, and increased activity, use of heavy equipment, and associated disturbances.	Long-term adverse impacts possible through continued use of road and parking area.
Turnouts and Wayside Exhibits	• Quail Mountain Fire • Tree of Life • Black Brush Hillside (turnout only) • Wonderland of Rocks / Lost Horse Valley	Short-term adverse impacts possible due to movement of machinery along road to reach the site, and increased activity, use of heavy equipment, and associated disturbances.	Long-term adverse impact due to continued road and turnout use, and to reduction of habitat. Possibility for long-term adverse impact due to increased social trailing from new turnouts.
Drainage	• low water crossings • curb cuts	Short-term adverse impacts possible due to movement of machinery along road to reach these sites, and increased activity, use of heavy equipment, and associated disturbances.	Long-term, adverse impacts due to continued road use. Beneficial effects may result from erosion control efforts and designs to maintain existing drainage patterns.
Roadway Widening and Realignments	• widen road to 22 feet • horizontal and vertical alignment shifts	Most realignments would occur within current disturbed footprint, but some would be outside the footprint. Potential short-term adverse impacts due to movement of machinery along road to reach these sites, and increased activity, use of heavy equipment, installation of curbing and regarding of road shoulders, and associated disturbances.	Most realignments would occur within current disturbed footprint, but some would be outside of the footprint. Long-term impact due to continued road use.

Table 1. Activity Table Depicting the Summary of Potential Environmental Consequences

Activity	Description	Short-Term Impacts	Long-Term Impacts
Curb and Tortoise Trots	• curbs on both sides of road • tortoise trots every 30 meters	All impacts within disturbed footprint of current road. Potential short-term adverse impacts due to use of heavy equipment.	All impacts within current road footprint. Long-term adverse impact due to continued road use. Beneficial impact due to reduced occurrence of informal turnouts and associated disturbances.
Striping and Chip Sealing	• 7.0 miles of Route 12/Park Boulevard and Barker Dam Road • 5.5 miles of Route 12/ Keys View Road to Geology Tour Road	All impacts within the current footprint. Short-term impacts related to the potential toxicity of road striping and chip sealing materials; however, the chip seal would be covered immediately with chips. Potential for short-term impacts due to sticky nature of substances used; however, the sticky substances would be covered immediately with chips.	No long-term impacts expected.

- Rehabilitation of the main park road, from Cap Rock intersection to the Geology Tour Road (in progress). Activities and impacts for this project are similar to those described for the Keys View Road reconstruction.

Projects In or Near Joshua Tree National Park, but Distant from Project Area

Past Actions. The following past actions could contribute to cumulative effects on a regional basis:

- archaeological surveys initiated in the northwestern section of the park in 2001, as part of a proposed multi-year program of site testing to identify and evaluate the significance of sites in the area so that their eligibility for inclusion in the National Register of Historic Places could be determined
- replacement of 139 outhouses over the past 8 years

Current and Future Actions. Current and projected future actions that could contribute to cumulative effects on a regional basis include:

- future phases of road projects in Joshua Tree National Park include Indian Cove, Pinto Basin, and South Road rehabilitations
- possible redesign and relocation of park headquarters and visitor center
- installation of wayside exhibits throughout the park
- continued development of private lands near the park

Most areas within the park do support desert tortoises (NPS 1994), with densities ranging from zero in rugged mountain areas to 240 per square mile in the Pinto Basin. The potential for the projects discussed above to cumulatively impact desert tortoise populations or habitat on a regional basis depends on the scope of the specific project and its location relative to desert tortoise densities. Data on tortoise densities on private lands outside the park are not available; however, tortoises are known to occur in the area and such activities undoubtedly would have some level of adverse impact on tortoise populations. For those project planned within the park, road reconstruction in the Pinto Basin area, where desert tortoise populations are highest, would have the greatest potential to contribute to adverse impacts on a regional basis without proper mitigation. Future activities within the park, such as the road project in Pinto Basin, would be subject to section 7 consultation. The adverse impacts of the Keys View Road reconstruction would be a minor component of the overall cumulative impact of actions in the region.

AMOUNT AND EXTENT OF TAKE ANTICIPATED

The Keys View Road reconstruction would generate new disturbance of approximately 5.0 acres over the entire stretch of the road. This disturbance would include any disturbance (paving, shoulder support, cut/fill slopes, ditches) that extends beyond the existing edge of road/roadside berms (4.0 acres) and existing parking areas (1.0 acre). Approximately 1.5 acres of abandoned portions of parking areas and informal turnouts would be rehabilitated.

One adult tortoise, seven burrows, and two scats were found during the survey. All of the recent signs of desert tortoises were found on the 2,400-foot zone of influence line outside of the active construction zone. Tortoises on the surface within the construction limits could be killed or injured by construction vehicles unless they are moved during clearance surveys. In addition, tortoises could be harassed by construction noise, interruptions to normal behavior, and being moved into the construction zone. Conservation measures proposed to reduce the potential adverse effects associated with project activities include: (1) pre-construction clearance surveys, (2) survey/removal activities during construction in months when desert tortoises are active, (3) conducting an education program for all project employees, and (4) establishment of a litter control program during construction. Nonetheless, it is possible that during rain events, when desert tortoise movements typically increase, individuals may move onto the project site. Stringent handling procedures would be implemented in removing these animals from the project area. Only the authorized biologists, approved by the U.S. Fish and Wildlife Service, would be allowed to handle/relocate desert tortoises. Given the small number of individuals anticipated to be in the project area, this harassment rate is not expected to exceed three animals over the course of the project. After the project is completed, there would be a continued threat to desert tortoises from vehicular take. Based on local population estimates and casual observations along this stretch of road, it is estimated that one individual per year may have to be moved for the duration of the use of the road.

DETERMINATION OF EFFECT

The proposed project, Keys View Road reconstruction, would occur in an area of the park that does not support high densities of desert tortoises. All activities would occur within a zone that, due to past and current disturbance, is considered to be low-quality habitat that is minimally inhabited. Impacts to individuals and habitat in the project area would be minimized through proposed conservation measures. The project would not impact any critical habitat areas and any impacts in the project area are unlikely to measurably affect the desert tortoise meta-population. However, adverse impacts at the individual tortoise and local habitat levels may occur. Therefore, the determination of effect on the desert tortoise for implementation of the Keys View Road reconstruction is "may affect, likely to adversely affect."

SUMMARY AND CONCLUSION

Although it is believed that much of the vegetation community bordering the area of proposed construction is poor habitat or of little value to the desert tortoise, there is still a small population of desert tortoises present at a distance from the road. There appears to be two groupings of sign in fairly close proximity to each other (> 0.75 kilometer), the recent and

active group at the 2,400-foot zone, and the other inactive group much closer to the road at the 100-foot zone. Considering these locations and the lack of desert tortoise sign found elsewhere throughout the survey area, it is most likely that desert tortoise movements would occur across or in close proximity to the proposed Keys View Road reconstruction in the area just north of Juniper Flats Road.

During the Keys View Road reconstruction, some short-term, adverse effects would be anticipated from increased levels of human activity, noise, and the ground vibrations produced by vehicles and heavy equipment. Long-term, adverse impacts would result due to continued road use and the road widening and curve straightening that would likely increase speeds on the road. Long-term, adverse impacts may also result if social trails become established from new turnouts. Beneficial impacts would occur over both the short and long term as a result of various erosion control measures, as well as installation of curbing and consequent reduction of informal turnouts and associated impacts (e.g., social trailing) Long-term, beneficial impacts would also result from reclamation of potential desert tortoise habitat at various sites within the project area. Therefore, the determination of effect for the desert tortoise, considering potential impacts of the reconstruction project and proposed conservation measures, is *may affect, likely to adversely affect.*

LITERATURE CITED

Behler, J.L., and F.W. King
1979 The Audubon Society field guide to North American reptiles and amphibians. Alfred A. Knopf, New York. 719 pp.

Berry, K.H.
1978 Livestock grazing and the Desert Tortoise. Pp. 505-19 in Transactions of the 43rd North American Wildlife and Natural Resources Conference; Phoenix, AZ; 1978 March 18-22. Wildlife Management Institute, Washington, DC.

Berry, K.H.
1992 Population declines, epidemics, visitor use, and habitat deterioration at two desert tortoise preserves in California: lessons for future preserves. Abstract, 6th Annual Meeting of the Society for Conservation Biology, p. 39.

Brown, P. R.
1968 Residents of the Golden State. International Turtle and Tortoise Society Journal. 2(6):28-9.

California Department of Fish and Game (CDF&G)
1990 1989 Annual Report on the Status of California's State-Listed Threatened and Endangered Plants and Animals. 188 pp.

Desert Tortoise Council (DTC)
1994 (Revised 1996). *Guidelines for Handling Desert Tortoises During Construction Projects.* Edward L. LaRue Jr., editor. San Bernardino, CA.

1999 Guidelines for Handling Desert Tortoise. Edward LaRue Jr., Editor.

Esque, T.C. and E.L. Peters
1994 Ingestion of bones, stones, and soil by desert tortoises. Pp. 105-11 in Bury, R.B. and D.J. Germano (eds.). Biology of North American Tortoises. National Biological Survey, Fish and Wildlife Research 13.

Hartwig, Kim
2004 Response to species list request. Personal communication with Doug Threloff, Ventura Field Office. November 24, 2003.

Jacobson, E.R. et al.
1995 Mycoplasmosis and the desert tortoise (*GOPERUS AGASSIZII*) in Las Vegas Valley, Nevada. Chelonian Conservation and Biology 1(4):279-284.

LaDoux, Tasha
2003 Personal Communication.

Lamb, T., J. Avise and J. Gibbons
1989 Phylogeographic patterns in mitochondrial DNA of the desert tortoise (Xerobates agassizi), and evolutionary relationships am the North American gopher tortoises. Evol. 43:76-87.

Lamb, T. and C. Lydeard
1994 A molecular phylogeny of the gopher tortoises with comments on familial relationship within the Testudinoidea. Mol. Phylo. Evol. 3:283-91.

Luckenbach, R.A.
1982 Ecology and management of the desert tortoise (*GOPHERUS AGASSIZII*) in California. pp. 1-37 in Bury. R.B. (ed.).

1982 North American Tortoise Conservation and Ecology. Wildlife Res. Rep. 12. U.S. Fish and Wildlife Service, Washington, DC.

Marlow, R.W. and K. Tollestrup
1982 Mining and exploitation of natural mineral deposits by the desert tortoise. *GOPHERUS AGASSIZII.* Animal Behavior. 30(2):475-8.

National Park Service (NPS)
1994 Joshua Tree National Park General Management Plan. U.S. Department of the Interior, National Park Service. 326 pp.

2003 Joshua Tree National Park, Resources Management. Desert Tortoise Clearance Surveys for Project 13(1): Road Rehabilitation from Cap Rock to Keys View. 6 pp.

2004 Joshua Tree National Park. Keys View Road Plant and Wildlife Inventories Report. 80 pp.

NatureServe
2003 NatureServe Explorer: An online encyclopedia of life [Web application]. Version 1.8 NatureServe, Arlington, VA. Available online at: http://www.natureserve.org/explorer. (Accessed August 25, 2003.)

Niblick, H.A. et al.
1994 Role of male-male interactions and female choice in the mating system of the desert tortoise, *GOPHERUS AGASSIZII.* Herpetological Monographs 8:124-32.

Okamoto, C.L.
1995 Color, calcium, and insect choice trials performed with captive juvenile desert tortoises (*GOPHERUS AGASSIZII*). California State University, Dominguez Hills, Carson, CA. M.A. Thesis.

Oldemeyer, J.L.
1994 Livestock grazing and the desert tortoise in the Mojave Desert. Pp. 95-103 in Bury, R.B. and D.J. Germano (eds.). Biology of North American tortoises. National Biological Survey, Fish and Wildlife Research 13.

Turner, F.B., P. Hayden, B.L. Burge, and J.B. Roberson
1986 Egg production by the desert tortoise (*GOPHERUS AGASSIZII*) in California. Herpetologica 42:93-104.

Turner, F.B., P.A. Medica, and C.L. Lyons
1984 Reproduction and survival of the desert tortoise (*SCAPTOCHELYS AGASSIZII*) in Ivanpah Valley, California. Copeia 1984:811-820.

U.S. Fish and Wildlife Service (USFWS)
1990 Endangered and threatened species recovery program: report to Congress. 406 pp.

1992 "Field Survey protocol for any federal action (or non-federal action) that may occur within the range of the desert tortoise." Phoenix, Arizona; Ventura, California; Carlsbad, California; Reno, Nevada; and Salt Lake City, Utah.

1994 The desert tortoise (Mojave population) recovery plan. U.S. Fish and Wildlife Service, Region 1-Lead Region, Portland, Oregon. 73 pp. + appendices.

Woodbury, A.M. and R. Hardy
1948 Studies of the desert tortoise, *GOPHERUS AGASSIZII*. Ecological Monographs. 18(2):145-200.

As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. Administration.

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