United States Department of the Interior

NATIONAL PARK SERVICE
Yosemite National Park
P. O. Box 577
Yosemite, California 95389

IN REPLY REFER TO:
L7617

June 29, 2007

Dear Yosemite Friends:

On behalf of the National Park Service (NPS), I am pleased to present the Glacier Point Road Rehabilitation Environmental Assessment.

Rehabilitation of Glacier Point Road is necessary to maintain access to Badger Pass and Glacier Point and to preserve natural and cultural resources along the road. These road repairs were identified as a high priority in the Yosemite Road System Evaluation / Parkwide Road Engineering Study. The road has not been fully repaved in over 40 years and has deteriorated in many areas due to poor drainage, resulting in unsafe driving conditions. Visitor safety would be improved by repaving, replacing culverts, making minor grade adjustments, and cleaning and restoring shoulders to their original width. This project would restore the roadbed while preserving the historic character of the road.

Public and agency participation has been a key element in the planning process. In the fall of 2005, Yosemite National Park held informal public scoping meetings and conducted a formal 30-day public scoping period to solicit ideas and concerns from park visitors, staff, conservation and park partner organizations, gateway communities, and other agencies. The NPS worked with subject matter experts and applied ideas generated from scoping to develop the alternatives for this Environmental Assessment.

The publication of this document begins the 30-day public comment period on the Glacier Point Road Rehabilitation Environmental Assessment. Comments will be used to prepare a Finding of No Significant Impact (FONSI), if appropriate. If approved, the rehabilitation of the road would likely begin in May 2008.

We appreciate your interest in this planning process and welcome your participation. On July 25, 2007 (1:00-5:00 pm), the NPS will host a public Open House in the Yosemite Valley Visitor Center East Auditorium, where information can be obtained and comments may be submitted in writing on this and other park projects. Comments must be submitted in writing by July 29, 2007, and may be sent by mail, fax, or e-mail, to:

Mail: Superintendent, Yosemite National Park
Attn: Glacier Point Road Rehabilitation
P.O. Box 577
Yosemite, California 95389

Fax: (209) 379-1294
Email: yose_planning@nps.gov

Information on this project can be reviewed online at www.nps.gov/yose/planning. Copies of this EA may be requested at the address above, or by phone at (209) 379-1365.

Sincerely,

Michael J. Tollefson
Superintendent

Glacier Point Road Rehabilitation
Environmental Assessment

Yosemite National Park

Lead Agency: National Park Service

ABSTRACT

This Environmental Assessment (EA) has been prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 42 U.S. C. 4321-4347, as amended), including the Council on Environmental Quality (CEQ) regulations found at 40 CFR 1500 -1508 and other applicable laws, *National Park Service Management Policies* (NPS 2006) and management directives. This Environmental Assessment facilitates compliance with Section 106 of the National Historic Preservation Act, Section 7 of the Endangered Species Act, the Wilderness Act, Clean Water Act, and the Clean Air Act as well as other applicable laws enacted for the protection of the environment.

This EA describes the impacts associated with proposed rehabilitation of the historic Glacier Point Road. The No Action Alternative (Alternative 1) describes the existing conditions and maintenance associated with managing the Glacier Point Road. It is used as a baseline to compare the other alternatives. Alternatives 2 and 3 are based on the purpose and need for the project and conform to existing planning documents, including the Yosemite National Park General Management Plan (NPS 1980) and other agency and park planning documents. The preferred alternative (Alternative 2) describes work that would be undertaken to rehabilitate, restore and resurface 5.1 miles of the road. Alternative 3 provides some other options for the treatment of the Wawona Road section chaining areas, historic El Portal Overlook turnouts and the historic Chinquapin intersection. A summary of other alternatives considered but not fully analyzed is also provided.

The primary purposes of this rehabilitation project are:
1) Maintain Vehicle Access to Badger Pass and Glacier Point;
2) Improve Safety at Locations with a High Incidence of Accidents;
3) Reduce Annual Maintenance Costs; and
4) Protect Area Natural and Cultural Resources.

Road rehabilitation is necessary to ensure the continued availability of the Glacier Point Road as a major park travel route, and to preserve and protect natural and cultural resources in the vicinity. The 1989 Yosemite Road System Evaluation/Parkwide Road Engineering Study (RSE) identified Glacier Point Road as the highest priority for park road improvement (NPS 1991). This section of road was last rehabilitated (resurfaced) in 1960. The portion of the Glacier Point Road proposed for rehabilitation has developed potholing, an uneven surface, drainage problems and vegetation encroachment. While the road was originally designed as 22 feet wide (with 10-foot travel lanes and 1-foot shoulders) some areas have become narrower, making it difficult for large vehicles, including buses and motor homes, to navigate. Steep road cuts ravel onto the road. Portions of the road, particularly along the outside edges that lack shoulders, are physically disintegrating due to wear from heavy vehicles (NPS 1991).

If reviewers do not identify significant environmental impacts, this EA will be used to prepare a Finding of No Significant Impact (FONSI), which will be sent to the National Park Service Pacific West Regional Director for signature and the project will be implemented upon approval of the FONSI.

How this Environmental Assessment (EA) is Organized

i. Table of Contents: This lists the chapters and primary subsections of each and where they may be found within the document.

ii. Executive Summary: This section briefly recaps the contents of the EA, including the purpose and need for the project, an overview of the alternatives and other key project information.

Chapter I Introduction: This section highlights the purpose and scope of the EA, the park purpose and significance, the purpose and function of park roads, and relationship to the Federal Lands Highway Program.

Chapter II Purpose and Need: This Chapter identifies the purpose and need for the proposed actions and the planning background for the project, including related laws, policy, and park plans. It also summarizes public participation to date.

Chapter III Alternatives: This Chapter describes the proposed alternative courses of action; including the reasons for dismissing options that do not meet project objectives or other defined criteria. It also identifies and provides analysis related to the selection of the Environmentally Preferable Alternative. The *Alternative Comparison Chart* (Table III-1) highlights the major differences among the alternatives.

Chapter IV Environmental Impact Analysis Methodology / Affected Environment / Environmental Consequences: This Chapter has three sections: Methodology, Affected Environment and Environmental Consequences. *Methodology* identifies the means by which impacts to various resources are analyzed. It also includes *Impact Topics*, which describes the potentially affected resources and laws or policy relating to their inclusion in this EA. This section also identifies those resources that have been dismissed from further analysis due to their having no identified or negligible potential environmental consequences. *Affected Environment* describes the existing environment by resource category. *Environmental Consequences* provides analysis of effects associated with the alternatives including cumulative impacts. Similar to Chapter III: Alternatives, the Environmental Consequences section contains an *Impact Comparison Chart* (Table IV-7) to compare the differences in projected impacts among the alternatives.

Chapter V Consultation and Coordination (List of Persons and Agencies Consulted / Preparers): This chapter provides additional information about public and internal scoping, preparation and review of the EA.

Chapter VI Glossary: This section provides definitions for acronyms and technical terms used in this EA.

Chapter VII References: This section provides bibliographical information for sources cited in this EA.

Appendix A Cumulative Projects List identifies the list of projects considered in the cumulative impacts analysis.

Appendix B Mitigation Measures summarizes ways potential impacts to resources will be avoided, minimized or mitigated as included in the Environmental Consequences section.

Appendix C Culverts and Other Drainage Modifications lists the common treatments between Alternatives 2 and 3.

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Executive Summary

Introduction

This Environmental Assessment (EA) has been prepared to describe the effects of the proposed rehabilitation of a portion of the historic Glacier Point Road. The No Action Alternative (Alternative 1) describes existing conditions and maintenance associated with managing the Glacier Point Road. The preferred alternative (Alternative 2) describes work that would be undertaken to rehabilitate, restore and resurface 5.1 miles of the road. Alternative 3 provides some other options for the treatment of the Wawona Road section chaining areas, El Portal Overlook turnouts and the Chinquapin intersection. A summary of other alternatives considered but not fully analyzed is also provided.

Pending approval of the project, actions taken under the no action alternative (Alternative 1), preferred alternative (Alternative 2) or Alternative 3, would affect a variety of park resources including vegetation, soils, water resources, wildlife, and cultural resources as well as park operations and visitor experiences.

The proposed rehabilitation of this segment of the Glacier Point Road is one of several likely rehabilitation projects that would eventually be accomplished for the roadway and is also one of several road projects planned for the park in the next few years (see *Planning Background* for more information). Cumulative impacts on park resources, therefore, are also described in relationship to planned park projects in the vicinity of the proposed action. Projects considered in the cumulative impact analysis include: rehabilitation of the Valley Loop Road, El Portal Road reconstruction, future rehabilitation of the remainder of the Glacier Point Road and ongoing Yosemite Valley Plan implementation projects.

This project is being designed cooperatively by the Central Federal Lands Highway Division (CFLHD) of the Federal Highways Administration (FHWA), the National Park Service (NPS), Yosemite National Park, and the NPS, Denver Service Center (DSC). It would be administered by the park and CFLHD.

As a result of its recent determination of eligibility for the National Register, actions that retain the character of the Glacier Point Road and which avoid, minimize or mitigate effects on contributing elements are important considerations for the proposed project. This is also true of actions which would affect the existing Chinquapin Historic District and the portion of the potentially eligible Wawona Road within the proposed project area. As with all park proposed actions, other important considerations also include ensuring that the project fulfills the mission of the park and the NPS in its preservation of park resources and the visitor experience for future generations.

At a minimum, to be considered successful, the purposes of this project must be fulfilled, including improving public health and safety, enhancing the visitor experience, preserving the historic road, contributing to natural and cultural resources protection, and enabling more efficient use of park road maintenance funds.

Purpose and Need

Road rehabilitation is necessary to maintain access to Badger Pass and the rest of the Glacier Point Road; to improve safety at high accident locations; to reduce annual maintenance costs; and to reduce impacts to natural and cultural resources.

The 1989 Yosemite Road System Evaluation (RSE) / Parkwide Road Engineering Study identified Glacier Point Road as the highest priority for park road improvement (NPS 1991). The portion of the Glacier Point Road proposed for rehabilitation has numerous areas with potholes, damaged or missing shoulders, drainage impediments and vegetation encroachment. Based on the continued decline of portions of the road, it is important that the rehabilitation takes place, before ongoing deterioration results in a serious or fatal incident.

Maintain Vehicle Access to Badger Pass and the Rest of the Glacier Point Road: The most recent Road Inventory Program (FHWA 2003) which measures pavement conditions and distresses found nearly this entire segment to be in poor condition. The average Pavement Condition Rating over this 5.1 mile segment was 35 on a scale of 100. The problems which contributed to this low rating include severe rutting in the wheel paths (which causes increased hydroplaning and icing during the winter); severe longitudinal, transverse and alligator cracking; and large areas of rough patches.

Improve Safety at High Accident Locations: In addition to the above noted pavement problems the intersection of the Glacier Point Road with the Wawona Road at Chinquapin has a history of being a high accident location due to an alignment that many motorists find confusing. Parkwide traffic safety studies in 1985 and 1995 confirmed the high rate of accidents at the intersection. Along the remainder of the road many curves were built with a steeper degree of superelevation ("banking") than is now considered appropriate for a road that frequently has low speed traffic on slippery snow-covered pavement. Turnouts that allow winter traffic to safely pull off the road and to install or remove tire chains are informal and inadequate.

Reduce Annual Maintenance Costs: The poor condition and the poor design of the Glacier Point Road infrastructure results in the consumption of an inordinate amount of park operations resources (staff time and money). Traffic accidents and the resultant congestion divert park staff from other tasks. Rutted and rough pavement that collects snow and ice requires more snow plowing and sanding. Culverts that are too far apart and undersized (too small in diameter) are more likely to clog during storms, requiring staff to invest more effort in unclogging them. Undersized culverts are also more prone to washing out during high runoff storm events, thus requiring emergency repairs to restore access. Pavement in poor condition requires more frequent patching and pothole filling. Inadequate, narrow ditches prone to clogging, cause ground water to back up, in turn saturating soils under the pavement and accelerating the rate of pavement deterioration. Other narrow or filled ditches require frequent cleaning of rocks and other debris by hand laborers working with front end loaders, which may require closing one lane of traffic. This, in turn, requires at least two additional laborers as flaggers, further compounding the burden on the already short-handed maintenance staff. Narrow ditches or ditches that have been lost are also inadequate to hold the quantity of snow that is removed from the travel lanes. Narrow ditches require more frequent use of expensive equipment to operate and maintain, including rotary snowplows to throw accumulated snow up and off of the roadway.

Reduce Impacts to Natural and Cultural Resources: Various conditions on Glacier Point Road contribute to adverse conditions for both natural and cultural resources. These include the ongoing impacts to historic features associated with the construction of the road, including damage to culverts, headwalls, rock walls, drainage devices and other features. The increasing use of sanding over the years due to deteriorating pavement conditions has resulted in increasing soil erosion and changes in drainage patterns. Rockfall alongside the road from eroding cliff edges is also common. In addition, drainage conditions within the Badger Pass parking lot are contributing to poorly directed runoff or ponding, creating icy areas in winter. Increasing accidents due to pavement deterioration have the potential to result in fuel spills and other adverse impacts to roadside resources. Informal turnouts also contribute to loss of vegetation alongside the road.

Overview of the Alternatives

This Environmental Assessment presents and analyzes three alternatives. Alternative 1, the No Action Alternative would continue the existing program of routine and periodic maintenance and repairs along the Glacier Point Road. Alternatives 2 and 3, describe a series of improvements to the road which conform to NPS and Yosemite National Park plans and goals.

The following general actions are common to Alternatives 2 and 3:

- Correcting the width and superelevation of the road to provide a uniform pavement width of 22 feet, including two 10-foot travel lanes with one-foot paved shoulders, and one-foot curve widening at select locations. (The pavement was generally constructed as 22 feet wide, however,

in certain areas the roadway has deteriorated and become narrower or appears narrower due to topographic conditions.)
- Replacing and/or adding signs and snow poles to improve navigation.
- Modifying the superelevation (roadway cross-slope / banking) where needed.
- Making drainage improvements (including repairing, replacing, lining or removing existing culverts, and installing new culverts; installing or replacing paved ditches; subexcavating in select areas and adding rip-rap rundowns to some culvert outlets) to route water away from the road and to minimize saturated areas underneath the road and currently accelerated pavement edge deterioration. Culvert actions would affect intermittent and perennial drainages and ditch-relief (rain / snowmelt) drainage.
- Performing slope scaling (hand removal of unstable rock from steep cut slopes) to reduce rocks and debris sliding down cutslopes onto the road or into drainage ditches.
- Conducting selective tree thinning, removal and brush removal along the edges of the road to improve snow removal, pavement warming, road maintenance, and sight distance.
- Repaving the 5.1 mile section of road in the project area.

The following specific actions are common to Alternatives 2 and 3:
- Chinquapin Intersection: Reconstruct (Alternative 2) or modify the Chinquapin Intersection to improve the ability of vehicles to stop as they exit the Glacier Point Road and to turn right onto Wawona Road from Glacier Point Road (construct a right-hand turn lane). Modify the existing traffic island to improve the turning radius for large vehicles entering the Chinquapin Comfort Station Parking Lot from the Glacier Point Road.
- Chinquapin Comfort Station Parking Lot: Add an accessible path to the restroom, stripe parking area to allow incidental chain-up, delineate parking, and clear select vegetation adjacent to the Wawona Road entrance to the parking area to increase sight distance for vehicles making the turn.
- Chinquapin Intersection Administrative Parking Area: Designate either back-in (Alternative 2) or pull-through (Alternative 3) parking for maintenance vehicles used on the Glacier Point Road.
- Wawona Road Chain-down Lane: Designate a formal chain-down lane for vehicles heading toward Yosemite Valley, either in conjunction with the Chinquapin Administrative Parking Area (Alternative 2) or slightly north of the Chinquapin Administrative Parking Area (Alternative 3).
- El Portal Overlook Area Chaining Lanes: Create a new uphill chain-up lane just north of the El Portal Overlook and allow the use of the upgraded El Portal Overlook for chain-down.
- El Portal Overlook Visitor Use Area: Improve the El Portal Overlook Visitor Use Area by providing a sidewalk, low seating wall, and a small degree of vista / historic restoration clearing. Retain the three historic turnouts at El Portal Overlook.
- Badger Pass Access Road: Modify the profile grade of the exit road from the Badger Pass Parking Lot to Glacier Point Road to reduce the potential for vehicles to slide across the intersection.
- Badger Pass Parking Lot: Improve drainage within and around the parking area by collecting and discharging runoff to reduce erosion and point source pollution. Remove and replace existing curbing around the parking lot and add new curbing to better control drainage. Increase the turning radius at three chokepoints.

Alternative 2 would also include:
- Chinquapin Intersection: Construct formal southbound and northbound (left and right) turn lanes from Wawona Road to Glacier Point Road, including widening the intersection slightly (less than five feet) by constructing retaining walls on either side of the existing Ranger Residence.
- Chinquapin Administrative Parking Area: Construct a formal service area with back-in parking for large maintenance vehicles behind the proposed Wawona Road chain-down area.
- Wawona Road Chaining Lanes: 1) Construct a formal chain-up lane for southbound vehicles heading toward Glacier Point Road by modifying the existing entrance to a service road. 2) Designate a formal chain-down lane within an existing disturbed area for vehicles exiting Glacier Point Road and heading northbound toward Yosemite Valley.

- El Portal Overlook Area Turnouts: Retain not only the El Portal Overlook Turnout (A), but also Turnout C by extending it slightly downhill. Retain Turnout B and repair the two existing historic rock walls on either side of it. (See Figure III-14).
- Badger Pass Parking Lot: Protect water quality in Grouse Creek by adding treatment for parking lot runoff.
- Other Turnouts: Retain formal turnouts with in-kind (paved or gravel treatments). Block access to and restore turnouts that do not contribute to the cultural landscape, that are unsafe, or which have adverse effects on park resources. (See Table III- 8 for more information.)

Alternative 3 would also include:

- Chinquapin Intersection: Add a deceleration right hand turn lane entering the Chinquapin Comfort Station Parking Lot from northbound Wawona Road to increase the ability of vehicles to anticipate and make the turn safely. Widen the intersection slightly (less than five feet) by constructing retaining walls on either side of the existing Ranger Station.
- Chinquapin Administrative Parking Area: Designate a formal service area with pull-through parking for five large maintenance vehicles.
- Wawona Road Chaining Area: Construct a formal chain-down lane for northbound vehicles heading toward Yosemite Valley just north of the proposed Administrative Parking Area.
- El Portal Overlook Area Turnouts: Retain El Portal Overlook Turnouts A and C. Retain Turnout C by modifying the cutslope across from it and shifting it slightly downhill. Construct a rock-faced guardwall between the two existing historic rock walls at Turnout B to increase vehicle safety along the steep drop-off and to minimize use of this narrower turnout on a curve.
- Other Turnouts: Repave or re-gravel formal turnouts. Allow the retention of some informal turnouts that provide for visitor safety and resource protection. Restore turnouts that are informal with unsafe conditions or resource damage.

The NPS has identified Alternative 2 as the preferred alternative. It would also improve protection of park resources and enhance the visitor experience on Glacier Point Road and at Badger Pass. Alternative 2 would improve key safety deficiencies and extend the service life of the road, resulting in lower annual maintenance costs. Alternative 2 is also the "environmentally preferable alternative" (see below).

Environmental Analysis

Chapter III of this document presents the *Affected Environment* (existing condition of potentially affected park resources) and the *Environmental Consequences* (likely environmental effects of Alternatives 1, 2 and 3) for the proposed Glacier Point Road rehabilitation. This section fulfills applicable requirements of the NEPA and Section 106 of the National Historic Preservation Act (NHPA) as well as other laws enacted for the protection of the environment. Table III-9 provides a comparison of the Alternatives and Table IV-8 provides a summary of anticipated effects of the Alternatives.

Environmentally Preferable Alternative

Implementing regulations for NEPA promulgated by the Council on Environmental Quality (CEQ) require that agencies identify "the alternative or alternatives which were considered to be environmentally preferable." Environmentally preferable is defined as the alternative that will promote the national environmental policy as expressed in Section 101 of NEPA, including:

- "Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations;
- Ensuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- 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;

- Achieving a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
- Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (NEPA Section 101(b))."

Generally, the above criteria mean the environmentally preferable alternative is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (46 FR 18026 – 46 FR 18038).

Alternative 2 has been designated as the environmentally preferable alternative because it would best meet these criteria (see *Chapter 2: Alternatives* for the analysis).

Public Participation

The formal public scoping period for the *Glacier Point Road Rehabilitation Environmental Assessment* (EA) began on August 17, 2005 and ended on September 16, 2005. During this time, Yosemite National Park held an Open House to present the preliminary design drawings for the proposed project. The public was encouraged to submit comments. During the public scoping period, seven letters or e-mails were received and analyzed. Public scoping comments are summarized in *Chapter 1: Purpose and Need*. Park planning staff was also available to answer questions, provide additional project information and to receive comments at subsequent Open Houses, as planning for the project progressed. These comments were used to prepare the alternatives presented in this EA. Comments were also solicited formally and informally from park and federal highways planning team members and from other agency staff.

The public outreach called for in Section 106 of the National Historic Preservation Act NHPA was integrated into the NEPA process in accordance with the 1999 Yosemite National Park Programmatic Agreement Among the NPS at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Planning, Design, construction, Operations, and Maintenance, Yosemite National Park, California (NPS 1999).

This EA is being made available to the public, federal, state and local agencies and organizations through press releases distributed to a wide variety of news media, direct mailing, placement on the park's website and announcements in Yosemite Planning Update Newsletters as well as in local public libraries (Mariposa, Wawona, Oakhurst and Groveland).

Responses to comments on the EA will be addressed in the proposed Finding of No Significant Impact (FONSI) or will be used to prepare an Environmental Impact Statement (EIS) (if appropriate).

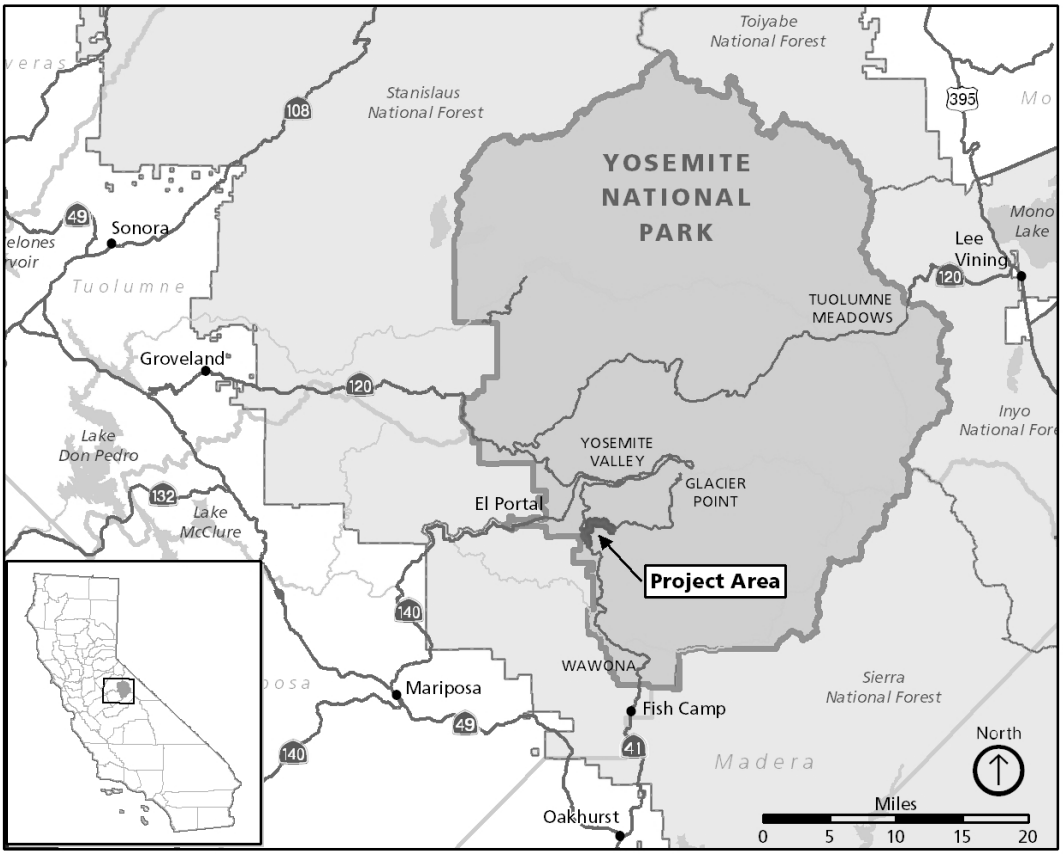
Table ES-1
Summary of Alternatives

Alternative 1 No Action	**Actions Common to All Action Alternatives**	**Alternative 2** Preferred	**Alternative 3**
Road Elements Road width not consistently 22 feet (varies from ~19-24 ft due to damage, deterioration and patching). Super-elevation of road in key areas promotes cars sliding when icy. Lack of informational and traffic safety signs lead to motorist confusion and traffic hazards. Road base sinking and deteriorating where water is not draining properly. **Accessibility** Chinquapin Comfort Station walkway not accessible. Pedestrian areas undefined at El Portal Overlook area. **Safety** Turn lanes not defined, causing motorist confusion and accidents. Chain-up areas insufficient, undefined and, in some areas, unsafe. Vegetation sprouting on roadsides and road cuts blocks visibility, interferes with road maintenance equipment; shading contributes to ice on roadway. **Resource Impacts** Roadside resources such as historic features, native vegetation, and streams unprotected from damage, deterioration, and siltation. Badger Pass parking area deteriorating from age, heavy winter use, and drainage problems.	**Road Elements** Rehabilitation improvements: 10 foot travel lanes, one foot paved shoulders (consistent width, no widening). Adjust super-elevation. Improve signage. Add drainage improvements (including new culverts and some paved ditches). **Accessibility** Improve El Portal Overlook, Chinquapin parking/comfort station, and Badger Pass Parking Lot. **Chinquapin Area** Realign Comfort Station island. Trim vegetation to improve sight distance at key areas. Add turn lane from Glacier Point Road onto Wawona Road northbound. **Administrative Vehicle Parking Area** Pull-through parking area separated from new chain-up area. **El Portal Overlook Area** Enhance formal vista point overlook at historic Turnout A with adequate access, formal sidewalk, parking and a viewing platform / low seating wall. Construct new uphill chain-up lane on Glacier Point Road just beyond El Portal Overlook **Badger Pass Parking Area** Repair drainage system, repave lot, improve accessibility / visitor drop-off.	**Road Elements** Adjust centerline (approx. one foot) in key areas. Replace in kind formal turnouts. Restore informal, unsafe or resource damaging turnouts. **Chinquapin Area** Trim vegetation at Comfort Station entrance to increase sight distance (No deceleration turn lane). Adjust centerline to accommodate designated left and right turn lanes from Wawona Road onto Glacier Point Road. Construct low-profile support walls north and south of Ranger Residence. Adjust super-elevation of Wawona Road. **Administrative Vehicle Parking Area**. Designate back-in administrative vehicle parking and public chaining area at site of former gas station (w/ slight extension to accommodate chain-off for 50 ft to the north). Construct new chain-up area on Wawona Road across from administrative parking, at service road entrance. **El Portal Overlook Area** Retain historic turnouts (A, B and C). Rehabilitate and repave Turnout B in-kind. Adjust parking area 3-5 feet south and adjust centerline to improve safety at Turnout C. **Badger Pass Parking Area:** Point-source runoff treatment.	**Road Elements** Replace in kind formal turnouts. Formalize some safe informal turnouts. Restore informal, unsafe or resource damaging turnouts. **Chinquapin Area** Add deceleration turn lane into Comfort Station. No designated turn lanes from Wawona Road onto Glacier Point Road. Construct low-profile support walls north and south of Ranger Residence. **Administrative Vehicle Parking Area** Construct pull-through administrative vehicle parking. Increase public chain-off area (by extending lane for 250 ft to the north. **El Portal Overlook Area** Connect existing historic rock walls between Turnouts A and C with a concrete core guardwall to match. Lay back cut slope across from Turnout C to improve safety conditions (visibility and width). **Badger Pass Parking Area** No point-source treatment of runoff.

Chapter I: Introduction

Yosemite National Park encompasses nearly 750,000 acres (just under 1,200 square miles) and is located in the central Sierra Nevada Mountains of California. Yosemite was established as a protected area in 1864 and as a national park on October 1, 1890. The park lies approximately 150 miles east of San Francisco and is about a six-hour drive from Los Angeles. Designated a World Heritage Site on October 31, 1984, Yosemite is internationally recognized for its spectacular granite cliffs, waterfalls, clear streams, giant sequoia groves, and biological diversity. The park contains thousands of lakes and ponds, 1,600 miles of streams, 800 miles of hiking trails, and 350 miles of roads. Two federally designated wild and scenic rivers, the Merced and Tuolumne, begin within Yosemite's borders and flow west into California's Central Valley. Annual park visitation exceeds 3.5 million. Elevations in the park vary from 2,127 feet at the western boundary to 13,114 feet near the eastern boundary. This range of elevation contributes to a varied environment with wide differences in terrain, temperature and precipitation.

Figure I-1. Project Area, Yosemite National Park, California



The project site is located approximately 33 miles north of Oakhurst, California off of State Route 41, midway between Yosemite Valley (9.3 miles) and Wawona (12.2 miles). The two-lane Glacier Point Road, originally constructed in 1936 to replace a wagon road built in 1882, extends nearly 16 miles to Glacier Point. The average width is 22 feet; however, the road narrows and widens from 21 to 24 feet, includes wider curves and has variable-sized unpaved shoulders. The entire length of the road (16 miles) is open to visitors during the peak summer season (May 16 – September 15 or until snow fall), whereas the proposed project segment up to the Badger Pass Ski Area (5.1 miles) is open year-round. During winter, snow depths surrounding the Badger Pass parking lot are 6 to 8 feet.

For the purposes of evaluation and proposed repair, the NPS has divided the road into three segments. The first of the segments (Chinquapin to Badger Pass) is the subject of this Environmental Assessment. The other two segments (*Badger Pass to Sentinel Dome Parking* and *Switchbacks to Glacier Point*) will also likely be proposed for rehabilitation within the next 10-15 years but because of the uncertainty of both the timing and nature of proposed improvements, these projects are excluded from this analysis, except with respect to potential cumulative effects.

A. Scope of the Environmental Assessment

This Environmental Assessment (EA) has been prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 42 U.S. C. 4321-4347, as amended), including the Council on Environmental Quality (CEQ) regulations found at 40 CFR 1500 -1508 and other applicable laws, *National Park Service Management Policies* (2006) and management directives. This EA facilitates compliance with Section 106 of the National Historic Preservation Act (NHPA), Section 7 of the Endangered Species Act, the Wilderness Act, Clean Water Act, and the Clean Air Act as well as other applicable laws enacted for the protection of the environment.

NEPA requires the documentation and evaluation of potential impacts resulting from federal actions on lands under federal jurisdiction. Federal actions may include projects financed, assisted, conducted, regulated or approved by a federal agency. An EA discloses the potential environmental consequences of implementing the proposed action and other reasonable and feasible alternatives. NEPA is intended to provide decision-makers with sound knowledge of the environmental consequences of the alternatives available to them. In this case, the superintendent of Yosemite National Park and the Pacific West Regional Director, NPS are faced with a decision regarding whether to rehabilitate a portion of the Glacier Point Road as described herein.

The purpose of this EA is to identify, evaluate and document the potential effects of the proposed rehabilitation of the first phase of the Glacier Point Road. Existing conditions constitute the baseline for evaluating the effects of the proposed rehabilitation. The effects of the proposed rehabilitation are presented in Table IV-8: Impact Comparison Chart. Existing conditions constitute the No Action Alternative (Alternative 1). The preferred alternative is Alternative 2. Alternative 3 is another viable action alternative. Proposed actions under Alternatives 1, 2 and 3 are compared in Table III-8: Alternative Comparison Chart.

An interdisciplinary team comprised of NPS and FHWA staff, including engineers, landscape architects, maintenance and natural and cultural resources professionals determined the purpose and need for the project and identified the likely beneficial and adverse effects of the proposed actions compared to existing conditions as documented herein.

B. Park Purpose and Significance

Yosemite Valley and the Mariposa Big Tree Grove were granted to the State of California by the federal government on June 30, 1864 to “be held for public use, resort and recreation” to be “inalienable for all time” (NPS 2004).

Yosemite National Park was established on October 1, 1890 as a “forest reservation” to preserve and protect “from injury, all timber, mineral deposits, natural curiosities, or wonders” within the park and to retain them in their “natural condition.” This Act excluded Yosemite Valley and the Mariposa Grove, leaving them under the jurisdiction of the State of California. By June 11, 1906, a joint resolution of Congress accepted the transfer of Yosemite Valley and the Mariposa Grove from California to the federal government as part of Yosemite National Park. According to the General Management Plan (NPS 1980), the two primary purposes, established for the park in the 1864 Act and subsequent legislation are:

> . . . preservation of the resources that contribute to Yosemite’s uniqueness and attractiveness – its exquisite scenic beauty; outstanding wilderness values; a nearly full diversity of Sierra Nevada environments, including the very special sequoia groves; the awesome domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; historic

> resources, especially those relating to the beginnings of a national conservation ethic; and evidences of the Indians that lived on the land.
>
> . . . to make the varied resources of Yosemite available to people for their individual enjoyment, education and recreation – now and in the future (NPS 1980:2).

Under the California Wilderness Act (1984) 95 percent of Yosemite National Park was designated Wilderness. In 1984, the park was also designated a World Heritage Site in recognition of its international importance.

C. Purpose and Function of National Park Roads

One objective of the actions described in this EA is to maintain the purpose of the national park road network as summarized in the "Park Road Design" memorandum dated February 20, 1986 from then NPS Director Mott:

> *Park Roads are intended to enhance visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management access needs. 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 (NPS 2002c).*

As stated in the NPS Park Road Standards (NPS 1984), among all public resources, those of the National Park System are distinguished by their unique natural, cultural, scenic, and recreational qualities; values that are dedicated and set-aside by public law to be preserved for future generations. In general, the protection, use, and enjoyment of park resources in a world of modern technology have necessitated the development and maintenance 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, park roads provide both access and enjoyment (scenic touring).

"The distinctive character of these roads sets the stage for the visitor experience in the park. They are designed with extreme care and sensitivity to the natural, cultural, scenic and recreational values of parks. They are often narrow, winding and steep; these very attributes define the distinctive character of the roads. The character of these roadways prepares the visitors for all that lies beyond (NPS 1984)."

The park road system includes roads within or accessing a park. The roads are administered by the NPS or by the NPS in cooperation with other agencies. In defining functional classification, the system is grouped into three broad categories, primarily based on use, including: public use park roads, administrative park roads, and urban parkways (NPS 2002, NPS 1984).

Park roads intended for the primary use of visitors for access into and within a park are designated as Public Use Park Roads. This classification includes all roads that provide vehicular means of access for visitors, or access to such representative park areas as points of scenic or historic interest, campgrounds, picnic areas, trailheads, and similar features. Functionally, the Glacier Point Road is classified as a public use park road.

Administrative Park Roads are comprised of all public and non-public roads intended primarily to fulfill management objectives for the particular area. This category of roadway includes those routes serving employee residential areas, maintenance areas, and other administrative developments, as well as patrol roads, truck trails, or similar administrative roads (NPS 2002). Urban Parkways are routes and facilities that serve high volumes of park and non-park related traffic, such as the George Washington Memorial Parkway near Washington, D.C.

D. Federal Lands Highway Program

The Federal Lands Highway Program (FLHP) began in 1982 under the Surface Transportation Assistance Act, however, the NPS and the Federal Highways Administration (FHWA) (and its predecessor, the Bureau of Public Roads) have cooperated since the inception of the NPS in 1916. The

NPS and FHWA have had a formal relationship since 1926 to develop and maintain the current system of National Park Roads and Parkways. The main intent of the FLHP is to disburse funding to a coordinated program of public roads that serve the transportation needs of federal lands, not under state or local governmental responsibility.

The FHWA, operating through Interagency Agreements with federal land managing agencies including the NPS, oversees and administers a coordinated federal lands program, which includes forest highways, public lands highways, park roads and parkways, refuge roads, and reservation roads. Overall, the FLHP program is responsible for funding to maintain more than 90,000 miles of federally owned and public authority-owned roads, which provide access to and serve federal lands. The NPS maintains jurisdiction over approximately 8,000 miles of park roads and parkways.

The rehabilitation of the Glacier Point Road project is being funded under the FLHP. FHWA, Central Federal Lands Highway Division, is a cooperating agency on the design and construction of the project. The proposed action is a “3R” project, consisting of resurfacing, restoration and rehabilitation, but not reconstruction.

Chapter II: Purpose and Need

A. Purpose and Need

The 1989 Yosemite Road System Evaluation (RSE) / Parkwide Road Engineering Study identified Glacier Point Road as a priority for park road improvement (NPS 1991). Road rehabilitation is needed to maintain access to Badger Pass and Glacier Point; improve safety at high accident locations; reduce annual maintenance costs; and to protect natural and cultural resources. (Note: These needs are not ranked.)

The portion of the Glacier Point Road proposed for rehabilitation has numerous areas with potholes, damaged or missing shoulders, drainage impediments and vegetation encroachment. It is critical to rehabilitate the road before ongoing deterioration results in a serious or fatal incident.

Maintain Vehicle Access to Badger Pass and the Rest of the Glacier Point Road: The most recent Road Inventory Program (FHWA 2003) which measures pavement conditions and distresses found nearly this entire segment to be in poor condition. The average Pavement Condition Rating over this 5.1 mile segment was 35 on a scale of 100. The problems which contributed to this low rating include severe rutting in the wheel paths (which causes increased hydroplaning and icing during the winter); severe longitudinal, transverse and alligator cracking; and large areas of rough patches.

While the road pavement was originally designed as 22 feet wide (with 10-foot travel lanes and one-foot shoulders), some areas are narrower, with sharp curves that make it difficult for large vehicles, including snowplows, delivery trucks, buses and motor homes, to navigate. Steep road cuts are eroding, allowing rocks to fall onto the road. Portions of the road, particularly along outside edges that lack shoulders, are physically disintegrating due to wear from heavy vehicles (NPS 1991).

The Glacier Point Road pavement was last resurfaced in 1960 and has long since passed its life expectancy (in this environment, asphalt pavements typically last 25 years or less between major resurfacing). Without pavement rehabilitation, the pavement will continue to deteriorate and become increasingly rough and rutted. This roughness will hold more snow and ice during the winter and could contribute to an increase in accidents. Rough pavement will also increasingly cause or contribute to year round loss of control accidents for motorcycles, bicycles and automobiles.

Layers of asphalt, added to some sections over many years of patching, have raised and in turn narrowed the road. The road has now reached a condition where adding more asphalt layers to patch and maintain the road will reduce the width of the road toward a point that compromises safety for large vehicles using the road.

Failure to maintain the pavement will eventually cause the road to become unsafe and impassable.

Many of the metal culverts under the road which date from the original road construction are now over 70 years old and have rusted through. These are now in danger of washing out during high runoff storm events. Some are plugged and no longer function to carry water away from the road, contributing to additional pavement deterioration.

Improve Safety at High Accident Locations: In addition to the above noted pavement problems the intersection at Chinquapin with the Wawona Road has a history of being a high accident location due to an alignment that many motorists find confusing. Parkwide traffic safety studies in 1985 and 1995 confirmed the high rate of accidents at the intersection. Along the remainder of the road most curves were built with a steeper amount of superelevation ("banking") than is now considered appropriate for a road that frequently has low speed traffic on slippery snow-covered pavement. Additionally there are inadequate turnouts or chaining lanes for winter traffic to safely pull off the road and to install or remove tire chains.

Accidents have occurred because of vehicles partially blocking travel lanes while installing or removing tire chains. Other roadside turnouts are inadequately sized and/or have inadequate sight distance for traffic to safely pull into and out of. These also contribute to accidents and near misses.

Reduce Annual Maintenance Costs: The poor condition and the poor design of the Glacier Point Road infrastructure consumes an inordinate amount of park operations resources (staff time and money). Traffic accidents and the resultant congestion divert park staff from other tasks. Rutted and rough pavement that collects snow and ice requires more snow plowing and sanding. Culverts that are too far apart and undersized (too small in diameter) are more likely to clog during storms, requiring staff to invest more effort in unclogging them. Corroded or plugged culverts also are more prone to washing out during high runoff storm events, thus requiring emergency repairs to restore access. Pavement in poor condition requires more frequent patching and pothole filling. Inadequate, narrow ditches prone to clogging, cause ground water to back up, in turn saturating soils under the pavement and accelerating the rate of pavement deterioration. Other narrow or filled ditches require frequent cleaning of rocks and other debris by hand laborers working with front end loaders, which may require closing one lane of traffic. This, in turn, requires at least two additional laborers as flaggers, further compounding the burden on the already short-handed maintenance staff. Narrow ditches or ditches that have been lost are also inadequate to hold the quantity of snow that is removed from the travel lanes. Narrow ditches require more frequent use of expensive equipment to operate and maintain, including rotary snowplows to throw accumulated snow up and off of the roadway.

Reduce Impacts to Natural and Cultural Resources: Various conditions on Glacier Point Road contribute to deteriorating conditions for both natural and cultural resources. These include the ongoing impacts to historic features associated with the construction of the road, including damage to culverts, headwalls, rock walls, drainage devices and other features. The increasing use of sanding over the years due to deteriorating pavement conditions has resulted in increasing soil erosion and changes in drainage patterns. Rockfall alongside the road from eroding cliff edges is also common. In addition, drainage conditions in the Badger Pass parking lot are contributing to poorly directed runoff. Increasing accidents due to pavement deterioration have the potential to result in fuel spills and other adverse impacts to roadside resources. Informal turnouts also contribute to increasing loss of vegetation alongside the road.

The following section summarizes problems in specific areas.

Glacier Point Road / Wawona Road Intersection: At the Chinquapin / Wawona Road intersection, sight distances for turning vehicles are poor (FHWA 2004). Inadequate signage, speed, and poor visibility also contribute to the high frequency of accidents at this intersection.

Two traffic engineering studies (Kruse 2004), including one in 1985 identified the Glacier Point Road / Badger Pass intersection and the Glacier Point Road / Wawona intersection as high accident locations (NPS 1991). A high accident site is one with six or more accidents occurring in the 3½ year study period.

Based on the studies, most accidents at the Badger Pass intersection were due to a driver being out-of-control on icy or sanded pavement (NPS 1981). Some of the accidents at Chinquapin were related to winter driving conditions, but others resulted from drivers rear-ending other vehicles, backing up in traffic lanes, or turning from the wrong lane NPS (1981). According to the report, these latter types of accidents indicated that visitors were confused by the choices available at the intersection. Co-located near the Chinquapin intersection are the Chinquapin Comfort Station; incidental and formal parking areas; and informal chain-up / off areas; as well as informal NPS equipment storage / parking; and a staff residence. At the time of the first study, there was also a gas station, which no longer exists.

Glacier Point Road / Badger Pass Ski Area Intersection: The approach to the Glacier Point Road from the Badger Pass Ski Area has a relatively steep grade (from less than one percent to six percent) and also has a documented history of motor vehicle accidents, with most accidents being related to sliding across the road during winter conditions.

Badger Pass Ski Area Parking Lot: Drainage at the Badger Pass Ski Area parking lot is in very poor condition due to the fact that it has exceeded its life expectancy and has both an inadequately designed and failed drainage system. The paved parking lot has extensive alligator cracking (FHWA 2004). Groundwater percolates up through the asphalt every spring and has deteriorated the parking lot and road. Existing concrete curbs, designed to direct runoff around the edge of the parking area have also deteriorated. The embankment on the west side of the parking area is eroding into the parking lot (FHWA 2004). Bus parking is not adequately reinforced or defined. Skier drop-off areas are also poorly defined.

Chain-up / off Areas: Although there is a small informal chaining area, north of the Chinquapin intersection, on the west side of the road and informal parking areas on the east side of the road used for this activity, these areas are insufficient to accommodate the number of vehicles routinely needing to chain-up or down, as required by road conditions. In addition, chains are sometimes not needed until the El Portal Overlook area, resulting in damage to the road as vehicles with chains on dry pavement traverse the area between the Glacier Point / Wawona Road intersection and the El Portal viewpoint.

Drainage: Although some culverts along the roadway are in good condition, most are undersized, inadequately placed, or in need of other improvements such as repair of historic headwalls. In areas with narrow roadside ditches or proposed ditches, more frequent culverts are needed to transport snowmelt. A number of culverts are located in deep fill slopes and would be difficult to replace without extensive excavation. As a result, culvert improvements may include adding more, replacing some, adding extensions, adding end treatments (including drop inlets, flared end sections, or headwalls), plugging and replacing others and/or abandoning some. In addition, while some drainage ditches are located along the road, other areas of the road have none where they are needed, as a result water flows on and alongside the road and in many of these areas is undermining the road.

Vegetation Encroachment: In some areas, vegetation encroaches on the road and is hazardous to all vehicular traffic. Where trees have grown up since the road was constructed, particularly around curves, it is difficult to see traffic from the opposite direction. Shading by dense tree growth close to the edge of the road also contributes to icy road conditions in winter and reduces the snow storage area needed to keep the road clear in winter.

Rockfall: At a number of locations along the road, rocks continue to slough off cut-slopes, resulting in areas of individual rockfall or rock slides onto the surface of the road or plugs the roadside ditch.

El Portal Overlook Area: At the El Portal Overlook Area (Figure III-14), the rock retaining wall foundations and wall edges on either side of Turnout B have deteriorated. The rock retaining walls on either side of this turnout connect two other turnouts (A and C). The upper two turnouts (B and C), according to FHWA, are too narrow and abrupt for safe use due to their location on a curve with poor sight distance for

entering and leaving safely. Because, however, this area offers an outstanding historic view, visitors often stop to enjoy it and a wayside exhibit at the uppermost turnout (C) or at the lower turnout (A). During field reviews, cars have been observed crossing the double yellow line from the uphill lane to the downhill side turnout to stop for the view. Because the El Portal Overlook area is often contiguous with the snowline, the lower turnout (A), which has a wide area for stopping and a good view, is also used informally for chain-up / off activities, particularly by buses.

Summary: As a result of the above problems and issues, the NPS and FHWA have undertaken preliminary design of a project to improve the segment of the Glacier Point Road from the intersection with the Wawona Road to the Badger Pass Ski Area, including the section of the Wawona Road on either side of the Glacier Point Road.

B. Project Background

1. Planning

Road History and 1930s Design

Glacier Point Road is one of several major roads in Yosemite National Park. It provides access to several popular visitor use areas, including Glacier Point and the Badger Pass Ski Area, and is itself used for scenic driving. The Glacier Point Road was originally a bridle trail. Later, in 1882, it was converted to a 16-foot wide wagon trail in 1882. In the 1930s, the road was redesigned by the NPS landscape architecture division and converted to a park road, generally designed to have pavement that is 22-feet wide.

As noted in DuBarton and Sandy (2006), under the supervision of Thomas Chalmers Vint, NPS landscape architects became experienced in the principles of naturalistic landscape architecture by the early 1930s. As a result, the design and construction of park roads from that point on was a combined effort between the Bureau of Public Roads (BPR) and the NPS (see McClelland 1998:196-201). NPS Director, Stephen T Mather had worked with the BPR, which then oversaw the construction and design of national park roads to advocate encourage scenic preservation and landscape engineering of roads in national parks. As a result Mather's advocacy, a Memorandum of Agreement was signed in 1926 that allowed park superintendents and NPS landscape engineers to determine the road alignment and character of roads within national parks. It resulted in roads designed in the naturalistic style of landscape engineering. By 1928, the NPS had developed standard specifications for road construction, which continued to influence national parks well into the period of visitor use development.

From that point on, detailed designs for intersections, parking areas, bridges, guardrails and the treatment of road banks were provided to BPR engineers and contractors. Standardized techniques to protect rockwork, trees and scenery included locating work camps in the right-of-way to limit disturbance of roadside scenery, limiting blasting and burning, applying naturalistic treatment of earth cuts and fill slopes, minimizing tree removal, and naturalization of road banks (McClelland 1998:202-207 in DuBarton and Sandy 2006:25).

As noted in DuBarton and Sandy (2006:25-26):

> "When NPS began planning the redesign of Glacier Point Road in the early 1930s, improving the road by making it wider and with lesser grades was important to the designers. . .The route featured easier grades and wider track than the carriage road and was designed to be a full 22 feet wide. The section between Chinquapin and Bridalveil Creek was extensively rerouted following a generally north to northeast route via Grouse Creek. . .
>
> The 1930s construction methods used to construct the road combined modern technology with hand work. Grading was accomplished with heavy machinery and trucks as was surfacing. Dynamite was used to "daylight" some areas. Slopes were limited to a 3:1 ratio and were treated by rounding and flattening them. This limited erosion and blended the cuts into adjacent forests or meadows. Informal plantings of native species on these slopes controlled erosion and contributed to the desired naturalistic character of the landscape (McClelland 1998:206-207). Another method to blend the line between the natural woodland or meadow and the cut-and-fill

slopes was to clear trees and other vegetation along an irregular uphill or downhill line and likewise replant with appropriate native species. This naturalization of roadsides after construction was just one part of the program that also included screening undesirable views, opening up scenic vistas, clearing dead and decaying timber from the roadside, and placing telephone lines underground.

Construction of culverts required specialized labor. Rock headworks at many of the culverts were placed by skilled masons who cut pieces to fit around the corrugated metal or concrete culverts and divert water into the drains. A 1938 NPS publication, *Park and Recreation Structures*, describes the way culverts were designed to be subordinate to the natural surroundings:

> The culvert proper is sometimes of local stone when this is abundant and workable, but if it must be of concrete or galvanized iron, reasonable concealment of the fact is to be striven for. The head wall, by extending well into the culvert opening, should avoid disclosing that it is a mere veneer. Natural rock is certainly the preferred material for the head wall, laid either dry or in mortar.

(see also Historic Structures / Cultural Landscapes in Chapter IV: Affected Environment and Environmental Consequences).

1991 Environmental Assessment

In April 1991 an Environmental Assessment (public review period May 1, 1991 to June 7, 1991) and accompanying Finding of No Significant Impact (FONSI) (signed August 29, 1991) provided for rehabilitation of the entire length of the Glacier Point Road, modifications to the Chinquapin intersection, Badger Pass Parking Area and several trailheads along the road. It also proposed to relocate maintenance functions from the Chinquapin intersection to Henness Ridge in conformance with the park's 1980 General Management Plan and called for removal of the Chinquapin Gas Station, a structure then eligible for the National Register of Historic Places. As a result a Memorandum of Agreement among the NPS, the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) was executed and the gas station was eventually removed. Other portions of this project, however, were not implemented (see *Alternatives Considered But Rejected* in *Chapter III: Alternatives* below).

Alternatives in the 1991 Environmental Assessment evaluated options for five parts of the project, including the Chinquapin intersection, the Badger Pass Parking Area, the Glacier Point Road from Chinquapin to Badger Pass, the Glacier Point Road from Badger Pass to Sentinel Dome, and the switchbacks segment of the Glacier Point Road (just before Glacier Point).

Alternatives considered in the 1991 EA included:

<u>Chinquapin Intersection, including Henness Ridge</u>

1. No Action
2. Redesign Chinquapin Intersection (Preferred)

<u>Badger Pass Ski Area Parking</u>

1. No Action
2. Improve Parking Area (Preferred)

<u>Glacier Point Road: Chinquapin to Badger Pass</u>

1. No Action (subgrade remains 24 feet wide)
2. Moderate Reconstruction (subgrade widened by 10 feet with a typical section of 11-foot travel lanes, 1-foot paved shoulders, 3-foot gravel foreslope on fill side and 3-foot paved ditch on cut side)
3. Light Reconstruction (Preferred) (subgrade widened by 6 feet)
4. Rehabilitation (subgrade widened by 2.5 feet, with a typical section of 11-foot travel lanes, no shoulders, 1.5 foot-foreslopes on fill side and 2-3 foot paved ditch on the cut side)

Glacier Point Road: Badger Pass to Sentinel Dome

1. No action (subgrade remains up to 29 feet wide)
2. Moderate Reconstruction (subgrade widened to 34 feet, with a typical section the same as in Alternative 2 above)
3. Light Reconstruction (Preferred) (subgrade 24 feet within existing disturbed area – except at Ostrander Rocks – with a typical section of 11-foot travel lanes, no shoulders, and a 1-foot paved foreslope modified as a ditch on both sides)
4. Rehabilitation (subgrade 22 feet wide, with a typical section of 10-foot travel lanes, no shoulders and a 2-foot paved foreslope modified as a ditch on both sides)

Glacier Point Road: Switchbacks

1. No Action
2. Minor Rehabilitation and Spot Safety (Preferred) (widen curves, remove several large trees and overhanging rocks, and pavement overlay)

For the 1991 EA, public comments were received from the State of California, the National Parks and Conservation Association (NPCA), the Wilderness Society, and two private individuals. NPCA supported the preferred alternatives and also removal of the Chinquapin Ranger Station (another historic structure), and urged that road work fit the existing terrain as sensitively as possible. The Wilderness Society commented that bicycle lanes were not mentioned and reduced speed limits should be used in areas known to be frequented by great gray owls. One individual was concerned that the road was being widened excessively through application of the 1984 Park Road Standards and that large vehicles should be restricted on the narrow sections of the road. The State of California had no specific comments. Comments were also received on the trail system (outside of scope) and on the inappropriateness of the Henness Ridge maintenance area.

This *reconstruction* (4R) project, as described in the 1991 EA, was not implemented because the NPS Park Road Program approach changed servicewide, to widen roads only in select cases (a more costly approach). When roads have a generally acceptable alignment and width (such as the Glacier Point Road) and the resource is historic, *rehabilitation* (3R) is considered more appropriate.

2. Relationship to Laws, National Park Service Policy, and Yosemite National Park Planning Documents

LAWS

National Park Service Organic Act

The key provision of the legislation establishing the NPS, referred to as the 1916 Organic Act is:

> The National Park Service shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified . . . by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (16 USC 1).

1970 National Park Service General Authorities Act (as amended in 1978 – Redwood amendment)

This act prohibits the NPS from allowing any activities that would cause derogation of the values and purposes for which the parks have been established (except as directly and specifically provided by Congress in the enabling legislation for the parks). Therefore, all units are to be managed as national parks, based on their enabling legislation and without regard for their individual titles. Parks also adhere to other applicable federal laws and regulations, such as the Endangered Species Act, the National Historic Preservation Act, the Wilderness Act, and the Wild and Scenic Rivers Act. To articulate its responsibilities under these laws and regulations, the NPS has established management policies for all units under its stewardship.

National Environmental Policy Act (NEPA) (42 USC 4341 *et seq*.)

NEPA requires the identification and documentation of the environmental consequences of federal actions. Regulations implementing NEPA are set for by the President's Council on Environmental Quality (40 CFR Parts 1500-1508). CEQ regulations establish the requirements and process for agencies to fulfill their obligations under the act.

Clean Water Act (CWA) (33 USC 1241 *et seq*.)
Under the Clean Water Act (CWA), it 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, and control, and abate water pollution. Section 401 of the CWA as well as NPS policy requires analysis of impacts on water quality. *NPS Management Policies* (2006) provide direction for the preservation, use, and quality of water in national parks.

Clean Air Act (as amended) (42 USC 7401 *et seq*.)
The Clean Air Act states that park managers have an affirmative responsibility to protect park air quality related values (including visibility, plants, animals, soils, water quality, cultural resources and visitor health) from adverse air pollution impacts. Special visibility protection provisions of the Clean Air Act also apply to Class I areas, including new national rules to prevent and remedy regional haze affecting these areas. Under existing visibility protection regulations, the NPS identified "integral vistas" that are important to the visitor's visual experience in NPS Class I areas, and it is NPS policy to protect these scenic views. Haze is a chronic, regional problem that stems primarily from pollutant emission in source regions to west of Yosemite, including the Bay Area, Sacramento Area, and the San Joaquin Valley. Some local campfire and wildland fire smoke can also affect scenic views on an episodic basis, but the bulk of the impacts to our viewsheds is from the chronic emissions that occur every day to the west. Yosemite therefore monitors haze at Turtleback Dome, a site that allows quantification of the worst of haze impacts as pollutant transport occurs. As a result, the Turtleback Dome measurement is a conservative measurement of regional haze that is protective of scenic values throughout the park, including those along the Glacier Point Road.

Endangered Species Act (16 USC 1531 *et seq*.)
The Endangered Species Act (ESA) requires federal agencies, in consultation with the Secretary of the Interior, to use their authorities in the furtherance of the purposes of the act and to carry out programs for the conservation of listed endangered and threatened species (16 USC 1535 Section 7(a)(1)). The ESA also directs federal agencies, in consultation with the Secretary of the Interior, to ensure that any action authorized, funded, or carried out by an agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat (16 USC 1535 Section 7(a)(2)). Consultation with the United States Fish and Wildlife Service (USFWS) is required if there is likely to be an effect.

National Historic Preservation Act (1966 as amended) (16 USC 470)
Section 106 of the National Historic Preservation Act (NHPA) directs federal agencies to take into account the effect of any undertaking [a federally funded or assisted project] on historic properties. "Historic property" is any district, building, structure, site, or object that is eligible for listing in the National Register of Historic Places because the property is significant at the national, state, or local level in American history, architecture, archeology, engineering, or culture. This section also provides the Advisory Council on Historic Preservation and the State Historic Preservation Officer (SHPO) an opportunity to comment on the undertaking which is satisfied following the 1999 Programmatic Agreement Among the National Park Service at Yosemite, the California State Historic Preservation Officer and the Advisory Council for Historic Preservation regarding Planning, Design, Construction, Operations and Maintenance, Yosemite National Park, California (1999 PA).

Native American Graves Protection and Repatriation Act (NAGPRA) (1990)
Section 3 has provisions regarding the custody of cultural items found on federal or tribal lands after November 16, 1990, while section 8 provides for repatriation of items found before that date. Section 3 also identifies procedures regarding the inadvertent discovery of Native American remains, funerary objects and objects of cultural patrimony during federal actions. NAGPRA regulations are found at 43 CFR Part 10.

Wilderness Act (1964) (Public Law 88-577)
The Wilderness Act and legislation establishing individual units of the national park system as wilderness establish consistent direction for the preservation, management, and use of wilderness and prohibit the construction of roads, buildings and other man-made improvements and the use of mechanized transportation in wilderness. The public purpose of wilderness in national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition, as well as for the purposes of recreational, scenic, scientific, education, conservation, and historical use. These policies establish consistent servicewide direction for the preservation, management, and use of wilderness and prohibit the construction of roads, buildings and other man-made improvements and the use of mechanized transportation in wilderness. All park management activities proposed within wilderness are subject to review following the minimum requirement concept and decision guidelines.

POLICIES

National Park Service Management Policies (2006)
Management Policies governs the way park managers make decisions on a wide range of issues that come before them. Excerpts from the section on park roads are highlighted below.

Park Roads (NPS 2006 9.2.1.1)
"Park roads will be well constructed, sensitive to natural and cultural resources, reflect the highest principles of park design, and enhance the visitor experience. Park roads are generally not intended to provide fast and convenient transportation; rather, they are intended to enhance the quality of a visit while providing for safe and efficient travel with minimal or no impacts on natural and cultural resources. For most parks, a road system is already in place. When plans for meeting the transportation needs of these parks are updated, a determination must be made as to whether the road system should be maintained as is, reduced, expanded, reoriented, eliminated or supplemented by other means of travel. Before roads are chronically at or near capacity the use of alternative designation points or transportation systems or limitations on use will be considered as alternatives to road expansion."

"Park road designs are subject to NPS Park Road Standards, which are adaptable to each park's unique character and resource limitations. Although some existing roads do not meet current engineering standards, they may be important cultural resources whose values can and should be preserved with attention to visitor safety."

NPS Directors Order 87A: Park Road Standards (NPS 1984)
p. 7: "The fundamental purpose of national parks . . . dictates that the *quality* of the park experience must be our primary concern. Full 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. Consequently, park roads are designed with extreme care and sensitivity with respect to the terrain and environment through which they pass – they are laid lightly onto the land."

"Each segment of every park road should relate to the resource it traverses in a meaningful way and should constitute an enjoyable and informative experience in itself while providing the visitor the utmost in visual quality. . . The horizontal and vertical alignment and cross-section should respect the terrain, blending into the environs. . . 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."

p. 13: "Park roads are constructed only where necessary, and only as necessary to provide access for the protection, use and enjoyment of the natural, historical, cultural and recreational resources which constitute our National Park System. National park roadways, where they exist, are planned for leisurely sightseeing and are located with sensitive care for the environment and designed with extreme care. They are often narrow, winding, and hilly—but therein may lie their appeal. . ."

"Thus park roads are often an end in themselves, rather than just a means to an end, in contrast to more conventional highway systems. For some, such as the handicapped, roads may provide the only means of park use, thereby reinforcing the case for their being intimately blended with the resource. Where terrain and safety conditions permit and where such uses are advocated by the general management plan, opportunities should be provided for random stopping to enable park visitors to more completely experience the park resources."

p. 40: "The primary purpose of the 3-R [resurfacing, restoration and rehabilitation] work the NPS will undertake is to preserve and extend the service life of park roads and to enhance their safety (23 USC 109 (o). Park roads on which geometrics were established several decades ago are capable in most instances of providing safe, useful service. In such cases, minor improvements will make these roads serviceable for many more years, and the complete reconstruction which would be required on such roads to meet current standards would be prohibitively costly and environmentally objectionable."

PLANS

General Management Plan (NPS 1980: 5, 18-19, 58)

The following goals and objectives in the 1980 Yosemite National Park General Management Plan (GMP) relate to this project. Broad goals include:

- Reclaim priceless natural beauty,
- Markedly reduce traffic congestion,
- Allow natural processes to prevail,
- Reduce crowding, and
- Promote visitor understanding and enjoyment.

The following area-specific goals of the GMP relate to this project:

Chinquapin

Remove intensive development and non-essential housing.

Improve efficiency of road maintenance during winter months.

- Remove gas station, comfort station and ranger residence, and
- Construct a covered sand storage structure at Henness Ridge.

Badger Pass

Glacier Point Road will be open year round to just past Bridalveil Campground.

Downhill skiing is a traditional activity that will be allowed to continue.

Alleviate congestion and overflow parking during winter.

- Retain lodge for visitor services,
- Retain downhill skiing facilities,
- Retain 600-car parking area, and
- Continue winter bus service from the Valley and Wawona.

Glacier Point Road

Interpret activities and resources along Glacier Point Road.

Many of the above actions proposed in the 1980 GMP have been implemented, however, others have not, due to reasons such as funding constraints, conflicts with other park plans and objectives, or new information has become available and better solutions have been identified to protect park resources.

Yosemite Resources Management Plan (1993)

This plan describes the status of park natural and cultural resources and recommends actions and programs needed to accomplish the legislative mandates applicable to the NPS and the park as well as to comply with other applicable environmental laws and NPS Management Policies (2006) (NPS 2004: I-19).

Yosemite National Park Vegetation Management Plan (1997)
This plan established broad objectives for park vegetation management. Descriptions of plant communities, management issues, and management strategies and techniques were identified for achieving desired conditions for park vegetation communities (NPS 2004: I-20)

According to the plan (Hall 1997:19), road rehabilitation and reconstruction projects require revegetation of areas using native plants. As these construction projects are implemented, existing vegetation needs to be salvaged and held on-site for short-duration projects, or placed in temporary in-park holding facilities until construction is completed. Seeds, seedlings, or cuttings need to be collected. Site-specific integrity needs to be protected.

The plan also contains a section on Roadside Vegetation Maintenance (p. 59-60), which states that: "Minor manipulation of roadside vegetation may be appropriate for the following purposes:

1. Providing adequate clearance for safe passage of the largest vehicles normally using the road segment, considering heavy snow loading;
2. Providing for safety under the hazard tree management program in designated areas;
3. Providing appropriate sight distances for the reasonable safety of road users;
4. Protection of park wildlife by removing screening vegetation, thereby allowing motorists to see and avoid striking wildlife; and
5. Allowing for the disposal of plowed snow from the road surface."

Mitigation measures described in this section are included under vegetation in the *Environmental Consequences* section of this document.

According to the plan, the design of vista viewing areas is critical for visitor and resource protection (p. 101). As stated in the plan, all pull-outs along roadways should be established and maintained in areas with consideration to traffic patterns, speeds, sight distances, etc. to limit vehicular accidents. Pull-outs should also have paved surfaces, curbing, signing (interpretive and regulatory), and a designated pedestrian viewing area for protection of resources.

1999 Programmatic Agreement regarding the Planning, Design, Construction, Operations and Maintenance of Yosemite National Park
Under this agreement, the park has the responsibility to review and approve undertakings that are determined to have no effect or no adverse effect to historic properties without further review by the State Historic Preservation Office (SHPO) or the Advisory Council provided the stipulations of the agreement have been fulfilled. The agreement applies to undertakings performed by NPS lessees, permittees, concessioners, cooperators and park partners.

It also requires Yosemite to "make every reasonable effort to avoid adverse effects to Historic Properties identified . . . through project design, facilities' location or other means" and to document avoidance alternatives through the NEPA process.

Yosemite National Park Fire Management Plan (2004)
Numerous techniques are available to reduce or remove hazardous fuels in forest systems. In general, live and dead vegetation can either be burned or mechanically removed. Prescribed fire, managed wildland fire, and mechanical removal of trees and shrubs can be used to remove or reduce fuels.

A variety of methods are approved to mechanically remove live and dead trees and surface fuels. These methods are classified as either aggressive or passive reduction techniques. Both techniques are used to accomplish the dual objectives of removing hazardous fuels and restoring vegetation target conditions. Aggressive and passive tree and shrub removal techniques for restoration of target forest conditions

would occur only on public lands in the core and inner Wildland Urban Interface (WUI) zones of the six wild-urban interface areas (Wawona, Yosemite Valley, Foresta, Yosemite West, Hodgdon Meadow, and El Portal). Only passive methods for reducing wildland hazard fuels would be used to clear non-Wilderness roadside vegetation (shrubs and small trees less than 20 inches in diameter) within 200 feet of the centerline and under utility lines. Public roads subject to this treatment would be inside five WUI communities (Yosemite Valley is excluded), the El Portal, Big Oak Flat, and Wawona Roads within the Suppression Unit; the roads to O'Shaughnessy Dam at Hetch Hetchy, Aspen Valley, and Glacier Point roads, and the fire motorway roads identified in the plan (Mattos 2005).

As noted above, limited passive reduction techniques would be used in non-Wilderness within 200 feet of the centerline of paved roads, generally on shrubs and trees less than 20 inches in diameter; all heavy mechanical equipment would remain outside the Wilderness boundary and would not reach over from Wilderness to non-Wilderness areas (NPS 2004:II-39). Maintenance would be done to keep road (but not trail) corridors free from fuel accumulation. Removing brush and downed trees also would reduce the risk of a fire crossing a road and threatening another area or becoming established below firefighters (Mattos 2005).

Because many roads and trails are important cultural resources, maintenance activities would be designed with guidance from Resource Management and Resource Protection to preserve important historic characteristics and to avoid impacts to contributing features (NPS 2004:II-47).

The southwestern end of the Glacier Point Road is within the Yosemite West 1.25 mile wilderness buffer zone (NPS 2004: Map 2-18). The Glacier Point Road and Wawona Road are also included in the "Road Thinning Corridor."

Valley Loop Road Rehabilitation (2006)
The Yosemite Valley Loop Road constitutes the primary roadway system in Yosemite Valley and is in poor condition due to many decades of freeze-thaw cycles, floods, and the lack of major maintenance repairs. Though minor roadway and drainage system repairs are performed annually (e.g., pothole repair, ditch clearing, and re-striping); comprehensive maintenance repairs are needed to correct the inadequacy of numerous existing culverts that are undersized, in disrepair and/or are ineffectively located to capture seasonal runoff. Additional culverts are needed in some areas to restore natural hydrologic functions. The existing condition of roadway pavement is considered poor as evidenced by extensive transverse and lateral cracking, ruptured or warped pavement, potholes, alligator cracking, and deteriorating shoulders. Adjacent roadside turnouts are in need of repairs and, in many locations, definition (i.e., defining the extent of the turnout).

Rehabilitation elements called for in the Yosemite Valley Loop Road project include: rehabilitation or replacement of drainage features (e.g., culverts and drainage ditches), pulverization (i.e., grinding up existing pavement to form a new road base) and resurfacing of the roadway, and "replacement-in-kind" improvements of the condition of adjacent roadside parking. The project does not include widening of the road, realignment or changes in vehicle or pedestrian circulation patterns.

El Portal Road Reconstruction (Proposed 2007)
This project would reconstruct a portion (approximately 1,350 feet) of the El Portal Road east of the Big Oak Flat Road Intersection. The existing road is in unstable condition due to high water in 1997, which undercut many sections of the El Portal Road. Since that time, five emergency stabilizations have been completed to prevent catastrophic failure. Complete reconstruction of this portion of the road is necessary to stabilize the road during future high water events. Public scoping for this project was completed on December 29, 2006. An EA was released for public review on June 4, 2007.

STUDIES

Traffic Engineering Safety Improvement Study (1985)

The purpose of this study was to determine the traffic safety improvement needs of Yosemite National Park and to formulate an effective and efficient program for the implementation of the recommended improvements. All accidents occurring in the park over a 3.5 year period (1,600) were systematically reviewed and analyzed. Accident rates were calculated for high accident locations and high accident road segments. The types of accidents were analyzed for patterns that would suggest operational and safety improvements. Improvements that could potentially reduce the number of accidents were developed and recommended. Recommendations were also given to increase safety and to improve operations and to bring the park's traffic control devices into compliance with the Manual on Uniform Traffic Control Devices (MUTCD). See *Affected Environment – Visitor Experience – Visitor and Employee Safety* for more information.

Following this study, funds were secured for the following improvements on the Glacier Point Road:

- Installation of centerline and edge striping on Glacier Point Road (1986);
- Installation of raised pavement markers and reconstruction of the superelevation in curves at sites on Glacier Point Road (1989) (not within current proposed project area); and
- Installation of raised pavement markers on Glacier Point Road (1991) (not within current proposed project area).

Traffic Safety Study (1995)

In 1995, a Traffic Safety Program Review was conducted in the park. It consisted of a detailed review of accident characteristics in the park and an assessment of the park's success in implementing traffic safety improvements (Peccia and Associates, Inc. 1995).

According to the report, the accident severity remained unchanged or decreased at 16 of the 15 (sic) high accident road segments and at 14 of the 18 high accident sites during the latter period. They were notably lower in 11 of 15 high accident road segments; however, they were higher for four segments. Key to the proposed project under Alternative 2 or 3, the apparent increases in accident rates occurred on Wawona Road near the Chinquapin intersection (as well as east of Wawona Tunnel as well as at a location on Northside Drive and in the vicinity of the Arch Rock Entrance) (Peccia and Associates 1995). There were a total of 67 accidents on the Glacier Point Road and 298 accidents on Wawona Road (44 of which occurred near the Chinquapin Intersection).

According to a field review at each of the high accident road segments and sites, approximately 20 percent of the recommendations made in the 1985 Traffic Safety Study had been implemented. NPS Traffic Safety funds were used to install edge lines and centerline striping on park roads, reconstruct a curve on the Glacier Point Road and to add raised pavement markers on various park roads.

Overall, between the two study periods, collisions with other vehicles were down from 46 percent to 40 percent; nighttime accidents were down (21 percent to 16 percent); animal vehicle collisions increased from 5 percent to 8 percent; wet road accidents were similar (7.5 percent and 6 percent); and snowy or icy road accidents were down from 27 percent to 20 percent.

C. Public Participation

Public involvement is a key component of the NEPA process. In this part of the process, the general public, federal, state, local agencies and organizations are provided an opportunity to identify concerns and issues regarding the potential effects of proposed federal actions. The opportunity to provide input is called "scoping."

Internal scoping is the effort to engage professional staff of Yosemite National Park and other NPS offices to provide information regarding proposed actions that may affect park resources. Yosemite National Park conducted internal scoping in spring 2005. A variety of comments were received from park staff in vegetation, wildlife, maintenance, water resources and planning.

Public scoping was conducted through the following means: 1) a press release describing the intent to begin the public involvement through comments on the proposed project was issued on August 5, 2005;

2) an electronic newsletter was sent out to the parks e-mail list on August 17, 2005 to announce the opening of public scoping; 3) a Gateway Partners Update sent out via e-mail; 4) announced in the the park's Daily Report; and 5) it was announced via the park's website. Invitations to Open Houses were extended through press releases on August 17, 2005 (regarding the August 31, 2005 Open House), and September 15, 2005 (regarding the September 28, 2005 Open House), as well as advertised on the park website. The electronic newsletter was emailed to a list of 5,388 people, agencies and organizations. The Open Houses included exhibits about existing road conditions, the proposed action and alternatives, environmental considerations, transportation issues and construction and design procedures. Professional staff was available to introduce the project, give a presentation, answer questions, and to accept comments.

During the public scoping process for this Environmental Assessment, which occurred from August 17 to September 16, 2005, seven comment letters were received, including six from individuals and one from the chair of the Sierra Club's Yosemite Committee (Sierra Club Fresno Chapter). All were received via email and included the following comments:

- Add a chain-up lane in the vicinity of El Portal Overlook. [Note: This area is commonly used by private cars and buses for chain-up instead of Chinquapin because the road is generally snow free until that point.]
- Consider adding a drop off area for families at the Badger Pass Parking Area.
- Consider adding a bike lane to the Glacier Point Road.
- Increase the safety of the Chinquapin intersection.
- Consider speed bumps or stop signs near congested areas, such as popular trailheads, to prevent visitors from driving the road too fast.
- Concern about potential for blasting and laying back steep road cuts eight feet [not part of road rehabilitation proposal].
- Concern about potential for clear-cutting an eight foot swath of vegetation along the road corridor [not part of road rehabilitation proposal]
- Concern about cutting black oaks, dogwoods and other small woody trees.
- Request to remove small trees and leave the large ones (see note below).
- Request to consider Great Gray Owls and their habitat.
- Concern over increasing impacts from continued winter operations at Badger Pass [not part of road rehabilitation proposal].
- Concern that roadside turnouts would be lost.
- Request to improve the remaining turnout at El Portal View (including vista clearing) if two adjacent ones are to be obliterated.
- Concern about needing turnouts to accommodate safety issues imposed by stalled / inoperable vehicles on the road.
- Consider identifying turnouts to be obliterated as "emergency parking only."
- Concern about barrier treatment of road edges where turnouts are obliterated (asphalt / concrete / granite curbs or boulders mentioned).
- Request to identify the pros and cons of each type of barrier treatment noted above.
- Request for additional public comment on selective thinning misinterpreted as clear cutting proposal (see below).
- Request to evaluate turnouts on merit (views, location, etc.) before deciding to retain or obliterate them.
- Concurrence regarding eliminating curbing along road to facilitate snow removal coupled with concern about treatment (asphalt, concrete or large boulders) if it is to be retained.
- Request to retain large diameter trees, including pine, fir and oaks as well as flowering small woody trees (dogwood) for aesthetics.
- Request to remove only small diameter fir, pine and other non-sensitive vegetation.
- Request for judicious selective cutting of trees (to facilitate snow removal) modeled after the fuels reduction program along Wawona Road.

Note: Two letters misinterpreted the proposal to selectively thin young trees (eight inches or less in diameter) that have grown up along the road corridor since road construction to improve sight distance around curves as a proposal to "clear cut" eight-foot corridors of vegetation along both sides of the road.

1. Issues and Concerns Addressed in this Document

All of the above issues and concerns were considered in the planning process and/or are addressed in this document except for those identified under the next heading. The following issues, however, were considered but rejected by the planning team. Reasoning is given in *Chapter III: Alternatives* under the heading *Alternatives Considered but Rejected*.

- Consider adding a bike lane to the Glacier Point Road.
- Consider speed bumps or stop signs near congested areas, such as popular trailheads, to prevent visitors from driving the road too fast.

2. Issues and Concerns NOT Addressed in this Document

The following three issues generated through public scoping are not within the scope of this project and are therefore not analyzed in detail in the document:

- Concern over increasing impacts from continued winter operations at Badger Pass.

This issue is outside the scope of the proposed road rehabilitation project, which applies only to the existing road corridor and adjacent parking lots. Modifications to Badger Pass operations, including increases or decreases in the number of people using Badger Pass may be considered at some future date, but are not part of the proposal. The Yosemite National Park General Management Plan (NPS 1980) calls for a continuation of existing operations at Badger Pass (see *Relationship to Laws, National Park Service Policy and Park Planning Documents* above).

- Concern about potential for blasting and laying back steep road cuts eight feet.

This action is not part of the proposed project and is therefore not considered in the accompanying analysis.

- Concern about potential for clear-cutting an eight foot swath of vegetation along the road corridor.

This action is not part of the proposed project and is therefore not considered in the accompanying analysis. What is considered is a proposal under Alternatives 2 and 3 for selective thinning of roadside vegetation alongside the Glacier Point Road in a manner similar to that currently approved under the Yosemite National Park Fire Management Plan (NPS 2004).

Public Review of Environmental Assessment

This Environmental Assessment is being made available to the public, federal, state and local agencies and organizations through press releases distributed to a wide variety of news media, direct mailing, placement on the park's website and announcements in press releases as well as in local public libraries (Mariposa, Wawona, Oakhurst and Groveland). Copies of the document may also be obtained from:

Mail: Superintendent, Yosemite National Park
Attn: *Glacier Point Road Rehabilitation EA*
P.O. Box 577
Yosemite, California 95389

Fax: (209) 379-1294
Email: YOSE_planning@nps.gov

Responses to comments on the Environmental Assessment will be addressed in the proposed Finding of No Significant Impact (FONSI) or will be used to prepare an Environmental Impact Statement (if appropriate). (For more information about specific agency and staff consultation, see the section in this document entitled *List of Persons and Agencies Consulted / Preparers*.

Chapter III: Alternatives

The interdisciplinary project team sought input and analysis from subject matter experts, and applied ideas from public scoping to develop reasonable and feasible alternative actions that would meet the project's purpose and need.

The following goals guided development of the alternative actions proposed for the Glacier Point Road project:

- Maintain the park-like character of the road corridor, including significant cultural landscape characteristics such as the curvilinear alignment, grade, and road features such as guardwalls, culverts, retaining walls, turnouts and significant natural features encountered along the road (e.g. vegetation and topography).
- Maintain the historic characteristics of the Glacier Point Road, including the road's eligibility for the National Register of Historic Places, as defined through research and inventory for the Determination of Eligibility for the National Register.
- Avoid or minimize adverse effects on park resources.
- Improve the safety of visitors and employees during travel on the Glacier Point Road.
- Ensure the continued use and availability of the Glacier Point Road for access to Glacier Point and the Badger Pass Ski Area.
- Improve resource conditions, such as controlling the effects of runoff, or reducing degradation of cultural resources.
- Increase accessibility of visitor services and improve visitor experience (including safety) (Chinquapin Comfort Station, El Portal Overlook, Badger Pass).
- Reduce resource damage associated with informal turnouts.
- Reduce the possibility of rockfall along Glacier Point Road.

A. Alternative 1: No Action (Continue Current Management)

Under this Alternative, the existing roadway would not be improved, except for continuation of emergency repairs and routine and periodic maintenance activities as described below.

Under this Alternative (Figure III-1) the existing roadway would not be improved, except for continuation of emergency repairs and routine and periodic maintenance activities. Because no rehabilitation or comprehensive resurfacing would take place, this alternative would not address improvements to the condition of the road, resource impacts from the existing road, safety issues or improvements to the visitor experience.

This Alternative would, however, continue to result in routine maintenance actions, including snow removal; spring opening; unpaved road grading, shaping and repair; paved road asphalt patching, crack sealing, and application of slurry- or chip-seal treatments; ditch clearing; culvert cleaning and repair; vegetation maintenance; traffic control striping; and signage replacement as needed (and as described below).

Seasonal Routine Road Maintenance Program

The purpose of the park road maintenance program is to provide safe vehicular access on park destination roads, campground roads, administrative roads, etc. and in public and administrative parking areas. To accomplish this, regular maintenance of the road surface, including bridges, culverts and ditches occurs as summarized in the paragraphs labeled Winter, Spring and Summer below.

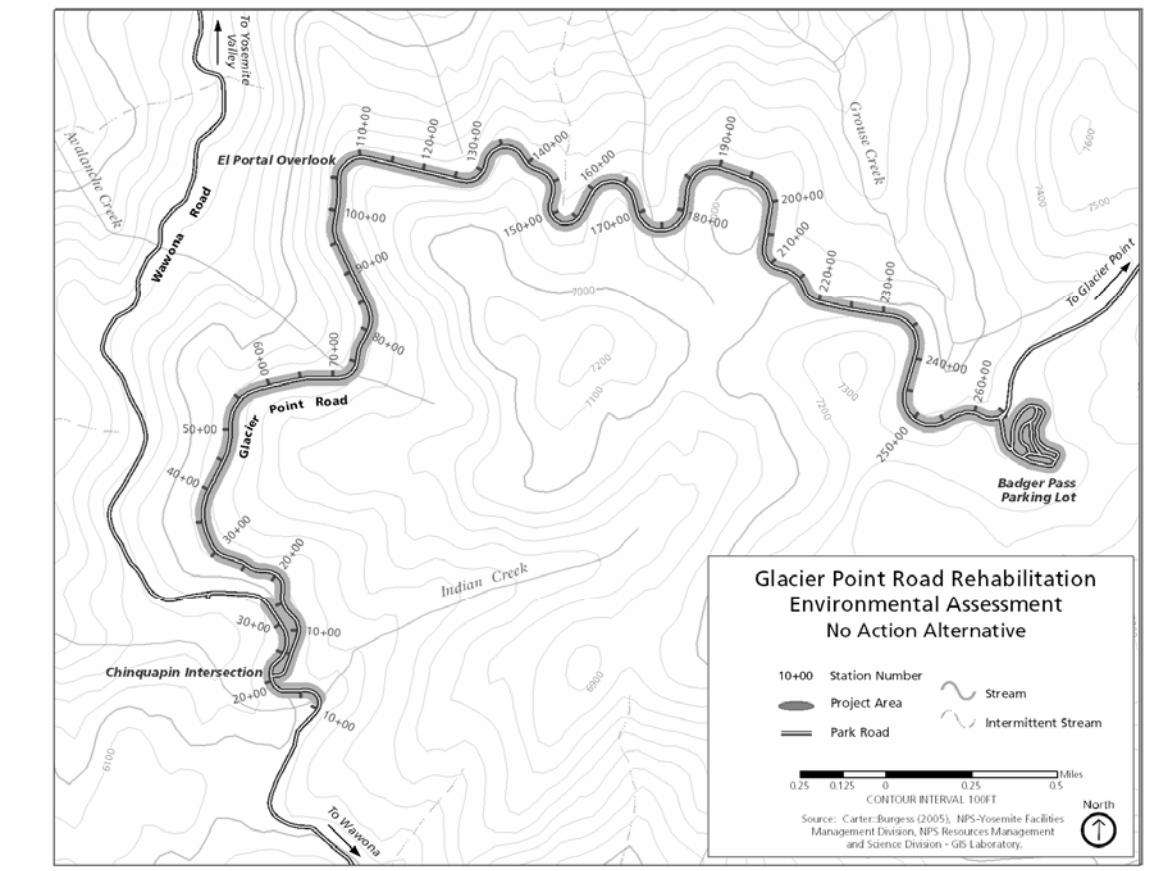
Winter

Mechanical removal of snow occurs regularly in the winter up to Badger Pass. Snow removal also occurs during spring opening to Glacier Point. Snow removal can include the application of sand or other abrasives as needed to provide traction enhancement for vehicles on icy roads. Snow removal reduces

hazardous winter driving conditions and ensures that some park roads are open to visitor use in winter. The Glacier Point Road is plowed to Badger Pass from approximately December 15 to April 1 each year, depending on snow conditions. Beyond the Badger Pass Ski Area, spring opening usually commences on April 15 or later. To assist with vehicle traction in icy areas, approximately 500 tons of sand is applied annually to the road between Chinquapin and Badger Pass. Snow and ice melt chemicals are not used.

Spring
Spring road opening operations begin by May 15 to ensure availability during the peak visitor use season (June thru September). Road opening activities include snow removal, clearing roads of windfall trees and debris, clearing avalanches or rock slides, cleaning culverts, and minor repairs to the road surface or shoulders or embankments.

Figure III-1
Alternative 1 (No Action)



Summer
Road maintenance activities occurring during normally dry weather include grading unpaved road surfaces, shoulder maintenance, removal of sloughed material from ditches, pavement repairs and leveling, pothole patching, crack sealing, slurry sealing, repaving, pavement marking, sign installation, etc.

Paved road maintenance includes, patching of small areas of asphalt paving with cold, premix asphalt concrete to correct abrupt depressions, potholes, edge failures and other potential road / parking surface hazards is undertaken to provide a smooth paved surface. Occasionally, permanent pothole patching is conducted with a premix asphalt concrete and asphalt emulsion (tack) to correct abrupt depressions,

potholes, edge failures, and other potential road / parking surface hazards to provide a smooth paved surface.

Other maintenance actions include clearing road shoulder and parking ditches to enable rapid melt water and rain dispersion off the road surface. This includes the cleaning and reshaping of roadside ditches along paved and unpaved roads and parking areas as well as the removal, hauling and disposal of excess material to restore the original grade and to ensure adequate drainage. On occasion, it can include the importation of additional material. It also includes the trimming or removal of woody vegetation from roadside ditches and shoulders and the removal of overgrown herbaceous vegetation. These actions are done to eliminate or improve edge ruts, washouts, ridges, corrugation and encroaching vegetation.

When pavement failures occur, they may be repaired by removing and replacing areas of failed surfaces with premix asphalt, including a base course, if required, to provide a structurally sound surface and to eliminate safety hazards from roads and parking areas. Work may include the placement of a new asphalt surface leveling course on asphalt-paved surfaces to provide a smooth driving surface and to eliminate safety hazards. Premix asphalt concrete is then applied with either a grader or a spreader box. Slurry seal or chip seal is applied as needed and includes the placement of liquid asphalt with an aggregate or chip seal coat to seal cracks and prevent water entry and related damage to base course materials; correct minor surface depressions to seal asphalt surfaces; to restore skid resistance; and to retard further surface deterioration.

Routine Road Maintenance

Day to day maintenance may also include:

- Sweeping paved road / parking surfaces, including intersections and curb gutters to remove dirt, sand and other debris;
- Cleaning drainage structures by removing rocks, debris and silt from pipe culverts, box culverts, inlets and storm sewers to maintain adequate drainage and to prevent roadway flooding;
- Repairing pipe culverts, drop inlets, catch basins, headwalls, and manholes to provide proper drainage;
- Maintenance and repair of curbs and gutters damaged by snowplows and/or traffic to ensure proper drainage flow, including the replacement of short curb sections;
- Cutting and removing brush, trees and overhanging limbs along roads, in campgrounds and parking areas to maintain vistas and to restore sight distances, to eliminate traffic hazards and to remove encroaching vegetation;
- Picking-up and disposing of litter to remove objects that could be hazardous or could obstruct drainage or damage road maintenance equipment and for aesthetics;
- Repairing slope failures and erosion near roads and developed areas and the removal of eroded material, including occasional reseeding, replanting or installing mechanical erosion control measures as needed to prevent such an occurrence from recurrence;
- Removing rockfall and slide material from the roadway and roadsides;
- Striping the centerline, lane, fog and edge markings on roads and the parking stalls and roadway directions for traffic safety, parking and pedestrian control.

Major repairs or rehabilitation not falling into these categories would undergo separate environmental analysis and is not included in the analysis of the No Action Alternative (Alternative 1).

Current Problems

Although the following specific areas have problems as noted below, there would be no systematic corrective actions taken to address them or other problems stemming from the age and long-term deterioration of the road.

Glacier Point Road: No improvements would be made to the existing road. Its current variable average pavement width of 22 feet (subgrade width 24 feet) would remain. Where the road narrows due to deterioration or terrain, such as near El Portal Overlook, snow plows and other large vehicles would continue to have difficulty staying in their travel lane. Due to the steeply banked sides of the road and the steep descents toward intersections, vehicles would continue to have difficulty stopping once sliding began, especially during icy conditions.

Chinquapin Intersection: No improvements would be made to the existing intersection. The current circulation pattern and all existing functions and structures would be retained. Vehicles would continue to have difficulty navigating the entrance to the Chinquapin Comfort Station parking lot, either from Wawona Road or from Glacier Point Road. Existing wayfinding signs would continue to cause confusion for visitors.

Badger Pass Ski Area: No changes would be made to drainage within the Badger Pass Parking Lot. Although pavement overlays or chip seals, as well as patching would continue to be applied to reduce alligator cracking and depressions caused by saturation beneath the existing paving, no comprehensive rehabilitation projects would change the subgrade or drainage in the parking lot.

This alternative would also result in some minor reconstruction of existing road features and possibly disruptions in travel for emergency vehicles and visitors if failure occurred. The impacts of major rehabilitation or reconstruction treatments, however, have not been included in this analysis. Because the overall condition of the road would not undergo comprehensive improvements, it would likely continue to deteriorate. Over time, this deterioration could result in increasingly uneven pavement (warping and cracking), narrowing lane width and other road conditions that would adversely affect both visitor safety and experience on the road and within the park, as well as the quality of cultural and natural resources along the road, including the quality and persistence of the road resource itself.

B. Actions Common to All Action Alternatives (2 and 3)

General Improvements
The following general improvements would take place if either Alternative 2 or 3 were selected. (Note: All work affecting historic sites or structures in existing or proposed historic districts (including cultural landscapes) would be conducted in accordance with the Secretary of the Interior's Standards and Guidelines.)

Pavement / Topwidth Rehabilitation: Correcting / repairing the road alignment to restore a uniform pavement width of 22 feet – two 10-foot travel lanes with one-foot paved shoulders, and one-foot curve widening at select locations. Repaving the 5.1 mile section of road in the project area.

Increase Signage / Replace Snowpoles: Replacing and adding new signs and snow poles to improve navigation.

Alignment Modifications: Changing the top-width by repainting the centerline of the road in select locations to ensure consistent top and lane width.

Superelevation Corrections: Modifying the superelevation (roadway cross-slope) where needed to reduce vehicle acceleration on steep curves or downhill segments;

Drainage Modifications: Making drainage improvements (including repairing, replacing, lining or removing existing culverts, and installing new culverts, installing or replacing paved ditches, and adding rip-rap rundowns) to route water away from the road and to minimize saturated areas underneath the road and currently accelerated pavement edge deterioration. (Culvert actions would affect intermittent and perennial drainages and ditch-relief (rain / snowmelt) drainages.)

Selective Vegetation Removal: Conducting selective roadside tree thinning, removal and brush removal to aid in snow removal, pavement warming, road maintenance, and to improve sight distance.

Slope Scaling: Performing slope scaling (hand removal of unstable rock from steep cut slopes) to reduce rocks and debris sliding down the slope onto the road or into drainage ditches.

Note: Each of these proposed general improvements is more fully described below under the indicated heading.

Specific Improvements
The following specific improvements to developed areas would be the same or similar if either Alternative 2 or 3 were selected (variations noted).

Chinquapin Intersection: Modify the Chinquapin Intersection to improve the ability of vehicles to stop as they exit the Glacier Point Road and to turn right onto Wawona Road from Glacier Point Road. Widen the intersection by constructing short retaining walls on either side of the Chinquapin Ranger Station. Modify the traffic island to improve the turning radius for large vehicles entering the Chinquapin Comfort Station Parking Lot from the Glacier Point Road. Construct a right hand turn lane from Glacier Point Road onto Wawona Road.

Chinquapin Comfort Station Parking Lot: Modify the parking lot to add stacking space for vehicles waiting for road opening (plowing) and to better define parking by striping the lot. Add an accessible path to the restroom. Clear or trim vegetation adjacent to the Wawona Road entrance to the parking area to increase sight distance for vehicles making the turn.

Chinquapin Intersection Administrative Parking Area: Delineate either back-in (Alternative 2) or pull-through (Alternative 3) parking for maintenance vehicles at the site of the former gas station.

Wawona Road Chain-down Lane: Construct a formal chain-down lane for vehicles heading toward Yosemite Valley, either in conjunction with the Chinquapin Administrative Parking Area (Alternative 2) or slightly north of the Chinquapin Administrative Parking Area (Alternative 3).

El Portal Overlook Visitor Use Area: Improve the El Portal Overlook with a sidewalk, low seating wall, and a viewing platform (including a small degree of vista clearing to improve the view). Depending on the selected alternative, other pull-outs near El Portal Overlook would either be retained or lost.

El Portal Overlook Area Chain-up Lane: To correspond to higher elevation snow levels, create a new chain-up lane about 500 feet west of the El Portal Overlook, while continuing the use of the El Portal Overlook for chain-down.

Badger Pass Access Road Intersection: Modify the profile grade of the exit road to reduce the potential for vehicles to slide across the intersection with the Glacier Point Road.

Badger Pass Parking Lot: Improve drainage within and around the parking area by collecting and discharging runoff to reduce erosion and point source pollution. Remove and replace existing curbing around the parking lot and add new curbing where not present to better control drainage. Increase the turning radius at three chokepoints in the lower portion of the parking lot. Delineate ADA parking and visitor drop-off zones.

Note: Each of these proposed specific improvements is more fully described below under the indicated heading and/or in either Alternative 2 or 3.

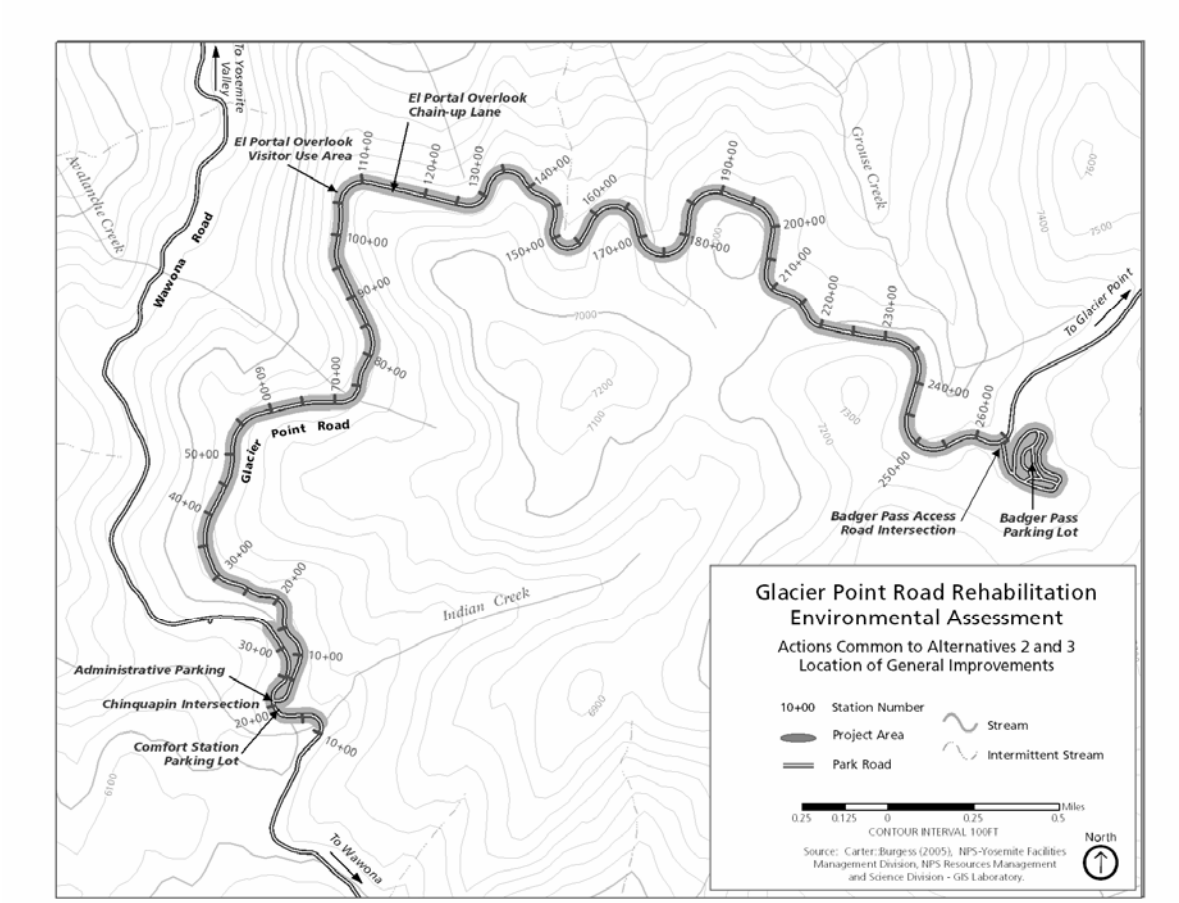
1. General Improvements (occurring along the whole roadway section) (Common to Alternatives 2 and 3)

❖ **Pavement Rehabilitation**

The existing asphalt road surface along the main park road would be pulverized and compacted; a new asphalt surface would be constructed; where necessary, shoulder grades would be raised with compacted aggregate to the level of the new paved surface; and pavement markings would be applied to the surface of the road. Road signs would be replaced and/or added as appropriate.

The new pavement would be similar in width to the existing pavement, with widening only in a few specific areas to ensure a consistent top-width of 22 feet, including two 10-foot travel lanes with one-foot paved shoulders. This section of Glacier Point Road was originally built to a pavement width of 22 feet, but deterioration of the roadway has created narrower portions. All work would be performed within the existing road bench (area disturbed by original road construction). Uniform road width improvements would improve driving and safety conditions for large vehicles, maintain the existing travel speed and maintain the narrow, historic curvilinear road.

Figure III-2
Actions Common to Alternatives 2 and 3
Location of General Improvements



In places where the road base is failing, the base and sub-grade would be excavated and replaced with suitable material. Some culverts would be replaced and other culverts would be extended. Additional culverts would be installed to correct drainage deficiencies. All new or replaced culverts would retain the native stone headwalls characteristic to the road. Paved ditches with curbing, and other minor features would be removed, replaced, repaired or added as appropriate to correct drainage problems.

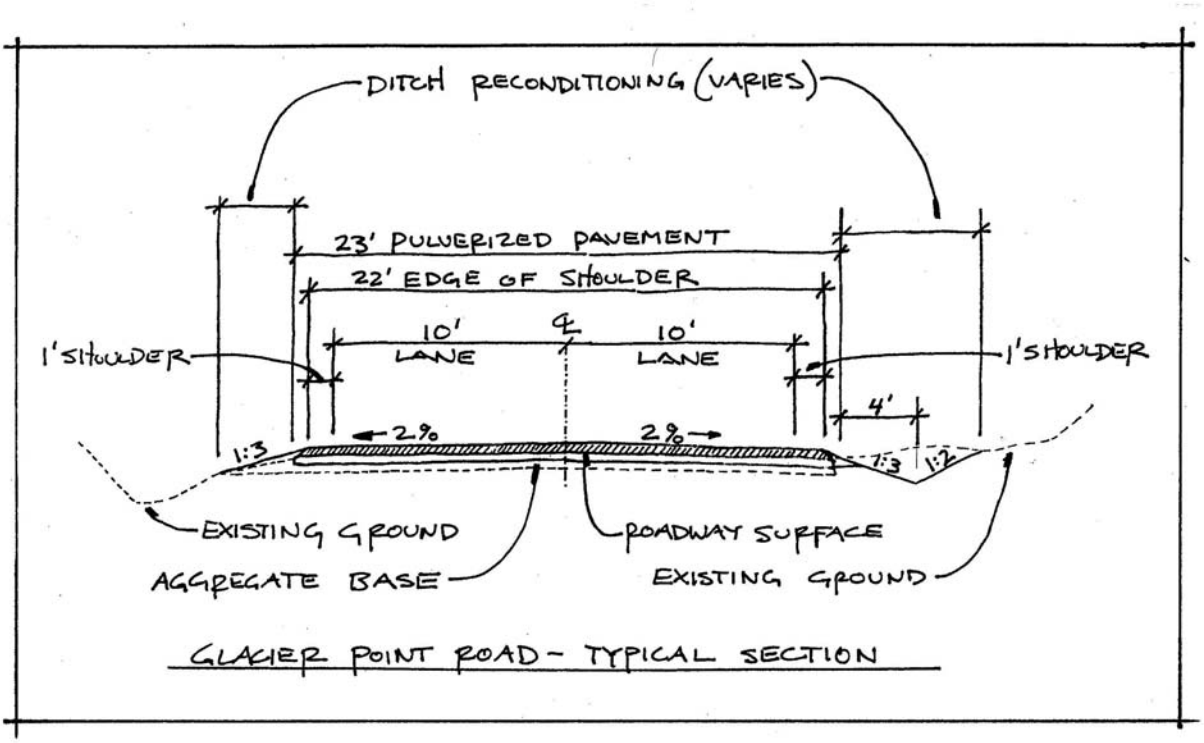
Proposed work would provide a uniform road width; improve driving and safety conditions for visitors and especially for large vehicles, including snowplows; generally retain the existing travel speed; and maintain a historically appropriate curvilinear roadway.

- **Increase Signage / Replace Snow Poles**

Additional advisory and regulatory signs such as the following would be installed at the following locations to alert drivers and improve traffic flow (actual text may vary):

- Wawona Road northbound before Chinquapin Intersection: *Rest Area Ahead*, *Slow*, *Intersection* (graphic), and *Speed Limit 20*.
- Chinquapin Intersection: New *Stop* sign (on island), *End Chain Control,; Autos and Pickups Snow Tires OK* / *Carry Tire Chains*, *Chains Required*, *Glacier Point 16* / *YCC camp* arrow left (verbal / graphic), *Speed Limit 25*,
- Glacier Point Road above Chinquapin Intersection: *Watch for Snow Removal Equipment*, *End Chain Control*, *Road Closed* (on gate), *Speed Limit 35, Stop Ahead* (verbal / graphic), Slippery When Wet (graphic), and *Slippery When Wet or Frosty*
- Wawona Road southbound before Chinquapin Intersection: *Speed Limit 20* and *Rest Area Ahead*.
- Glacier Point Road at El Portal Overlook: *Overlook Ahead* (verbal), *Stay in Lane, Chain up/off Area Ahead*
- Snow poles would be added at the beginning and end of all curves, at curve mid points and approximately every 300 feet on center.

Figure III-3
Actions Common to Alternatives 2 and 3
Typical Improved Road Section



- **Alignment Modifications** (Slight changes in the centerline alignment to achieve a consistent road top-width of 22 feet)

Alignment shifts would be used to center the new pavement and abutting shoulders onto the existing bench areas to avoid introducing new uphill cuts or downhill fill slopes. The roadway will follow the

existing alignment with alignment shifts of 1 to 3 feet. At the Glacier Point Road / Wawona Road Intersection, the Glacier Point Road would be reconstructed with a shift of approximately 12 feet to the north for a length of about 300 feet to allow for the construction of a turn lane.

- **Superelevation Corrections** (Changes to the cross-slope of the road)

Existing superelevations are too steep in seven locations. During icy conditions, this results in slow moving vehicles sliding sideways off the road and into the ditch. In several locations, the steep cross-slope of the road has contributed to a proliferation of accidents when vehicles slide across icy roads into oncoming traffic or roadside vegetation. The proposed superelevation corrections would flatten the cross-slope of the road so that it would be less likely that vehicles would slide across the road into oncoming traffic during inclement weather conditions. Existing superelevation at the locations to be rehabilitated varies between 14.5 and 10 percent. Standard superelevation for a mountainous road in snow country is six percent. This element would include reducing the superelevation to eight percent. All work would be performed within the existing road bench.

Altering the superelevation in these locations would reduce the potential for slow moving vehicle sliding; while maintaining the historic characteristic of a steeply banked road.

- **Drainage Modifications** (Adding, modifying or removing drainage structures, including culverts and paved and unpaved ditches, drainage inlets, etc.)

a. Subexcavation

Subexcavation is used to correct subgrade (under pavement) problems that result when the area beneath the road surface becomes saturated and cannot support the overlying pavement. In subexcavation, the subgrade materials are replaced with more granular (larger particle size) materials that allow the area to drain while still providing support to the pavement surface.

b. Roadside Drainage: Paved / Unpaved Ditch Construction and Maintenance

Former paved ditches would be rehabilitated and new paved ditches would be added to better channel rain and snowmelt water and sediment runoff, and to temporarily store rock and snow removed from the road surface during maintenance operations. Paved ditches would be two-feet wide, with a six-inch curb and would be constructed adjacent to existing cut slopes in select locations, where needed for drainage.

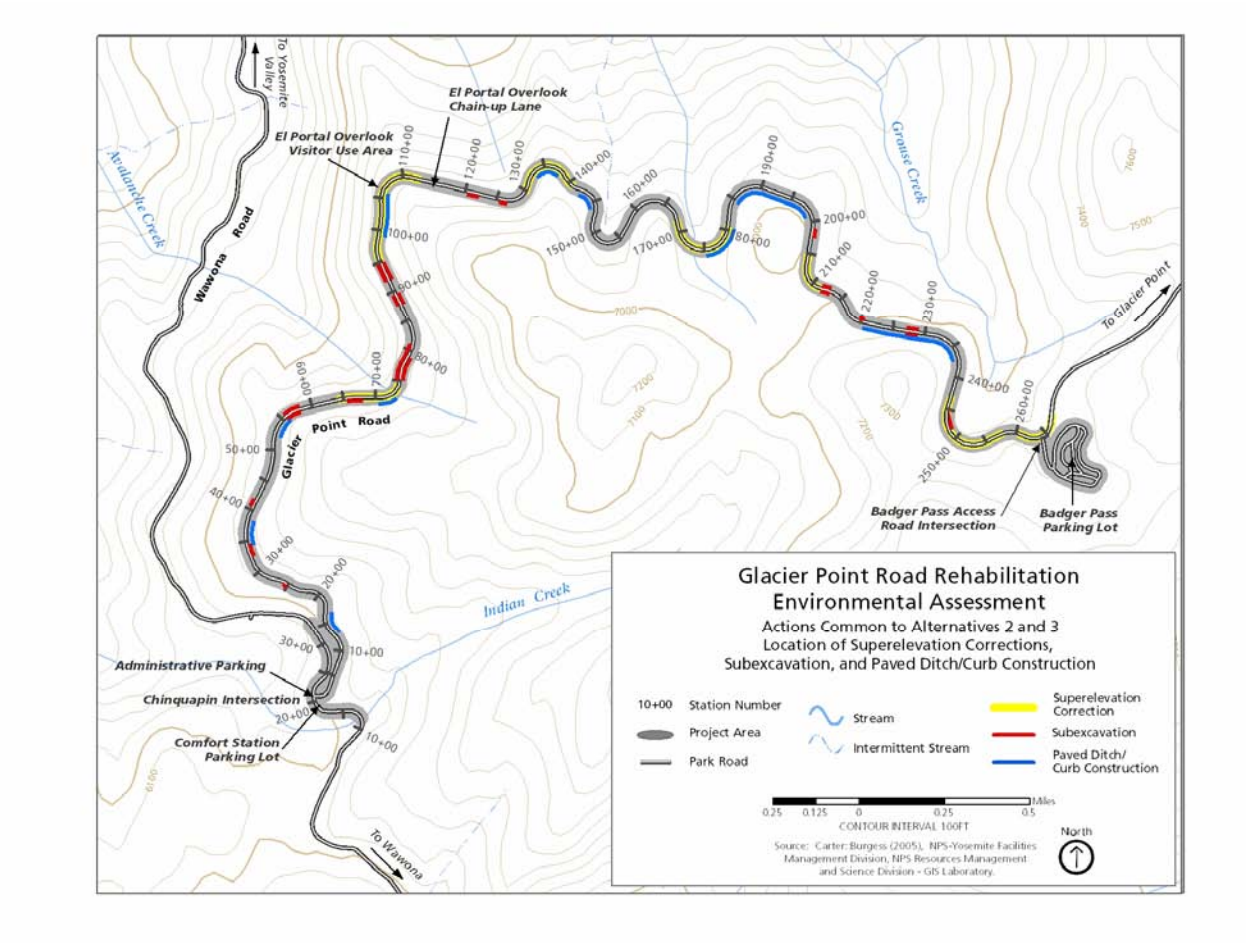
Repaving existing paved ditches and adding new paved ditches would reduce the potential for cut slope instability; reduce maintenance needs; and in combination with slope scaling would improve water quality by reducing erosion and sedimentation contributed from cut slopes above the ditches. Paved ditches would also reduce tread cutting in steep locations with erodible soils.

c. Culverts

Most historic culverts would have some work done to them, such as cleaning and/or repair or restoration of historic headwalls, in the proposed project (Figure III-5: Existing Culverts and Appendix C: Proposed Culverts and Other Drainage Modifications).

- Existing drainage inlets would be modified to preserve inlets to the extent possible. Some would be left in place, some modified and some would be removed and reconstructed.

Figure III-4
Actions Common to Alternatives 2 and 3
Location of Superelevation Corrections,
Subexcavation, and Paved Ditch / Curb Construction



d. Ditch Relief Culverts

Existing ditch relief culverts would be cleaned or rehabilitated (slip-lined, reconstructed or modifying damaged inlets and outlets) where needed at selected locations (numbers approximate).

- Approximately 10 culvert inlets and outlets would be cleaned. Two would be slip-lined or would be lined in another way.
- Approximately – nine culverts would be removed (eight replaced) and another eight would be plugged (seven replaced) on the Glacier Point Road; one would be removed and two plugged (all three replaced) on the Wawona Road; and five removed and replaced in the Badger Pass Ski Area Parking Lot.
- Approximately 10 headwalls would be reconstructed and approximately 50 riprap aprons would accompany new culverts on the Glacier Point Road, three on the Wawona Road and three within the Badger Pass Ski Area Parking Lot. Where riprap is placed, the top few inches of soil from the excavation would be placed over the exposed riprap.

e. Cross Culvert Improvements (Cleaning, Repair and Replacement)

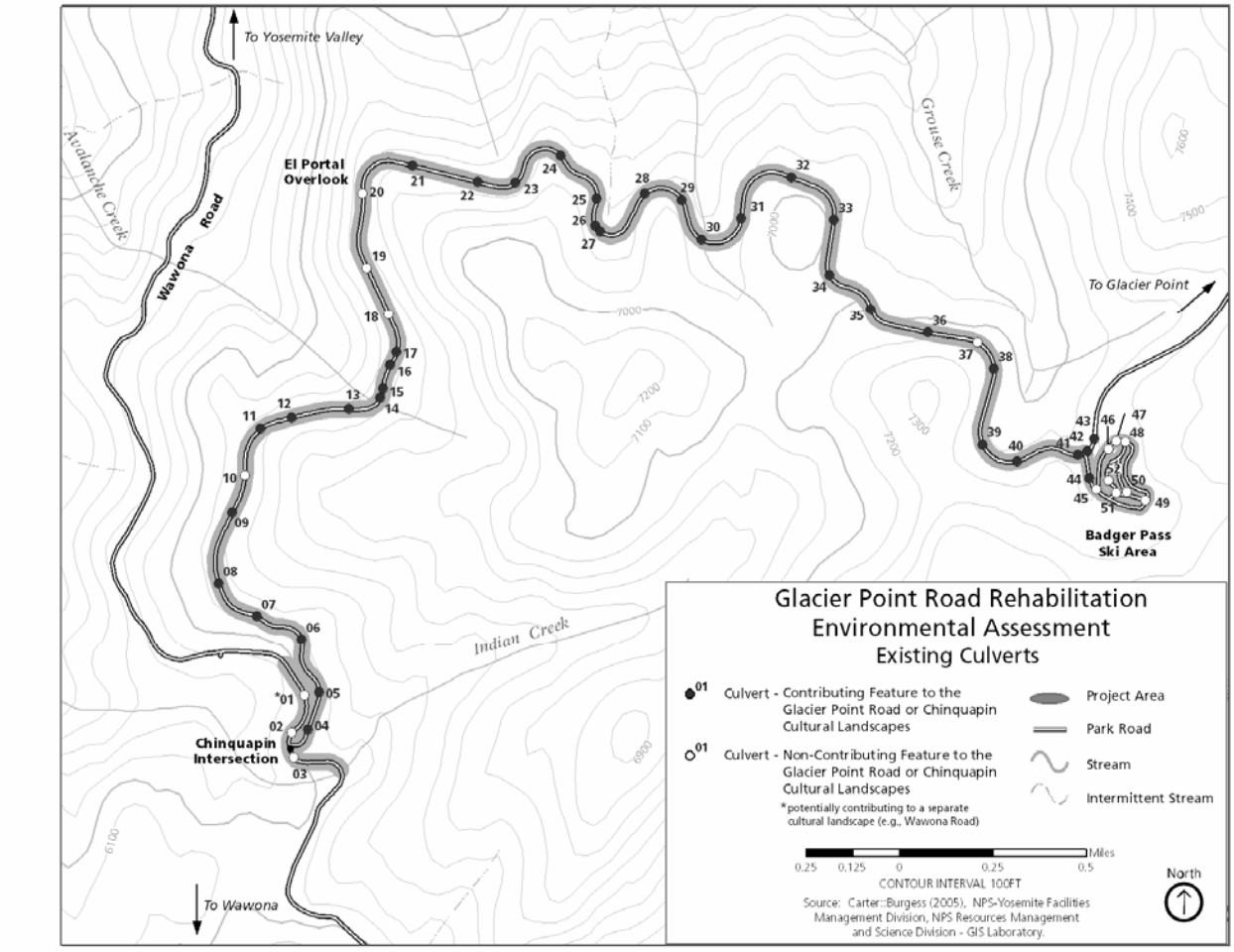
Many culverts along the roadway are undersized or in need of improvements (Appendix C: Proposed Culverts and Other Drainage Modifications). In areas with narrow roadside ditches or proposed ditches, more frequent culverts are needed to transport snowmelt. Small culverts would be replaced

with 24-inch or larger culverts, where appropriate, to more effectively transport heavy snowmelt in season.

Where culvert ends need to be accessed or riprap rundowns constructed, vegetation would be selectively removed.

- Approximately 30 new culverts would be installed on the Glacier Point Road, three replacement culverts on the Wawona Road, and five culverts, one concrete gutter and two or more underdrains would be installed within the Badger Pass Ski Area Parking Lot. In the lower parking lot area, a new culvert to Grouse Creek is proposed.

Figure III-5
Actions Common to Alternatives 2 and 3
Existing Culverts



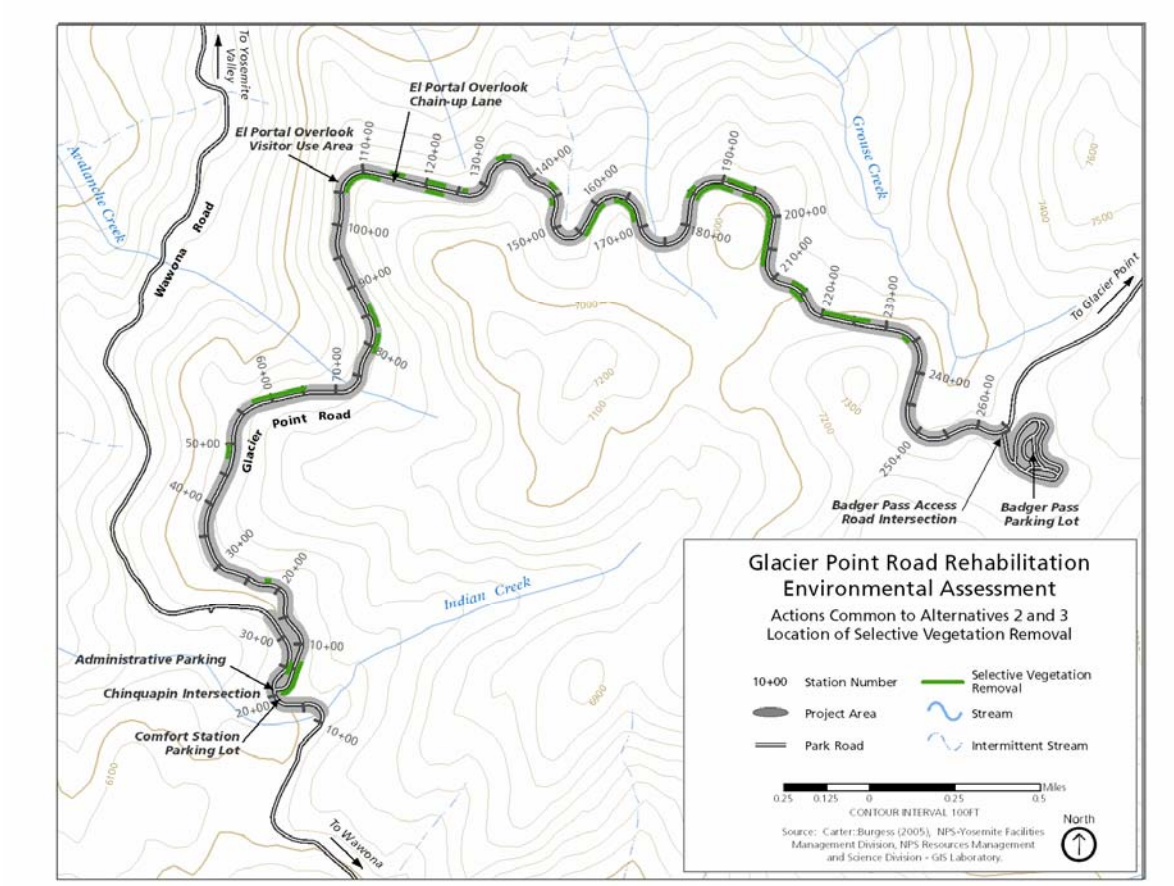
- To meet the Secretary of the Interior's standards for rehabilitation, new headwalls would be constructed to look like historic headwalls, but would be distinguished from these by their use of different (non-weathered) mortar and rocks.

f. Riprap Rundowns

- Riprap rundowns would be constructed, where needed, at selected locations.

The steep curves on Glacier Point Road contribute to roadside erosion. High speed runoff cuts deep gashes in the surround soils, causing soil loss and vegetation damage and jeopardizes the integrity of the edge of the road.

Figure III-6
Actions Common to Alternatives 2 and 3
Selective Vegetation Removal



- **Slope Scaling** (Removing individual rocks and overhanging brows, as appropriate, from steep cut slopes along the roadway)

Historically designed cut slopes along Glacier Point Road are very steep, causing rocks and soil to become dislodged and to roll down or fall off the slopes into ditches and onto the road.

This activity consists of hand plucking individual loose rocks and debris, as appropriate, from steep cut slopes above the road to proactively prevent their falling and blocking drainage ditches or causing safety hazards on the road. Laborers would be suspended from ropes and would use hand tools to dislodge loose rocks and soil. Securely lodged rocks and soil would not be affected.

An estimated 4,800 cubic yards of rocks (based on an average rock size of two cubic yards) would be removed from these areas. Plucked rocks would either be used in wide road areas (to be buried in rehabilitated shoulders as directed by the park or would be buried in proposed berms along the road, such as at El Portal Overlook.

Material generated from slope scaling would be used in the project to the degree possible. Selective clearing at the top of cut slopes may also be required to provide a more stable slope (see *Selective Vegetation Removal* above). Existing vegetation that promotes slope stability would not be removed.

Slope scaling would improve safety by reducing the potential for encountering rock and soil on the road. It would also reduce maintenance operations by systematically treating unstable slopes.

2. Specific Improvements (Common to Alternatives 2 and 3)

- **Chinquapin Intersection**

As noted above, this intersection would be reconstructed under Alternative 2 and 3 (see also information related only to Alternative 2 below).

Under both action Alternatives (2 and 3), the Chinquapin Intersection would undergo minor reconstruction at the exit from Glacier Point Road. Retaining walls would be added on either side of the Ranger Station on the Wawona Road to allow for either formal (Alternative 2) or informal (Alternative 3) turn lanes. A right turn lane would be created for northbound vehicles by broadening the pavement radius adjacent to the administrative parking area on the Glacier Point Road. In addition, the existing raised traffic island would be removed and reset to improve the turning radius for large vehicles entering the Comfort Station Parking Lot from Glacier Point Road.

Minor reconstruction is planned because the following issues have resulted in accidents (see *Background*) and traffic delays with the potential to result in accidents (waiting for large vehicles to navigate the sharp turn into the Comfort Station Parking Lot, which may involve cross-over into the downhill lane):

- For vehicles that have turned onto the Glacier Point Road and want to access the Chinquapin Comfort Station, there is a very sharp right hand turn around the traffic island that separates the parking area from the Wawona and Glacier Point Roads (this access to the comfort station is the only access for southbound vehicles due to the traffic island that separates the Wawona Road from the parking area);
- For vehicles coming down the hill on Glacier Point Road toward the Wawona Road, there is a potential for sliding into the intersection due to the steep descent and banking toward the opposite lane instead of into the curve and right turn;
- From the southbound Wawona Road, while an informal left turn lane exists for the Glacier Point Road, accessing the Comfort Station parking area requires the sharp right turn noted above immediately upon entering the Glacier Point Road (along the paved island) (Figure III-7).

Specific proposed modifications include the following:

Glacier Point Road / Wawona Road (Chinquapin) Intersection

- Modify the existing raised island that separates Wawona Road from the Chinquapin Comfort Station Parking Lot.
- Add a painted traffic island for the stop sign on the Glacier Point Road.
- Modify signage, moving the 20 mph sign south to the Yosemite West Intersection (approximately 0.5 miles south) and making it a regulatory, rather than an advisory sign, increasing information signs for Glacier Point / Badger Pass Ski Area, and adding chain-up signs and chain control signs as well as advance signs for the restroom turn-off.

Glacier Point Road

- Increase the superelevation of the Wawona Road at the Chinquapin Intersection approach from Glacier Point Road to construct a formal northbound right turn lane from Glacier Point Road to Wawona Road (including filling a portion of the adjacent road edge and selective removal of some small trees and shrubs to accommodate and increase sight distance for the turn).
- Modify the turning radius into the parking lot from the Glacier Point Road around the raised traffic island.

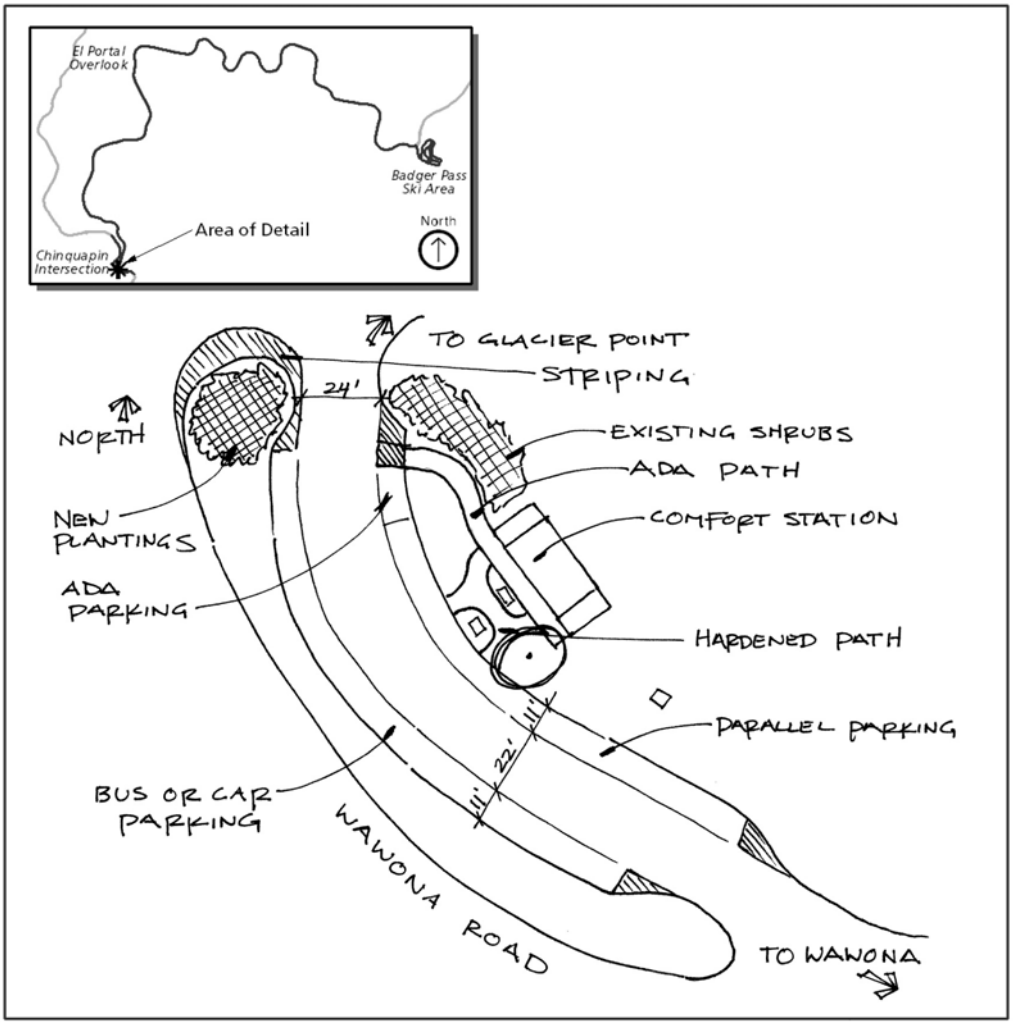
- Replace the current gate with a new administrative gate above the Chinquapin Comfort Station Parking Lot turnoff for nighttime winter closures.

❖ **Chinquapin Comfort Station Parking Lot**

The Chinquapin Comfort Station is a historic structure which lacks an accessible pathway to the restroom. The parking area is commonly used for restroom parking, chain-up/off, and for staging cars waiting for Glacier Point Road to be plowed and opened.

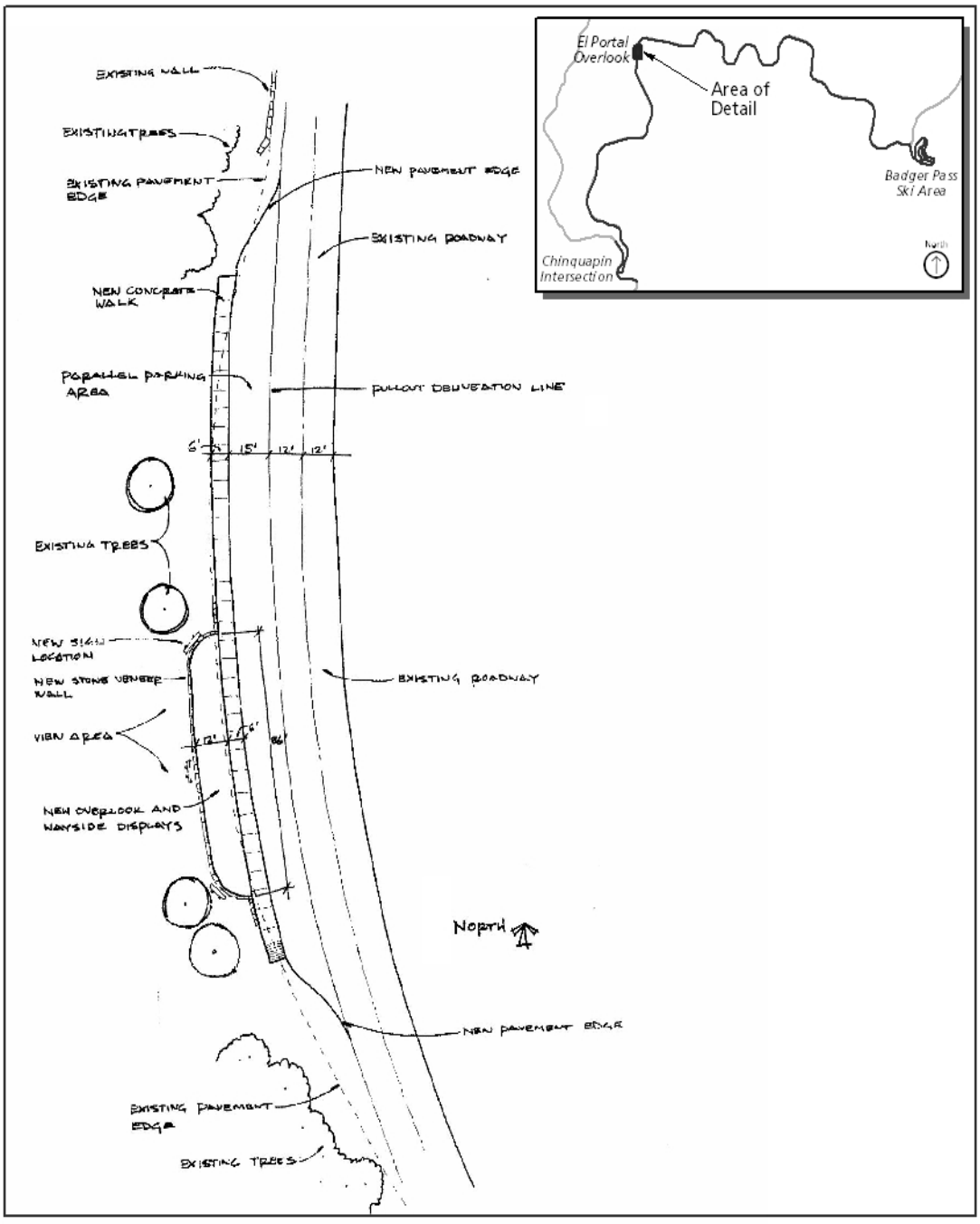
Under the action alternatives, the Chinquapin Parking Area would be modified to provide stacking space for vehicles waiting in winter for the road opening, to better define parking, and to add an accessible pathway to the restroom (Figure III-7).

Figure III-7
Actions Common to Alternatives 2 and 3
Chinquapin Comfort Station Overview



- The accessible pathway (including a short retaining wall) would extend from the parking lot to the comfort station.

Figure III-8
Actions Common to Alternatives 2 and 3
El Portal Overlook Visitor Use Area (Turnout A)



- An accessible parking space and a service vehicle parking space would be added adjacent to the new accessible walkway to the Comfort Station.
- The historic stone drinking fountain would remain and may be restored in a future project.

- Public parking spaces would be striped to delineate them from a through-lane in the center of the parking lot.
- The shape of the parking area, as well as the traffic island that separates Wawona Road from the parking area would be similar but would have a wider footprint to provide an easier turning radius for large vehicles and buses entering the parking area from Glacier Point Road.
- Sight distance would be improved for vehicles approaching Chinquapin Intersection from the south by removing some small trees and shrubs. A paved ditch (with curbing to prevent parking) would likely be added alongside the turn. Existing *advisory* speed limit signs approaching the area would include changeable *regulatory* signs for winter driving conditions that could be switched in summer when the road is bare and dry.

❖ **Chinquapin Intersection Administrative Parking Area**

Either back-in (Alternative 2) or pull-through (Alternative 3) parking for maintenance vehicles would be created at the site of the former gas station (see description of Alternatives 2 and 3 below for more information).

❖ **Wawona Road Chain-down Lane**

A formal chain-down lane for vehicles heading toward Yosemite Valley, either in conjunction with the Chinquapin Administrative Parking Area (Alternative 2) or slightly north of the Chinquapin Administrative Parking Area (Alternative 3) would be constructed (see Alternatives 2 and 3 below for more information) to improve safety in this area for vehicles removing chains.

❖ **El Portal Overlook Visitor Use Area**

At the El Portal Overlook, a sidewalk, a new rock wall, and a viewing platform (including a small degree of vista clearing to improve the view) would be constructed. The historic rock wall just north of the turnout would be repaired.

❖ **El Portal Overlook Area Chain-up / Chain-off**

A second chaining area would be constructed on the Glacier Point Road above El Portal Overlook (for vehicles heading to Badger Pass), while the El Portal Overlook would continue to serve as the downhill chain-off area.

To construct the northbound turnout, one mature (approximately 60-inch diameter) red fir would be removed, while two mature (approximately 54 and 48 inches in diameter) red firs would be avoided and protected. In addition, numerous seedling and sapling red and white firs would be removed. Construction of this turnout would also require the importation of fill to create a flat lane off the existing east-facing slope. The chaining lane would be approximately 250 feet long and 15 feet wide.

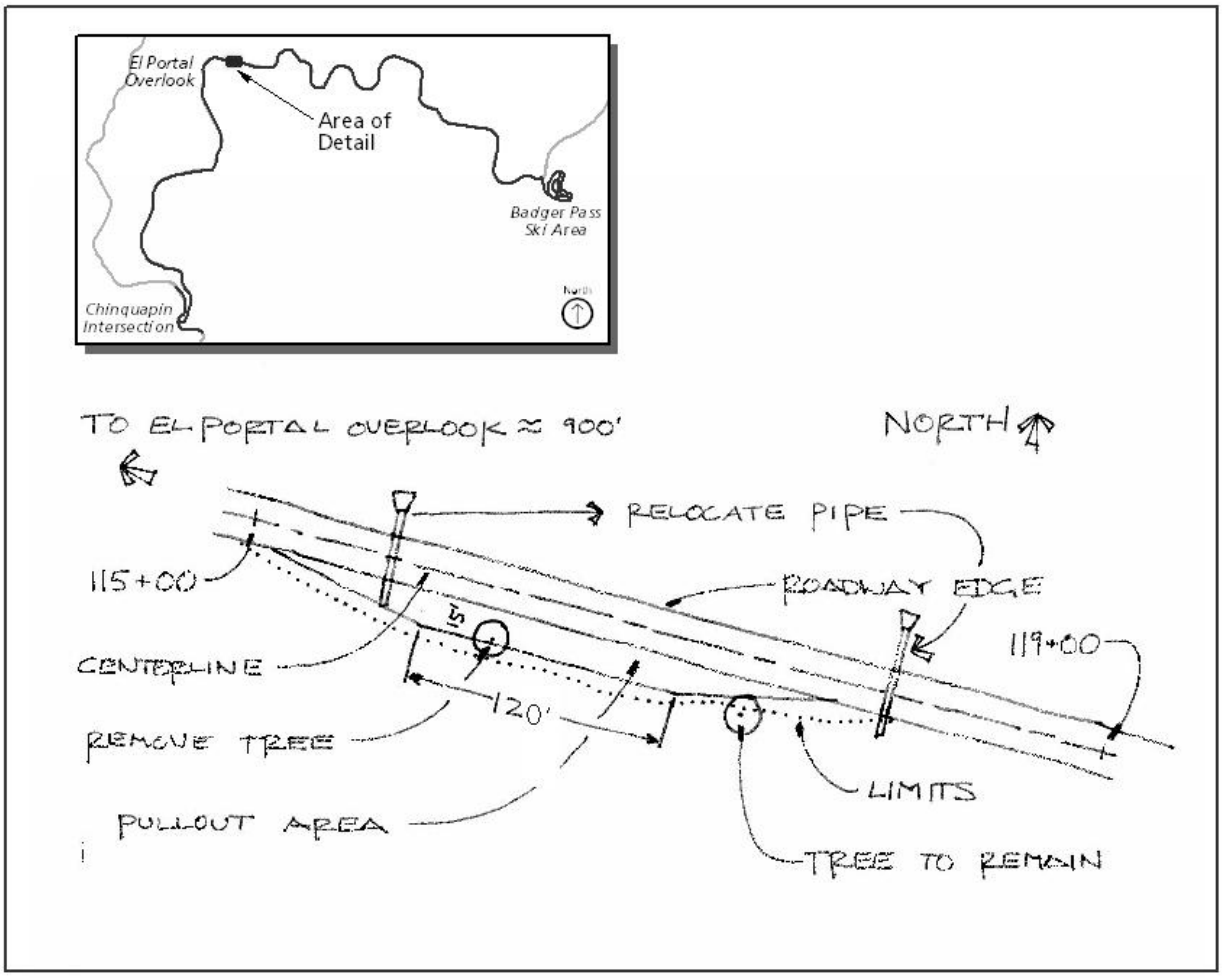
As with the Wawona Road chain-down lane, the El Portal Overlook chaining area would improve safety for vehicles using tire chains, but would have the additional advantage of protecting the surface of the road between Chinquapin and El Portal by allowing the adding or removal of chains nearer the early / late season snow zone, thus minimizing the use of chains on bare pavement.

❖ **Badger Pass Access Road Intersection**

The intersection of the Badger Pass Ski Area Access Road and the Glacier Point Road is problematic during icy winter conditions, resulting in numerous sliding accidents. The proposed project would:

- Reduce profile grade of Badger Pass Ski Area exit road (0.1 mile) at the intersection with Glacier Point Road.
- Reduce the superelevation of the Glacier Point Road at the approach to the Badger Pass Ski Area access road.
- Remove select trees along the access road to provide a uniform lane width at the exit.

Figure III-9
Actions Common to Alternatives 2 and 3
El Portal Overlook Area Northbound Chain-up



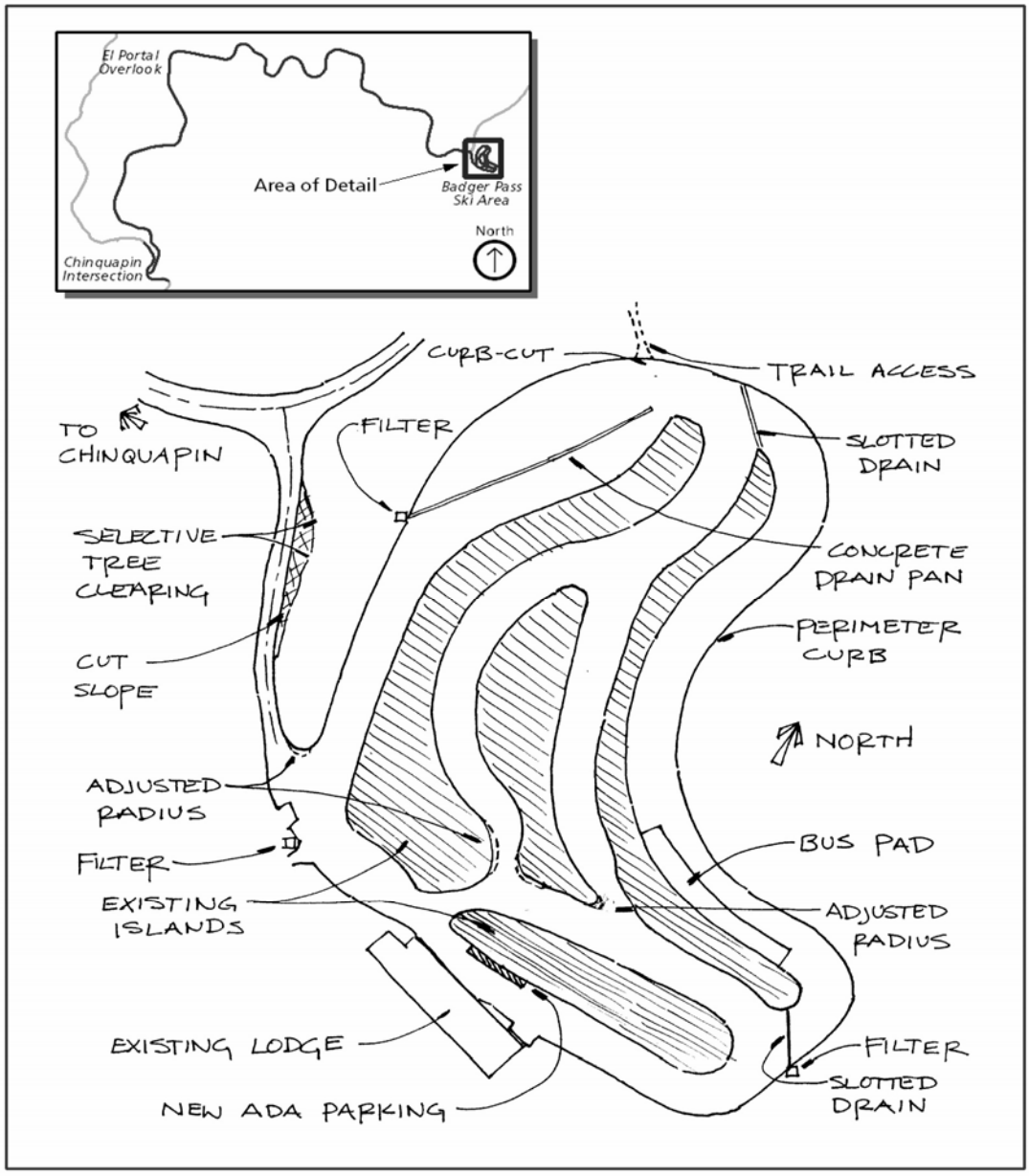
❖ **Badger Pass Ski Area Parking Lot**

During the spring as snowmelt begins, and in summer as melt continues, water percolates up through the parking lot, or runs over the surface in several places. This has resulted in numerous patches and overlays of certain sections of the parking lot to reduce and/or to compensate for water damage to the asphalt surface as well as icy conditions in winter, with unoccupied vehicles sliding in the lot. The southwest
portion of the parking lot is bordered by a wetland at the base of the historic ski facilities. To improve drainage conditions in the parking lot and around the historic building, the following actions would be taken:

- Match the existing footprint of the parking lot with new paving.
- Increase drainage structures in and from the parking area to reduce percolation up through the pavement.
- Add reinforced bus parking pads to limit damage to the parking lot from repeated parking of these heavy vehicles.
- Replace or install new concrete curbs to allow snow plows to better define the lot edge, to focus runoff, and to limit off-pavement vegetation impacts.

- Construct a concrete swale to match existing depression in the lot to modify flow and to help prevent water and ice damage to the pavement.
- Modify existing drainage in front of the lodge to allow drainage away from the buildings by adding curb, drop inlets and culverts in selected locations.
- Allow for treatment of parking lot runoff.
- Install an underdrain system and replace concrete curbing in upper lot, moving the curb to the inside of the existing paved surface area to minimize resource impacts.
- Retain the existing Grouse Creek Culvert.

Figure III-10
Actions Common to Alternatives 2 and 3
Badger Pass Ski Area Parking Lot



3. Construction and Restoration

❖ Excavation and Fill / Use of Native Materials

Approximately 4,500 cubic yards of fill is required for the proposed rehabilitation. This fill would be obtained from other portions of the project area, such as the Chinquapin Intersection redesign and would primarily be used to fill in widened road edges, at wall locations and in chaining areas. Based on the project design, most materials generated by the project should be able to be used in the project.

❖ Staging Areas

Staging areas for equipment and materials would be in previously disturbed, park-approved locations, such as in existing turnouts. Major staging would occur at the Chinquapin Intersection parking areas and at the Badger Pass Ski Area Parking Lot as well as at El Portal Overlook. Staging areas would be protected from spillover impacts by the placement of silt fencing or other barriers as appropriate and would be returned to pre-construction conditions upon completion of the proposed project.

❖ Construction Timing

Work that would affect major visitor use areas would be scheduled early or late in the season to avoid the greatest potential for visitor use impacts due to area closures that would need to occur. Major culvert replacement and repair work would likely occur in fall, after Labor Day. Road work on Glacier Point Road would be initiated as early as possible the following spring, after Badger Pass Ski Area is closed for the season, and prior to the seasonal opening of the road for public access to Glacier Point. Once the road to Glacier Point is opened for the season, visitors to the park could encounter construction delays of up to 30 minutes on weekdays. To minimize impacts on the busiest days, no construction delays would occur on weekends or federal holidays. Holiday, weekend and night work could be approved, however, through specific authorization of the park superintendent, with adequate public notification. A public information campaign would be initiated to inform visitors and local residents of construction delays and closure scheduling. Public notices would include flyers posted at local businesses, press releases and information on the park website and in newspapers. The California Department of Transportation statewide toll-free telephone road conditions message would have information on project construction delays and scheduling.

❖ Disturbed Area Rehabilitation and/or Restoration

As earthwork concludes, rehabilitation of disturbed areas would include topsoil replacement, installation of container plants and hand seeding. Some areas would also be hand-seeded and/or planted by the park or its revegetation contractor. Topsoil and duff would be salvaged and applied to priority areas by the contractor as directed by the park.

Approximately 13.2 acres of previously disturbed area within the road prism would be disturbed by the proposed improvements. This area also includes minor road widening where the road width is less than 22 feet (24 feet subgrade).

To facilitate rehabilitation of these areas, consistent with the Regional Directive “Revegetation of Disturbed Sites,” the following actions would occur:

- The proposed road contractor would complete earthwork (such as placement of berms –including boulders within them – and scarification) according to contract documents to ensure adequate surface preparation for restoration / revegetation.
- Prior to construction, park staff would collect site / species specific seeds for restoration.
- Primary restoration areas would include obliterated turnouts and wide road shoulders.
- Revegetation treatments would include hand seeding with locally collected native grasses and forbs, and installation of container plants.
- The revegetation strategy would rely heavily on natural regeneration from conserved topsoil.
- Revegetation success would be monitored by park staff to ensure its successful implementation.

- Although some revegetation work would be done by park staff, the park may contract with appropriate sources for plant propagation and restoration treatments such as duff salvage, plant propagation and planting.

❖ **Monitoring**

FHWA would work in cooperation with the NPS to ensure the contractor complies with all mitigation measures to avoid or minimize impacts to resources during construction activities throughout the duration of the project. NPS staff would periodically conduct onsite inspection of construction activities and materials to ensure protection of park natural and cultural resources. Arrangements would be made to inspect equipment and materials entering the project to ensure they are free of noxious weeds. The NPS would also monitor the success of revegetation treatments and supplement these with additional plants if needed. For three years following project completion, the NPS would monitor for the presence of invasive plants. Invasive species would be removed as they are found at this time and through ongoing maintenance. Other activities identified under Alternative 1, including ongoing maintenance to historic structures as well as roads, parking areas and other features would also continue.

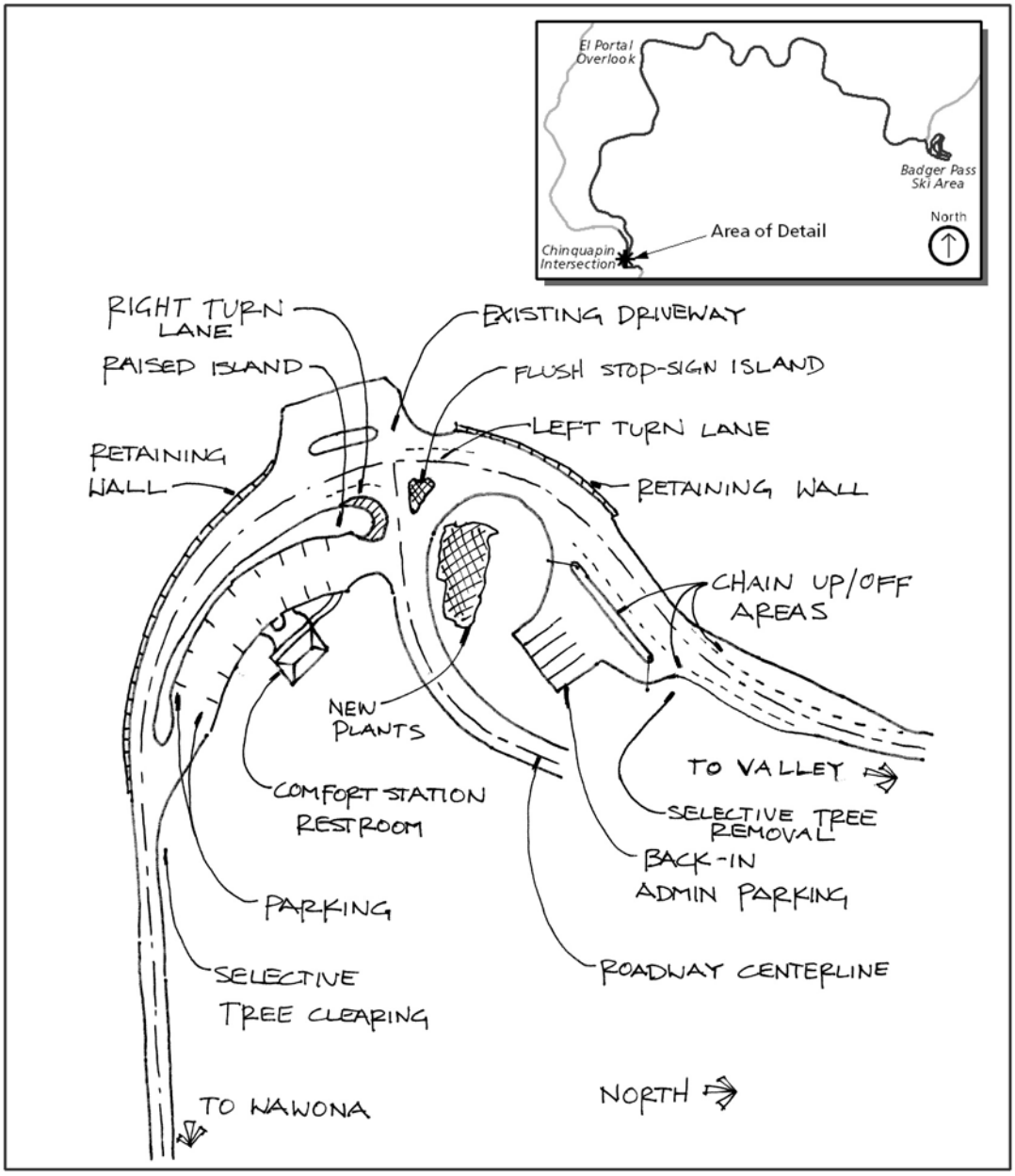
C. Alternative 2 (Preferred)

Under this Alternative, driving conditions on the first 5.1 miles of the Glacier Point Road would be improved as noted under the *Common to All Action Alternatives (2 and 3)* above, including reconstructing portions of the road, modifying unsafe sections, and improving minor developed areas and overlooks, such as the Chinquapin Intersection, the Badger Pass Ski Area Parking Lot and the El Portal Overlook (Figure III-7) and repaving. Systematic general improvements would include (where needed) changing the superelevation (angle of the road); adjusting the centerline; modifying turnouts; modifying drainage; paved / unpaved ditch construction and maintenance; trimming vegetation and removing rockfall hazards. Maintenance activities noted under Alternative 1 would also continue. There would be no obvious realignment or widening of the Glacier Point Road. Upon completion of the project, the road would continue to be a narrow, steep, winding road with natural vegetation close to the road.

Under this Alternative, in addition to these general improvements, there would be the following specific improvements (described in more detail following their introduction below):

- Chinquapin Intersection: Construct formal southbound and northbound (left and right) turn lanes from Wawona Road to Glacier Point Road. Remove select small trees at the south entrance to the Chinquapin Comfort Station Parking Lot to increase visibility and allow drivers to anticipate the turn (Figure III-11).
- Chinquapin Administrative Vehicle Parking Area: Designate a formal service area with back-in parking for five large maintenance vehicles behind the proposed Wawona Road chain-down lane.
- Wawona Road Chaining Areas: 1) Construct a formal chain-up lane for southbound vehicles heading toward Glacier Point Road by using the entrance of an existing service road. 2) Designate a formal chain-down lane for vehicles exiting Glacier Point Road and heading northbound toward Yosemite Valley.
- El Portal Overlook Area (see Figure III-13): Retain historic El Portal Overlook turnouts (A, B and C).
- Other Turnouts: Retain formal turnouts, including two gravel turnouts. Revegetate / obliterate (informal), unsafe turnouts.
- Badger Pass Parking Lot: Add an oil water separator or other water treatment device to treat parking lot runoff (as determined appropriate) to improve water quality protection for Grouse Creek.

Figure III-11
Alternative 2
Chinquapin Intersection Overview



Specific Improvements (Alternative 2)

❖ **Chinquapin Intersection**

The Chinquapin Intersection would be redesigned to address current safety problems, including the following:

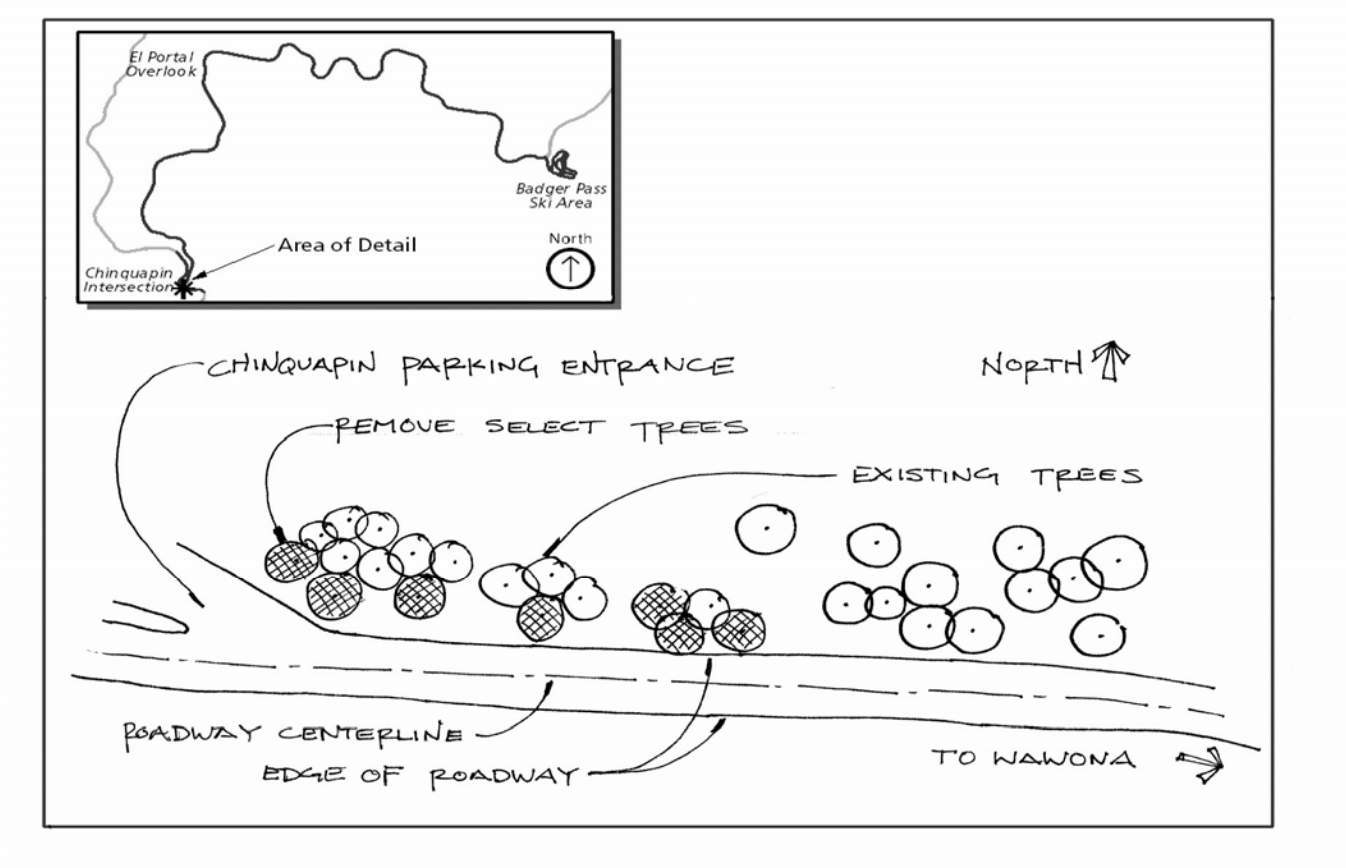
- Drivers traveling northbound on Wawona Road have very limited sight distance approaching the Chinquapin Comfort Station and the Chinquapin Intersection. Although the signed regulatory (and advisory) speed limit is 20 mph, vehicles commonly exceed that speed. Often cars that missed the turn make U-turns on a blind curve.

- For vehicles traveling north or south on Wawona Road, there are no defined turn lanes onto the Glacier Point Road. Cars speeding around the curve toward the intersection do not anticipate cars stopped in the travel lane waiting to turn or deciding where to go.

To correct these problems, the following actions would be taken on Wawona Road:

- Construct a formal (painted) southbound left turn lane from Wawona Road to Glacier Point Road.
- Construct a formal (painted) northbound right turn lane from Wawona Road to Glacier Point Road.
- Construct approximately 240 feet of rock-faced concrete core guardwall along the edge of pavement on the south side of the Chinquapin Ranger Station loop and approximately 115 feet on the north side to accommodate the Wawona Road intersection widening and turn lane modifications.
- Selectively clear trees to increase sight distance for the Chinquapin Comfort Station parking lot right turn from Wawona Road south (Figure III-12).

Figure III-12
Actions Common to Alternatives 2 and 3
Chinquapin Parking Area: Selective Clearing to Improve Sight Distance



Together, these actions would improve traffic safety and flow at the Chinquapin intersection as well as improve the turning radius for large vehicles.

❖ **Chinquapin Administrative Vehicle Parking Area**

- Delineate an Administrative Vehicle Back-in Parking Area on the northeast side of Chinquapin Intersection.

To accommodate the parking of large maintenance vehicles that currently occurs, the rear (east) portion of the proposed northbound chain-down area would be sectioned off with an island and area that would screen this parking from both the chain-up area, Wawona Road and the Glacier Point Road. A gate would also be installed to prevent unauthorized use. This area would then accommodate approximately five large maintenance vehicles (including snow plows and heavy equipment or trucks). (This largely bare area, surrounded by trees was the site of the former gas station which was removed in the early 1990s.)

❖ **Wawona Road Chaining Areas**

Chaining areas along Wawona Road have not been formally constructed or designated. The informal chaining areas that do exist are either located too distant from where they are most needed or are inadequately sized and cannot safely accommodate this activity, especially when there are delays in opening the Glacier Point Road due to overnight snow accumulation.

Although conditions at Chinquapin Intersection sometimes do not require chains, chains are often needed a few miles up the road, where steep, narrow conditions have precluded adding chaining lanes. Under Alternative 2, formal chaining areas would be designated and constructed alongside Wawona Road.

The addition of chaining areas on the Wawona Road would require removal of a small number of trees and shrubs because the chaining lanes would be located in previously disturbed areas (the former gas station location and a service road entrance). (Northbound traffic could also continue to chain-up in the Chinquapin Comfort Station parking area.) Shrubs would be planted to screen the view of maintenance vehicles from Glacier Point Road and the Chinquapin Comfort Station.

In addition, the park would add pedestrian signing and crosswalks across Wawona Road and Glacier Point Road to provide safer pedestrian access to the comfort station from the chaining area along Wawona Road.

Formally designating chaining areas would improve visitor safety while chaining, reduce pavement maintenance by providing appropriate locations for chaining, and allow park staff to enforce chain control signs more effectively.

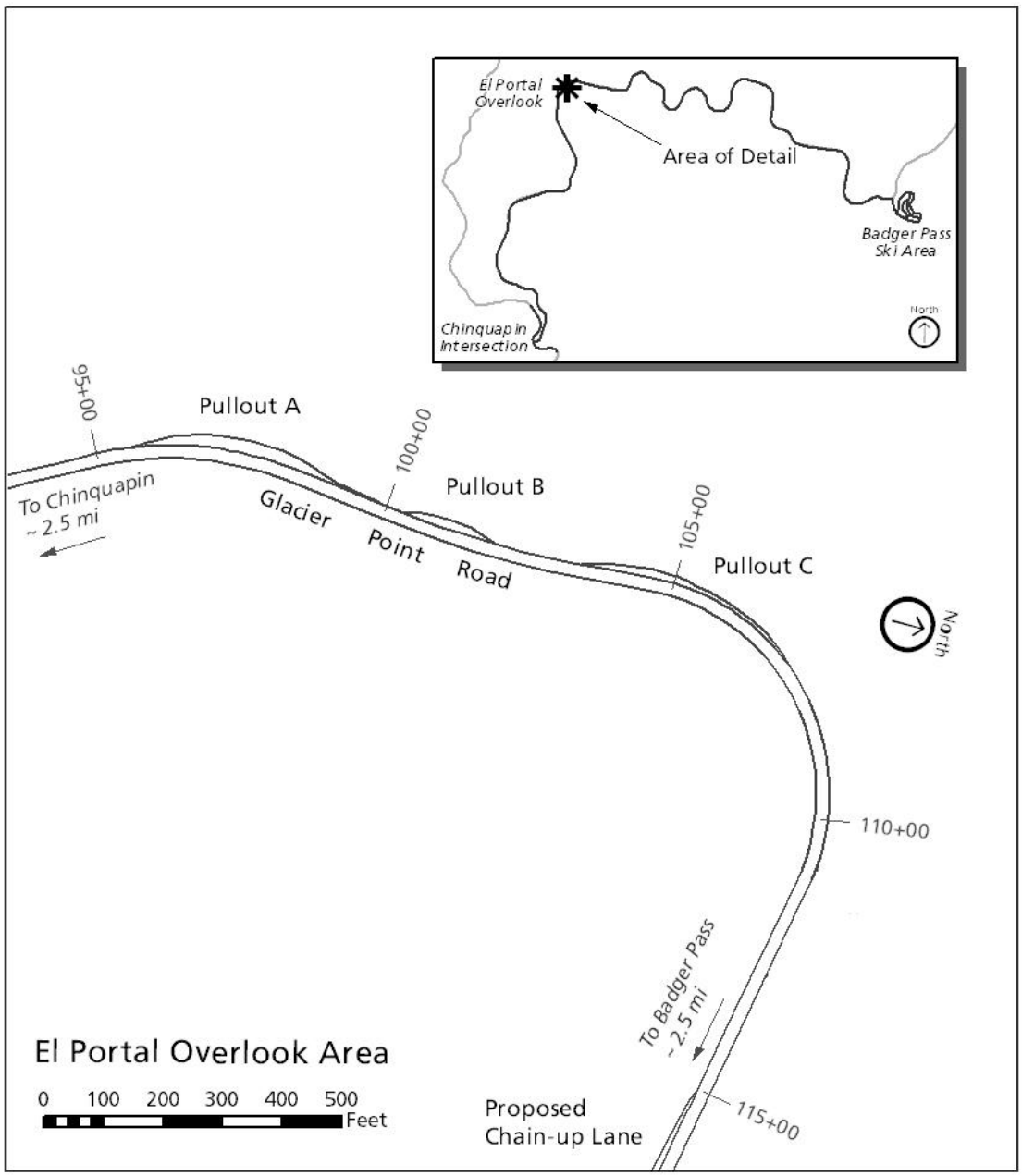
❖ **El Portal Overlook Area**

Currently there are several formal and informal turnouts in the vicinity of El Portal Overlook (lettered A, B, and C from the bottom for ease of reference as shown in Figure III-13). Turnout C contains an interpretive wayside on air quality, with a distant view of El Portal. Turnout B is short, with a steep drop-off and lies between two historic rock walls. Turnout A is long and wide. Because two turnouts (B and C) are entered off a steep downhill curve, visitors often either miss the turnouts, or fail to pull safely off the road, resulting in an unsafe situation along this cliff-edge. The following actions would improve safety and visitor access to this area:

Turnout A: Turnout A is located alongside a fairly straight stretch of road and has adequate sight distance for both pulling into and pulling out from it. It provides a distant view of El Portal and the Merced River Canyon. This alternative calls for the following actions:

- Restore historic vista point with adequate parking and add an historically appropriate viewing platform / walkway with a low seating wall in accordance with the Secretary's Standards.
- Remove some vegetation to restore historic views of El Portal and the Merced River Canyon.
- New interpretive panels may be added under a future park project.
- Allow buses to continue to chain-off at El Portal Overlook.

Figure III-13
El Portal Overlook Area

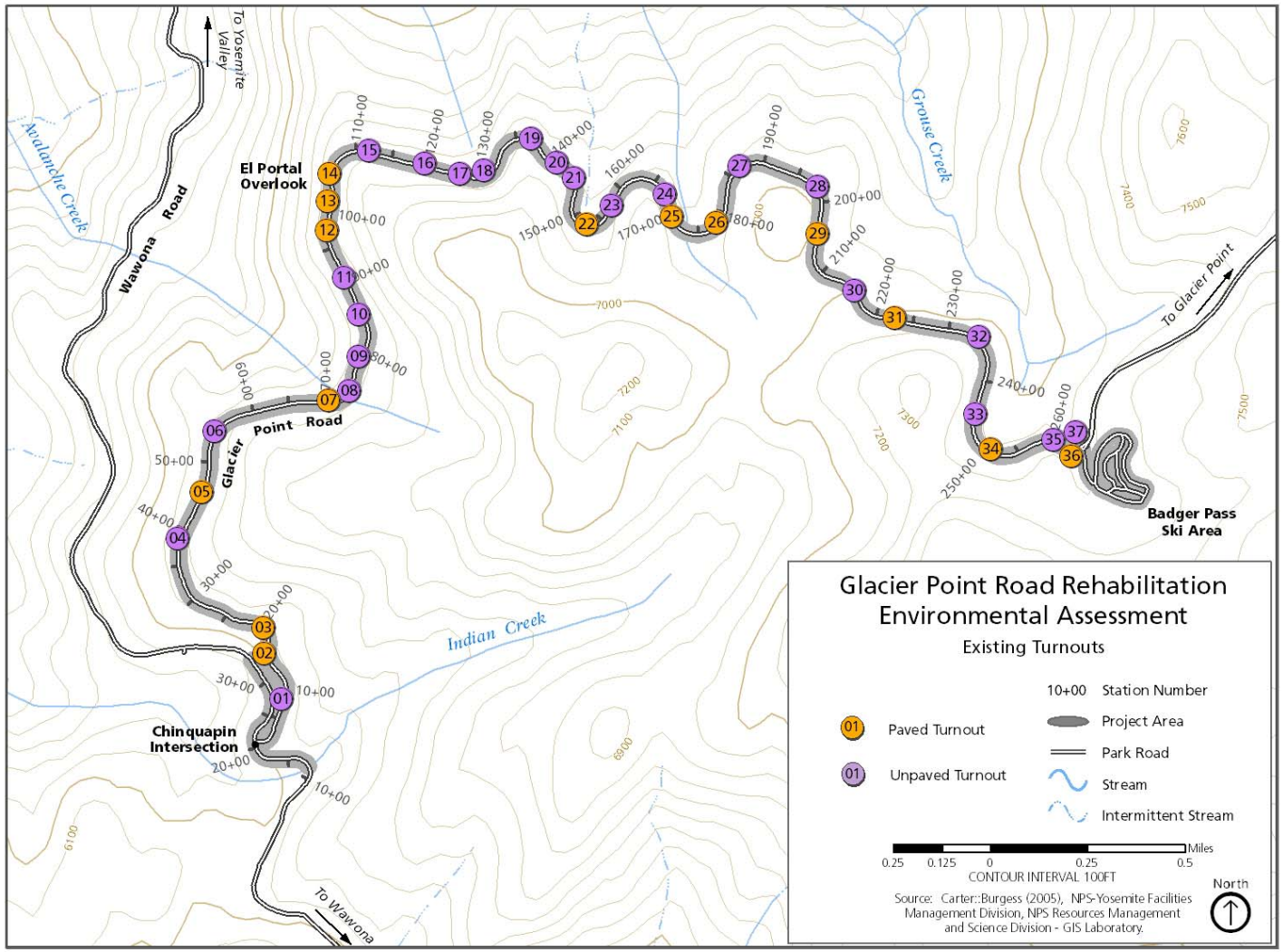


Turnout B: Turnout B is located between two existing historic rock guardwalls and is adjacent to a steep slope, where the view is generally poor through mature trees that hold the slope in place.

- Preserve and repair existing historic rock walls.
- Retain (repave in-kind) the turnout.

Turnout C: Turnout C is historic and recognized for providing the best views of El Portal and the canyons of the Merced River, as well as distant hills. It is located, however, adjacent to a sharp curve and sight distance from the road for pulling into it or out from it is less than is required by current design standards.

Figure III-14
Glacier Point Road Existing Turnouts



The centerline would be adjusted to accommodate large vehicles, including snowplows, which often have to veer into the downhill lane to make the uphill curve, and the turnout would be cleaned and retained.

- The centerline would be moved west (towards the turnout) to provide additional room for wide vehicles traveling uphill.
- Accumulated debris would be cleaned off the ends of the turnout to improve its delineation.
- The existing air quality wayside exhibit would likely be relocated to the improved visitor use area at Turnout A.

Turnout C would being retained for its contribution to the historic landscape, and to maintain visitor access to its outstanding views.

❖ **Other Turnouts**

There are approximately 33 additional turnouts along the Glacier Point Road (Figure III-14) within the area of potential effect. Eleven of these are paved formal turnouts; a few are informal gravel turnouts**.** Others are merely wide spots in the road barely suitable for one car to pull off into (casual use turnouts). Under the proposed project, formal turnouts would be retained and replaced in kind (either paved or unpaved according to their existing condition). Specific turnouts would also have curbs added, repaired, or removed to improve drainage conditions; others would contain short berms to prevent additional vegetation damage. Informal unsafe turnouts or turnouts that are adversely affecting nearby resources would be restored to natural conditions as the road was rehabilitated.

- Retain formal turnouts.
- Repave in kind, or gravel in kind turnouts to be retained.
- Block access to and restore unsafe or resource damaging turnouts.

❖ **Badger Pass Parking Lot**

A suitable water treatment device would be added to treat stormwater runoff at select discharge points.

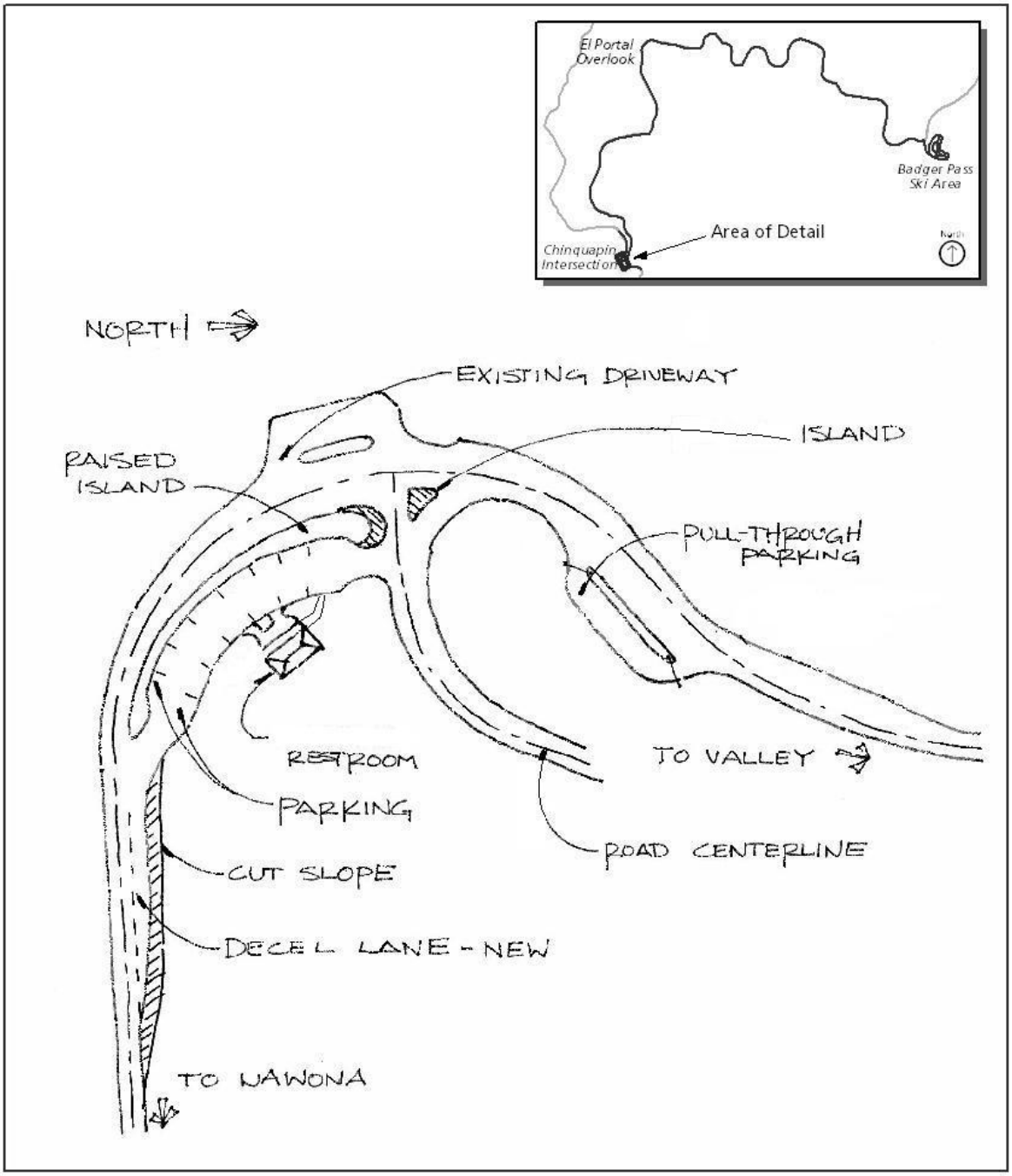
D. Alternative 3

Under this Alternative, driving conditions on the first 5.1 miles of the Glacier Point Road would be improved in the same way as in Alternative 2, including reconstructing portions of the road, modifying unsafe sections, and improving minor developed areas and overlooks, such as the Chinquapin Intersection, the Badger Pass Ski Area Parking Lot and the El Portal Overlook, and repaving the road.

Under this Alternative, in addition to these general improvements, there would be the following specific improvements (which are described in more detail following their introduction below):

- Chinquapin Intersection: Changes would be the same as those described in the Actions Common to All Action Alternatives (2 and 3) section above except for the following: a) No formal turn lanes would be added as in Alternative 2, although the intersection would be widened and would include the rock retaining walls on either side of the Ranger Station; and b) a deceleration turn lane would be constructed to improve access from Wawona Road northbound into the Chinquapin Comfort Station Parking Lot.
- Chinquapin Administrative Parking Area: Construct a formal service area with pull-through parking for five large maintenance vehicles behind the proposed Wawona Road chain-down lane.
- Wawona Road Chaining Lane: Construct a formal chain-down lane for northbound vehicles heading toward Yosemite Valley just north of the proposed Administrative Parking Area. No formal southbound chain-up lane would be constructed on Wawona Road. The chain-up lane near the service road proposed in Alternative 2 would not be constructed. Chaining up below El Portal Overlook would continue to be in informal turnouts currently used for that purpose.

Figure III-15
Alternative 3
Chinquapin Intersection Overview



Note: There would also be retaining walls on either side of the Ranger Residence driveway as in Figure III-11.

- El Portal Area Turnouts: Retain the El Portal Overlook (A); Turnout B would be lost as a rock-faced concrete core guardwall would be constructed between the two historic rock walls. Turnout C would be retained by modifying the cut slope across the road.
- Other Turnouts: Re-pave or re-gravel all formal turnouts. More gravel turnouts would be retained in this Alternative. As in Alternative 2, casual or informal and unsafe turnouts would be restored or lost as part of road rehabilitation.

Specific Improvements

❖ **Chinquapin Intersection**

The same reconfiguration of the Comfort Station Parking Lot would occur as in Alternative 2, including modifications to the traffic island separating Wawona and Glacier Point roads. No formal turn lanes on Wawona Road at the entrance to Glacier Point Road, however, would be added in this Alternative.

Instead, a formal deceleration right turn lane into the Chinquapin Comfort Station Parking Lot from northbound Wawona Road (Figure III-15) would be constructed to facilitate an easier and safer turn into the lot with more warning (including laying back the slope alongside a small portion (40 feet) of northbound Wawona Road, prior to the entrance to the Comfort Station Parking Lot, and clearing trees and soil). To accommodate the turn lane, the slope would be cut back to expose a natural rock slope. To reach natural bedrock, existing trees, shrubs and soil would need to be removed. Adding the deceleration lane and tree removal along the inside of the curve would improve the safety and visibility for this turn.

❖ **Chinquapin Administrative Parking Area**

Similar to Alternative 2, an administrative vehicle parking area would be provided so that snow plows and other maintenance vehicles could be stored closer to where they are regularly needed. In this Alternative, however, the parking would be pull-through rather than back-in (Figure III-15). This would require a larger area than in Alternative 2 and therefore would, in combination with the chain-up lane, require additional tree removal on the edges of the former gas station clearing.

❖ **Wawona Road Chaining Lane**

Instead of the two Wawona Chaining Lanes added in Alternative 2, one chain-down lane would be added in this Alternative. This northbound chain-down lane would be shifted slightly down from the former gas station disturbed area to allow for the pull-through administrative parking design. This would result in a larger number of trees than in Alternative 2 being removed to accommodate this parking that then did not interfere with the Administrative Parking Area and access to it.

❖ **El Portal Area Turnouts**

Turnout A: Turnout A would have the same improvements made as identified in Alternative 2.

Turnout B: Turnout B would be blocked by a concrete core, rock-faced wall constructed between the two repaired historic rock walls.

Turnout C: To retain and improve the visibility of turnout C, it would be widened by expansion of the cut slope across from it.

Other Turnouts

As noted above, there are approximately 33 additional turnouts along Glacier Point Road. Under Alternative 3, formal or purposely constructed turnouts would be retained and re-graveled or paved. Other turnouts that could be made safe would also be retained. As in Alternative 2, where needed for drainage, curbing around the edges of turnouts would be replaced, but would be replaced with colored concrete rather than asphalt.

Changes to turnouts would include the following:

- Remove some informal wide road shoulders / turnouts by scarifying the soil and applying a revegetation treatment.
- Pave some informal gravel turnouts.
- Repave formal turnouts.

E. Alternatives Considered but Dismissed

Under NEPA, an alternative may be eliminated from detailed study for the following reasons [40 CFR 1504.14 (a)]:

- *Technical or economic infeasibility;*

- *Inability to meet project objectives or resolve need for the project;*
- *Duplication of other less environmentally damaging alternatives;*
- *Conflicts with an up-to-date valid plan, statement of purpose and significance, or other policy; and therefore, would require a major change in that plan or policy to implement; and*
- *Environmental impacts too great.*

The following alternatives or variations were considered during the design phase of the project, but because they did not meet one of the above criteria, they were rejected.

Upgrade Road to Meet NPS or American Association of State Highway and Transportation Officials (AASHTO) Standards
NPS road standards as articulated in Park Road Standards (NPS 1984) called for new, non-historic roads with a proposed traffic volume similar to the Glacier Point Road to be designed with 11-12 foot lane widths and three-foot shoulders. AASHTO standards for Glacier Point Road traffic volumes would call for 11-12 foot-lane widths with two to four-foot shoulders for Recreational Roads. Walls and hillside cuts would be needed to redesign horizontal curves, provide improved sight distances and provide a minimum 10-foot clear zone.

Alternatives Evaluated in the 1991 Glacier Point Road Rehabilitation Environmental Assessment (EA) / Finding of No Significant Impact (FONSI)
All alternatives and options from this previously approved plan have been listed here to show connections to the current proposal. Some are included in the proposed actions under Alternative 1 or 2. Others were rejected as shown below (see also *Planning Background* section above in addition to notes in *italics* below)

<u>Chinquapin Intersection, including Henness Ridge</u>
1. No Action (*This is included in the No Action Alternative (Alternative 1) in this Environmental Assessment.)*
2. Redesign Chinquapin Intersection (Preferred) *(This is part of the proposed project under Alternative 2 in this Environmental Assessment and is slightly modified under Alternative 3.) The Henness Ridge component is no longer part of the proposed project (as a road rehabilitation project, the current project is smaller in scope.)*
<u>Badger Pass Ski Area Parking</u>
1. No Action (*This is included in the No Action Alternative (Alternative 1) in this Environmental Assessment.)*
2. Improve Parking Area (Preferred) *(This is part of the proposed project under Alternatives 2 and 3 in this Environmental Assessment.)*

<u>Glacier Point Road: Chinquapin to Badger Pass</u>
1. No Action (subgrade remains 24 feet wide) (*This is included in the No Action Alternative (Alternative 1) in this Environmental Assessment.)*
2. Moderate Reconstruction (subgrade widened by 10 feet with a typical section of 11-foot travel lanes, 1-foot paved shoulders, 3-foot gravel foreslope on fill side and 3-foot paved ditch on cut side) (*This was rejected due to the recognition of the historic nature of the Glacier Point Road and the desire to retain 10-foot travel lanes and one-foot paved shoulders to conform to the road's historic design.*)
3. Light Reconstruction (Preferred) (subgrade widened by 6 feet, with a typical section the same as in Alternative 2). (*This was rejected due to the recognition of the historic nature of the Glacier Point Road for the same reasons as noted above.*)
4. Rehabilitation (subgrade widened by 2.5 feet, with a typical section of 11-foot travel lanes, no shoulders, 1.5 foot-foreslopes on fill side and 2-3 foot paved ditch on the cut side) *(This is similar to the proposed project under Alternative 2 in this Environmental Assessment, however, the proposed action includes 10-foot paved travel lanes with 1-foot paved shoulders and does not propose an increase in top-width except as needed to conform to the proposed lane size.)*

Portions of the 1991 EA Outside the Scope of the Current Proposal but within the 1991 EA / FONSI

The following actions were proposed as part of the 1991 Environmental Assessment but are not part of the current proposal. They are therefore not considered in this Environmental Assessment. It is likely that they would be considered at a later date and would be more similar to the light rehabilitation now proposed for the first part of Glacier Point Road, however it is unknown at this time when they would be proposed or how they would be designed. General impacts from these proposed improvements, however, are considered in the cumulative effects analysis.

Glacier Point Road: Badger Pass to Sentinel Dome
1. No action (subgrade remains up to 29 feet wide).
2. Moderate Reconstruction (subgrade widened to 34 feet, with a typical section the same as in Alternative 2 above).
3. Light Reconstruction (Preferred) (subgrade 24 feet within existing disturbed area – except at Ostrander Rocks – with a typical section of 11-foot travel lanes, no shoulders, and a 1-foot paved foreslope modified as a ditch on both sides).
4. Rehabilitation (subgrade 22 feet wide, with a typical section of 10-foot travel lanes, no shoulders and a 2-foot paved foreslope modified as a ditch on both sides).

Glacier Point Road: Switchbacks
1. No Action.
2. Minor Rehabilitation and Spot Safety (Preferred) (widen curves, remove several large trees and overhanging rocks, and pavement overlay).

OTHER OPTIONS CONSIDERED BUT DISMISSED

Other Modifications to Create a Deceleration Turn Lane into the Chinquapin Restroom Parking Area

Options considered included:
a) Construct a concrete wall faced with granite rock (preferred option to minimize tree loss but may be the most expensive option);
b) Build a rockery wall (tiered);
c) Stabilize the steep cut slope with soil nails and provide a rockery wall facing;
d) Stabilize the steep cut slope with soil nails and provide a sculpted granite shotcrete treatment; and
e) A shorter deceleration turn lane to minimize resource impacts.

The following options were considered but dismissed for having much greater impacts compared to the action alternatives (2 and 3).

Consider Adding a Bike Lane to the Glacier Point Road: This action would not be possible given the desire to maintain the historic width of the Glacier Point Road with two 10-foot travel lanes and one-foot paved shoulders.

Consider Speed Bumps or Stop Signs near Congested Areas, such as Popular Trailheads, to Prevent Visitors from Driving the Road Too Fast: Modifications to stop signs are part of the project under Alternatives 2 and 3; however, speed bumps and other physical modifications to the road would not conform to the historic characteristics of the road. There are no trailheads along this portion of the road.

Chinquapin 30-car Parking Area: The park's General Management Plan (NPS 1980: 58) calls for the Chinquapin Parking Area to accommodate 30 vehicles. At its current size and configuration this lot cannot accommodate that many vehicles. This option did not meet other needs for the project, including allowing vehicle stacking while the road is being plowed.

Widening the Chinquapin Intersection without Constructing Rock Retaining Walls on Either Side of the Ranger Station: This alternative was rejected because it would have much greater impacts than constructing rock retaining walls, which would require a large amount of fill; and because it would result in the loss of many more trees surrounding the intersection.

Creating a Chain-up Lane approximately 0.25 miles North of the Chinquapin Intersection by Removing Trees and Adding Fill: This alternative was rejected because of it would have much greater impacts than either the proposal in Alternative 2 or 3. Use of previously disturbed areas would require much less tree removal and slope fill.

Creating a Chain-up Area on a West-facing Slope Adjacent to El Portal Overlook: This option was dismissed because it would require extensive slope cutting to accommodate a lane in this area.

Constructing a Berm between the Two Rock Walls at El Portal Overlook: Although this action was considered more historically appropriate, it was not a safe solution since the berm could allow cars to go up and over the edge.

F. Environmentally Preferable Alternative

In accordance with Director's Order-12, *Conservation Planning, Environmental Impact Analysis, and Decision-making* and CEQ (Council on Environmental Quality) requirements, the NPS is required to identify the "environmentally preferred alternative" in all environmental documents, including EAs. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ). The CEQ (46 FR 18026 - 46 FR 18038) provides direction that the "environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101," including:

1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2) Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3) Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4) Preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources (NEPA Section 101(b)).

Generally, these criteria mean the environmentally preferable alternative is the alternative that causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources (46 FR 18026 – 46 FR 18038).

Alternatives 2 and 3 would improve the quality of the roadway, including adding and replacing culverts, replacement of its sub-base and alterations to its banking (superelevation) where necessary, and recreating a uniform top-width / paved surface and would do so with limited effects on adjacent resources, retaining the historic integrity of the road. Upon implementation of either Alternative 2 or 3, visitors would find a well-maintained road, with upgraded safety features.

By creating formal chain-up areas, Alternative 2, and to a lesser degree Alternative 3 would also improve safety and operations for visitors stopping to put on chains before ascending the Glacier Point Road to Badger Pass. Alternative 2, however, would have fewer resource impacts (less tree removal) associated with the creation of the chain-down lane near Chinquapin.

Alternative 2 would improve turning safety for southbound large vehicles turning into the Chinquapin Comfort Station Parking Lot; Alternative 2 would include minor clearing to improve safety for northbound vehicles turning into the lot. Alternative 2 would also add turn lanes from Wawona Road, for both north and southbound traffic turning onto the Glacier Point Road. Alternative 3 would include a safer turn into

the Chinquapin Comfort Station Parking Lot for northbound vehicles but would require laying back a cutslope and tree removal to accomplish it.

Alternative 1 would result in ongoing deterioration of the roadway, including its culverts and other features. Over time, visitors would find deteriorating driving conditions and road features, with the road periodically subject to closures based on unacceptable deterioration of features and the need for emergency repairs.

In this Environmental Assessment therefore, the Alternative that best meets the environmentally preferable criteria is Alternative 2. Analysis of resource and visitor impacts and mitigation strategies as noted above has found that the preferred alternative achieves the greatest balance between the need for repairing the road and the need for preserving natural and cultural resources and improving the visitor experience in the park. This alternative was selected as the best alternative when taking into account enhancement and upgrades to the road that would improve park maintenance operations, visitor and employee safety, and reduce long-term operational costs. Alternative 2 has the following benefits:

- Minimizing loss of natural and cultural resources;
- Protecting public health, safety, and welfare;
- Improving operations efficiency and sustainability; and
- Protecting visitor and employee safety and welfare.

Because Alternative 1 could continue to result in adverse effects on public safety, most notably in the vicinity of the Chinquapin Intersection; because it could also continue to result in adverse impacts to wetlands in the vicinity of Badger Pass; and because it would likely result in a greater potential for road failure, it does not best meet the criteria for the environmentally preferable alternative.

Because Alternative 3 would have greater impacts to retain a historic turnout near El Portal and because it would have greater resource impacts near the Chinquapin Intersection to create a chain-down lane and a deceleration turn lane, it was not selected as the Alternative that would best meet the intent of the environmentally preferable alternative.

Table III-1
Glacier Point Road Rehabilitation Environmental Assessment
Alternative Comparison Chart

	ALTERNATIVE 1: (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3
Maintain Glacier Point Road			
Winter Activities (snow removal, sand application)	Ongoing	Same as Alternative 1	Same as Alternative 1
Spring Activities (road opening operations, snow storage removal, clearing windfall trees and slide debris, culvert cleaning, minor repairs to road surface, shoulders, embankments)	Ongoing	Same as Alternative 1	Same as Alternative 1
Summer Activities (grading unpaved surfaces, shoulder maintenance, ditch debris removal, pavement repairs, ditch and culvert cleaning, reshaping shoulders)	Ongoing	Same as Alternative 1	Same as Alternative 1
Sweeping, cleaning and repairing drainage structures, vegetation maintenance, litter removal, erosion control, pavement marking, applying pavement overlays, etc.	Ongoing	Same as Alternative 1	Same as Alternative 1
Glacier Point Road Rehabilitation			
Typical Section	Variable – generally 20-22 feet wide.	Typical section 22 feet wide with two 10-foot paved travel lanes and 1-foot paved shoulders.	Same as Alternative 1
Regulatory, Advisory and Information Signs	No change	Install additional signs for Chinquapin Intersection, Wawona Road, Glacier Point Road at El Portal Overlook, etc.	Same as Alternative 2
Road Edge Delineation	Continue to maintain existing snow pole locations.	Install snow poles at the beginning and end of curves, curve mid-points, and 300 feet on center.	Same as Alternative 2
Alignment	No change	Make slight changes in centerline alignment to achieve a consistent road top-width of 22 feet.	Same as Alternative 2
Superelevation (Slope of Road)	No change	Flatten the angle of the road in approximately seven locations to reduce the likelihood of vehicles sliding across the road during icy conditions.	Same as Alternative 2 for Badger Pass Intersection, Chinquapin Intersection and El Portal Overlook.
Drainage Modifications			
Headwalls	No change	Restore historic culvert headwalls as needed.	Same as Alternative 2
Culverts	Unplug or fix as needed.	Repair approximately 33 of 37 historic culverts. Clean culverts as needed. Remove and replace approximately eight historic culverts. Remove but do not replace one historic culvert. Plug and leave in place eight additional historic culverts.	Same as Alternative 2

	ALTERNATIVE 1: (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3
		Install approximately 34 new culverts on Glacier Point Road, three on Wawona Road and three within the Badger Pass Parking Area. Install or replace curbing in turnouts where needed to facilitate drainage to existing or proposed culverts. Remove curbing where it does not function to improve drainage.	
Riprap Aprons	No change	Construct riprap aprons as needed (approximately 50).	Same as Alternative 2
Subexcavation	No change	Subexcavate approximately 15 locations to correct under road subsidence problems related to drainage.	Same as Alternative 2
Paved Ditch / Curb Construction	No change	Construct paved ditches and/or curbs as appropriate.	Same as Alternative 2
Selective Vegetation Clearing			
	No change	Restore the original clear zone shoulder areas along approximately two miles of roadway to improve safety (sight distance and pavement warming as well as snow storage areas).	Same as Alternative 2
Slope Scaling			
	No change	Hand-pluck loose rocks (where safe to do so) from steep cliffs above the road along approximately ¾ mile to proactively prevent them from falling onto the road surface below.	Same as Alternative 2
Pavement Rehabilitation			
	Patching as needed.	Pulverize and compact existing road surface. Cover with new asphalt (entire roadway section).	Same as Alternative 2
Roadside Parking Areas			
Turnouts	No change	Repave or re-gravel historic turnouts to be retained. Obliterate and restore unsafe or unendorsed turnouts.	Retain paved turnouts. Improve additional gravel turnouts. Obliterate and restore unsafe or unendorsed turnouts.
Chinquapin Comfort Station			
Historic Features	Retain historic stone drinking fountain, stone steps around drinking fountain, historic comfort station, and historic ranger station.	Same as Alternative 1	Same as Alternative 1
Accessibility	No change	Improve access to Comfort Station.	Same as Alternative 2
Parking Area	Retain existing configuration.	Modify parking area configuration to allow for increased turning radius for buses and other large vehicles from Glacier Point Road. Delineate travel lane through lot (for stacking cars prior to Glacier Point Road opening).	Same as Alternative 2
Chinquapin Intersection			

	ALTERNATIVE 1: (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3
Intersection Modifications	N/A	Modify Chinquapin Intersection to accommodate left and right turn lanes from Wawona Road. Construct approximately 240 feet of guardwall on the south side of the Chinquapin Ranger Station and approximately 115 feet on the north side to accommodate turn lanes. Increase superelevation (downslope) of approach to Chinquapin Intersection from Glacier Point Road to facilitate turn lane and to reduce potential for vehicle sliding. Change location of administrative closure gate. Add clearer directional signage, including painted stop sign island.	Same as Alternative 2 except no left and right turn lanes from Wawona Road onto Glacier Point Road would be added.
Wawona Road Northbound Access to Chinquapin Comfort Station	Sharp right turn after curve	Increase sight distance on approach to Chinquapin Intersection from Yosemite West through selective vegetation clearing. Change advisory speed limit sign to regulatory sign and move to Yosemite West Intersection (0.5 miles) south. Add restroom turning signs.	Same as Alternative 2 plus: Add deceleration turn lane 0.5 miles past Yosemite West Intersection alongside road cut. Provide additional sight distance for the turn lane through cut slope modifications.
Wawona Road Southbound Access to Chinquapin Comfort Station	Left turn from primary travel lane	Add a left hand turn lane. Add clearer directional signage.	Add clearer directional signage.
Glacier Point Road Access to Chinquapin Comfort Station	Sharp turn around island	Enhance turning radius into Chinquapin Parking Area from Glacier Point Road.	Same as Alternative 2
Chaining Lanes	Informal existing undesignated turnouts Informal area within Chinquapin Comfort Station Parking Area	Construct formal southbound chain-up lane (enlarge existing turnout). Construct formal northbound chain-down lane (in former gas station area) alongside Wawona Road. Add chain control signs.	Same as Alternative 2 except: Shift northbound chain-down lane farther north to allow existing clear area for pull-through administrative parking. Do not construct southbound chain-up lane.
Administrative Vehicle Parking Area	Informal parking of large vehicles for maintenance / snow removal	Delineate formal *back-in* administrative parking area behind northbound chain-down lane (in large bare area vacated by former gas station). Add vegetated island to separate administrative parking area from Wawona and Glacier Point Roads.	Same as Alternative 2 except: Delineate formal *pull-through*, rather than back-in administrative parking area in former gas station location and northward extension.

	ALTERNATIVE 1: (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3
		Install administrative gate.	
Wawona Road and Chinquapin Parking Area Separation	Small elongate island	Locate wider concrete barrier (planter) between Wawona Road and Chinquapin Comfort Station Parking Area to provide for separation from traffic along Wawona Road.	Same as Alternative 2
El Portal Overlook			
	Repair and continued preservation maintenance of rock walls pending funding. Continue to allow use of area for bus chaining when road conditions below do not require chains.	Same as Alternative 1 plus: Construct formal vista point overlook at Turnout A with adequate access, formal sidewalk, parking and a viewing platform / low seating wall. Conduct limited vista clearing to improve view of El Portal and Merced River from historic turnouts (A, B, and C). Repair historic rock walls at Turnout B. Repave in-kind to retain it. Retain upper turnout (C) where air quality exhibit is located by moving the lower end slightly downhill. Add a new uphill chain-up lane above El Portal Overlook.	Same as Alternative 2 plus: Remove Turnout B by connecting existing historic rockwalls with a concrete core guardwall to match. Layback cutslope across from Turnout C to improve safety conditions.
Badger Pass Intersection			
Intersection modifications	N/A	Reduce superelevation of Badger Pass Ski Area Access Road to prevent vehicle sliding onto Glacier Point Road. Increase width of Access Road to conform to width of Glacier Point Road.	Same as Alternative 2
Badger Pass Parking Lot			
Improve Drainage and Reduce Wetland Impacts	N/A	Regrade parking lot within existing footprint to improve drainage. Add designated bus parking and visitor drop-off areas. Construct a concrete swale to match existing depression in lot to modify water flow during runoff. Replace existing curbing around parking lot and add new curbing where not present to facilitate drainage Increase drainage structures within parking area to reduce percolation up through pavement and water flow across pavement.	Same as Alternative 2 except: Do not install point source runoff treatment.

	ALTERNATIVE 1: (NO ACTION)	ALTERNATIVE 2	ALTERNATIVE 3
		Increase turning radius for large vehicles at chokepoints in lower part of parking lot. Modify existing drainage in front of Badger Pass Lodge to redirect drainage away from buildings and to improve drainage with riprap rundown to Grouse Creek. Install an underdrain system along upper edge of parking lot to reduce water damage to pavement. Retain Grouse Creek culvert. Install point source runoff treatment for Grouse Creek.	

Chapter IV: Affected Environment and Environmental Consequences

How Chapter IV is Organized:

A. Impact Topics

Specific impact topics were developed to address potential natural, cultural, recreational, social and park operations impacts that might result from the Alternatives as identified by the public, NPS, and other agencies, and to address federal laws, regulations and executive orders, and NPS policy. A brief rationale for the selection or non-selection of each impact topic is given in this section.

B. Methodology

This section contains the methods / criteria used to assess impacts for specific resource topics. Additional information is found in the Environmental Consequences section preceding impact analysis. The definitions of impacts adhere to those generally used under the NEPA to describe impacts as well as to those used under Section 106 of the National Historic Preservation Act (NHPA) and those used under Section 7 of the Endangered Species Act (ESA).

C. Affected Environment (a) and Environmental Consequences (b)

Information in this section, from Air Quality through Visitor Experience, is derived from a comprehensive review and analysis of existing information pertaining to the Glacier Point Road. It includes information from the General Management Plan (NPS 1980), various natural and cultural resources management plans and other park planning documents. Specific sections from these documents are cited appropriately in the text and the bibliographic information placed in the *References* section of this document. Information in this section has been gained from research and analysis of the best available information regarding Yosemite National Park.

Immediately following the description of each park resource potentially affected by the proposed project is a description of the probable consequences (effects or impacts) that could result from the alternatives [Alternative 1: No Action (Continue Current Management, Alternative 2 (Preferred), and Alternative 3] described in this Environmental Assessment.

Summary of Environmental Consequences by Alternative

An Impact Comparison Chart (Table IV-8) can be found at the end of this chapter.

A. Impact Topics

Impact Topics Analyzed

Impacts of each alternative have been analyzed for the following topics: soils; water resources, including wetlands and water quality; vegetation; wildlife; special status species; prehistoric and historic archeological resources; historic structures; cultural landscapes; visitor experience; and park operations.

PHYSICAL RESOURCES

Air Quality: Yosemite National Park is in a mandatory class I area under the *Clean Air Act* (CAA)(1977). Class I areas are afforded the highest degree of protection under the CAA. This designation allows very little additional deterioration of air quality. The CAA states that park managers have an affirmative responsibility to protect park air quality related values (including visibility, plants, animals, soils, water quality, cultural resources and visitor health) from adverse air pollution impacts. Special visibility protection provisions of the CAA also apply to class I areas, including new national rules to prevent and remedy regional haze affecting these areas. Under existing visibility protection regulations, the NPS identified “integral vistas” that are important to the visitor’s visual experience in NPS class I areas, and it is NPS policy to protect these scenic views.

Soils: *Management Policies* (NPS 2006) require the NPS to understand and preserve and to prevent, to the extent possible the unnatural erosion, physical removal, or contamination of the soil. The alternatives involve ground-disturbing activities with the potential for erosion or sedimentation impacts to occur.

Water Resources: The 1972 *Federal Water Pollution Control Act*, as amended by the *Clean Water Act* (CWA) (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, and control, and abate water pollution. *Management Policies* (NPS 2006) provide direction for the preservation, use, and quality of water in national parks.

The CWA is a national policy aimed at restoring, maintaining, and enhancing the chemical, physical, and biological integrity of the nation's waters and to prevent, control, and abate water pollution. Construction will result in earth disturbing activities, which increases the potential for erosion and sedimentation to occur.

Water Quality: Section 401 of the CWA as well as NPS policy requires analysis of impacts on water quality.

Wetlands: Executive Order 11990 requires that impacts to wetlands be addressed. Many park meadows, including areas at Badger Pass, are considered wetlands.

Water Quantity: The increased / decreased use of water to provide for public use may also have an impact on park resources, such as amphibians. Withdrawal of water from the park's domestic water supply system from the Badger Pass Ski Area is proposed for use in road reconstruction.

BIOLOGICAL RESOURCES

Vegetation: NEPA calls for examination of the impacts on the components of affected ecosystems. *Management Policies* (2006) call for protecting the natural abundance and diversity of park native species and communities, including avoiding, minimizing or mitigating potential impacts from proposed projects. The alternatives are likely to result in tree and other vegetation removal.

Wildlife: NEPA calls for examination of the impacts on the components of affected ecosystems. NPS policy is to protect the natural abundance and diversity of park native species and communities, including avoiding, minimizing or mitigating potential impacts from proposed projects. More than 342 native species of terrestrial and aquatic vertebrates have been recorded in the park, including 85 mammals, 224 birds, and 33 species of amphibians and reptiles. Many wildlife species may reside in or near the project area.

Special Status Species: The *Endangered Species Act* (ESA) requires an examination of impacts to all federally listed threatened or endangered species. *Management Policies* (NPS 2006) call for an analysis of impacts to state-listed threatened or endangered species and federal candidate species. Under the ESA, the NPS is mandated to promote the conservation of all federal threatened and endangered species and their critical habitats within the park boundary. Management Policies include the additional stipulation to conserve and manage species proposed for listing. Ongoing informal consultation with the U.S. Fish and Wildlife Service, and California Department of Fish and Game (Natural Diversity Database) has identified several important rare, threatened and endangered species that occur in Yosemite National Park.

CULTURAL RESOURCES (Historic Properties)

Prehistoric and Historic Archeological Resources / Historic Structures / Cultural Landscapes: Consideration of the impacts to historic properties is required under provisions of Section 106 of the NHPA (1966), as amended, and the 1995 *Programmatic Agreement among the National Park Service, the National Conference of State Historic Preservation Officers, and the Advisory Council on Historic Preservation* (ACHP). It is also required under *Management Policies* (NPS 2006). Conformance with the *Archeological Resources Protection Act* in protecting known or undiscovered archeological resources is necessary. *NPS Management Policies* (2006) call for ongoing inventory and analysis of the significance of archeological resources found within parks. Federal land managing agencies are required to consider

the effects proposed actions have on properties listed in, or eligible for inclusion in, the National Register of Historic Places (i.e., Historic Properties), and allow the ACHP a reasonable opportunity to comment. Agencies are required to consult with federal, state, local, and tribal government / organizations, identify historic properties, assess adverse effects to historic properties, and negate, minimize, or mitigate adverse effects to historic properties while engaged in any federal or federally assisted undertaking (36 CFR Part 800).

RECREATIONAL / SOCIAL RESOURCES

Visitor Experience: Depending on the selected alternative, a variety of impacts to visitor use may occur. Based on *Management Policies* (NPS 2006), impacts to visitors are considered with respect to park undertakings. Among the impacts considered in this section are visitor access and opportunities, visitor and employee safety, and scenic resources.

Wilderness: Approximately 95 percent of Yosemite National Park is designated Wilderness. Congress designated this area in 1984. NPS wilderness management policies are based on provisions of the 1916 NPS Organic Act, the Wilderness Act (1964), and legislation establishing individual units of the national park system. These policies establish consistent service-wide direction for the preservation, management, and use of wilderness and prohibit the construction of roads, buildings and other man-made improvements and the use of mechanized transportation in wilderness. All park management activities proposed within wilderness are subject to review following the minimum requirement concept and decision guidelines. The public purpose of wilderness in national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition, as well as for the purposes of recreational, scenic, scientific, education, conservation, and historical use.

Park Operations: Impacts to park operations and visitor services are often considered in Environmental Assessments to disclose the degree to which proposed actions would change park management strategies and methods and what additional costs (including staffing) are associated with the proposal.

Impact Topics Dismissed From Further Analysis

The topics listed below either would not be affected or would be affected only negligibly by the alternatives evaluated in this Environmental Assessment. Therefore, these topics have been dismissed from further analysis. Negligible effects are localized effects that would not be detectable over existing conditions.

Water Resources:

> **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, DO-2 (Planning Guidelines), and DO-12 (Conservation Planning, Environmental Impact Analysis, and Decision Making) provide guidelines for proposals in floodplains. Executive Order 11988 requires that impacts to floodplains be addressed. No floodplains would be affected by actions proposed in this Environmental Assessment. The proposed project is primarily located along steep, mountainous roads. The requirements of this executive order do not apply to the proposed action. No new facilities are proposed within floodplains.

Geologic Processes / Geothermal Resources / Geological Hazards: There would be no increase or decrease in potential impacts associated with geology or geological hazards from the impacts of road rehabilitation. No new facilities would be constructed.

American Indian Religious and Traditional Cultural Resources: Yosemite National Park and the surrounding area have a long history of habitation and resource use by prehistoric and contemporary American Indians. Analysis of impacts to known resources is important under the NHPA and other laws, including the Native American Graves Repatriation Act (NAGPRA), American Indian Religious Freedom Act (AIRFA) and Executive Order 13007 (Indian Sacred Sites). The NPS defines American Indian

traditional cultural (ethnographic) resources as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (DO-28, *Cultural Resource Management Guideline*, p. 181). Traditional cultural properties are ethnographic resources listed on or eligible for the National Register of Historic Places. Yosemite National Park has two places proposed for listing as Traditional Cultural Properties (Yosemite Valley and El Portal / Foresta).

There are five federally recognized tribes as well as two non-recognized Native American tribes associated with the park, including the:

- American Indian Council of Mariposa County, Inc. (Southern Sierra Miwuk Nation),
- North Fork Mono Rancheria of Mono Indians of California,
- Tuolumne Band of Me-Wuk Indians of the Tuolumne Rancheria of California,
- Picayune Rancheria of Chukchansi Indians,
- Mono Lake Kutzadika Paiute Indians,
- Bridgeport Paiute Indian Colony of California, and the
- Paiute-Shoshone Indians of Bishop, Community of the Bishop Colony.

A park-wide ethnographic overview and assessment has not been completed and little is known of current Native American traditional use of the project area. Bibby (2002:22) indicates that the Southern Sierra Miwuk claimed Chinquapin, and that the nearby area of Bridalveil Creek and its associated meadows are the location of numerous archeological sites and the likely route of the southern branch of the Mono Trail. Based on ongoing consultation, there have been no ethnographic resources found or identified in the proposed project area to date (also see Chapter V., Consultation and Coordination). Thus, there would be no effect on any known ethnographic resources as a result of the implementation of the proposed project under any of the alternatives in this EA.

To comply with the American Indian Religious Freedom Act (AIRFA), federal agencies must consider the effects of their actions on American Indian traditional religious practices. Based on analysis of the area of potential effects, there are no known traditional or religious use areas within the proposed project area. In addition, there are no known Indian sacred sites that would require compliance with Executive Order 13007.

Museum Collections: *Management Policies* (NPS 2006) and other cultural resources laws identify the need to evaluate effects on NPS collections if applicable. The collections at Yosemite National Park would not be affected by the proposed project, except by the potential addition of material to the collections if any is found (see mitigation measures under *Archeological Resources* in the *Environmental Consequences* section). Requirements for proper management of museum objects are defined in 36 CFR 79.

Socioeconomics: Socioeconomic impact analysis is required, as appropriate, under NEPA and *Management Policie*s (NPS 2006) pertaining to gateway communities. The local and regional economy and most business of the communities surrounding the park are based on tourism and resource use. Agriculture, manufacturing, professional services, and education also contribute to regional economies. There would be no measurable effects to regional or gateway community economies, or changes in visitor attendance or visitor spending patterns as a result of the implementation of the actions described herein.

Prime and Unique Farmlands: Although soil surveys have not been conducted along the Glacier Point Road in Yosemite National Park, no unique agricultural soils are believed to exist in this area because of the steep, mountainous terrain traversed by the road.

Energy Consumption: Implementation of the proposed actions would not cause measurable increases or decreases in the overall consumption of electricity, propane, wood, fuel oil, gas or diesel associated with visitation or for park operations and maintenance.

Land Use: Land use would not change as a result of the implementation of the alternatives described herein. The overriding land use would remain as parklands. No additional facilities would be constructed.

Environmental Justice: Executive Order 12898 requires all federal 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 and communities. This Executive Order does not apply to the subject of this Environmental Assessment. The actions evaluated in this Environmental Assessment would not adversely affect socially or economically disadvantaged populations.

B. Methodology

NEPA requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented. This section analyzes the environmental impacts of project alternatives on affected park resources. These analyses provide the basis for comparing the effects of the alternatives. NEPA requires consideration of context, intensity and duration of impacts, indirect impacts, cumulative impacts, and measures to mitigate impacts. In addition to determining the environmental consequences of the preferred and other alternatives, *Management Policie*s (NPS 2006) and Director's Order-12, *Conservation Planning, Environmental Impact Analysis, and Decision-making* require analysis of potential effects to determine if actions would impair park resources. Impact analysis for historic properties is based on NHPA 36 CFR Part 800 criteria of effect as detailed below.

ENVIRONMENTAL IMPACT ANALYSIS

The environmental consequences for each impact topic were defined based on the following information regarding context, type of impact, duration of impact, area of impact and the cumulative context. Unless otherwise stated in the resource section in Environmental Consequences, analysis is based on a qualitative assessment of impacts.

CONTEXT OF IMPACT: Setting within which impacts are analyzed – such as the project area or region, or for cultural resources – the area of potential effects.

TYPE OF IMPACT: A measure of whether the impact will improve or harm the resource and whether that harm occurs immediately or at some later point in time.

Beneficial: Reduces or improves impact being discussed.
Adverse: Increases or results in impact being discussed.
Direct: Caused by and occurring at the same time and place as the action, including such impacts as animal and plant mortality, damage to cultural resources, etc.
Indirect: Caused by the action, but occurring later in time at another place or to another resource, including changes in species composition, vegetation structure, range of wildlife, offsite erosion or changes in general economic conditions tied to park activities.

DURATION OF IMPACT: Duration is a measure of the time period over which the effects of an impact persist. The duration of impacts evaluated in this Environmental Assessment may be one of the following:

Short-term: Often quickly reversible and associated with a specific event, one to five years.
Long-term: Reversible over a much longer period, or may occur continuously based on normal activity, or for more than five years.

AREA OF IMPACT

Localized: Detectable only in the vicinity of the activity.
Widespread: Detectable on a landscape or regional scale.

CUMULATIVE IMPACTS

Cumulative impacts are the effects on the environment that would result from the incremental impacts of the action when added to other past, present and reasonably foreseeable future actions. Impacts are considered cumulative regardless of what agency or group (federal or non-federal) undertakes the action.

The Council on Environmental Quality (CEQ) describes a cumulative impact as follows (Regulation 1508.7):

> *A "Cumulative impact" is 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 non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

The cumulative projects addressed in this analysis include past and present actions, as well as any planning or development activity currently being implemented or planned for implementation in the reasonably foreseeable future. Cumulative actions are evaluated in conjunction with the impacts of an alternative to determine if they have any additive effects on a particular resource. Because most of the cumulative projects are in the early planning stages, the evaluation of cumulative impacts was based on a general description of the project. These projects are included in the cumulative effects analysis presented in Chapter IV of this document. (See Appendix A: Cumulative Projects List for a more complete list and description of these and other projects.)

Environmental Education Campus (EIS)
Merced River Comprehensive Management Plan
Rehabilitation of the Valley Loop Road
El Portal Road Reconstruction
Tunnel View Overlook Project
Glacier Point Road Repair (additional segments)

IMPACT MITIGATION

- **Avoid** conducting management activities in an area of the affected resource
- **Minimize** the type, duration or intensity of the impact to an affected resource
- **Mitigate the impact by**
  Repairing localized damage to the affected resource immediately after an adverse impact.
  Rehabilitating an affected resource with a combination of additional management activities.
  Compensating a major long-term adverse direct impact through additional strategies designed to improve an affected resource to the degree practicable.

All Impacts Except Special Status Species and Historic Properties
Note: Special Status Species and Cultural Resources impact determinations are formally determined under the Endangered Species Act (Section 7) and the National Historic Preservation Act (Section 106), respectively.

Negligible: Measurable or anticipated degree of change would not be detectable or would be only slightly detectable. Localized or at the lowest level of detection.
Minor: Measurable or anticipated degree of change would have a slight effect, causing a slightly noticeable change of approximately less than 20 percent compared to existing conditions, often localized.
Moderate: Measurable or anticipated degree of change is readily apparent and appreciable and would be noticed by most people, with a change likely to be between 21 and 50 percent compared to existing conditions. Can be localized or widespread.
Major: Measurable or anticipated degree of change would be substantial, causing a highly noticeable change of approximately greater than 50 percent compared to existing conditions. Often widespread.

Note: Although cultural resources impacts are also initially characterized as noted above to fulfill NEPA requirements, the conclusion follows the format below, and makes a formal determination of effect under Section 106 of the National Historic Preservation Act (36 CFR 800). In accordance with Management Policies (NPS 2006) and the 1999 Yosemite Programmatic Agreement, this analysis fulfills the responsibilities of the NPS under Section 106 of the NHPA.

Special Status Species

No Effect: The project (or action) is located outside suitable habitat and there would be no disturbance or other direct or indirect impacts on the species. The action will not affect the listed species or its designated critical habitat (USFWS 1998).

May Affect, Not Likely to Adversely Affect: The project (or action) occurs in suitable habitat or results in indirect impacts on the species, but the effect on the species is likely to be entirely beneficial, discountable, or insignificant. The action may pose effects on listed species or designated critical habitat but given circumstances or mitigation conditions, the effects may be discounted, insignificant, or completely beneficial. Insignificant effects would not result in take. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not 1) be able to meaningfully measure, detect, or evaluate insignificant effects or 2) expect discountable effects to occur (USFWS1998).

May Affect, Likely to Adversely Affect: The project (or action) would have an adverse effect on a listed species as a result of direct, indirect, interrelated, or interdependent actions. An adverse effect on a listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the effect is not: discountable, insignificant, or beneficial (USFWS 1998).

Historic Properties Impacts

No effect: There are no historic properties in the Area of Potential Effect (APE); or, there are historic properties in the APE, but the undertaking will have no impact on them.

No adverse effect: There will be an effect on the historic property by the undertaking, but the effect does not meet the criteria in 36 CFR Part 800.5(a)(1) and will not alter characteristics that make it eligible for listing on the National Register. The undertaking is modified or conditions are imposed to avoid or minimize adverse effects. This category of effects is encumbered with effects that may be considered beneficial under NEPA, such as restoration, stabilization, rehabilitation, and preservation projects. Under the terms of the Yosemite National Park's 1999 Programmatic Agreement (PA) with the SHPO and the ACHP, data recovery can mitigate effects to archaeological properties eligible for listing on the National Register under criterion D. Some archaeological sites are eligible as traditional cultural places under Criterion A, however, and for these, such mitigation may not be sufficient or appropriate.

Adverse effect: The undertaking will alter, directly or indirectly, the characteristics of the property making it eligible for listing on the National Register. An adverse effect may be resolved in accordance with the Stipulation VIII of 1999 Programmatic Agreement, or by developing a memorandum or program agreement in consultation with the SHPO, ACHP, American Indian tribes, other consulting parties, and the public to avoid, minimize, or mitigate the adverse effects (36 CFR Part 800.6(a)).

Significant Impact: An impact to a National Register historic property would be considered significant when an adverse effect cannot be resolved by agreement among SHPO, ACHP, American Indian tribes, other consulting and interested parties, and the public. The impact will diminish the integrity of location, design, setting, materials, workmanship, feeling or association characteristics that make the historic property eligible for inclusion in the National Register of Historic Places. The resolution must be documented in a memorandum or programmatic agreement or the FONSI. It is possible that an unresolved adverse effect could be considered impairment.

Impairment

In addition to determining the environmental consequences of the preferred and other alternatives, *Management Policies* (NPS 2006) and Director's Order-12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*, require analysis of potential effects to determine if actions would impair park

resources. The following sections from Management Policies define impairment and highlight the difference between an impact and impairment.

1.4.3 The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values

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. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. The laws do give the Service the management discretion, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

1.4.4 The Prohibition on Impairment of Park Resources and Values

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment.

1.4.5 What Constitutes Impairment of Park Resources and Values

The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

An impact to any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to 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, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated. An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park. . .

1.4.6 What Constitutes Park Resources and Values

The "park resources and values" that are subject to the no-impairment standard include:

- the park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;
- appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and
- any additional attributes encompassed by the specific values and purposes for which the park was established.

1.4.7 Decision-making Requirements to Identify and Avoid Impairments

Before approving a proposed action that could lead to an impairment of park resources and values, an NPS decision-maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values. If there would be an impairment, the action must not be approved.

In this Environmental Assessment determinations of impairment are provided in the conclusion section under each applicable resource topic for each alternative. Impairment determinations, however, are not made for health and safety, visitor use, maintenance, operations, socio-economic resources and other non-natural or cultural resources topics.

C. Affected Environment and Environmental Consequences

1a. Air Quality Affected Environment

Yosemite National Park is classified as a mandatory class I area under the Clean Air Act (CAA) (42 USC 7401 *et seq*.). Class I areas are afforded the highest degree of protection under the CAA. This designation (primarily for national parks and wilderness) allows very little additional deterioration of air quality (small amounts of sulfur dioxide, particulates, and nitrogen dioxide). The CAA states that park managers have an affirmative responsibility to protect park air quality related values (including visibility, plants, animals, soils, water quality, cultural resources and visitor health) from adverse air pollution impacts. Special visibility protection provisions of the CAA also apply to class I areas, including new national rules to prevent and remedy regional haze affecting these areas. Under existing visibility protection regulations, the NPS is beginning to identify "integral vistas" that are important to the visitor's visual experience in NPS class I areas, and it is NPS policy to protect these scenic views. The CAA also requires consideration of the protection of air quality related values, such as visibility and scenic vistas that are occasionally significantly affected by non-attainment particulate concentrations in the surrounding areas. Similarly, the California Air Resources Board has promulgated state Ambient Air Quality Standards, which are stricter than national standards. When areas fail to reach these standards they are identified as non-attainment areas and a State Implementation Plan (SIP) is required to define how areas will meet the standards.

Yosemite National Park lies within Tuolumne, Mariposa and Madera Counties. Tuolumne and Mariposa counties are part of the Mountain Counties Air Basin and Madera County is part of the San Joaquin Valley Air Basin (San Joaquin Valley Unified Air Pollution Control District). The project area lies within Mariposa County. Currently Mariposa County is in attainment or is unclassified for all national ambient air quality standards, however, the county exceeds two California air quality standards – ozone (throughout the county) and small particulates (PM_{10} in Yosemite Valley) (NPS 2005). Madera County is a non-attainment area for ozone and PM_{10} (particulate matter less than 10 microns).

Air quality within the park is generally good; however, it occasionally exceeds state standards for ozone and particulates (PM_{10}) as noted above. Park air quality is affected by nearby urban areas, but daily patterns of wind movement generally disperse pollutant concentrations. Aside from motor vehicles, typical sources of major air pollution such as industry and fossil fueled power plants are not currently in the area. Park air quality monitoring stations are located at Turtleback Dome (Ozone and IMPROVE – Interagency Monitoring of Protected Visual Environments) and park headquarters (particulates). Other air quality monitoring stations are located in nearby communities in Fresno, Madera, Mariposa, Merced, Mono, and Tuolumne counties in California and in Douglas County in Nevada.

If the new EPA 8-hour standard for ozone had been in effect in 1998-2000, it would have been exceeded 19 times in 1998, with fewer times in 1999 and 2000 (NPS 2004:III-36). Similarly, the state 24-hour PM_{10} standard was exceeded twice in 1999 and once in 2000, however, the federal PM_{10} standard was not exceeded. Exceeding the standards is primarily attributed to sources outside the park.

Existing sources of air quality degradation in the vicinity of the project include campfires and vehicle exhaust, both of which may contribute to human health effects, primarily from particulates. Fine particles (PM_{10}) result from burning wood and from other activities. They may be carried aloft by smoke and away from the source area by air movement. During temperature inversions, however, wood smoke can remain near ground level. Inhalation of PM_{10} matter can result in harmful effects on humans because fine particles interfere with the respiratory tract and because these particles may be inherently toxic due to their chemical or physical characteristics.

The main pollutant of concern from vehicle exhaust is carbon monoxide (CO), a colorless, odorless gas. Impacts from CO are usually very much localized and tend to occur near busy, congested urban intersections. CO interferes with oxygen transport in the human body therefore; it impairs the brain, heart, and exercising skeletal muscles. Generally, neither the levels of traffic or number of particulate sources are concentrated enough to adversely impact a non-urban area.

Ozone occurs when sunlight reacts with chemical pollutants in the air. In the park, slight ozone damage has been documented in up to one third of study specimens in the 4,000 – 6,000 foot range of sensitive pine species (ponderosa and Jeffrey pine) (Hall 1997).

Beneficial impacts to air quality now occurring in the park include increasing access to public transportation, both in Yosemite Valley and along spur roads, such as the Glacier Point Road. Although limited numbers of people access the Glacier Point Road via public transportation (buses), those that do contribute negligibly to decreasing air quality impacts from vehicle exhaust.

1b. Air Quality Environmental Consequences

Methodology: Air quality analysis was based on a qualitative assessment of typical air emissions from construction and operations activities. While localized emissions from the proposed project would contribute to effects on air quality, deterioration of air quality is a regional issue influenced by a variety of factors, including weather and transportation, manufacturing and other criteria occurring outside the park.

Type of Impact: Beneficial air quality impacts would reduce pollutant emissions or lower pollutant concentrations, while adverse impacts would increase these.

Alternative 1: There would be no additional impacts to air quality from the implementation of Alternative 1. Ongoing maintenance and repair of the road surface and associated structures (including rock and

vegetation removal, minor culvert work, crack sealing, chip-sealing and future asphalt overlays) would result in negligible construction exhaust emissions – hydrocarbons and particulates (diesel engines) – associated with the use of a small number of vehicles and equipment. These emissions could increase to locally minor if they were associated with traffic delays, which could temporarily increase the concentration of pollutants in the vicinity of idling vehicles, depending on air movement associated with weather conditions. Such emissions would be short-term, localized and quickly dispersed, depending on weather patterns.

Alternatives 2 and 3: In general, construction emissions would be generated by:
(1) Earth movement, brush removal, rock blasting, and construction / demolition activities;
(2) Road and non-road (construction) vehicle exhaust emissions; and the
(3) Use of construction materials that result in evaporative emissions such as the potential use of a hot mix asphalt batch plant.

Earth Movement: There would be localized degradation of air quality in the vicinity of earth-moving construction activities, including filling and grading, brush removal, blasting and the repeated use of heavy equipment during dry periods, as well as from vehicles passing over temporarily unpaved road surfaces, causing dust to rise. These effects would be short-term and would contribute to increased localized particulate concentrations in their vicinity, an effect which would be mitigated (when possible) by the use of watering trucks to minimize the release of fugitive dust. There would be no long-term contribution that would increase particulate concentrations from the proposed action under Alternatives 2 or 3.

Vehicle Emissions: There would be increased (locally negligible to minor) gasoline and diesel emissions during reconstruction of the road from the use of construction vehicles and equipment, particularly from temporary lane closures which would result in traffic delays and increased (minor) localized emissions in the vicinity of the delay. There would be no increase in roadway capacity or increased overall traffic volumes as a result of the road improvements. As a result, long-term exhaust emissions from vehicles using the Glacier Point Road or Wawona Road would not change as a result of implementing Alternatives 2 or 3.

Evaporative Emissions: Due to the size of the construction efforts and remoteness of the park, it is envisioned that a portable batch hot mix asphalt plant would be required to provide the asphalt necessary for parking lot and road construction, resulting in evaporative emissions. Alternatively, asphalt could be trucked into the park from a batch plant located outside the park. Batch hot mix asphalt plants typically involve aggregate storage and handling, rotary drying (typically oil-fired), screening, and mixing, and emit particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and volatile organic compounds (VOC) and would result in a minor to moderate localized, short-term effects on air quality in the vicinity of their use. Other evaporative emissions would result from the use of sealants and chemicals used in the project.

Actions having a beneficial effect on air quality, such as access to public transportation (buses) to travel the Glacier Point Road would not be affected by the proposed action, however, the proposed project would increase the ability of buses and other large vehicles to engage in a safer driving experience, with some wider turning radii and enhanced parking areas.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to air quality include:

- Disposing of excess plant materials offsite (rather than burning onsite);
- Spraying water over exposed soil, particularly during dry conditions to minimize fugitive dust;
- Covering trucks transporting cut or fill material to reduce or eliminate particle release during transport;
- Encouraging contractor and NPS employees to travel together to and from the project site to the extent possible (rather than in multiple separate vehicles);

- Revegetating bare and staging areas as soon as possible; and
- Limiting vegetation removal within the project area.

Cumulative Impacts: Over time, human impacts such as the development of roads, businesses and housing have contributed to increasing vehicle travel to obtain goods and services and to access recreational experiences. In California, as elsewhere, population increases have resulted in dramatic increases in the number of vehicle miles traveled. In addition, these increases associated with vehicle travel have been coupled with increases in the number of industrial, commercial and other vehicle sources of pollution. With the passage of the federal and state clean air acts, emissions controls have been implemented on stationary and mobile sources of air quality degradation. California has some of the strictest standards on vehicle emissions in the United States. Over time, these standards have changed and have resulted in moderating the effect of ever increasing population and industry in the vicinity of the park. In the park, existing adverse impacts to air quality (vehicle traffic, campfires, power generation) would not increase as a result of the proposed actions under the Alternatives described herein, nor would there be changes to existing long-term regional beneficial effects, such as the Yosemite Area Regional Transportation System (YARTS). Therefore, when added to the impacts of other actions that may occur in the park and which would affect air quality, including other construction, transportation and restoration projects, the proposed action, under whichever Alternative is implemented, would contribute negligible localized adverse effects. If the project occurred at the same time as other projects having an effect on air quality, such as the rehabilitation of the Valley Loop Road or the El Portal Road, effects could increase, but would remain localized and negligible to minor and would be generally undetectable, except within the vicinity of the actions. Regional air quality would not be affected by the proposed actions under the Alternatives described in this Environmental Assessment.

Conclusion: Vehicle and evaporative emissions and dust would be largely dispersed by air movement in the project area, although lingering effects from vehicle emissions would likely occur during traffic delays. Impacts from dust and construction equipment emissions would be short term, and negligible to minor along the project corridor. Overall effects from Alternative 1 would be negligible to minor, localized and short-term. Alternatives 2 and 3 could contribute to more widespread effects than Alternative 1, however, these effects would continue to be primarily detected in the immediate vicinity of construction work as it traveled up the 5.1 mile road project and would be negligible to minor, with an undetectable effect on regional air quality. In contrast to Alternative 3, Alternative 2 would likely have fewer localized effects, due to the fact that it would not result in lay back of the slope near El Portal (Turnout C) or construction of the deceleration turn lane at Chinquapin. None of the alternatives would contribute long-term operational impacts to air quality over impacts already occurring from existing traffic patterns. There would continue to be negligible beneficial effects from options to access the Glacier Point Road through public transportation (buses) and from regional transportation programs, such as YARTS, contributing to a long-term negligible to minor regional beneficial effect on air quality. There would be no impairment of air quality or air quality related values from the proposed actions under the Alternatives described herein.

2a. Soils Affected Environment

More than 50 different soils have been identified in Yosemite. Soils are differentiated based on how they are formed, including source, topography, weathering, deposition, surface runoff, groundwater, and underlying geology. Soils are also differentiated on the basis of particle size, with six classes of particles making up soils: 1) coarse gravel, 2) fine gravel, 3) coarse sand, 4) fine sand, 5) silt and 6) clay. Most soils are comprised of particles of various sizes. Loams are soils in which clay, silt and sand are all fairly equally represented.

Most soils in the park are derived from underlying granitic bedrock parent materials and contain similar chemical and mineralogical composition. Except for meadow soils, most soils at high elevation were developed from glacial materials or from bedrock (NPS 2004:III-24). Poorly formed glacial soils, include moraine material, a mixture of fine sand, glacial flour, pebbles, cobbles and boulders of various sizes. Well-developed soils (loams) are found where fast growing and decaying plants abound, primarily in herbaceous dominated areas near wetlands and in forest meadows.

The Vegetation Management Plan (Hall 1997) citing Wood (1975), classifies forest soils in the Sierra Nevada in the Inceptisol order, while those in meadows in the Entisol or Histosol order. Soils at high elevation are generally relatively shallow (from one to five feet) and tend to be glacial in origin. In contrast, alluvial soils in Yosemite Valley may be thousands of feet deep (Hall 1997).

Disturbed slopes along the road can lead to maintenance problems with slumping, raveling and slope failure. There are unstable cut-slopes above the road between Chinquapin and Badger Pass which require design measures to stabilize soil and rock.

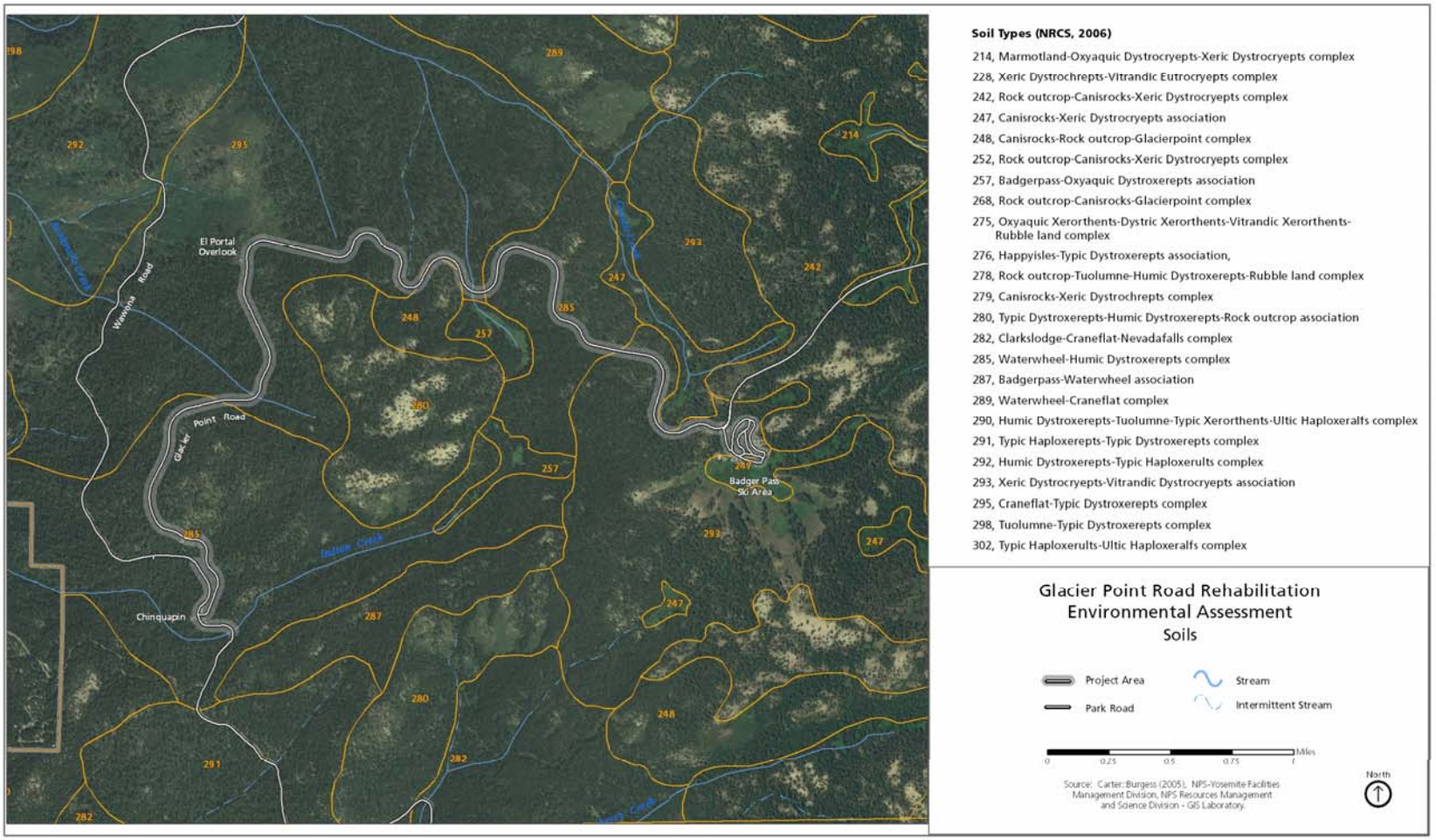
2b. Soils Environmental Consequences

Methodology: Soils analysis was based on a qualitative assessment of generalized soil types (wetland or upland) and typical effects of the type of impact described. For Alternatives 2 and 3, quantitative analysis was conducted to determine the amount of soil to be removed in major excavation and fill areas.

Types of Impacts: Types of soil impacts include soil removal, profile mixing, compaction, erosion, contamination, and soil restoration and revegetation activities. Activities that result in soil impacts include the construction of buildings or structures, parking areas, roads, trails, and other facilities. Beneficial impacts would protect soils from erosion or restore natural soil conditions; adverse impacts would degrade chemical or physical properties of soils or result in the loss or temporary removal of soils.

- **Soil Removal.** Paving and construction remove and cover the soil surface and can result in changes to basic soil properties, including altering the ability of water to penetrate the soil. Excavation and removal of the soil surface result in a long-term impact because basic soil properties (such as compaction, texture, and physical and chemical composition) which may have taken from tens to hundreds or thousands of years to develop are removed. Covering the surface reduces water movement and minimizes the opportunity for the normal physical and chemical soil processes.
- **Soil Profile Mixing.** Soil excavation and redistribution causes removal or mixing of the soil profile and disrupts soil structural characteristics, interrupting the chemical, physical, and biological processes that naturally occur in the soil. The level of change is dependent on the level of the alteration. It may take years to redevelop the soil profile.
- **Soil Compaction.** Soil compaction may occur as a result of construction activities or in areas of intensive use such as trails, campgrounds and picnic areas. Wetland soils are very susceptible to compaction effects. Soil compaction reduces infiltration rates and decreases pore spaces within soils, thereby increasing surface runoff and the potential for erosion. Deep compaction of soils may impede subsurface water movement. In turn, these effects can alter soil chemical processes such as nutrient transfer, biological processes such as root development and microbial patterns, and physical processes such as soil structure. Vegetation growth on compacted soils is often limited due to low infiltration and poor root penetration. **Soil Erosion.** Removal of vegetation through grading or casual pedestrian use may result in accelerated erosion of the soil surface. Soils on steep slopes and along watercourses are especially susceptible to erosion.
- **Soil Contamination.** The addition of chemical constituents into the soils as a result of paving, untreated runoff from paved surfaces, or from incidental spills, may alter micro- or macro-organism populations, diversity, and dynamics. Machinery involved with construction activities may deposit small amounts of natural and synthetic petro-hydrocarbons onto soils through equipment failure or normal operations.
- **Soil Restoration.** Ecological restoration that would minimize erosion potential and increase organic matter in the soil is considered a beneficial effect. Short-term adverse effects may occur during site restoration activities where construction equipment may compact soils, temporarily eliminate groundcover vegetation, and cause potential erosion from surface water runoff over the exposed soils, however, over the long-term, restoration will restore the soil profile, eliminate erosion, and increase continuity with adjacent areas.

Figure IV-1
Soils Map



Alternative 1: There would be few impacts to soils except in the event of road failure. Ongoing impacts from erosion along the edge of the road due to poor drainage and deteriorated road conditions would continue. Routine, ongoing maintenance of the road surface could involve shoulder work and ditch maintenance and would affect soils. As a result, soils along the edge of the road and near culverts could be mixed, removed, moved and replaced and woody vegetation would continue to be removed from these areas, likely causing localized erosion of soils. These actions would likely occur as a result of annual and or cyclic maintenance or repair needs and except in the case of annual maintenance actions would occur widely spaced over time, constituting a long-term, localized, negligible adverse impact. In the event of catastrophic road or slope failure, soils would be disturbed and erosion and sedimentation could occur and affect areas down slope from the road, resulting in short and long-term minor to moderate localized adverse effects, depending on the severity and extent of the road failure.

The continued use of sand to provide traction on icy sections of the road, if not specifically removed, would continue to result in alteration of soil conditions alongside the edge of the road, where sand piles up, contributing an excess amount of this soil component to roadside soils. In addition to the indirect, minor to moderate localized effects of changing the physical and chemical composition of area soils through the addition of sand, the windrowing of the sand could result in the inability of plants to occupy the edge of the road, an indirect minor to moderate adverse effect on soil fertility. It is estimated that there is a year's worth of sand alongside the edges of the road, where sand is used most heavily (FHWA 2006).

Alternatives 2 and 3: The following specific actions common to these alternatives would affect soils:

- Excavating and compacting the roadway to rehabilitate base materials and to prepare the surface for an asphalt overlay;
- Excavating to decrease or adding fill to increase the superelevation or grade of the roadway;
- Repaving existing areas or adding new paving (e.g. El Portal Overlook) or hard-surface pathways (e.g. Chinquapin Restroom);
- Constructing or recreating roadside ditches and curbing;
- Constructing or replacing culverts, culvert headwalls and riprap rundowns;
- Removing and flush-cutting vegetation;
- Selective removal of rock during slope scaling activities;
- Modifying historic and non-historic turnouts;
- Reconstructing the Chinquapin Comfort Station Parking Lot and improving accessibility of the Chinquapin Comfort Station;
- Adding an administrative parking area at Chinquapin;
- Constructing a chain-down lane on the Wawona Road near Chinquapin;
- Adding a chain-up lane near the El Portal Overlook area;
- Modifying the Badger Pass Access Road / Glacier Point Road intersection; and
- Improving drainage and circulation space within the Badger Pass Parking Lot.

In addition, the following specific actions called for by Alternative 2 would also affect soils:

- Reconstructing the Chinquapin Intersection to add three turn lanes;
- Constructing a chain-up lane on the Wawona Road near Chinquapin;
- Constructing guardwalls at the Chinquapin Intersection; and
- Replacing in-kind historic turnouts and restoring casual use and/or unsafe turnouts.

The following specific actions called for by Alternative 3 would also affect soils:

- Redesigning the Chinquapin Intersection to add one turn lane;
- Laying back the slope across from El Portal area Turnout C to retain it;
- Constructing a stone-faced concrete core guardwall between El Portal Area turnouts "B" and "C;"
- Adding a deceleration (turn) lane into the Chinquapin restroom parking area; and
- Paving and restoring additional turnouts.

Under Alternatives 2 and 3, soils would be affected over the length of the road rehabilitation project, wherever excavation and/or fill is called for, particularly in areas noted above. While much of this soil disturbance would be limited to the existing road prism (in the area affected by original road construction activities), that occurring at the Chinquapin Intersection under Alternative 2 would result in the excavation of approximately 616 cubic yards of soil for the construction of rock walls to support intersection widening, and the excavation of approximately 123 cubic yards of soil to create chaining lanes (Alternative 2) or 100 cubic yards (Alternative 3) for one lane, as well as paving of these areas.

Laying back the slope across from Turnout C near El Portal (Alternative 3) would result in the excavation and removal of approximately 4,500 cubic yards of soil and rock, while the excavation of approximately 50 cubic yards of soil would be needed to create a deceleration lane (Alternative 3). Excavation and fill to create the El Portal area chain-up lane would consist of approximately 50 cubic yards of excavation, coupled with 450 cubic yards of compacted fill for this lane which would be approximately 120 by 15 feet plus tapering at both ends. Construction of the walkways at the Chinquapin Restroom and at El Portal Overlook would also result in minor excavation and paving, a negligible long-term localized adverse effect on soils. These activities would result in soil loss and decreases in permeability and increases in runoff due to paving. Taken together, excavation effects on soils would constitute a long-term minor to moderate, localized adverse effect.

Most soil excavated during construction, under both action Alternatives, would be retained for use on the roadway or in the project restoration areas, a long-term minor beneficial effect. All soil and earthen materials (for both Alternatives 2 and 3) would be used in the project or stockpiled in the park.

During excavation and grading, soils would be mixed, moved, and replaced, causing a minor to moderate, localized but long-term, adverse effect to the area's soil profiles, with the greater degree of impact occurring in the limited areas not previously disturbed by the construction of existing cut and fill slopes [for the deceleration lane near the Chinquapin Restroom parking area (Alternative 3), the layback of the slope to improve the safety of Turnout C (Alternative 3), the Chinquapin intersection widening (Alternative 2, and to a lesser degree Alternative 3 for constructing only the right turn lane onto the Wawona Road), and new culverts and riprap rundowns (both action alternatives)]. In areas previously disturbed by construction (chaining lanes – one in Alternative 3 and two in Alternative 2; the administrative parking area on Wawona Road; culvert modifications throughout the project area; and changes to the Chinquapin Comfort Station and Badger Pass parking lots – both action alternatives), these impacts would also occur, but would result in negligible to minor additional impacts to soils, given the compaction and disturbance that has already taken place.

Moving, covering, trampling, and compaction of soils by equipment and workers within the construction work zone would also occur, however, a majority of soils that would be affected in the project corridor have also been previously disturbed by road-related development activities (e.g., maintenance and construction). Localized soil compaction would temporarily decrease soil permeability, change soil moisture content, and lessen its water storage capacity. Because of planned scarifying during restoration in areas where exposed soils remain, compaction in these areas would constitute a negligible to minor, short-term adverse effect on soils. Because the road would remain essentially the same width, there would be no major increase in surface area covered by impermeable materials. Under both action alternatives, however, there would, be approximately 13,600 square yards covered by new paved ditches and approximately 2,500 square feet covered by new walkways (at Chinquapin and El Portal Overlook). New paving to provide a consistent topwidth of 22 feet would add approximately 54,000 square feet of impermeable surfacing.

During pavement rehabilitation and new paving application along the 5.1 mile length of the roadway project, in former gravel parking areas and turnouts and in widened curves or areas where the road alignment is changed, soils would be excavated, mixed and replaced, with fill materials, including aggregate base added where needed to ensure a long-lasting smooth finished road surface. Paving would include asphalt milling and compaction, base and sub-base excavation (as needed), fill placement and compaction, and surfacing as appropriate to ensure a smooth finished road surface. This would

constitute a long-term negligible localized adverse effect on soils, most of which have been previously disturbed by original road construction and other repaving efforts since road establishment.

Road shoulder rehabilitation and turnout construction, rehabilitation and obliteration would cover approximately 66,270 square feet (1.5 acres) under Alternatives 2 and 3. In some cases, topsoil would be removed, stored locally in windrows and then replaced; in others, soils would be graded, then excavated for placement of boulders, then bermed. Scarification (ripping) of soils to decrease compaction would occur wherever restoration treatments are prescribed (primarily in obliterated casual use turnouts). Ditching would consist of creating or recreating paved ditches that run alongside the uphill side of the road to ensure clear passage for water flow during rain and snow melt. Together these activities would constitute a localized minor to moderate long-term adverse effect on soils. Upon successful seeding and/or replanting, there would also be a long-term minor to moderate beneficial effect as the growth of plants and their return of nutrients and water holding capacity to soils in restored areas resulted in less erosion and more stable roadsides. There would be additional beneficial effects from the use of native plants in restoration and from decreasing the erosion potential of cut-slopes alongside the road by removing some overhanging vegetation and loose rocks.

With approximately 10 culverts slated for cleaning, and 11 for headwall installation or repair, and 56 for riprap installation additional impacts to soils would occur. There would also be excavation of soils at culvert ends to ensure clear passage for water flow during rain or snowmelt. An estimated 70-350 square feet would be affected at each location, depending on the size of the culvert and other needed rehabilitation work. The installation of new culverts and replaced culverts would also result in an additional estimated 2,800 cubic yards of soil excavation. Installation of slotted drains in the Badger Pass parking area would result in some additional excavation (200 cubic yards) and fill. Installation of inlet structures (Types G0 and G1) would result in approximately 5,000 cubic yards of soil excavation. Construction of rock walls at El Portal Overlook (Alternative 3) would also result in 347 cubic yards of soil excavation to create a foundation for wall placement. Together these actions would constitute a minor to moderate localized adverse effect on soils.

Aggregate, asphalt and some soil would likely come from commercial sources, resulting in a need to ensure clean fill materials to prevent contamination of the park soils through weed seed or other unwelcome additives. Where disturbed, slopes would be sculpted to provide a natural appearance to emulate the surrounding terrain and blend with the landscape and to reduce their future potential for erosion. Mulch and seed would also be applied to reclaimed areas as appropriate. This would constitute a negligible to minor localized long-term and beneficial effect on soils.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to soils include:

- Locating staging areas where they will minimize new disturbance of area soils and vegetation.
- Minimizing ground disturbance to the extent possible.
- Minimizing driving over or compacting root-zones.
- Using mats or plywood to minimize soil compaction impacts in sensitive areas identified by the park.
- Salvaging topsoil from excavated areas for use in re-covering source area or other project areas.
- Not piling excavated soil alongside trees to remain, and provide tree protection for trees to remain.
- Minimize trenching around trees to remain in an effort to preserve the dripline soils. For roots two inches or larger in diameter, hand excavation would be used as appropriate to prevent damage.
- The drainage ditch at the Chinquapin Intersection which runs behind the Administrative Parking Area, which would be within the dripline of numerous trees, would be hand excavated to minimize impacts.
- Storing conserved topsoil in a separate location (segregated from subsoils).
- Windrowing topsoil at a height that will help to preserve soil microorganisms (less than three feet).

- Reusing (rather than removing from the project area) excavated materials for use in constructing berms or to level areas of impact.
- Revegetating project areas through native seeding or planting of appropriate areas along the road and obliterated turnouts.
- Berms created for roadside restoration would have a natural, undulating appearance and would use excavated fill as a first choice followed by clean fill as specified by the park.
- Importing weed-free clean fill and topsoil (if used).

Cumulative Impacts: Adverse impacts to soils as a result of other past and ongoing actions include compaction, soil mixing, and soil loss from removal and erosion, from development and concentrated visitor use in the park, as well as from areas where soils have been disturbed and revegetation has not occurred naturally or been undertaken by the park. Other impacts include an overall decrease in soil infiltration, where hardening of surfaces (roads, walkways, buildings) has occurred. Some restoration and development projects (e.g. addition of new visitor service facilities, restoration of old roads or building sites) could occur within the park and project vicinity. These projects could contribute to both beneficial and adverse impacts to soils. Because most of the park continues to be undisturbed by human impacts and is designated wilderness, the amount of area affected by past and possible future projects is not substantial and soil impacts therefore are minor when considered in a regional context. Impacts from the above actions, together with the impacts of Alternative 1, 2 or 3, would continue to result in localized, long-term minor adverse and negligible beneficial cumulative impacts to soils in the park. Alternative 1 would contribute a negligible, long-term, adverse increment to total cumulative effects on soils, while Alternatives 2 and 3 would contribute localized negligible to moderate adverse and negligible to minor beneficial impacts on park soils, which would both be disturbed and subsequently restored under the proposed actions.

Conclusion: Alternative 1 would result in negligible to minor, localized long-term adverse effects on soils. Alternatives 2 and 3 would result in a series of negligible to moderate, localized long-term adverse effects (excavation, movement, grading, compaction, construction of impervious surfaces) as well as some localized long-term minor beneficial effects (vegetation restoration, decreased potential for erosion), with Alternative 3 having slightly more impacts than Alternative 2 due to excavation associated with the deceleration turn lane and the slope layback associated with retaining Turnout C. Localized long-term beneficial effects would result from vegetation restoration, and other activities, such as installing riprap rundowns that would lessen the potential for soil erosion. None of the alternatives described in this Environmental Assessment would result in impairment of soil resources or related values.

3a. Water Resources Affected Environment

1. Hydrology: In the park, annual precipitation varies from approximately 37 inches at 4,000 feet to 50 inches at 8,700 feet. Typical snow depths range from 8-10 feet, but may reach 20 feet. Most rain and snow falls between October and April and periodically accounts for flooding of the Merced and Tuolumne Rivers. There has been significant flooding in the park approximately once per decade over the last 100 years (e.g. El Portal sustained major flood damage in 1924, 1937, 1950, 1955, 1964, 1969, 1983 and 1997) (Volpe 1997:12).

Some of the tallest waterfalls in the world are found in Yosemite Valley, including Yosemite Falls (with a combined drop of 2,425 feet) and Ribbon Fall (with a drop of 1,612 feet). Hydrologic processes, including glaciation, flooding, and fluvial geomorphic response, have been fundamental in creating landforms in the park.

The park contains over 1,667 miles of rivers and streams (Hall 1997). Two major rivers bisect the park from east to west – the Merced River and the Tuolumne River. In addition there are many side drainages running north to south into both rivers. The Tuolumne and Merced River systems originate along the crest of the Sierra Nevada in the park and have carved river canyons 3,000 to 4,000 feet deep. The Tuolumne River originates at the Mount Lyell Glacier and drains the northern portion of the park (an area of 680 square miles). The Merced River Watershed originates in the park's southern peaks, in the Clark and Cathedral Ranges and drains westward into the Merced River Canyon (an area of 511 square miles). Eventually, the Tuolumne and Merced Rivers empty into the San Joaquin River, which converges with the

Sacramento River to form a complex delta system that eventually makes its way to the only outlet – Carquinez Strait and then into San Francisco Bay (Whitney 1979).

Located primarily in subalpine and alpine areas, the park contains over 1,591 lakes, which are at least 0.018 acres, with 526 lakes greater than one acre (Hall 1997). Hetch Hetchy and Lake Eleanor reservoirs are the two largest bodies of water in the park (both greater than 1,000 acres). Most lakes are located within the subalpine and alpine zones, left behind by glaciers.

The Glacier Point Road is entirely within the Merced River watershed. The project area immediately around Chinquapin is drained by Indian Creek to the south, which flows into the Merced River between El Portal and the park boundary. The road crosses the upper reaches of Avalanche Creek and Grouse Creek and then crosses the main channel of Grouse Creek in the vicinity of the Badger Pass Ski Area.

2. Water Quantity: The Upper Merced River watershed encompasses approximately 114,840 acres (181.9 square miles) above Happy Isles in upper Yosemite Valley. Elevations range from 4,000 to over 13,000 feet (Mt. Lyell). The sub-basins of Merced Peak, Lyell, Triple Peak, and Red Peak Forks, as well as Echo, Sunrise and Illihouette Creeks and over 1,000 lakes and ponds are located in the watershed (Williamson *et al.* 1996a in NPS 2004:III-26). The average discharge measured at Happy Isles gauging station is approximately 355 cubic feet per second (cfs) (USGS 1998 in NPS 2004:III-27). In comparison, according to the U.S. Geological Survey, this gauging station had a peak discharge of 10,000 cfs during the January 1997 flood (the largest recorded in the park) and the Pohono Bridge gauging station recorded a peak discharge or 25,000 cfs in the same flood (Eagan 1998 in NPS 2005). Both gauging stations are upstream of project area creeks.

3. Water Quality: Water quality is determined by a measure of the characteristics of water, including temperature, dissolved oxygen, suspended sediment, nutrients and chemical pollutants. The concentrations and interactions of these elements affect the ability of organisms to survive and exhibit a great degree of natural variation among water resources. Water quality also refers to the suitability of surface water for recreational use and wildlife habitat, particularly the enhancement or degradation of water quality. The NPS *Freshwater Resource Management Guidelines* (found in NPS-77) require the NPS to "maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems." The Clean Water Act requires the NPS to "comply with all federal, state, interstate, and local requirements."

Water quality within the park is considered good and is generally better than required by state and federal standards (NPS 1994 *in* Volpe 1997). According to the park's website, an inventory of water quality by the NPS indicated pristine conditions in many parts of the park, with some water quality degradation in areas of high visitor use (NPS 1994). Park surface waters have been designated by the State Water Resources Control Board as beneficial for wildlife habitat, cold freshwater habitat, and for non-contact and contact recreation, canoeing and rafting. In general, water in the Merced River Watershed is noted for low conductivity (limited dissolved solids), near-neutral pH (a measure of acid or base conditions) – low alkalinity, and low nutrient concentrations. Due to low alkalinity of the stream water, the Merced River also has low buffering capability (ability to withstand changes in water chemistry due to impacts) (NPS 1994 in NPS 2004: III-30).

Water quality in Grouse and Avalanche creeks is considered good to excellent. Existing impacts (occasional inputs of pollutants from runoff) primarily result from their proximity to developed areas, including the Glacier Point Road and the Badger Pass Ski Area.

4. Wetlands: The wetland protection statutes that guide the NPS include Executive Order 11990, *Protection of Wetlands*; Director's Order #77-1, *Wetland Protection,* and its accompanying Procedural Manual #77-1; and Clean Water Act Sections 10 and 404; and the "no net loss" goal outlined by the White House Office on Environmental Policy in 1993. Executive Order 11990 requires agencies to minimize the destruction, loss, or degradation of wetlands. NPS Director's Order #77-1 and Procedural Manual #77-1 provide specific procedures for carrying out Executive Order 11990. Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act authorize the U.S. Army Corps of Engineers to grant

permits for construction and disposal of dredged material in waters of the United States in jurisdictional wetlands (those meeting the definitions in Section 404 of the Clean Water Act). This analysis considers whether proposed actions would be in conformance with applicable federal laws, regulations, or executive orders.

Under the implementing regulations of the Clean Water Act, depending on the type and amount of jurisdictional wetland affected, there are certain allowable impacts allowed under the criteria established by the system of Nationwide Permits authorized under that law. In addition, NPS compliance with Executive Order 11990 and policy implementation documents supporting it generally allow for impacts of less than one acre without requiring a Wetlands Statement of Findings to accompany an Environmental Assessment.

Lakes, rivers, streams, and adjacent riparian areas, as well as wet meadows are classified as wetlands. Riparian areas, lakes and wet meadows occur throughout the park. The NPS defines wetlands as any area classified as a wetland habitat according to the U.S. Fish and Wildlife Service's *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin *et al.* 1979) or areas with at least one of three primary attributes: 1) undrained hydric (wet) soils; 2) predominately hydrophytic (water-dependent) vegetation; or 3) an area saturated with or covered with water at some point during the growing season. Jurisdictional wetlands are classified under slightly narrower criteria.

The following types of wetlands are recognized by this classification system: palustrine forested (swamps), palustrine emergent wetland persistent (wet meadows), palustrine scrub-shrub (willow thickets); lacustrine (associated with lakes); and riverine (along rivers or streams). Two of these – palustrine emergent and riverine occur in the vicinity of the project area.

Palustrine wetlands include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and some saltwater wetlands. Palustrine wetlands include those areas called marshes, bogs, fens and prairies as well as shallow permanent or intermittent ponds. Palustrine wetlands are further classified as forested, emergent wetland persistent, and scrub-shrub wetlands (Cowardin *et al.* 1979).

Riverine wetlands include all wetlands and deepwater habitats contained within a channel, except for wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and those near salt water. Water is usually, but not always flowing in the channel and these wetlands may also be surrounded on their floodplain by other kinds of palustrine wetlands (Cowardin *et al.* 1979).

Wetlands in Yosemite include meadows and wet areas along rivers, streams, lakes and ponds. Wetlands greater than five acres were mapped through interpretation of aerial photography by the U.S. Fish and Wildlife Service in 1995 as part of the National Wetlands Inventory (USFWS 1995).

Montane meadows comprise a fairly small percentage of the park's vegetation and vary in their sensitivity to impacts (resistance) and their ability to recover (resilience). Wetlands in the project area are located adjacent to the Badger Pass Parking Lot, along portions of Grouse and Avalanche Creeks affected by the project, near Chinquapin along Wawona Road and along the Glacier Point Road near Avalanche Creek.

3b. Water Resources Environmental Consequences

Methodology: Water resources analysis was based on a qualitative assessment of water resources and effects likely caused by maintenance, construction or rehabilitation and typical effects of the action described. For Alternatives 2 and 3, quantitative analysis was conducted to determine what portion of the proposed project would affect wetlands, the estimated quantity of water use by the project, and for determining other water resources effects such as the number of new culverts.

Type of Impact: Types of water resources impacts include adding constituents to water, such as sediment or runoff; loss of or additions to the amount of water; changes in the flow of water; and effects on water-related resources, such as floodplains and wetlands. Beneficial impacts would protect water resources (hydrologic (flow) conditions, quality (pollution, sediment or bacteria), quantity, wetlands) or

restore natural conditions, such as streambanks or remove impediments such as dams. Adverse impacts would degrade the same chemical or physical properties of water or water resources, including natural or human-constructed structures. Wetland impacts affect the size of a wetland, and may alter or remove it, thus affecting its type as well as its integrity and its connectivity to adjacent habitats.

Alternative 1: There would be no new impacts to water resources (hydrology, water quantity, water quality or wetlands) under Alternative 1. Existing impacts on water resources would continue under this No Action Alternative. The ongoing effects of locating development in sensitive areas near water resources, such as near Badger Pass, would continue to have a minor to moderate long-term adverse effects by continuing to alter the passage and quality of overland water flow to these areas.

In addition to petroleum products deposited onto road and parking lot surfaces from vehicles and picked up during rain and snowmelt there could be localized flooding due to undersized, damaged, or clogged culverts, and from poor drainage conditions under affected roads. Poorly located culverts would continue to inadequately carry water across the road and could impede surface flows. Poor drainage under the roadway and localized flooding could also contribute to a catastrophic road failure. If so, it is likely that disturbed soil and sediment could be carried into nearby streams and adversely impact water quality. Ongoing impacts related to erosion from unprotected culvert outlets and unpaved ditches would continue to occur. Adverse impacts would include minor to moderate short-term localized impacts and long-term minor impacts.

The continued use of sand to provide traction on icy sections of the road would result in a range of potential impacts to water quality, depending on the final location of the sand as it traveled down the road and in or alongside ditches during rain and/or snowmelt. In general, additional filtration of water through sand would result in a negligible beneficial effect, however, long-term use of sand without specific removal would result in the continued filling of some side ditches and road edges with drifts and could contribute to the inability of those side ditches to carry water during rain and snowmelt and could therefore contribute to the failure of the drainage structures on the road, leading to an indirect, long-term, negligible to moderate, localized adverse effect.

Alternatives 2 and 3:
1. Hydrology: There would be no work in water associated with the proposed project under Alternatives 2 or 3. The very large culverts located at Grouse Creek (two 36-inch) and Avalanche Creek (two 36-inch) would not be rehabilitated or altered under the proposed action. In addition there would be no culvert modifications to other flowing (intermittent or perennial) drainages along the road. Although there would be no alteration of stream drainages, proposed actions would contribute to modifying and redirecting the overland flow of water through developed areas, a minor long-term adverse coupled with a moderate beneficial effect in some locations, particularly at the Badger Pass Ski Area Parking lot, where overland flow would be redirected through (under or around) the lot instead of percolating up through the parking lot and where modifications would also redirect the flow of water off the parking lot away from buildings and structures.

Approximately 30 new culverts would be installed and coupled with the modifications to existing culverts would result in a minor long-term beneficial effect in facilitating the passage of water across the road (mimicking former natural flows) more frequently than now occurs.

2. Water Quantity: Approximately 12,000 gallons per day of water (three truckloads) would be needed in the proposed project under either action alternative to reduce dust and to condition roadside soil embankments for compaction. This water would be obtained from the Badger Pass Ski Area fire hydrant and added to existing uses of water in the vicinity of the Glacier Point Road (for restrooms at Chinquapin and for nonpotable water at Chinquapin (employee residence) and Badger Pass Ski Area, as well as outside of the project area for the Glacier Point development. This additional incremental use of water would be difficult to distinguish from the much greater use of water for administrative and park operations and would therefore result in a negligible short-term localized effect.

3. Water Quality: A series of proposed project actions under Alternatives 2 and 3 would have the potential to affect water quality, including excavation (which would loosen soil materials); stockpiling of topsoil and other materials (which could be affected by runoff during seasonal rain or snowmelt); vegetation modifications (removal and grubbing and flush-cutting (which would also open up new areas to erosive action by water once soil was disturbed); and drainage improvements such as creating underdrains, subexcavation areas, riprap rundowns, and installation of new culverts (which could affect wet soils and which would loosen soil materials and temporarily subject them to runoff). To the degree possible, all work near water would be conducted during dry periods or would employ sediment barriers, as appropriate, to minimize the potential for these effects to occur. In addition, as possible stockpiled materials would be covered with semi-permeable matting to minimize the potential for contributing sediment to runoff. Combined, effects on water quality would include minor to moderate short-term localized effects.

The California Regional Water Quality Control Board and Mariposa County have certified the removal and clean-up of groundwater contamination from the former gas station (underground storage tanks) located at the Chinquapin Intersection. It is possible, however, that some additional contamination could remain in the vicinity of the Administrative Parking / Chain-down lane which would need to be remediated by removal of soil. If additional contamination is found during the proposed project, it would be remediated, a long-term beneficial effect. The NPDES (non-point source pollution) permit for the proposed project may also propose additional stipulations regarding this area.

Other culverts affected by the proposed project do not contain perennial or intermittent streams: rather, they are used to convey rain and snowmelt in season. There would, however, be work near Grouse Creek in the vicinity of the Badger Pass Ski Area Parking Lot. Work at two locations (modifying drainage near the northeast part of the parking lot and adding a new culvert near the southwest corner of the lot) would have the potential to contribute sediment to Grouse Creek, a minor to moderate localized short-term effect. In addition, work in wet soils to create the underdrain at the Badger Pass parking lot and the underdrain near the seeps (near Chinquapin Intersection on the Wawona Road and along Glacier Point Road near Avalanche Creek) would have the potential to contribute a minor to moderate short term impact on water quality.

In Alternative 2, a new oil water separator, filters, or other stormwater runoff treatment device would be installed and maintained to diminish the probability of contamination of Grouse Creek associated with runoff from the Badger Pass Parking Lot, an additional long-term minor to moderate (depending on how well it was maintained) localized beneficial effect.

Where formal delineation of turnout parking areas is provided by paving or curbing, there would be a reduction in the extension of these turnouts into intact or sensitive vegetation adjacent to the road, a long-term, localized negligible to minor beneficial effect.

4. Wetlands: To correct road subsidence and cracking associated with a seep along the road, a small palustrine emergent wetland located in the roadside ditch near point 75 + 28 above Avalanche Creek would be affected. The wetland is approximately 100 feet long by 2.5 feet wide, or just less than 300 square feet. Work at this seep under Alternatives 2 and 3 would include constructing an underdrain to convey water away from the existing roadway, a localized, long-term moderate adverse effect. Over time, depending on the continued ability of the roadside ditch to catch and retain water from the seeps along the cliff face, the wetland would likely reoccur. Regardless, proposed work would not affect the presence of the seep, which would continue to pipe from the hillside.

Altogether, throughout the 5.1 mile road project, approximately 300 square feet of excavation would occur at culvert ends to construct inlets. There would also be another 100 square feet of excavation near another small seep along Wawona Road, although the seep itself would be avoided, a short-term minor adverse effect coupled with a negligible beneficial effect from avoiding changes to the seep. At the Badger Pass Parking Lot, 1,100 square feet of excavation would occur along the northeastern edge to create an underdrain, where a wet portion of the Badger Pass Meadow affects the existing parking lot creating warping and cracking. There would also be 700 square feet of excavation for an underdrain

along the southeastern edge and additional excavation to effect better drainage at another location in the lower lot where water rises to the surface. And, as noted there would be approximately 100 square feet of wetlands affected at the seep near Avalanche Creek.

As a result of the above actions, altogether approximately 2,600 square feet or 0.06 acres of wetland would be affected, with both short- and long-term localized minor to moderate adverse effects. As noted in the introduction to this section, wetland impacts of less than one-acre do not require a wetlands statement of findings. As a result, a statement of findings will not be prepared.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to water resources include:

- A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared by the Construction Contractor and implemented for construction activities to control surface run-off, reduce erosion, and prevent sedimentation from entering water bodies during construction. The SWPPP shall be submitted for park review and approval prior to construction.
- Develop and implement a comprehensive Spill Prevention/Response Plan that complies with federal and state regulations and addresses all aspects of spill prevention, notification, emergency spill response strategies for spills occurring on land and water, reporting requirements, monitoring requirements, personnel responsibilities, response equipment type and location, and drills and training requirements. The spill prevention/response plan will be submitted to the park for review/approval prior to commencement of construction activities.
- An Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan shall be prepared by the Construction Contractor for the project to address hazardous materials storage, spill prevention and response. The Plan shall be submitted for park review and approval prior to construction.
- Using temporary sediment control devices such as filter fabric fences, sediment traps, or check dams as needed during culvert replacement.
- Covering stockpiled soil and rock throughout the duration of the project with semi-permeable matting or plastic or another type of erosion control material.
- Minimizing soil disturbance and re-seeding or revegetating disturbed areas as soon as practical.
- Retaining silt fencing in disturbed areas until stabilization (by reseeding or revegetation).
- Using swales, trenches, or drains to divert storm water runoff away from disturbed areas.
- Locating staging areas away from areas where water would runoff to adjacent rivers and streams.
- Using tackifier / paper mulch for erosion control in revegetated areas and/or silt fences and seed-free sediment control barriers for erosion control.
- Requiring the submission of and reviewing an erosion control plan and storm water pollution prevention plan (as also required by California Water Quality Control Board).
- Requiring the contractor to install protective construction fencing around, adjacent to or near wetland and/or riparian areas that are to be protected or other erosion control measures to protect water resources (including near Grouse Creek) in the project area.

Cumulative Impacts: Hydrology and Water Quality: Other visitor use and facilities in the park and project area contribute to sediments and pollutants, including oil and other contaminants from motor vehicles as well as litter that can enter drainages and affect water quality. Some restoration and development projects (e.g. addition of new visitor service facilities, restoration of old roads and campgrounds or building sites) would continue to occur within the park and would contribute both beneficial and adverse impacts to water quality. Given the localized nature of these actions arkwide, overall effects on park waters would be limited to short-term construction impacts coupled with long-term beneficial impacts from removing facilities from floodplains and restoring riverbanks. Non-human factors, such as natural erosion of exposed soils can also affect water quality. The No Action Alternative would contribute negligible to minor localized inputs to cumulative impacts. Impacts of the above actions and factors, in conjunction with the impacts of the no-action alternative, would continue to result in negligible to moderate adverse cumulative effects on water

quality. With Alternatives 2 and 3, there would be short-term, localized negligible to moderate, adverse effects on water resources during construction and long-term, negligible to moderate beneficial effects during operations. Negligible long-term beneficial effects from portions of the planned road project as a result of the improvement of drainage conditions along the road would also occur. Under Alternative 2, these conditions would be improved to a greater degree than in Alternative 3, with the addition of stormwater treatment in the Badger Pass Parking Lot. Additional cumulative impacts could result if erosion and sedimentation best management practices and mitigation measures are not controlled following construction (i.e., during earth disturbance construction activities or by improving drainage systems) but would not otherwise be present. Overall, water resources would benefit as a result of past and reasonably foreseeable actions in the park as a result of the Yosemite Valley Plan, which has resulted in improved hydrologic conditions in the Merced River watershed through the relocation of some visitor and administrative facilities.

Water Quantity: Water is withdrawn throughout the park in small to moderately large quantities to supply visitor and administrative needs, including for water use at campgrounds, picnic areas, restrooms and for other facilities such as concession lodging and park housing. The use of this water has occurred in increasing quantities through the establishment of the park. The small additional use of water to keep dust down on the roadway and to facilitate the implementation of the road project under either Alternative 2 or 3 would add a negligible increment to the use of water for visitor and administrative uses. This use of water, in comparison to existing administrative and visitor use of water or in comparison to other projects and reasonably foreseeable future actions is insignificant.

Wetlands: Wetland and riparian systems of the Merced River watershed have been affected by park development and visitor activities. As a result, wetlands have been reduced and their functionality diminished. These effects were exacerbated by the 1997 flood, which reclaimed much of the formerly developed wetlands in Yosemite Valley. Along the Glacier Point Road, the meadow surrounding the Badger Pass Ski Area is a wet meadow, which has been altered by the presence of the historic development. Recent removal of the former Ski Rental Shop has resulted in a minor degree of improved functionality, although the process of removal also resulted in some minor to moderate adverse effects. In addition to the beneficial effects provided by that project, the Yosemite Valley Plan calls for the restoration over more than 100 acres of wetlands, a long-term minor to moderate beneficial effect. In comparison, the loss of 0.06 acre of wetlands as a result of the implementation of the proposed action under Alternatives 2 or 3 would be a minor adverse impact. There would be no loss of wetlands under Alternative 1.

Conclusion: Alternative 1 would continue to contribute minor to moderate localized adverse effects on water resources. Alternatives 2 and 3 would employ construction storm water management mitigation measures to control erosion and sedimentation during construction, and coupled with improvements in water collection and conveyance would result in short-term negligible to moderate localized adverse effects, minor long-term adverse effects (to the seep wetland in the vicinity of Avalanche Creek) and long-term negligible to minor beneficial effects from the improvement of drainage conditions along the road and in parking areas. Alternative 2, with its additional stormwater treatment system at the Badger Pass Ski Area parking lot would have slightly greater beneficial effects. There would be no impairment of water resources under the alternatives described in this Environmental Assessment.

4a. Vegetation Affected Environment

With a wide elevation range (2,000 to 13,123 feet) Yosemite contains five major vegetation zones: chaparral / oak woodland, lower montane, upper montane, subalpine and alpine. According to the park's website, of California's 7,000 plant species, about 50% occur in the Sierra Nevada and more than 20% of these occur within Yosemite. There is suitable habitat or documentation for more than 160 rare plants in the park. Often rare local geologic formations and unique soils characterize the restricted ranges of many of these plants.

Containing at least 1,374 vascular plant species and an unknown number of bryophytes, and lichens, Yosemite's forests are also home to three world record trees, the largest red fir, the largest white fir, and the tallest pine (a sugar pine). None of these occur off Glacier Point Road. Park vegetation zones follow

elevation bands, beginning from chaparral and oak woodland covered slopes near 2,000 feet, lower montane mixed-conifer forests from 3,000 to 6,700 feet, upper montane conifer forests rising to 10,000 feet and subalpine coniferous forests from 8,000 – 11,000 feet. Extensive subalpine communities dominate areas above 10,000 feet [NPS 2004:III-3).

Forests cover approximately 78 percent (596,358 acres) of the park, chaparral covers another 3.8 percent (28,980 acres), and meadows cover another 3.8 percent (28,600 acres), with the remainder (13 percent) of the park covered by alpine peaks and barren rocky areas) (Hall 1997).

The lower part of the Glacier Point Road occurs in Ponderosa Pine / Bear Clover Forest and in Ponderosa Pine / Mixed Conifer Forest, which may grade into White Fir / Mixed Conifer Forest (NPS 2004: Map 2-1). These forest types are fairly widespread in the park, consisting of approximately 33,846 acres, 33, 998 acres, and 46,871 acres respectively (NPS 2004: III-4) (Yosemite's total acreage is slightly less than 750,000 acres).

This lower montane zone comprises about 15 percent of the park. Dominant trees include ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), incense-cedar (*Calocedrus decurrens*), and white fir (*Abies concolor*). The most common understory shrubs are white leaf manzanita and deerbrush.

White fir / mixed conifer forest forms an almost continuous forest band of dense forest between 5,000 and 7,500 feet. Conditions vary from almost pure stands of white fir on north facing slopes to white fir mixed with co-dominant sugar pine, Jeffrey pine (*Pinus jeffreyi*), Douglas-fir (*Pseudotsuga menziesii*) and incense-cedar (NPS 2004:III-9).

Ponderosa pine / mixed conifer forest forms a fairly continuous band between 3,000 and 5, 500 feet. Ponderosa pine is dominant, along with California black oak (*Quercus* kelloggii) and white fir co-dominants. Whiteleaf manzanita (*Arctostaphylos viscida ssp. viscida*) and deer brush (*Ceanothus integerimus*) are often found in forest openings (NPS 2004:III-10).

Above 5,500 feet Ponderosa pine / bear clover forest, which covers south and west-facing slopes and ridgelines at lower elevations, intergrades with ponderosa pine / mixed conifer forest and is characterized by areas of an almost continuous understory of bear clover (*Chamaebatia foliosa)*.

Other understory species may include: greenleaf manzanita (*Arctostaphylos patula*), buckbrush (*Ceanothus cuneatus*), birchleaf mountain mahogany (*Cercocarpus betuloides*), bitter cherry (*Prunus emarginata*), bear clover, and serviceberry (*Amelanchier alnifolia*).

On moist sites, understory shrubs may also include Sierra wax myrtle (*Myrica hartwegii*), California hazelhut (*Corylus californica*), spice bush (*Calycanthus occidentalis*), various gooseberries and currants (*Ribes* sp.), wild roses (*Rosa* sp.), thimbleberry (*Rubus parviflorus*), dogwoods (*Cornus* sp.), western azalea (*Rhododendron occidentale*), red huckleberry (*Vaccinium parvifolium*), snowberries (*Symphoricarpos* sp.) and others.

Riparian (streamside) vegetation may include: big-leaf maple (*Acer macrophyllum*), white alder (*Alnus rhombifolia*), mountain alder (*Alnus tenuifolia*), Fremont cottonwood (*Populus fremontii*), black cottonwood (*Populus trichocarpa*), mountain dogwood (*Cornus nuttalii*), California hazelnut, and several species of willows (*Salix* sp.). In canyon bottoms, stands of quaking aspen (*Populus tremuloides*) may be present.

Vegetation in the project area is dominated by the Sierran mixed conifer zone, which covers approximately 25 percent of the park, between 4,900 feet and 9,840 feet. This zone is characterized by mixed stands of ponderosa pine, Douglas-fir, incense cedar, white fir and sugar pine at higher elevations. Understory varies from dense chaparral shrubs to sparsely vegetated grasses and herbs. Near Badger Pass at about 7,200 feet elevation, red fir begins to predominate.

Non-native Plants: The project area contains few non-native species. Non-native plant species that occur in the park and pose the most serious threat to park resources include spotted knapweed, yellow star-

thistle, bull thistle, and Himalayan blackberry. The park actively attempts to control these invasive species because they can rapidly invade natural communities, out-competing native plants and reducing habitat for wildlife. During a fall walk-through of the project area, a single yellow star-thistle was found along the road.

4b. Vegetation Environmental Consequences

Methodology: Vegetation analysis was based on a qualitative assessment of project area vegetation and the effects anticipated as a result of ongoing maintenance, construction or rehabilitation. For Alternatives 2 and 3, quantitative analysis was conducted to determine what portion of the edge of the road was likely to be affected by selective tree and shrub removal and other aspects of the project.

Type of Impact: Actions that reduce the size or disrupt the continuity, and/or integrity of native plant communities are considered adverse impacts. Ground disturbance and importation of contaminated materials can adversely impact native plant communities because they provide means for non-native species to gain a foothold in the park. Standard mitigation measures minimize such adverse impacts. Restoration of disturbed areas using native seeds, plants, mulch, or other stabilizing materials accellerates site recovery and reduces opportunities for exotic plants to become established. Actions that preserve and/or restore any or all of these essential qualities of native plant communities constitute beneficial impacts.

Alternative 1: Under Alternative 1, continual minor repairs and maintenance to the Glacier Point Road would be necessary and would increase over time, as the road condition increasingly deteriorated. Repair activities would include shoulder area and drainage ditch modifications, which would result in the removal, damage, or disturbance of vegetation, a long-term localized negligible to minor effect. In the event of a catastrophic road failure, depending on the location and severity of the failure, adverse impacts to vegetation could range from minor to moderate in intensity, and could be long-term in duration, depending on the nature of the repair (for example, from new fill placed in fill slope to riprap that replaces a fill slope) and the degree of revegetation implemented, but would be localized. Damage and destruction of roadside vegetation would continue to occur from ongoing establishment and use of informal roadside parking. Other impacts to vegetation would continue to result from vegetation maintenance activities alongside the road, including the periodic trimming and removal of vegetation from within approximately ten feet of the edge of pavement on both sides of the road, a negligible long-term adverse effect. Combined these impacts would have a localized, long-term minor effect on vegetation alongside the Glacier Point Road.

Alternatives 2 and 3: There would be a variety of vegetation impacts, including removal, trimming, and flush-cutting of plants, as a result of proposed rehabilitation of the Glacier Point Road under this Alternative. Along both sides of the road over approximately 10,465 feet (1.98 miles) (see Figure III-6), selective vegetation removal would result in the loss of trees, shrubs, forbs, grasses and other plants. Although the focus would primarily be on flush cutting or vegetation removal and grubbing woody vegetation that limits the field of view for drivers on the road as well as on removing vegetation that would be in the way during pavement, drainage ditch or curbing rehabilitation or installation, herbaceous plants would also be affected. As noted above, a variety of trees, shrubs, forbs and grasses grow along the road and it is likely that many of these species would be affected, including seedling and sapling red and white fir, ponderosa and sugar pine, incense cedar, and black oak; as well as a shrubs, including chinquapin, bitter cherry, manzanita, and ceanothus; and a wide variety of herbaceous plants, such as grasses, ferns, lupine, and other forbs.

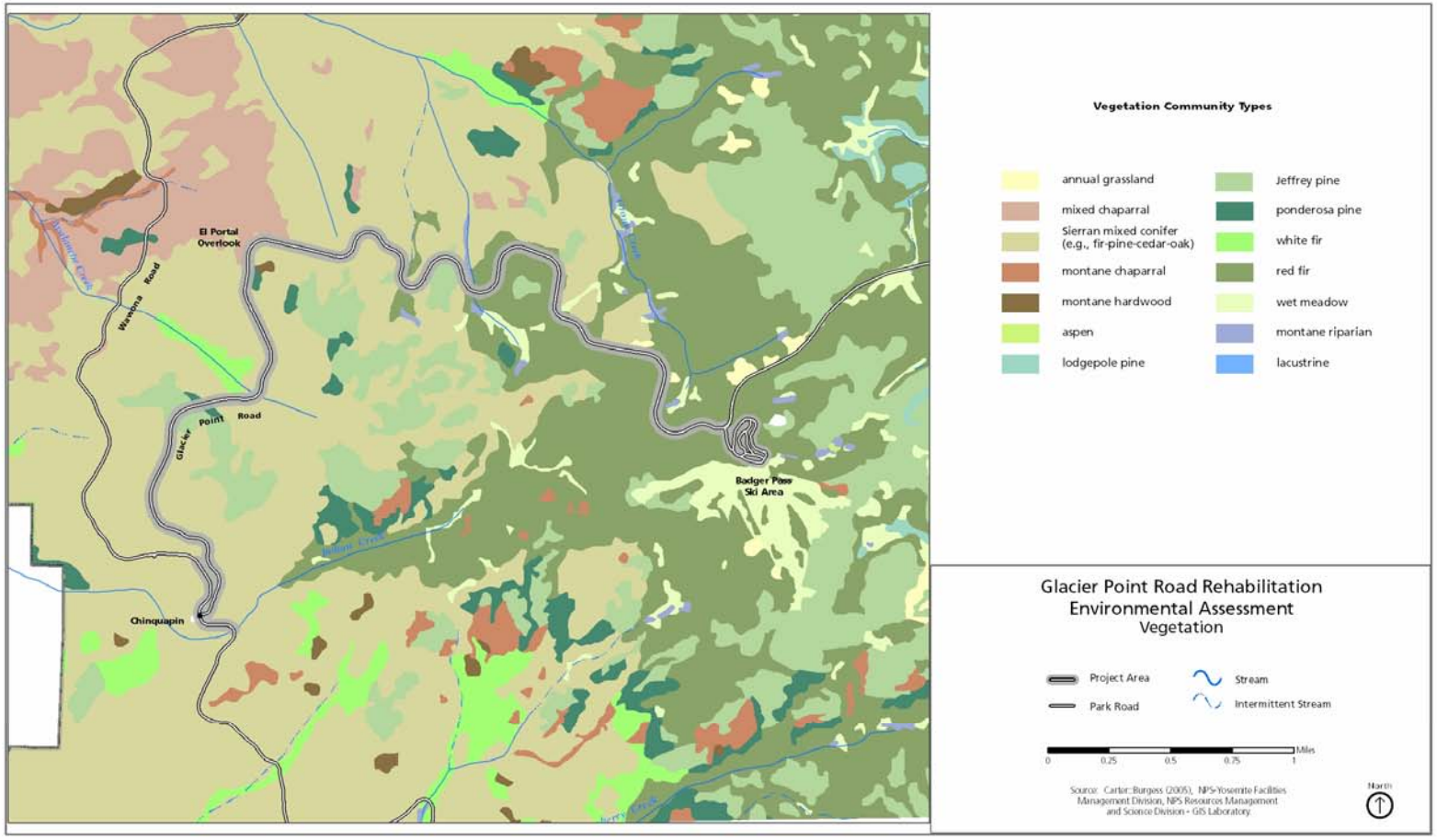
The following specific actions called for by Alternatives 2 and 3 would affect vegetation:

- Application of grading treatments (grading, berms and barrier stone placement) for road shoulder rehabilitation and turnout rehabilitation and obliteration; and curve widening;
- Revegetation treatments, including scarification, hydroseeding, hand seeding and planting, topsoil, duff salvage and reuse;
- Incidental vegetation loss associated with roadside paved ditch line construction and rehabilitation; culvert cleaning, replacement, extension and installation; construction of a new

seating wall at El Portal Overlook (Alternatives 2 and 3) and retaining walls at Chinquapin Intersection (Alternatives 2 and 3); and removal of vegetation along road shoulders and vegetation in the way of road repaving;

- Superelevation corrections;
- Removal of trees for the Chinquapin Deceleration Lane (Alternative 3), Chinquapin Intersection modifications (Alternatives 2 and 3), Wawona Road Chain-up (Alternative 2) / Wawona Road Chain-off Lanes (Alternatives 2 and 3), El Portal Overlook (Alternatives 2 and 3), Selective Vegetation Removal, etc.;
- Ongoing roadside vegetation maintenance;
- Staging and spoils deposition (as directed by park staff); and the
- Importation of fill, including asphalt, aggregate, mulch, erosion control devices, barrier stone and other materials, and
- Potential removal of hazard trees over time, in conformance with the park Hazard Tree Plan.

Figure IV-2
Vegetation Map



Chinquapin Comfort Station Access:
Alternatives 2 and 3: To enhance visibility (and therefore safety) of the Chinquapin Comfort Station Parking Lot entrance from Wawona Road, one ponderosa pine and one incense cedar greater than eight inches would be removed. In addition, approximately 10 trees between one and six inches (all measurements are estimated diameter at breast height) and approximately 30 manzanita and chinquapin shrubs would be removed. A fairly large (18 inch) ponderosa pine and downed log in the area would be retained and protected.

Alternative 3 Additional Impacts: For the deceleration turn lane, approximately 10 trees with a diameter of eight inches or larger would be removed from the project site as the slope was laid back to hold at an appropriate angle of repose. In addition to the loss of these large trees, an estimated additional 45 trees eight inches or less in diameter, as well as a variety of shrubs and forbs would also be removed.

Chinquapin Restroom Accessible Pathway:
Alternatives 2 and 3: Approximately 25 nearby shrubs, including bitter cherry and chinquapin would be removed to construct the accessible pathway. The large, mature ponderosa pine in front of the Comfort Station is considered a specimen tree that was intentionally preserved during the construction of the Comfort Station. This tree and its roots would be protected and retained.

Chinquapin Intersection Widening
Alternative 2 Retaining Walls: Approximately 616 cubic yards of soil, including attendant vegetation, would be removed to create footings and space for two stone-faced retaining walls created to accommodate the proposed Wawona Road turn lanes onto Glacier Point Road.

Alternative 2 Retaining Wall South: For this approximately 240-foot long wall, vegetation impacts were estimated based on six feet of area from the edge of pavement along the proposed length (or approximately 1,440 square feet). In this area, there are approximately 21 trees eight inches or greater in diameter, including seven trees 15 inches or more in diameter. These include the following species: sugar pine, ponderosa pine, white fir, and incense cedar. In addition, there are approximately 32 additional saplings that vary from less than one inch in diameter to six inches in diameter that would be removed, including the above species, as well as black oak. Finally, there are a variety of shrubs that would be affected, including manzanita, chinquapin, bitter cherry and thimbleberry, and a variety of understory forbs.

Alternative 2 Retaining Wall North: For the north rock wall (approximately 115 feet long), vegetation impacts (over approximately 690 square feet) would include the removal of approximately six trees eight inches or more in diameter, including two trees greater than 15 inches in diameter. Tree species include: incense cedar, black oak, white fir, sugar and ponderosa pine. Approximately 36 smaller trees and shrubs, including manzanita, currant, and bitter cherry would also be affected.

Wawona Road Northbound Chain-down Lane
Alternative 2: This area would be created almost entirely out of the existing bare area, where the former gas station / store once stood. It would be separated from the Administrative (large maintenance vehicle) Parking Area by a vegetated island and a gate (Figure III-13). A few select trees would be removed near the northern end of the site, including incense cedar, ponderosa and sugar pine and white fir. At the south end, these would be replaced by plantings to screen the maintenance vehicles.

Alternative 3: Because the northbound chaining lane would be shifted farther north in this Alternative, into an existing stand of trees, it would require more tree removal than the combined chain-down / administrative parking area in Alternative 2 (Figure III-17). As a result, approximately 20 trees eight or more inches in diameter would be removed; 18 of these would be between 15 and 30 inches in diameter. In addition, a number of chinquapin and dogwood shrubs would also be affected, as well as approximately five trees under eight inches in diameter. Affected trees would include: ponderosa and sugar pine, white fir and incense cedar.

Wawona Road Southbound Chain-up Lane

Alternative 2: This area would be created at the mouth of an existing access road to the Ranger Residence septic system. To construct the chain-up area, a short retaining wall would be built and filled with approximately 133 cubic yards of soil. An estimated three trees eight or more inches in diameter, including one greater than 15 inches in diameter, would be removed. In addition, there would be removal of approximately 16 trees less than eight inches in diameter. Affected trees and shrubs would include: black oak, white fir, incense cedar, ponderosa pine, hazelnut, chinquapin, manzanita and azalea, as well as a variety of grasses and forbs.

El Portal Overlook – Turnout A

Alternatives 2 and 3: To construct a low seating wall and walkway, the following trees would be removed (approximate diameters): three sugar pines (12 inches, 10-inches, 6 inches), three ponderosa pines (14 inches, 10 inches, 4 inches), and eight white firs (two 8-inches, two 4-inches, three eight-inches – dead, one 6-inches – dead). Numerous large trees (including one cedar snag, three ponderosa pines – one 30 inches and two 36 inches) would be retained, as would a relatively large black oak (although some of its branches would likely need to be trimmed to restore the view).

El Portal Area Chain-up Lane

Alternatives 2 and 3: The proposed El Portal Overlook Area Chain-up Lane would lie between two mature red firs (an estimated 54 inches and 48 inches in diameter) that would be preserved, while approximately 12 trees eight inches or more in diameter, including two that are 15 inches or more in diameter and one red fir estimated at 60 inches in diameter would be removed. In addition, approximately 35 trees less than eight inches in diameter would be removed, as well an estimated 140 seedling red and white fir less than one inch in diameter. Affected trees would include the following species: sugar pine, red and white fir. Affected shrubs would include currant, hazelnut, chinquapin, ceanothus, and bitter cherry.

Selective Vegetation Removal / Paved Ditches

Alternatives 2 and 3: Under either Alternative 2 or 3, roadside vegetation removal would be prescribed according to need, to achieve additional sight distance and de-icing of the roadway. Established vegetation on cut- or fill slopes would be retained unless it impedes visibility or road maintenance operations. Older plants have well-developed root systems that anchor soils on slopes. Younger plants have poorly developed root systems that hold only a small amount of soil and may actually destabilize slopes by adding extra weight (VMP). Roadside vegetation maintenance is an activity that has been identified by the park as being completed before the proposed work under either Alternative 2 or 3 would take place and would be directed by park fire or vegetation staff. Clearing would be completed by flush-cutting vegetation, with grubbing permitted only as directed on the plans (FHWA 2005:A6).

As noted in Figure III-6 (*Chapter III: Alternatives*), approximately 1.98 linear miles of vegetation (assuming approximately half of the 10-foot clear zone width contains vegetation) would be selectively removed to enhance visibility along the road, to limit fire danger, to increase sunlight on the road (decreasing iciness), to provide snow removal areas, and to increase the life span of the road. Trees slated for removal would be trees that germinated post-original road construction, which are less than eight inches in diameter. Methods for tree removal would be similar to those used for roadside fire clearance, based on the Fire Management Plan (NPS 2004), but would be removed in a much narrower band (between six and 10 feet) adjacent to the road. In addition, approximately 1.21 linear miles of paved ditch construction with an estimated construction area width of two feet would result in the temporary removal of approximately 6,385 square feet of primarily herbaceous vegetation (assuming approximately half of the paved ditch contains vegetation).

Plants affected would be small trees of the following species: lodgepole pine, western white pine, sugar pine, ponderosa pine, Jeffrey pine, red fir, white fir, subalpine fir, incense cedar, and black oak. Shrub species would include: bitter cherry (*Prunus serotin*), buckbrush ceanothus (*Ceanothus cuneatus*), white thorn ceanothus (*Ceanothus* sp.), manzanita (*Arctostaphylos* sp.), and dogwood (*Cornus* sp.), among others. Herbaceous vegetation affected would include: phacelia (*Phacelia* sp.), buckwheat (*Eriogonum*

sp.), penstemon (*Penstemon* sp.), bee balm (*Menarda* sp.), bedstraw (*Galium* sp.), bearberry (*Arctostaphylos uva-ursi*), wintergreen (*Pyrola* sp.), iris (*Iris* sp.), mariposa lily (*Calochortus* sp.) as well as a variety of grasses, rushes, and sedges, and ferns.

Restoration / Landscaping

Alternatives 2 and 3: Removing, windrowing and then replacing topsoil, the restoration of unpaved turnouts under Alternative 2 and Alternative 3, in addition to vegetated islands in the Chinquapin area, as well as repairing small eroded areas at the ends of paved turnouts would result in localized, long-term, minor beneficial effects.

Altogether, approximately 58,710 square feet of vegetation (see Figure III-6, *Chapter III: Alternatives*), primarily in the existing road prism, would be affected by rehabilitation activities. Tree removal would include some additional trees removed for El Portal Overlook, superelevation corrections at Badger Pass intersection and incidental removal of trees along the road, where needed to facilitate culvert lining, replacement or construction. Because the species affected are common to abundant in the lower montane forest that comprises much of the project area, and because the impacts would occur primarily in areas previously affected by road construction, impacts would constitute a minor to moderate localized impact.

Taken together, impacts to vegetation would constitute negligible to moderate, short- and long-term effects. Because no vegetation would return in some areas affected by the project, long-term effects would occur from the additional construction of widened intersections (Chinquapin – including the deceleration lane – and Badger Pass), rehabilitated developed areas (Chinquapin Restroom Parking, El Portal Overlook), paved ditches, from superelevation corrections, and from chaining area construction, while short-term, negligible to moderate, localized effects would occur from selective vegetation removal, paving, roadside vegetation maintenance, culvert installation and replacement, and staging operations, where vegetation would be cut or trimmed, but would eventually reestablish.

Impact Avoidance, Minimization or Mitigation Measures

Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to vegetation include (*those included in the Vegetation Management Plan are marked by VMP in parentheses*):

- Construction limits are mapped and may be flagged or fenced to protect sensitive areas. Work near wetland or riparian areas would follow best management practices to minimize impacts (siltation, erosion, compaction, etc.).
- Install temporary barriers to protect natural surroundings (including trees, plants, and root zones) and highly sensitive sites, such as creek edges and wetlands, from damage. Vegetation to be preserved within the project area would be clearly identified by marking, fencing, or another appropriate technique.
- Make every effort to protect wetlands from damage caused by construction equipment, erosion, siltation, and other ground-disturbing activities. Avoid fastening ropes, cables, or fences to trees and install signs as needed to direct use to more appropriate areas.
- Implement a noxious weed abatement program. Standard measures include the following elements: ensure construction-related equipment arrives on site free of mud or seed-bearing material, certify all seeds and straw material as weed-free, identify and treat areas of noxious weeds prior to construction, and revegetate with appropriate native species and monitor the restored site annually for three years to ensure absence of noxious weeds, successful revegetation, plant maintenance, and replacement of unsuccessful plant materials.
- Prior to entry into the park, steam-clean heavy equipment to prevent importation of non-native plant species, tighten hydraulic fittings, ensure hydraulic hoses are in good condition and replace if damaged, and repair all petroleum leaks.
- Inspect the project area to ensure that impacts stay within the parameters of the project area and do not escalate beyond the scope of the EA. Additionally, ensure that the project conforms with all applicable permits or project conditions. Store all construction equipment within the delineated work limits. Confine work areas within creek channels to the smallest area necessary.

- Trees to be removed in selective vegetation removal would be flush cut, but not grubbed.
- Shrubs would be flush cut unless pre-identified for grubbing (such as those that root-crown sprout like ceanothus).
- Removal of vegetation would be done in a manner that would not affect vegetation not proposed for removal.
- A contractor damage clause for impacts to trees / vegetation not within the project area would be part of the contract for road rehabilitation.
- Imported topsoil and other materials sources would be submitted to the park for approval.
- Shoulder topsoil would be bladed away from the road (to allow for pulverizing pavement and other construction) and windrowed along the edge of the road and then pulled back upon completion of work in the vicinity. Windrowed material would be kept within the limits of construction,
- The specific locations and type of vegetation work would be identified, specified in plans and approved by the Contracting Officer based on consultation with the park vegetation ecologist and forester (VMP).
- Only native species, appropriate to the site would be used in revegetation (seeding or planting).
- Salvage of topsoil and duff would occur in and adjacent to the rehabilitated shoulders and turnouts as appropriate, subject to approval from park staff.
- Salvage of vegetation would occur to the degree possible; staff time and need permitting, however, most plants would be propagated from seed collected within each plant community along the road where revegetation is needed.
- Conifers with a basal diameter of greater than eight inches in specifically identified areas, where Annosus root disease is a problem, would be treated with borax within 30 minutes of being cut and flush cut. (Annosus root disease colonizes freshly cut stump surfaces or wounds and can infect undamaged trees through root-to-root contacts) (VMP).
- Established vegetation on cut- or fill slopes would be retained unless it impedes visibility or road maintenance operations. Older plants have well-developed root systems that anchor soils on slopes. Younger plants have poorly developed root systems that hold only a small amount of soil and may actually destabilize slopes by adding extra weight (VMP).
- Clearance heights and widths will vary to avoid giving natural roadside vegetation a regular “hedge” or “tunnel” appearance (VMP).
- Upon consultation with the park vegetation ecologist and forester, thickets of dense trees (doghair stands) with little growth may be thinned away from the road as approved by the Contracting Officer.

Cumulative Impacts: Human activities, particularly fire suppression, general visitor use and traditional park maintenance practices have altered the structure and composition of park plant communities. Due to the large amount of land set aside as Wilderness, however, relatively relatively small patches and corridors of habitat have been lost in the park in areas that have been developed for visitor and administrative facilities, roads and trails. As a result, broad scale changes in vegetation characteristics have occurred in relatively small areas as a result of the disturbance of natural ecological processes, compared to the amount of area preserved. These impacts have resulted in changes to vegetation community size, integrity, function and characteristic wildlife. The park remains 95 percent wilderness. Past and reasonably foreseeable future actions would have both beneficial and adverse effects on vegetation. Activities such as restoration and rehabilitation could result in both beneficial and adverse effects, while additional development of new visitor facilities would likely result in mostly adverse effects. Parkwide, the Yosemite Valley Plan calls for the restoration of approximately 175 acres. These cumulative effects would not, however, be evident in the proposed project area. In the proposed project area, impacts from Alternative 1, would contribute an indiscernible, localized negligible long-term adverse cumulative effect on vegetation, while Alternative 2 would also contribute to a localized, negligible, short-term adverse cumulative impact, though greater than Alternative 1. Due to the restoration of some bare areas and the revegetation of roadsides, Alternatives 2 and 3 would also contribute to long-term negligible to minor localized beneficial effects.

Conclusion: Alternative 1 would continue to include removal or disturbance of vegetation during maintenance and repair activities, a long-term localized negligible to minor effect. Alternatives 2 and 3

would result in road rehabilitation, including new construction and overdue vegetation maintenance activities, including negligible to moderate short- and long-term adverse and beneficial effects. Alternative 2 would result in additional vegetation removal to improve safety conditions on the roadway, including at several of the turnouts near El Portal Overlook, while Alternative 3 would include removal for the deceleration turn lane approaching the Chinquapin Comfort Station Parking Lot. No specimen trees or snags with wildlife habitat value would be removed. There would be no impairment of vegetation or values related to it from the implementation of either alternative. Although a few large trees, some of which were likely present prior to park establishment, would be removed in the in Alternatives 2 or 3, these impacts would be contained within the area previously affected by development of the Glacier Point Road and would not noticeably affect the density of this locally abundant community. As a whole, the existing footprint of development associated with the road would remain small.

5a. Wildlife Affected Environment

Eighty-five species of mammals are known to occur in Yosemite. Others, like the California grizzly are extinct, or have disappeared from the park. Mammals include mountain lions, black bears, mule deer, bighorn sheep, coyotes, ringtail, raccoons and a variety of small mammals, such as mice, woodrats, squirrels and chipmunks. Black bears are abundant in the park, and are often involved in conflicts with humans that result in property damage and, occasionally, injuries to humans. Visitor education and bear management efforts have reduced the bear-human incidents and property damage by 90 percent. Ungulates include large numbers of mule deer. Bighorn sheep formerly were common along the Sierra crest, but have been reduced to several remnant populations.

Five species of shrew and one mole are found in the park. Eighteen species of bats inhabit the park (of these nine are considered state or federal species of concern). There are six species of squirrels, eight species of chipmunks, eight species of mice and other rodents, including woodrats, voles and gophers. Rarely seen, but still present are fisher, wolverine and Sierra Nevada red fox (NPS 2004:III-17).

Over 224 species of birds have been recorded in the park. These include resident and migratory species. Approximately 80 percent may nest within the park. Many migrate to lower elevations or latitudes in the late summer and fall. Noticeable population declines have been detected in numerous bird species in the Sierra Nevada, including in Yosemite (NPS 2004:III-17).

The park contains a wide variety of reptiles and amphibians – approximately 33 species. Most of these are snakes (14), with seven different lizards, one turtle species, two toads, four frogs, and five kinds of salamanders (NPS 1996c cited in Volpe 1997:48). At higher elevations, mountain yellow-legged frogs and Yosemite toads are still present; however, they are severely reduced in population size and range. Possible causes of amphibian declines in the Sierra Nevada continue to be studied, but likely include habitat destruction, introduction of non-native fish and frogs, pollution, pesticides and diseases. Two formerly common species have been extirpated as a result (foothill yellow-legged frog and California red-legged frog) (NPS 2004:III-18).

Most fish in the park were introduced, stocked by the California Department of Fish and Game for recreational fishing. Seven fish are known from the Merced River, including the Sacramento squawfish, Sacramento sucker, golden trout, cutthroat trout, rainbow trout, brown trout and the Arctic grayling. Naturally occurring rainbow trout in the Merced and Tuolumne Rivers have disappeared due to competition with introduced fish. Above about 4,000 feet, there were historically no native fish known to occur due to impassable barriers, such as waterfalls and hanging valleys. Of 319 lakes surveyed slightly more than half contained fish (Volpe 1997).

Wildlife commonly found in the vicinity of the Glacier Point Road include the: rubber boa, mountain kingsnake, northern alligator lizard, western fence lizard, goshawk, flammulated owl, black-backed woodpecker, northern flicker, Steller's jay, Clark's nutcracker, great horned owl, American kestrel, common raven, green-tailed towhee, Steller's jay, fox sparrow, Lincoln's sparrow, white-crowned sparrow, dark-eyed junco, cotton-tail rabbit, woodrats, white-footed mouse, deer mouse, brush mouse, chipmunks, chickaree, golden-mantled ground squirrel, California ground squirrel, coyote, black bear and mule deer

(NPS 1991). Occasionally, mountain beaver (*Aplodontia rufa*) may be found: they have been recorded from the edges of the Badger Pass parking area, Chinquapin and the surrounding drainages (NPS 1991).

Non-native Wildlife: In addition to several introduced species of trout, Yosemite contains white-tailed ptarmigans, wild turkeys, brown-headed cowbirds, European starlings, house sparrows, crayfish and bullfrogs. The presence of wild turkeys, white-tailed ptarmigan, bullfrogs, introduced fish and other non-native animal species in Yosemite threatens the park's native species. Bullfrogs, which occupy standing and slow moving water throughout Yosemite Valley have been implicated in the disappearance of other amphibians. Brown-headed cowbirds have been cited as a cause of the disappearance of willow flycatchers from Yosemite Valley. Wild turkeys likely contribute to reduced seedling survival for oaks, and white-tailed ptarmigan may affect native plants with reduced growth and productivity (NPS 2004:III-19).

Wildlife Habitat Relationships in Yosemite: With habitats ranging from thick foothill chaparral to expanses of alpine rock, Yosemite National Park supports a high diversity of species. This is also because habitats in Yosemite are largely intact, compared to areas outside the park where various human activities have resulted in habitat fragmentation or loss.

Along much of Yosemite's western boundary, habitats are dominated by mixed coniferous forests of ponderosa pine, sugar pine, incense cedar, white fir, and Douglas fir, and a few stands of giant sequoia, interspersed by areas of black oak and canyon live oak. A relatively high diversity of wildlife species are supported by these habitats, due to relatively mild, lower-elevation climate, and the mixture of habitat types. Wildlife species typically found in these habitats include black bear, bobcat, gray fox, mountain kingsnake, Gilbert's skink, white-headed woodpecker, brown creeper, spotted owl, and a wide variety of bat species. In the case of bats, large snags are important as roost sites.

Going higher in elevation, the coniferous forests become purer stands of red fir, western white pine, Jeffrey pine, and lodgepole pine. Fewer wildlife species tend to be found in these habitats, due to their higher elevation, and lower complexity. Species likely to be found include golden- mantled ground squirrels, chickaree, marten, Steller's jay, hermit thrush, and northern goshawk. Reptiles are not common, but include rubber boa, western fence lizard, and alligator lizard.

At a variety of elevations, meadows provide important, productive habitat for wildlife. Animals come to feed on the green grasses and use the flowing and standing water found in many meadows. Predators, in turn, are attracted to these areas. The interface between meadow and forest is also favored by many animal species because of the proximity of open areas for foraging, and cover for protection. Species that are highly dependent upon meadow habitat include great gray owls, willow flycatchers, Yosemite toads, and mountain beaver.

5b. Wildlife Environmental Consequences

Methodology: Wildlife analysis was based on a qualitative assessment of wildlife that could occur in the project area and the effects anticipated as a result of ongoing maintenance, rehabilitation, and/or construction.

Type of Impact: Adverse impacts include those that directly remove, relocate or affect wildlife or wildlife habitat or that affect wildlife or wildlife habitat through increased disturbance. Beneficial impacts result from restoration of wildlife habitat (size, continuity, or integrity). Noise impacts can adversely affect wildlife foraging, mating and nesting behavior. Construction activity can also directly interfere with normal animal movement patterns.

Alternative 1: Ongoing work to repair the park road (including crack sealing, asphalt overlays, etc.) would result in periodic noise and human presence that would have localized, short-term negligible to minor impacts on wildlife presence. Continued use of the road would also result in some continued noise and mortality impacts from vehicle wildlife collisions. A spotted owl and Pacific fisher are known to have been struck and killed by vehicles in the Chinquapin area. If catastrophic road failure occurred, wildlife habitat could be altered, water quality in nearby streams could be degraded, and longer-term noise associated

with reconstruction of the roadway could result in additional short-term minor to moderate impacts on wildlife. Otherwise, the continued deterioration of the road could result in increasingly difficult navigation for vehicles, and potentially more collisions as drivers are forced to pay more attention to navigating poor road conditions (potholes and bumpy pavement). Should catastrophic road failure occur, wildlife habitat could be altered, water quality in nearby streams could be degraded, and longer-term noise associated with reconstruction of the roadway could result in additional short-term minor to moderate impacts on wildlife.

Alternatives 2 and 3: The following specific actions would affect currently undisturbed habitat or habitat that has recovered from the effects of previous road construction activities:

- Chinquapin retaining wall construction (Alternative 2 and to a lesser degree, Alternative 3;
- Chinquapin deceleration lane construction (Alternative 3);
- Wawona Road Chain-up (Alternative 2) / Chain-down area construction (Alternatives 2 and 3);
- El Portal Turnout Modifications (Alternatives 2 and 3); and
- Selective vegetation removal (Alternatives 2 and 3).

In addition, there would be effects under both action alternatives related to noise and activity during construction.

In general, however, there would be few impacts to wildlife since few intact habitat areas would be disturbed and construction would therefore primarily occur in areas previously impacted by road and developed area construction. There would, however, be above ambient noise and activity during project implementation. Road repair would also coincide with the visitor use season, when some of the heaviest traffic occurs. The noise and activity associated with the construction would be similar to but would be in addition to the noise and disruption of visitor traffic in the vicinity of the proposed project area (Table IV-7). To reduce impacts, construction hours may be limited. Because construction noise and activity would be concentrated in various locations throughout the visitor use season, wildlife, particularly medium and large mammals, would tend to avoid the construction area during daylight hours when project work was occurring. In the evening and on weekends when work would generally cease, wildlife would be expected to return to the project areas. Some species, such as birds, deer, and squirrels might also be seen throughout the day. Since road rehabilitation impacts would be localized alongside an already highly modified road corridor and in a small number of the park's minor developed areas, and a great deal of suitable habitat for wildlife would continue to be present in the vicinity, these impacts would be short-term, localized and negligible to minor.

The excavation needed to repair various portions of the road would likely result in some disturbance and elimination of small mammals and invertebrates not able to move quickly away from the project site. In addition, there would continue to be wildlife vehicle collisions on the road as a result of normal use. Because speed limits change variously through the project area and may change in the future, depending on the season, and because minor alignment changes would not be expected to result in faster speeds, although with improved road conditions, drivers may take the road faster, the potential for these collisions would remain similar to Alternative 1, resulting in a negligible to minor long-term adverse effect on wildlife use in the project areas.

Habitat modification (including potential loss of food and cover) as a result of the proposed implementation of the project, combined with removal of primarily small trees and vegetation (approximately 58,710 square feet under Alternative 2) would preclude short and long-term return to the former level of use by some species of wildlife, particularly perching birds, who used the formerly present trees for food or to forage for food, roosting or nesting. Therefore, among the habitat loss would be a long-term localized negligible incremental loss of a moderate number of trees that may have been used for perching, nesting or food.

Road work in some areas also has the potential to cause sedimentation in adjacent or nearby aquatic habitat, should best management practices fail. Sedimentation can have negative consequences on fish

and amphibian species occurring in, and downstream of, areas where sedimentation occurs. Impacts to wildlife, however, would be minor and short-term, having no lasting effects beyond construction.

The importation of fill materials, including topsoil and compaction from construction equipment has the potential to result in changes in the microbial composition of the soil, thereby altering its utility or viability for some unknown organisms. Because no topsoil would be imported and because restoration is planned, this effect would be negligible to minor. Eventually, as a result of the restoration of some former gravel turnouts and road shoulders, there would be a long-term negligible to minor, localized, beneficial impact in increasing plant cover and therefore restored or improved habitat for some local wildlife.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to wildlife include:

- Schedule construction activities with seasonal consideration of wildlife lifecycles to minimize impacts during sensitive periods (i.e., bird nesting and breeding seasons, periods of bat breeding, rearing and hibernating, etc).
- Limit the effects of light and noise on wildlife habitat through controls on construction equipment and timing of construction activities.
- If any special-status species is observed nesting, a determination will be made as to whether or not the proposed action will affect the active nest or disrupt reproductive behavior. If it is determined that the action will not affect an active nest or disrupt breeding behavior, work will proceed without any restriction or mitigation measure. If it is determined that construction activities will affect an active nest or disrupt reproductive behavior, then avoidance strategies will be implemented.
- Installation of stream culverts would occur during low-flow conditions.
- Routes of escape for animals that might fall into excavated pits and trenches would be maintained. During construction activities, Contractor personnel would maintain vigilance for animals caught in excavations and take appropriate action to free them.
- Proper food storage is important to the park's bear population and is required.
- All food, toiletries, and scented items (i.e. bug spray) would be placed in bear boxes at the construction site. Bear boxes must remain closed and latched at all times, unless items are being retrieved. No trash, food, toiletries, or scented items would be stored in vehicles or left outside of bear boxes.
- All food waste and food-related waste would be disposed of promptly, in a bear-proof receptacle.
- All vehicles would be checked daily to ensure that no items that may attract bears remain inside an unattended vehicle. Items that would not be left in vehicles include canned food, drinks, soap, cosmetics, toiletries, domestic trash, recyclable food containers, ice chests, grocery bags, and unwashed items used for preparing or eating meals.
- All windows and doors in recreational vehicles or trailers used for lodging or office space would be closed and latched when not occupied.
- The job site would be checked at the end of each day for trash, food, and food-related items remaining at the site.

Cumulative Impacts: The combined effects of development in the park and in the surrounding area over time coupled with the purposeful eradication predators through the mi-1900s have contributed to low level or extirpated wildlife populations of some key species in the park. Past and reasonably foreseeable development projects planned for the park, such as relocation of campgrounds and construction of visitor and administrative facilities would result in additional negligible to minor cumulative effects to wildlife. The effects of existing development continue to take a toll on wildlife primarily from collisions on the road as well as from occasional inappropriate wildlife-human interactions. Yet, development within the park has remained at a relatively low level, and because of the extensive protected areas in and around the park on neighboring federal lands, the park provides a significant piece of protected, mostly intact Sierran habitat. The existence and maintenance of the road and park developed areas under Alternatives 1-3 would continue to contribute to a long-term negligible to minor adverse effect on wildlife increasing some species while decreasing the presence of others. Other park projects would also continue to have

primarily short-term negligible to moderate impacts, with some minor long-term impacts on wildlife, where new development occurs. Because the proposed action under Alternatives 2 or 3 would not result in major changes to the road alignment or width, it would contribute localized negligible to moderate short-term adverse effects from noise and activity, negligible to minor beneficial effects from habitat restoration along road shoulders and turnouts, and localized negligible to minor short- and long-term adverse effects from construction in undisturbed areas along the road or in areas that have recovered from the disturbance associated with original road construction.

Conclusion: Alternative 1 would have short-and long-term negligible to minor adverse impacts from retention of the roadway and from minor repairs to it. Alternatives 2 and 3 would result in short-term negligible to moderate adverse impacts from noise and disturbance associated with the rehabilitation project and long-term negligible to minor beneficial impacts from increasing plant cover associated with changing the condition of road shoulders and turnouts. There would be no impairment of wildlife under any of the alternatives described in this Environmental Assessment.

6a. Special Status Species Affected Environment

The U.S. Fish and Wildlife Service (USFWS) and the State of California Department of Fish and Game classify threatened, endangered, or rare species of plants and animals as those that have undergone serious national, state or local declines and which may be threatened with extinction if not otherwise protected. Species that are being monitored because they are undergoing noticeable declines or are threatened by significant loss of habitat, but are not protected by law, may be categorized as rare or sensitive.

Consultation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game, established the following lists of species that are likely to occur within the project area or adjacent habitats (Table IV-1 and IV-2). Federal and state regulations, including Section 7 of the Endangered Species Act (1973) and the Council on Environmental Quality's regulations as well as NPS Management Policices (NPS 2006) require analysis of whether the proposed actions would cause impacts to any plant or animal species listed or under consideration for listing as threatened or endangered. In addition, Yosemite National Park recognizes state and local rare and sensitive species, maintaining its own list of "park sensitive species," These species may have extremely limited distributions, represent relict populations from past climatic or topographic conditions, or have unique adaptations to local conditions (endemics). Many of these are listed in the California Natural Diversity Database.

Special Status Plants

According to Hall (1997), the relative isolation of ecosystems in the Sierra Nevada has resulted in a high degree of endemism, particularly for plants. Many of these endemic plants are considered rare within the park and are given special protection. Four plants known to occur in Yosemite National Park or the El Portal Administrative Site are listed as "rare" by California. All are known to occur in Lower Montane and Foothills Woodland zones. They occur near the western park boundary below 6,000 feet.

Table IV-1
Special Status Plant Species

Common Name *Scientific Name*	Federal, State and Park Status*	Vegetation Zone: Habitat Type / Occurrence
Yosemite Onion *Allium yosemitense*	FSC, PS	Found in open metamorphic slabs, talus slopes and scree in the Merced River Watershed.
Tompkin's sedge *Carex tompkinsii*	FSC, PS	Limited to Foothills Oak Woodlands and chaparral areas and along lower talus slopes. Found from Arch Rock to El Portal in Merced River Canyon.

Congdon's wooly sunflower *Eriophyllum congdonii*	FSC, PS	Restricted to dry, mostly south-facing metamorphic and meta-sedimentary outcrops. Occurs on dry ridges on metamorphic rocks, scree and talus.
Congdon's lewisia *Lewisia congdonii*	FSC, PS	Grows on moist, exposed metamorphic rock faces and slopes. Occurs in chaparral and mixed conifer forest on shady north-facing slopes.

The following six plant species are federal species of concern (FSC) or species of local concern (FSLC):

Table IV-2
Federal and Local Species of Concern

Common Name *Scientific Name*	Federal, State, and Park Status*	Vegetation Zone: Habitat Type / Occurrence
Short-leaved Hulsea *Hulsea brevifolia*	FSLC	Upper montane coniferous forest on granitic or volcanic, gravelly substrates
Yosemite Lewisia *Lewisia disepala*	FSC, PS	Lower and upper montane coniferous forest, pinyon-juniper woodland, on granitic, sandy substrates
Pansy or Slender-stemmed Monkeyflower *Mimulus pulchellus*	FSLC, PS	Lower montane coniferous forest, vernally mesic meadows
Yosemite Popcorn-flower *Plagiobothrys torreyi* var. *torreyi*	FSLC, PS	Moist meadows and flats, forest edges
Parasol or Bolander's Clover *Trifolium bolanderi*	FSC, PS	Lower and upper montane coniferous forest, in moist montane meadows

Another 103 plant species are being tracked by the park and are considered by the park or the California Native Plant Society to be rare. Among these, the following may be found in the vicinity of the project area near Badger Pass, some others located outside the project area, are in meadows that touch the Glacier Point Road (Acree 2005):

Table IV-3
Park Sensitive Plant Species

Common Name *Scientific Name*	Vegetation Zone: Habitat Type / Occurrence
Leucothoe davisiae	Red fir and lodgepole pine forest in cool, shady places
Plantanthera yosemitensis	Wet meadow in Red fir forest

***Definitions**

Federal

Endangered (FE): Species in danger of extinction throughout all or a significant portion of its range
Threatened (FT): Species likely to become endangered within the foreseeable future throughout all or a significant part of its range
Candidate: Species is a candidate (proposed) for threatened or endangered status
Species of (Local) Concern (SC/SLC): Species of Concern to the Sacramento USFWS Office
De-listed (FD): Species that has been taken off the Endangered Species List

State

Endangered: Species in danger of extinction throughout all or a significant portion of its range in the state
Threatened: Species likely to become endangered in the foreseeable future throughout all or a significant portion of its range in the state
Rare (plants only): A native plant, not currently threatened with extinction, present in small numbers throughout its range, which may become endangered if its present environment worsens

California Native Plant Society (CNPS) codes
CNPS 1A: Plants Presumed Extinct in California
CNPS 1B: Plants Rare, Threatened or Endangered in California and Elsewhere
All of the plants constituting List 1B meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code, and are eligible for state listing.
CNPS 2: Plants Rare, Threatened or Endangered in California, but more common Elsewhere
With List 2, CNPS recognizes the importance of protecting the geographic range of widespread species. All of the plants constituting List 2 meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California Endangered Species Act) of the California Department of Fish and Game Code, and are eligible for state listing.
CNPS3: Plants About Which CNPS Needs More Information – A Review List
CNPS4: Plants of Limited Distribution – A Watch List

CNPS RED Codes
These codes represent the different factors that contribute to the list assignments. They are:
Rarity – the number of individuals and their distribution within California;
Endangerment – the plant's vulnerability to extinction for any reason; and
Distribution – the overall range of the plant.

Together these three elements form the **R-E-D** Code. Each element is divided into three classes or degrees of concern, represented by the number 1, 2, or 3. In each case, higher numbers indicate greater concern.

Yosemite Codes
Park Sensitive (PS)

Special Status Wildlife

According to the park's website, despite the richness of high-quality habitats in Yosemite, three species have become extinct in the park within historical time, and another 37 species currently have special status under either California or federal endangered species legislation. The most serious current threats to Yosemite's wildlife and the ecosystems they occupy include habitat fragmentation, introduction of exotic species, deviation from the natural fire regime, air pollution, and climate change. Locally, factors such as road kills and the availability of human food have also affected some wildlife species.

Note: Aquatic species (fish and invertebrates) have been excluded from the following list since the proposed project area does not include aquatic habitats that support them.

No critical habitat has been designated for any species within the proposed project area.

Table IV-4
Special Status Wildlife Species

Common Name *Scientific Name*	Status*			Habitat Occurrence
	Federal	State	Park	
Invertebrates				
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*	FT	--	--	Foothill Woodlands: Found with its host plant elderberry (*Sambucus sp.*) below 3,000 feet.
Bohart's Blue Butterfly *Philotiella speciosa bohartorum*	FSC	--	--	This species is known from the foothills of the southern Sierra Nevada, near Briceburg, Mariposa County. It's associated with pink spineflower bushes (probable food plant).
Sierra Pygmy Grasshopper *Tetrix sierrana*	FSC	--	--	This species is often found in riparian areas, particularly in the spring and early summer. It occurs in upland and riparian habitats.
Amphibians				
Limestone or Mount Lyell Salama *Hydromantes brunus*	FSC	CT	--	Foothill Woodlands: Very limited distribution along Merced River and its tributaries from 800 - 2,500 feet. Has not been found in park.
Yosemite Toad *Bufo canorus*	Candidate	CSC	--	Restricted to areas of wet meadows in central Sierra Nevada between 6,400 -11,300 feet.

Common Name *Scientific Name*	Status*			Habitat Occurrence
	Federal	State	Park	
California Red-legged Frog *Rana aurora draytonii*	FT	CSC	Extinct	Lower Montane: Found in quiet pools in permanent streams. Prefers riparian deciduous habitat. Apparently extinct, though many type specimens from one park lake exist. Foothill populations have been impacted by competition from bull frogs.
Mountain Yellow-legged Frog *Rana muscosa*	Candidate	CSC	--	Lower Montane: Species of mountain habitats, occurring between 4,500 – 12,000 feet. Found in streams, lakes, and ponds in a variety of vegetation types.
Birds				
Bald Eagle *Haliaeetus leucocephalus*	FT	CE	--	Lower Montane: Forages over rivers, streams and lakes. Primarily eats fish, but also carrion, water birds and small mammals. No known nesting in park. Transient. Bald eagles winter in small numbers along the Merced River near El Portal, and on Cherry Lake, Lake Eleanor, and Hetch Hetchy reservoir.
American Peregrine Falcon *Falco peregrinus anatum*	FD	CE	--	Lower Montane: Usually nests on high cliffs near water and searches for prey along cliffs and in surrounding habitats. Four known active nest sites in park. Peregrines have shown recovery but are still state listed because they continue to be affected by pesticide contamination. After a long absence, peregrines were found nesting on El Capitan in 1978.
California Spotted Owl *Strix occidentalis occidentalis*	Candidate	CSC	--	Lower Montane: Breeds in oak and ponderosa pine forests up to low elevation red fir forests (7,500 feet). Declining due to habitat destruction and fragmentation. Most sightings of this species in the project area are clustered near Chinquapin. Some records also come from Peregoy Meadow. No breeding has been detected (NPS 1991).
Great Gray Owl *Strix nebulosa*	--	CE	--	Lower Montane: Great gray owls are of special interest in Yosemite because they reach the furthest southern extent of their global range, and they are isolated by hundreds of miles from the next closest population in far northern California. Breeds in mixed conifer / red fir forests. Winters in mixed conifer forests down to blue oak woodlands (disperses following the first snowfall). According to NPS (1991), the great gray owl breeds in Summit, Peregoy, and Ostrander Meadows in spring and summer. Because the owl is at the extreme end of its range, it may be very vulnerable, increasing the significance of its presence in the park (Hall 1997).
Oak Titmouse *Baeolophus inornatus*	FSC	--	--	Occurs throughout California except in the Central Valley, ranging into northern Baja California in warm, dry oak woodlands. Formerly, with Juniper Titmouse considered Plain Titmouse (one species).
American Dipper *Cinclus mexicanus*	FSC	--	--	Found along mountain streams throughout the west and British Columbia to Alaska.
Black swift *Cypseloides niger*	FSC	--	--	Found in Sierra Nevada and central California Coast Range and in other isolated populations in the west. Nests in colonies on cliffs, beneath waterfalls.
Little Willow Flycatcher *Empidonax traillii brewsteri*	FSC	CE	--	Found in brushy habitats in wet areas, pastures and mountain meadows.
Harlequin Duck *Histrionicus histrionicus*	FSC	--	--	Common along rocky coasts, nests inland along swift streams.
Lewis' Woodpecker	FSC	--	--	Occurs in open woodlands in mountains of the west.

Common Name *Scientific Name*	Status*			Habitat Occurrence
	Federal	State	Park	
Melanerpes lewis				
Long-billed Curlew *Numenius americanus*	FSC	--	--	Found and nests in wet and dry uplands, found in wetlands, grainfields in the Central Valley and western plains.
Flammulated Owl *Otus flammeolus*	FSC	--	--	Common in oak and pine woodlands, especially ponderosa, nests and roosts in tree cavities.
White-headed Woodpecker *Picoides albolarvatus*	FSC	--	--	Nests in coniferous mountain forests, especially ponderosa and sugar pine.
Rufous Hummingbird *Selasphorus rufus*	FSC	--	--	Common in forested areas in Pacific Northwest, winters in parts of California and the Gulf coast.
Mammals				
Sierra Nevada Bighorn Sheep *Ovis canadensis sierra*	FE	CE	--	Barren Areas: High elevation species reintroduced to the park in 1986. Population has fluctuated from more than 85 animals then to an estimated 20 today.
Mountain Beaver *Aplodontia rufa californica*	FSC	CSC	--	Found near Badger Pass in wetlands.
Sierra Nevada Red Fox *Vulpes vulpes necator*	FSC	CT	--	Lower Montane: Found mostly above 7,000 feet. Due to the presence of the road, the project area is considered low quality habitat for the fox.
California Wolverine *Gulo gulo luteus*	FSC	CT	--	Lower Montane: Found in a wide variety of habitats. Needs water, caves, logs or other cover for denning. Not recorded in California since the 1970s.
Pacific Fisher *Martes pennanti pacifica*	Federal Candidate	CSC	--	Lower Montane: Prefers coniferous and deciduous forests with high canopy closure. Occurs mostly above 6,000 feet. Carnivorous, but may also eat fruit and fungi. Fishers have been seen in the last decade near Henness Ridge and Crane Flat. According to NPS (1991), there is one record from the Chinquapin mixed conifer zone, however, fishers prefer the dense red-fir zone.
Townsend's Big-eared Bat *Corynorhinus townsendii townsendii*	FSC	CSC	--	Townsend's big-eared bats hibernate in caves and use caves, lava tubes, and abandoned buildings for breeding and roosting sites. Nursery colonies are extremely sensitive to human activity, and sites are readily abandoned if disturbed.
Pale Big-eared Bat *Corynorhinus townsendii pallescens*	--	CSC	--	This species is highly associated with caves and mines. Th are found primarily in rural settings from inland deserts to coastal redwoods; oak woodlands of sierra foothills; lower to mid-elevation mixed coniferous-deciduous forests from low desert to high mountain habitats. Day roost sites usua include mines, caves, and buildings; buildings must offer 'cave-like' spaces.
Pallid Bat *Antrozous pallida*	--	CSC	--	This species is found in a variety of habitats from desert to brushy terrain to coniferous woodlands. They are particula associated with oak, ponderosa pine, redwood and giant sequoia habitats in central California. Day roosts include rock outcrops, mines, caves, hollow trees, buildings, and bridges, but also in caves, mines, and bridges.
Spotted Bat *Euderma maculatum*	FSC	--	--	This species is found in a wide variety of habitats, from lov desert to high elevation coniferous forests; closely associat with rocky cliffs. They day roost primarily in crevices in cliff faces.
Greater Western Mastiff Bat *Eumops perotis californicus*	FSC	--	--	This species is found from desert scrub to chaparral to montane coniferous forest and has been detected in montane meadows above 8,000 ft. and in giant sequoia habitat. They day roost primarily in crevices in cliff faces, a cracks in boulders, and occasionally buildings.
Small-footed Myotis	FSC	--	--	This species inhabits a variety of habitats including desert

Common Name *Scientific Name*	Status*			Habitat Occurrence
	Federal	State	Park	
Myotis cilioabrum				scrub, grasslands, oak and pinyon-juniper woodlands, up into pine forests. They day roost in mines, caves, buildings rock crevices, hollow trees, and exfoliating bark.
Long-eared Myotis *Myotis evotis*	FSC	--	--	Primarily a forest associated species, it's found in mixed co hardwood forest and montane conifer forest in northern California and in pinyon-juniper, mesquite scrub, and pine / oak woodland in southern California.
Fringed Myotis *Myotis thysanodes*	FSC	--	--	This species is found in a variety of habitats from low deser scrub to high elevation coniferous forest. In California has been found in mixed deciduous / coniferous forest, in both redwood and giant sequoia groves. Day and night roosts a in mines, caves, trees, and buildings.
Long-legged Myotis *Myotis volans*	FSC	--	--	This bat is found in pinyon-juniper, and montane coniferous forest habitats. This species day-roosts primarily in hollow trees, particularly large diameter snags or live trees with lightning scars. They also use rock crevices, mines, and buildings.
Yuma Myotis *Myotis yumanensis*	FSC	--	--	This species is found in a wide variety of habitats from the coast to mid-elevation. Although often considered a 'building bat', it is also found in heavily forested areas.

from (NPS 2004:III-21-23 and USFWS Species List for El Capitan Quad 2006)

***Definitions**

Federal

Endangered (FE): Species in danger of extinction throughout all or a significant portion of its range
Threatened (FT): Species likely to become endangered within the foreseeable future throughout all or a significant part of its range
Candidate: Species is a candidate (proposed) for threatened or endangered status
Species of (Local) Concern (SC/SLC): Species of Concern to the Sacramento USFWS Office
De-listed (FD): Species that has been taken off the Endangered Species List

State

Endangered: Species in danger of extinction throughout all or a significant portion of its range in the state
Threatened: Species likely to become endangered in the foreseeable future throughout all or a significant portion of its range in the state
Rare (plants only): A native plant, not currently threatened with extinction, present in small numbers throughout its range, which may become endangered if its present environment worsens

6b. Special Status Species Environmental Consequences

Special Status Plants

Methodology: Analysis was based on the known or likely occurrence of the species in the vicinity of the project area, the potential loss of habitat for the species, and the alteration of habitat.

Type of Impact: Adverse impacts are those that alter the range, location, number or population of a species or its habitat. Beneficial impacts would improve one or more of these characteristics.

Alternatives 1, 2 and 3: None of the above-described special status plants would be expected to be affected by proposed construction under the alternatives described in this Environmental Assessment. Those in the vicinity of the project at Badger Pass are not within the area that would be affected by proposed repaving and drainage improvements affecting the parking lot.

Cumulative Impacts: Habitat modification within the park includes broad scale changes in vegetation characteristics due to fire suppression, grazing, water resources alteration, and the loss of comparatively small patches and corridors where park land has been developed for facilities, trails, and roads. This has resulted in a reduction of habitat available for use by special status species that occur within the park. Because the alternatives described herein would not be expected to affect special status plant species, there would be no contribution to cumulative effects on these species.

Conclusion: There would be no impacts to and no impairment of special status plants or their values from the implementation of the alternatives described in this Environmental Assessment.

Special Status Wildlife

Methodology: Analysis was based on the known or likely occurrence of the species in the vicinity of the project area, the potential loss of habitat for the species, and/or the alteration of habitat.

Type of Impact: Adverse impacts are those that alter the range, location, number or population of a species, and/or its habitat. Beneficial impacts would expand, improve or protect one or more of these characteristics.

Alternative 1: There would be no additional impacts (no effect) to special status species under the implementation of this Alternative. There would continue to be a potential for owls and other wildlife to be struck by cars along the Glacier Point Road, but this would not change under this Alternative. Traffic patterns and speeds would remain the same.

Alternatives 2 and 3: Most special status wildlife would remain unaffected by proposed actions under this Alternative. Alternative 2, would not, except for in the vicinity of the Chinquapin intersection and near El Portal Overlook, remove or affect any habitat previously unaffected by road construction. Near the Chinquapin intersection, a section of mature trees would be removed to construct the deceleration lane (Alternative 3), to widen the intersection slightly (Alternative 2 and to a lesser degree Alternative 3) and to construct the northbound chain-down lane (Alternatives 2 and 3), and to construct the southbound chain-up lane (Alternative 2). In addition, small trees would be removed along the length of the road under both Alternative 2 and 3 for the selective vegetation removal activity. These proposed actions would result in the loss of a small amount of habitat for nesting and roosting birds and cover for tree mammals, including possibly roosting space for some species of bats.

Great Gray Owls: The road rehabilitation described under this Alternative would be *not likely to adversely affect* great gray owls. Great gray owls, which occur in this type of habitat are subject to human-caused mortality by being hit by cars. No meadows, occur adjacent to the road in the proposed project area, however, where low lying vegetation occurs, roadside vegetation would be retained on both sides of the road to ensure that owls skimming over these areas would remain above the height of passing vehicles and would therefore be less likely to be hit. Trees, especially snags, and other vegetation would not be disturbed within 500-1,000 feet of meadows, depending on the proximity of the road and suitable habitat for great gray owls.

Mountain Beaver: Mountain beavers have been found in the vicinity of the project area and are associated with montane wetland habitats. Mountain beavers are considered rare in the park and sensitive by the USFWS and the State of California, the park is concerned about their continued persistence. As a result, there would be limited intrusion into the vegetation surrounding riparian and wetland areas. At Badger Pass Parking Lot, installation of curbing would begin at the current edge of pavement, except for areas where that start location would result in a narrowed roadway. In other locations, where the parking lanes are narrowed, they would be widened, but would not affect mountain beaver habitat.

Other Special Status Wildlife Species
Alternative 1, 2 and 3: There would be no additional adverse impacts to other special status wildlife species from the implementation of Alternatives 1, 2 or 3. Other species either do not occur in the proposed project area or would not be affected by proposed project actions under Alternatives 2 or 3. A slight (negligible) beneficial effect would be gained from the restoration of hydrologic flows by replacing culverts and adding new ones to facilitate the transport of snowmelt and rain runoff. Similar negligible beneficial effects would be realized from the restoration of areas disturbed by construction, as well as from the restoration of some currently disturbed areas used as turnouts.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to special status species include those noted above for wildlife as well as:

- Enhancement of hydrological flow patterns by locating more culverts in the project area.
- All reasonable efforts in accordance with the plans and specifications for the protection of threatened, endangered or candidate species including their habitat in accordance with federal, state, regional, and local laws and regulations.

Cumulative Impacts: Many special status species have not been verified to occur within the park and/or suitable habitat is limited or has not been found. Habitat modification within the park includes broad scale changes in vegetation characteristics due to fire suppression, grazing, water resources alteration, and the loss of comparatively small patches and corridors where park land has been developed for facilities, trails, and roads. Over time, this has resulted in a reduction of habitat available for use by special status species within the park. Approximately five percent of the park contains development. Because neither action alternative proposes new development where it does not already occur, with the exception of incremental expansion of the Wawona Road near the Chinquapin Intersection, and expansion of the Glacier Point Road in the vicinity of the El Portal Overlook (for the chain-up lane in Alternatives 2 and 3 and the turnout modifications in Alternative 2) neither are expected to contribute to cumulative effects on special status species.

Conclusion: Because no habitat for any listed, rare, or sensitive species would be affected by the proposed actions and because many of those species also do not occur in the vicinity of the project area, there would be no effect on any listed wildlife species. Effects on the federally sensitive and state-listed endangered great gray owl and federal and state sensitive mountain beaver would be not likely to adversely affect these species or their habitats. There would be no impairment of special status species under any of the alternatives described in this Environmental Assessment.

7a. Archeological Resources Affected Environment

Archeological evidence in the park indicates that people were living in the area as long as 9,500 years ago. Archeological studies include Hull and Moratto 1999, NPS 1987a, NPS 1990b, NPS 1998c, NPS 2000d, and NPS 2001b. The park's archeological sites, collectively demonstrate technological change through time, a highly developed trade network, at least one population replacement, and significant environmental manipulation using fire (NPS 2004: III-38). Approximately ten percent of the park has been inventoried for archeological resources, most associated with development projects. Within this area, approximately 1,375 sites have been located. Few archeological sites have been individually nominated for listing in the National Register, however, many areas with site concentrations have been listed or have been determined eligible for listing (NPS 2004: III-37).

There are over 1,600 documented archeological sites located in the park, including the El Portal Administrative Site. Based on information to date, Yosemite Valley and other areas of the park were occupied by about 6,000 years ago. There is also some evidence of possible use of the El Portal area between 8,000 and 9,500 years ago. Archeological sites in the park include scatters of obsidian flakes, milling features, rock alignments, tool caches, house floors, cemeteries, pictographs (paintings on rock faces), petroglyphs (pecked designs in rock faces), historic mining and logging remains, trash dumps, building foundations, and many other remnants of past land uses.

Technology and land use have changed over the millennia; some changes include replacement of atlatl and dart implements with the bow and arrow for hunting and of flat millingstones and handstones for processing hard seeds to mortars and pestles for processing acorns.

Archeological surveys were conducted in the project area prior to the 1991 Environmental Assessment. According to those surveys (NPS 1991:10) no sites were located in the vicinity of Chinquapin, along segment 15-1 from Chinquapin to Badger Pass, or at the junction of the South Entrance and Henness Ridge (Yosemite West) roads. Six sites (not within the project area), however, were identified along Glacier Point Road between Bridalveil Campground Road and Sentinel Point (outside of the project area)

(Hull 1990). Archeological surveys conducted since then along the lower part of Glacier Point Road (Chinquapin to Badger Pass) or in the Chinquapin area have not found evidence of prehistoric sites.

The project area has been systematically surveyed for historical and prehistoric archeological resources (Hanson 1990; Hull and Hale 1997; Hull and Mundy 1985; Middleton and Gavette 2007; Napton and Greathouse 1976; Norum 2005), with the exceptions of several sections along the lower portion of the Glacier Point Road. Further archeological survey is not recommended in these areas due to the steep terrain and consequent low probability of locating additional archeological materials.

Twelve historical/modern isolated artifacts and one historical archeological site have been documented in the project area. No prehistoric materials have been recorded. Cultural materials along the road corridor include numerous isolates, generally single incidents of historical/modern artifacts representing debris thrown from vehicles or remains associated with construction of the Glacier Point Road. Lacking potential for important information, no further archeological work is recommended at these locations.

One historical site is located in the vicinity of the project area. Several historical features and a light scatter of domestic and industrial debris comprise the site. The documented artifacts indicate use of the area by the early 1900s (Middleton and Gavette 2007), a span of time consistent with the known Euro-American development of the project area. The site has not been evaluated for eligibility under the National Register of Historic Places criteria. As currently documented, the site does not extend into the construction zone, although it is possible that archeological materials are present in buried context beneath the existing development.

Historic archeological resources along Glacier Point Road may include buried culvert headwalls. Approximately seven culverts listed on construction documents were not found (DuBarton and Sandy 2007: Appendix C4-17 *et seq.*). If these are later found, they would be considered contributing. Other historic resources documented, but not found along the road include drains, under drains and cross drains made of six-inch tile, perforated corrugated metal pipes or rock that directed water alongside the road, across the road or toward culvert inlets. None were located in the field (DuBarton and Sandy 2007:81).

Old Glacier Point Road Historic District (Eligible):
This archeological site (CA-MRP-1525H) is a 2.5 mile segment of the Old Glacier Point Road, constructed under the direction of Washburn, beginning in 1882. This reconstruction of the bridle trail from Chinquapin to Glacier Point as a 16-foot wide wagon road, allowed vehicle access to Glacier Point. In 2000, it was found to eligible for the National Register of Historic Places under Criteria A, B and C by Nave (2000:8) as indicated in Dubarton and Sandy (2007). In addition, Nave recommended that the remaining intact portions of the Old Glacier Point Road be recorded and added and that the entire route be nominated as the Old Glacier Point Road Historic District.

The Old Glacier Point Road, which had grades of up to 20 percent along its 14 mile route, was reconstructed following a new alignment for the modern road in the 1930s (DuBarton and Sandy 2007:19).

7b. Archeological Resources Environmental Consequences

Methodology: Archeological resources impacts were analyzed qualitatively, with respect to whether or not surveys have revealed archeological information in the project area (area of potential effects).

Type of Impact: Adverse impacts would include activities involving ground disturbance (including soil compaction) in the presence of an archeological site, or activities that would increase the potential for vandalism, illegal collecting of artifacts, or destruction of a site.

Alternative 1: There would be no additional impacts (no effect) to known archeological resources as a result of the implementation of Alternative 1. Routine, ongoing maintenance of the road prism (area affected by previous road construction activities) would not result in additional ground disturbance in undisturbed areas. Future road failure, if the road remained in poor condition would, however, have the

potential to disturb previously unknown or undiscovered archeological resources, as would replacement or modification of culverts, expansion of existing developed areas or other actions that result in ground disturbance. Continued encroachment from parking in undeveloped turnouts would also have the potential to affect previously unidentified archeological resources as erosion of bare soil continued. Because archeological resources have been surveyed for within the proposed project area; because archeological resources found were outside of the project area; and because the discovery potential buried archeological resources would employ mitigation measures noted below in Alternatives 2 and 3, there would be no adverse effect.

Alternatives 2 and 3: Any soil disturbance associated with these alternatives would have the potential to affect previously unidentified cultural resources, since construction of the road predated archeological resources protection laws. Among those actions most likely to affect unknown archeological resources would be deep excavation associated with:

- Adding a deceleration (turn) lane into the Chinquapin restroom parking area (Alternative 3);
- Excavation for the retaining walls in the vicinity of Chinquapin Intersection (Alternative 2 and to a lesser extent Alternative 3);
- Adding a northbound chain-down lane (Alternatives 2 and 3);
- Adding a southbound chain-up lane (Alternative 2);
- Installing new or replacing historic culverts; and
- Subexcavation in select areas and excavating to decrease the superelevation or grade of the roadway.

In addition, the following actions associated with both action alternatives (Alternatives 2 and 3), including improvements to roadside and parking area drainage, standardizing road width, rehabilitating or restoring turnouts, and installing paved ditches would have the potential to affect archeological resources. For the most part, however, these actions would occur in areas previously affected by road construction, and based on existing survey information, would be unlikely to affect archeological resources.

The potential for affecting previously unidentified archeological resources would be reduced somewhat because during surveys conducted to date, no prehistoric archeological resources have been found in the project area, nor have prehistoric archeological resources previously been located in the project area. Evidence of historic archeological resources present in the vicinity of the proposed project area (such as along the earliest wagon road alignment) would remain unaffected by proposed project work under these Alternatives. Six sites were identified in 1991, beyond the end of the proposed project area. Except for the historic Glacier Point Road (see *Historic Structures and Cultural Landscapes* below) they are not considered eligible for listing on the National Register and would not be affected by the proposed actions under Alternatives 2 or 3.

Impact Avoidance, Minimization or Mitigation Measures

Based on the park's Programmatic Agreement with the State Historic Preservation Office and the Advisory Council (NPS 1999), the following impact avoidance, minimization and mitigation strategies would be used to protect archeological resources.

- The park archaeologist will be notified of the specific work schedule at Chinquapin prior to staging and construction.
- Monitoring will be focused in the vicinity of Chinquapin Intersection where buried historical deposits might be present beneath existing development. To ascertain presence/absence of archeological materials within the proposed construction zone, monitoring of ground-disturbing actions during construction would be conducted.
- Prior to construction, a monitoring plan would be prepared, detailing the final construction plans, the cultural material that might be encountered, important archeological questions that could be addressed (following the park's archeological research design [Hull and Moratto 1999]), and a range of treatment options (e.g., avoidance, data recovery) for any findings. If monitoring results in the discovery of important materials, then evaluating the eligibility of the site as a whole under the National Register of Historic Places criteria would be undertaken. This course of action could

allow for a determination of "no adverse effect" to archeological resources under the 1999 Yosemite Programmatic Agreement.

- When it is necessary to stop work due to archeological resources discovery, the contractor would cease all activities in the area of discovery; allow the archeologist to complete investigations; and take measures to protect the resources discovered as directed by the park.
- In the unlikely event that human remains or any objects protected under the Native American Graves Protection and Repatriation Act (NAGPRA) are exposed, the NPS will follow procedures outlined in NAGPRA regulations (including the potential need to stop work for a minimum of 30 calendar days). Work may resume in non-sensitive areas during this time.

Cumulative Impacts: Archeological resources along the Glacier Point Road and elsewhere in the park have likely been adversely impacted to varying degrees from past construction-related disturbances (prior to the advent of archeological resources protection laws); visitor impacts and vandalism; and erosion and other natural processes. Because mitigation measures would be employed to minimize impacts to potentially unidentified cultural resources in other proposed and future park projects, it is likely that these would protect archeological resources from additional impacts. There would be no construction-related contributions to cumulative impacts from Alternative 1. There is a slight possibility; however, that future proposed work or landslides could affect unidentified cultural resources. Because of mitigation measures implemented in accordance with the park's 1999 Programmatic Agreement, Alternatives 1, 2 or 3 would not be expected to contribute to cumulative effects on archeological resources. There would continue to be no adverse effect on archeological resources.

Conclusion: If archeological resources were discovered during implementation, the preferred action would be to avoid further impact to the site by modifying project implementation as needed. If this is not possible, as much information as possible would be collected about the site in accordance with applicable laws and regulations and additional consultation with applicable agencies and tribes would occur as specified in the 1999 park Programmatic Agreement. As a result, the proposed actions under the Alternatives 1, 2 or 3 would have no adverse effect on and would not impair park archeological resources or the values for which they have been protected.

8a. Historic Structures / Cultural Landscapes Affected Environment

Area of Potential Effects Summary: As defined under Section 106 of the National Historic Preservation Act (NHPA), the area of potential effects includes the Chinquapin intersection (Wawona and Glacier Point Roads), the portion of the Glacier Point Road extending from Chinquapin to Badger Pass and its associated features, and the Badger Pass Ski Area.

Within the area of potential effects is the Chin
quapin Historic District (listed on the National Register of Historic Places). In addition, the Glacier Point Road has been determined eligible for the National Register. The cultural landscape inventory conducted pursuant to the proposed action in accordance with Section 106 of the NHPA indicates that Glacier Point Road is eligible as a historic district, including the road and associated turnouts, culverts and other structures. The Wawona Road, which is considered the parent landscape to the Chinquapin area has not yet had a cultural landscape inventory but is considered potentially eligible. The Badger Pass Ski Area is potentially eligible. Documentation and evaluation of the Badger Pass Ski Area will occur concurrent with a future rehabilitation project planned for that area. The Chinquapin Developed Area cultural landscape inventory determined that this area is potentially eligible as a component landscape of the Wawona Road parent landscape (Sandy and DuBArton 2007:2).

In the 1991 EA for the Glacier Point Road, the rock walls at El Portal Overlook and the road itself were determined to be ineligible for the National Register, as was the Badger Pass Ski Area. Through the current project, the determination for the Glacier Point Road (including its historic rock walls and the Old Glacier Point Road) and for an expanded area surrounding the Chinquapin Historic District were re-evaluated as noted above (DuBarton and Sandy 2007:84).

Although the park has an excellent historical overview in three volumes [Y*osemite, the Park and its Resources: A History of the Discovery, Management, and Physical Development of Yosemite National Park, California* by Linda W. Greene (1987)], elsewhere in the park, comprehensive inventories of historic structures, sites and cultural landscapes have only been undertaken for Yosemite Valley and the El Portal Administrative Area. The historical overview is comprehensive but does not contain enough detail to evaluate individual landscapes without additional documentation (Sandy and DuBarton 2007:A-1)

Historic Buildings and Structures Overview: There are over 500 individually listed historic buildings and structures on the park's List of Classified Structures (LCS). Many other structures are potentially eligible or eligible for listing in the park, including the Wawona Road, and the Old Glacier Point Road in the project area. Based on an overview of historic resources (NPS 1987) and an inventory of historic resources in Wilderness, approximately 2,000 historic resources have been recorded in park Wilderness, including trails, tree blazes, buildings, structures and miscellaneous features (NPS 2004:III-42).

National Historic Landmark Buildings Overview: There are five National Historic Landmark Buildings in the park (The Ahwahnee, LeConte Memorial Lodge, Parsons Memorial Lodge, Ranger's Club and garage, and the Wawona Hotel), however, none are located within the proposed project area.

Historic Districts Overview: There are two historic districts in the park (Camp Curry Historic District and Yosemite Village Historic District). Another seven, including the Chinquapin Historic District (see below) have been determined eligible for listing but have not yet been nominated. Besides the Chinquapin Historic District, these include the Glen Aulin High Sierra Camp Historic District, May Lake High Sierra Camp Historic District, Merced Lake High Sierra Camp Historic District, Tuolumne Meadows High Sierra Camp Historic District, Vogelsang High Sierra Camp Historic District and the Yosemite Valley Historic District (which includes but does not supersede the Yosemite Village and Curry Village historic districts. A Merced Canyon Travel Corridor Historic District report was also prepared in 1997, but has not yet been determined eligible.

Cultural Landscapes Overview: Cultural landscapes are defined as areas that reflect human adaptation and use of natural resources during one period or over time, as expressed in the way that land is organized and divided into patterns of settlement, land use, circulation systems, and structures. Cultural landscapes may be comprised of a series of historic districts or may be the landscape associated with one district. Cultural landscapes are generally described according to the following characteristics: spatial organization, land use, natural systems and natural features, circulation, vegetation, small scale features, and buildings and structures. These features are noted as contributing elements in historic districts. Sixty-five potential cultural landscapes have been identified in the park (NPS 2004:III-42). The Yosemite Valley Historic District is listed on the National Register of Historic Places. The proposed Glacier Point Road historic district contains numerous intact landscape components. The Chinquapin Historic District is listed on the National Register but some elements have lost integrity. A more detailed summary of the Chinquapin Historic District, Chinquapin Developed Area Wawona Road Component Landscape (proposed), and the Glacier Point Road Historic District (proposed) follows.

Chinquapin Historic District / Proposed Wawona Road Component Cultural Landscape (Eligible): Under the cultural landscape inventory for this area, a slightly larger area surrounding the Chinquapin Historic District is proposed for designation as the Chinquapin Developed Area Cultural Landscape, which in turn is recommended eligible as a component landscape of the Wawona Road. This larger area encompasses not only the features of the Chinquapin Historic District, but also includes the whole intersection as well as an associated water tank located approximately 600 feet from the Comfort Station (Sandy and DuBarton 2007:3-4).

The *period of significance* for the Chinquapin Developed Area is 1933 to 1938, during which the buildings and landscape were designed and built. Proposed contributing features include: the Glacier Point Road and Wawona Road intersection, the Ranger Station (1934), Garage / Storage (1934), Comfort Station (1933), and Redwood Water Tank (1936). Proposed non-contributing features include: the modified Gas and Oil House (enlarged in 1988), Barn (likely moved from Alder Creek in 1934 and proposed for

reclassification as contributing), Pump House, Emergency Fuel Shut-off, Utility Boxes (Transformers), Chlorinating Shed and New Water Tank Building (Sandy and DuBarton 2007:28-29).

Of the individually listed historic buildings and structures, the Ranger Station at Chinquapin and the Chinquapin Comfort Station are located in the project area. Of the contributing structures evaluated as part of the proposed project, the redwood water tank (located along the Old Wawona Road), the double pipe culvert along Wawona Road, the water fountain in front of the Chinquapin Comfort Station, and the island in front of the Ranger Station contribute to the significance of the Chinquapin Developed Area as a cultural landscape.

Of the features located at the Chinquapin Developed Area, the following cultural landscape characteristics have been evaluated with respect to integrity and have been determined to either retain or not retain integrity (Sandy and DuBarton 2007:29-34). Those that retain integrity are important to maintain in the proposed redevelopment:

- Spatial Organization: Of the three key buildings designed to dominate each lobe of the intersection, two remain: the Comfort Station and the Ranger Station. The gas station / lunchroom was razed. The large triangular island in the center of the intersection was removed and the other vegetated traffic islands, except for the one in front of the Ranger Station have changed shape and lost most of their plantings.
- Land Use: The functions of the area, including transportation facilities (roads, parking and tire chaining areas), recreation and visitor services (restroom, telephone), habitation (ranger station residence), and storage and staging for maintenance equipment, materials and fuel have been retained and are part of the historic pattern of use at Chinquapin.
- Topography: The flat area that comprises the Chinquapin Developed Area was the determining factor for its development.
- Vegetation: Vegetation surrounding the intersection (fill slopes on either side of the ranger station) contributes to the integrity of the landscape as it was intended in the original design. Vegetation in the interior of the plaza (on the traffic islands) has either disappeared (lost central triangular island and vegetated islands) or is overgrown (in front of the ranger station and screening between Glacier Point Road and the intersection) and does not retain integrity. Only a small chokecherry in the island in front of the Comfort Station retains integrity.
- Circulation: Wawona and Glacier Point roads continue to be used as they were when first designed and the intersection continues to provide parking.
- Buildings and Structures: The Ranger Station retains a great deal of integrity (both inside and out), in location, design, setting, materials, workmanship and association. The Garage and Storage building retains integrity as a utilitarian structure. The Comfort Station retains some interior and most exterior integrity, with minor alterations, including the modification of the entrance porches from side to front entry and the replacement of latticework with board siding. The Service Station / Lunchroom was razed in 1992 and prior to that had first lost its gasoline pumps and overhanging roof shelter, and then was converted to concession housing. The Light Plant (generator) was also removed. The redwood water tank that originally and still supplies water to the site retains integrity. The Gas and Oil House, Barn, Shed and New Water Tank Building (outside the area of potential effects) are not contributing.
- Views and Vistas: The historic view (the expansive openness of the intersection) has disappeared due to the gradual growth of trees and other vegetation. Instead of the expansive view, the feeling at Chinquapin today is closed in or encompassed by the surrounding mixed conifer forest.
- Small Scale Features: Two drop inlets are of unknown age and do not display any unique characteristics or quality craftsmanship. A pipe culvert along Wawona Road contains a mortared angular stone inlet headwall characteristic of the craftsmanship of its era. Its outlet headwall does not retain integrity. The water fountain in front of the Comfort Station is a massive block constructed of mortared rounded stones with a spigot on top. It retains integrity but currently does not retain its function. Providing water would restore its function. The islands in the Chinquapin Intersection were formerly planted with shrubs and edged with 14-inch diameter, partially buried log curbing. Except for the one in front of the Ranger Station, which retains its shape and likely historic, though mature, tree plantings, they retain little integrity today, with

different shapes, concrete curbing and denuded plantings or paving. Steps laid around the water fountain up to the comfort station have greatly deteriorated and do not retain integrity but would be preserved in the current project.

- Archeology: No prehistoric resources have been found. Historic resources (westernmost portion of Glacier Point Road and Old Wawona Road) are outside the period of significance for the Chinquapin Developed Area.

History and Significance of the Chinquapin Historic District / Proposed Wawona Road Component Cultural Landscape

The Chinquapin area was developed by the NPS after the completion of the Wawona Road in 1933. A ranger station / garage, gas and oil house, comfort station, a gas station / lunch room, and extensive tree and shrub plantings were completed by 1937. The gas station has since been removed from the site.

Located at the junction of the Glacier Point and Wawona roads, according to the National Register nomination (NPS 2004), Chinquapin seemed like a good place to provide information to the public and to house rangers patrolling the southern park boundary, especially during deer hunting season. Completion of the Wawona Road (1933) and improvement of the Glacier Point Road was expected to increase travel. Although a service station / store had been built in the 1920s at the location, the buildings had burned during a fire that occurred in the Contractor's camp at Chinquapin while road construction on the Glacier Point Road was underway in 1932. As a result, park officials decided to install a complete administrative unit at the Chinquapin junction. To this end, the NPS Branch of Plans and Design prepared a construction scheme consisting of a ranger station, comfort station, and a Standard Oil Company service station with a small refreshment stand. The plan included landscaping around the plaza area connecting the Glacier Point and Wawona roads (Figure IV-3: Historic Overview of Chinquapin Intersection c. 1934). The vegetated island separating the Wawona and Glacier Point Roads was altered sometime prior to 1991 (Sandy and DuBarton 2007:56).

The current Chinquapin Historic District boundary starts behind the currently unoccupied park residence (Ranger Station: Yosemite Building #5000) located at the intersection of the Wawona Road and the Glacier Point Road, then extends north and east to cross the road encompassing the former service station and light plant, and then turns south to a point behind the existing Chinquapin comfort station and the crosses the Wawona Road back to the starting point.

According to the National Register Nomination (NPS 2004), this Historic District boundary encompasses the significant resources of the remaining buildings and the immediate surrounding land that comprises their historical setting. Although the Historic District also includes the plaza and intersection areas which were an integral part of the design scheme for the intersection as proposed by the NPS Branch of Plans and Design, the road configuration is not considered part of the National Register nomination, which applies only to the buildings' architectural significance.

As noted in the nomination, the former Chinquapin administrative complex is considered regionally significant as exemplifying an architectural theme specifically developed by the NPS Branch of Plans and Design in response to earlier building traditions in Yosemite National Park. It is a unique style unused in other parks and is exemplified by only a few buildings in Yosemite. According to the nomination, the four buildings at Chinquapin comprise a small historic district exemplifying one aspect of the Park Service's interpretation of the rustic design ethic, specifically, one stressing harmony with the cultural environment rather than the natural setting. The Gas and Oil House (Building #5003), the Light Plant (Building #5051) and a small barn were considered noncontributing resources within the historic district and have since been removed.

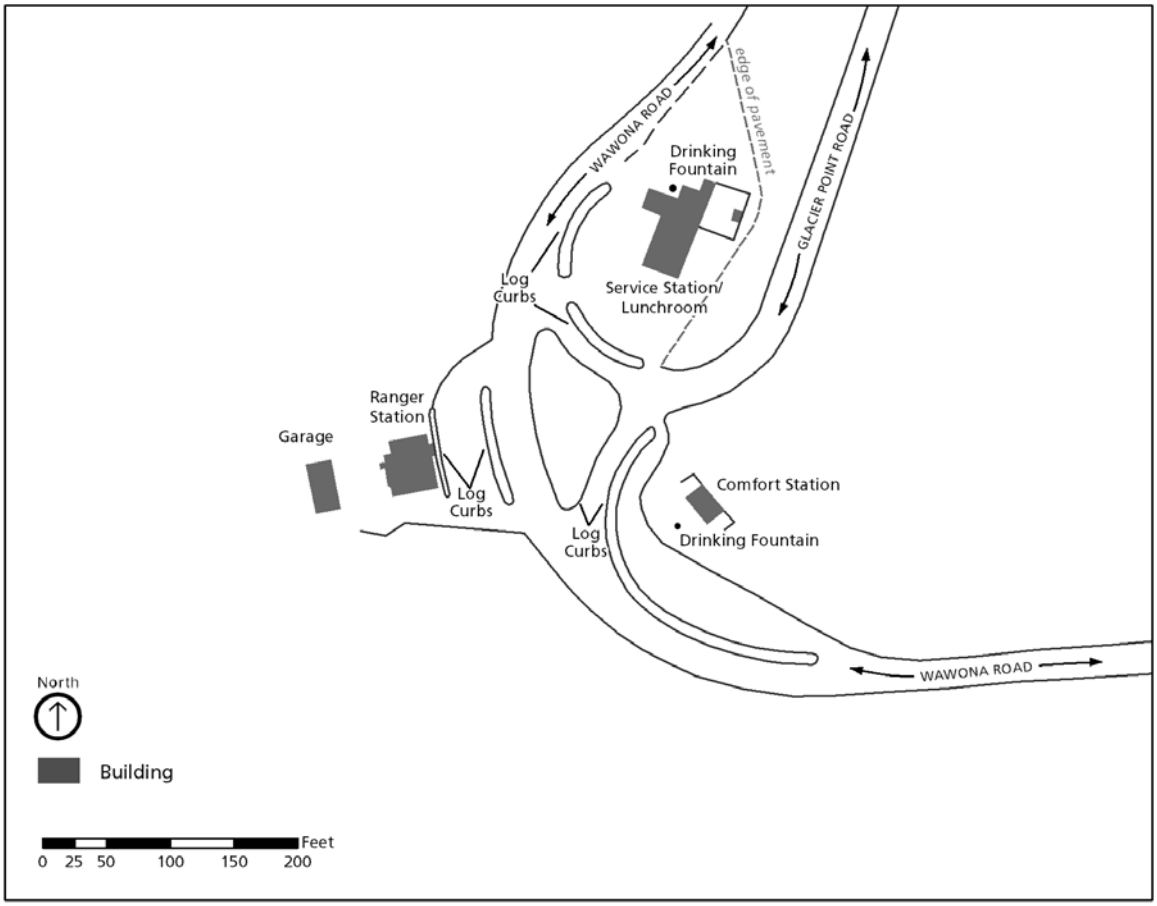
Nonetheless, the former service station / lunchroom was featured in the three-volume study by Albert H. Good entitled *Park and Recreation Structures*, published in 1938. According to the nomination, this study served as a training tool for park architects and landscape architects throughout the nation. The study provided examples of many of the best Emergency Conservation Work projects completed in county, state, and national parks through 1937. It described the Chinquapin concession building (vol. II, p. 86) as follows:

> In parks of vast size and along extended parkways, concessions to dispense gasoline are necessary. This one dispenses fuel for both man and motor and provides quarters for an attendant in a housing that admirably recaptures the simple character of early California architecture.

According to the National Register nomination, the significance of the Chinquapin complex was also noted later (1987) by Allan Temko an architecture critic for the *San Francisco Chronicle.* Temko stated that the two service stations at Yosemite (one in Yosemite Valley, the other at Chinquapin) prepared in the office of Eldridge T. Spencer revealed the "forward movement" of a period when designers had more freedom to be imaginative when confronted by perplexing architectural problems. The buildings at Chinquapin, he said, are important because they were executed at a time when architects could still practice their "high calling" and were not yet "reduced to servitude to fast-buck promoters and pre-packaged structures."

> Unlike most practitioners today, they had a good fund of general culture, and were broadly educated in literature and history as well as the arts. They created buildings carefully. Scale and proportion, massing and texture, symbolic form and nobility all were ingredients of their work.[29]

Figure IV-3
Historic Overview of Chinquapin Intersection c. 1934



[29] Allan Temko, "Show of Architectural 'Treasures'." *San Francisco Chronicle*, 23 January 1987.

In addition, according to McClelland (1993) as cited in Sandy and DuBarton (2007:17):

> Nowhere else in the national park system had an intersection received so much attention. This special treatment was due in large part to the importance that surrounded the construction of the Wawona Road and the many difficulties it encountered. No other road received such scrutiny by national park landscape architects, officials and the Yosemite Board of Expert Advisers. . . The principles of naturalistic design were reinforced with full force, and many practices were rediscovered and innovations made, from the rehabilitation of springs to the naturalization of roadsides and newly constructed buildings.

A significant effort was made to landscape the new buildings as shown by the following excerpts from McClelland (1993) and Figure IV-4 above.

In spring 1934, enrollees from Wawona Camp set to work on the landscape improvements that were part of Wosky's overall design for the plaza. The area was graded, the steep hillsides behind the gas station and comfort station were flattened and sloped, and log curbing was installed along the roadway, islands, and parking areas. Beside the ranger station, a view was cleared and a viewing area designated by the flagpole and plantings. Trees, shrubs, and flowers were planted throughout the site. Thirty-eight loads of black soil, measuring fifty-six and a half square yards, were hauled in from the woods to prepare the site, and twelve cubic yards of rock were removed from dug holes and hauled away. By July 1934, 213 holes (moving one cubic yard of dirt each) had been dug and the following planted: 27 willows *(Salix* spp.), 134 chinquapins *(Castanopsis sempervirens),* 14 cherry *(Prunus* spp.), 12 manzanitas *(Arctostaphylos mariposa),* 17 ceanothus *(Ceanothus* spp.), 27 buckthorn *(Rhamnus californicum),* 6 ferns, and 2 mountain currants *(Ribes* spp.). One enrollee spent fifteen days watering, and the total project required 494 enrollee and 50 civilian man-days.[30]

> Planting continued in the fall with 384 chinquapins, 18 manzanitas, 2 sugar pines *(Pinus lambertiana),* 3 willows, 2 buckthorn, 5 cedars *(Libocedrus decurrens),* and 5 white firs *(Abies concolor).* Thirty-two cubic yards of black soil were hauled in for planting purposes, and twenty-five cubic yards of poor soil were hauled away. This work, performed over a three-month period, required 688 enrollee and 51 civilian man-days.[31]

> During 1935, enrollees from the Cascades Camp installed 852 linear feet of log curbing, requiring thirty-three truckloads of logs. Logs measuring about fourteen inches in diameter were fitted end to end and embedded partially in the ground. The logs were the snags and old logs being cleared under a separate job by other members of the camp and piled up along the old Wawona Road. Two hundred feet of road surface previously treated with oil were removed from the area, and eighty cubic yards of dirt hauled in to create a bank behind the curbs.[32]

The work was finally completed in early 1937. More shrubs were planted than had been originally estimated, and the loss of plants was greater here than in Yosemite Valley, owing to poor soil conditions and an inexperienced foreman. The plantings around the ranger station included:

> chinquapin shrubs in great abundance at all corners, manzanitas and cherry trees at each end of the station, and white firs and cedars on the slopes behind the gas station to create a screen for motorists ascending the Glacier Point Road. Islands in the plaza were planted with chinquapins and other low-growing shrubs. The slopes behind and beside the comfort station were planted with shrubs, predominantly chinquapins. At the end of the parking area for the comfort station, where the road began its ascent, pines were planted to blend the plaza with the roadside

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[30] ECW Quarterly Report, Wawona Camp NP-1, Yosemite National Park, July 1934, Record Group 79, National Archives, Washington, D.C.

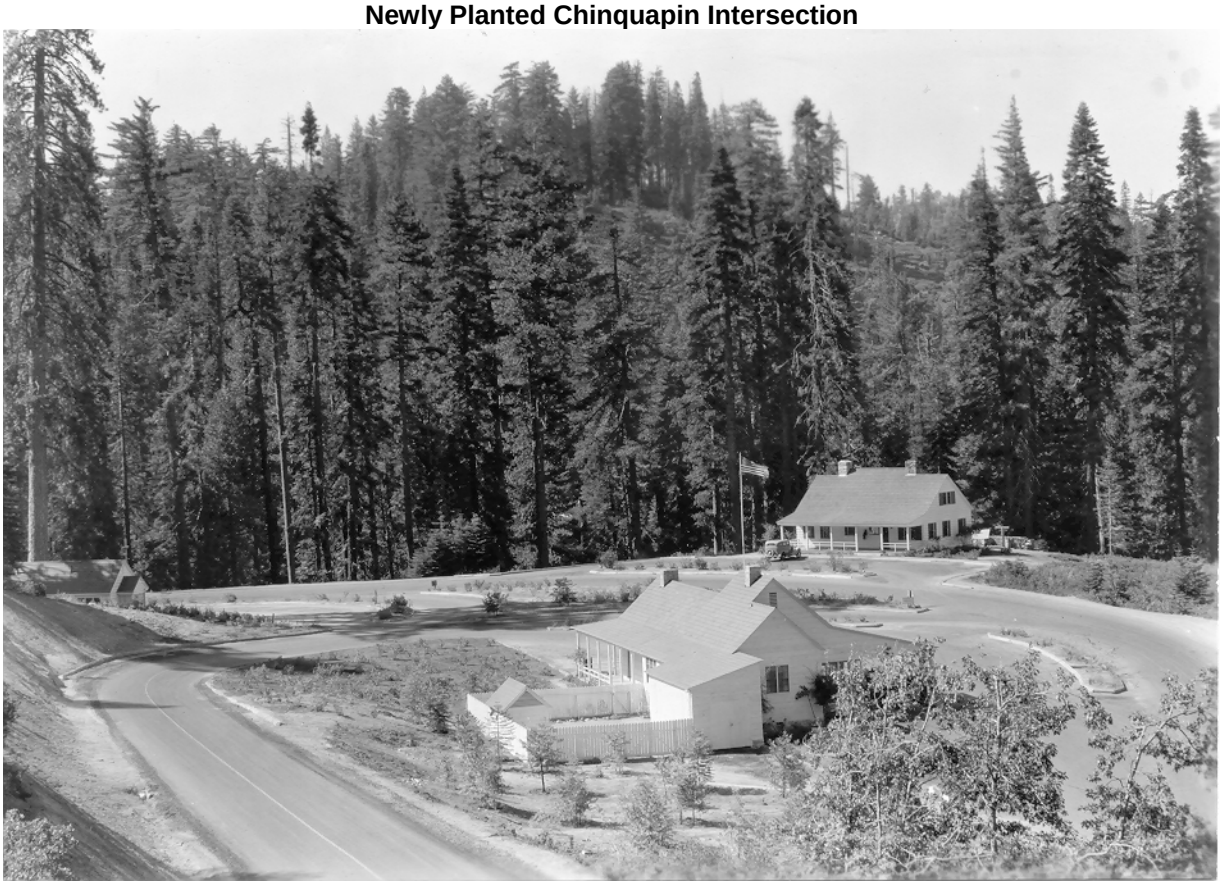
[31] Ibid, October 1934

[32] ECW Quarterly Report, Cascades Camp, NP-1, Yosemite National Park, April 1934, Record Group 79, National Archives, Washington, D.C.

vegetation. Recognizing that the results of the planting were not immediately obvious to observers, the camp superintendent advised, "Give the trees and plants a chance to spread out and in another year or two this plot will be one of the beauty spots on the Wawona Road."[33]

Glacier Point Road Cultural Landscape (Eligible):
The proposed Glacier Point Road Cultural Landscape includes the roadway, which begins at the Chinquapin Intersection and ends at Glacier Point, a distance of about 16 miles. The portion within the proposed project area is approximately 5.2 miles, begins at the Chinquapin Intersection and ends at the entrance to the Badger Pass Parking Lot. While the existing road (built in the 1930s) mostly follows the alignment of the previously existing carriage road built in the 1920s, in the project area, the western portion from Chinquapin to Badger Pass was rerouted to lessen the steep ascent (DuBarton and Sandy 2007:1).

Figure IV-4
Newly Planted Chinquapin Intersection



Three Periods of Significance for the proposed Glacier Point Road Historic District cultural landscape have been identified:

1) The prehistoric period, particularly from 1200 to 1850 A.D., when a residential base camp was established near Bridalveil Creek.

[33] ECW Quarterly Report, Wawona Camp NP-1, Yosemite National Park, October 1935, Record Group 79, National Archives, Washington, D.C.

2) From 1860 to 1900, when native trails were developed as saddle and carriage trails to bring visitors to view Yosemite's scenic wonders.
3) From 1900 to 1940, when the road took on many of the characteristics that are important to motor tourism in Yosemite.

Of the features located along the Glacier Point Road, the following cultural landscape characteristics have been evaluated. Glacier Point Road retains a high level of integrity within all of the seven aspects (DuBarton and Sandy 2007:29-85). Those aspects that retain integrity are important to maintain in the proposed redevelopment:

- Topography: Aside from the destination, topography dictated to a large extent how and where the roads were constructed. Rock cuts, through cuts, cuts and fill, causeways, and ditches all remain as they were constructed.
- Vegetation: Glacier Point Road traverses the mixed conifer (3 miles), the red fir (8 miles) and the lodgepole pine (4 miles) zones. Naturalization of vegetation, according to then NPS standards, took place following road construction. Removal of select trees and vegetation created or enhanced scenic views and vistas along the road.
- Land Use: Land use has changed in response to land use priorities. Historic land use in the project area includes: Recreation and Sightseeing, Access to Yosemite Valley, Lodging and Homesteading, Camping, Winter Sports, and a Quarry. Current land uses include all but the Quarry and Lodging and Homesteading and Access to Yosemite Valley although still available for recreational use now occurs over the Wawona Road.
- Circulation: Although roads have replaced trails as the primary circulation system, two roads (current and old Glacier Point Road also old Bridle Trail) and six trails outside the project area (Alder Creek, Sentinel Dome, Taft Point, Ostrander Lake, Bridalveil Creek Campground, and Mono Meadow) are considered contributing. Although historically constructed, the Pohono Trail, Panorama Trail, Four Mile Trail, and McGurk Meadow Trail are not considered contributing to Glacier Point Road.
- Spatial Organization: Spatial organization has changed through time (related to each period of significance) as uses and circulation patterns have changed.
- Buildings and Structures: Four buildings outside the project area retain integrity – the Badger Pass Lodge, the Bridalveil Creek Campground Bathhouse, the McGurk Cabin, and the Bridalveil Creek Bridge.
- Views and Vistas: Contributing views along the Glacier Point Road include: El Portal (3 turnouts), and two outside the project area – Clark Range and Washburn Point.
- Small Scale Features: Small stone culvert headwalls (36) between Chinquapin and Badger Pass, 13 between Badger Pass and Sentinel Dome and 18 between Sentinel Dome and Glacier Point are considered contributing. Other contributing features include: a concrete box culvert on an unnamed intermittent creek, the stone headwalls at Avalanche, Grouse, East Fork Bridalveil, and Sentinel creeks, concrete drop-inlets, square rockwork drop inlet, turnouts at El Portal and Clark Range view, rockwalls at El Portal View, an embankment wall at Clark Range View, and three dry-laid stone walls on Old Glacier Point Road are considered contributing.
- Archeology: Archeological sites (outside of the project area) include granite milling features with mortar cups and grinding slicks, scattered flakes from materials processing, as well as remains indicative of a camp near Bridalveil Creek Campground. In addition, the historic remains of the Mountain View House were found, as was another site with petroglyphs and granite milling features which is likely another residential base camp. Other sites located are related to more ephemeral activities, such as arrowhead manufacture.

Altogether, the Glacier Point Road cultural landscape retains integrity associated with its location and setting, design, materials and workmanship, and feeling and association. All of these features are little altered since the route was first used (DuBarton and Sandy 2006:45-46).

8b. Historic Structures / Cultural Landscapes Environmental Consequences

Methodology: Historic Buildings and Structures and cultural landscape impacts were analyzed qualitatively, in accordance with 36 CFR 800 criteria of effect, based on their presence in the project area and the modifications that would be made to character-defining features (features that qualify the

structures or landscapes for inclusion in the National Register). Historic structures and landscapes for which a determination of eligibility has not been completed were considered eligible. Those which had previously been determined ineligible were also considered eligible (Glacier Point Road, including rock walls) and were analyzed again with respect to cultural landscape criteria.

Type of Impact: Adverse impacts result when effects of the proposed action diminish the characteristics which make the structure or landscape eligible for the National Register or which diminish the overall integrity of the landscape (see Methodology section for more information).

Alternative 1: There would be no additional impacts to historic structures located in the project area, to the Glacier Point Road's potential eligibility as a cultural landscape, or to the Chinquapin Historic District under this alternative. No modifications to the configuration of roads or structures, including historic culvert headwalls, would occur. There would be no effect on historic structures or cultural landscapes as a result of the implementation of Alternative 1.

Alternatives 2 and 3:
The following guidelines from the Secretary of the Interior's Standards for Rehabilitation apply to the current road project and its historic components:

> 3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
> 5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
> 6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.

As noted in the guidelines, the historic character of these features will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.

Among the actions would have the potential to affect historic structures and cultural landscapes under either one or both of these alternatives would be the following:

- Redesign of the Chinquapin Intersection / Chinquapin Restroom Parking Area (Alternatives 2 and 3);
- Constructing administrative maintenance vehicle parking at the site of the former gas station (Alternatives 2 and 3);
- Creating a deceleration turn lane into the Chinquapin Comfort Station Parking Lot (Alternative 3);
- Adding chain-up lane to Wawona Road (Alternative 2);
- Adding chain-down lane to Wawona Road (Alternatives 2 and 3);
- Modifying the cut slope across from El Portal Overlook Turnout C and constructing a rock wall between the two existing historic rock walls (Alternative 3); and
- Modifying drainage structures along the Glacier Point Road, including historic culverts and side ditches (Alternatives 2 and 3).

These changes and their potential effects are described in more detail below.

As noted above, in addition to character-defining features called out in the nomination of resources to the National Register, cultural landscapes are evaluated based on whether the landscape elements are contributing: topography, vegetation, land use, circulation, spatial organization, views and vistas, buildings and structures, and small scale features.

Each is discussed below with respect to changes to the features noted in the two Cultural Landscape Inventories (see above) that retain integrity at Chinquapin or along the Glacier Point Road.

Topography

Chinquapin: Under Alternative 2, there would be slight modifications to topography and to existing historic fill areas on either side of the Ranger Station and in the former Gas Station / Lunchroom setting to create (a) the right hand turn lane from Glacier Point Road onto Wawona Road, (b) the left hand turn lane from Wawona Road onto Glacier Point Road, and (c) the right hand turn lane from Wawona Road onto Glacier Point Road.

Under Alternative 3, construction of the right hand turn lane (a) above would occur and would have the same minor effects on the corner of the historic clearing for the Gas Station / Lunchroom as Alternative 2. Alternative 3 would also include laying back a cutslope along the Wawona Road to create level space for the deceleration turn lane into the Chinquapin Comfort Station. The deceleration turn lane would affect the cut slope above which Old Glacier Point Road was rehabilitated when the new Glacier Point Road was redesigned to pass through the Chinquapin Intersection. The cutslope, however, would likely not reach that rehabilitated road bed. Cutslope modifications would result in a moderate portion of soil and rock, currently with mature forest trees being removed. Beyond this area, however, that mature forest would continue to predominate and this approach to the intersection as well as the intersection itself would continue to retain its existing natural features, with perhaps additional rock exposed at the deceleration lane cut.

Glacier Point Road: Under Alternatives 2 and 3, there would be slight modifications to the slope of the road, where changes to superelevation or subexcavation occurred that would largely be unnoticeable. In addition, there would be slight changes to topography wherever turnouts were rehabilitated in both alternatives. Alternative 2 and 3 would also have a slight grade decrease associated with the access road from the Badger Pass Parking Area to the Glacier Point Road. Alternative 3 would also result in laying back the slope across from El Portal Overlook area "Turnout C."

Vegetation

Chinquapin: Under Alternative 3, a moderate number of both small and mature trees would be removed to accommodate the deceleration lane. Alternative 2 would also include tree removal to widen the area for the Wawona Road left and right hand turn lanes (see *Vegetation* section following *Soils* above). Additional trees would be removed under both Alternatives 2 and 3 to accommodate the right turn lane from Glacier Point Road onto Wawona Road and to accommodate the Administrative Parking Area (with fewer trees removed under Alternative 2). As noted in the CLI (Sandy and DuBarton 2007), vegetation in this area is considered overgrown and has obscured previously available views. Although the tree removal would not open up other than limited views (in Alternative 2 along the edges of the road where new rock walls would be constructed and from the chain-up lane and in Alternative 3 associated with the deceleration turn lane; in both alternatives in the former Gas Station / Lunchroom setting and near the Chinquapin Comfort Station; and in Alternative 3, additional clearing in the Gas Station setting for the chain-down lane), these would be considered negligible to minor beneficial effects on the cultural landscape.

Glacier Point Road: Under both Alternatives 2 and 3, vegetation would be removed to increase sight distance along curves, to improve pavement warming, to allow for repaving the road, and for constructing paved ditches. Some vegetation would also be removed to allow for culvert lining, culvert installation and culvert replacement. Selective removal of trees and brush alongside the road would be similar in scope to the same action carried out for the purposes of fire management. Over time, as shown by comparison with accompanying historic photographs, plants would reestablish and the area would continue to look much as it does today. Nonetheless, for a time, selective vegetation removal along Glacier Point Road would alter the road's current closed-in appearance and would make it appear more like it did shortly following construction, a moderate-term beneficial effect on the cultural landscape.

Additional vista clearing at the El Portal Overlook would also be consistent with the area's long-time use and with its proposed designation as a cultural landscape.

Land Use

Chinquapin: There would be negligible effects on historic land use under Alternatives 2 and 3 at Chinquapin with the addition of the Administrative Parking area located in the former Gas Station / Lunchroom setting under either Alternative 2 or 3.

Glacier Point Road: With the addition of a chain-up lane above El Portal Overlook, which is consistent with the activities that visitors currently engage in on the Glacier Point Road, there would be minor effects on historic land use.

Circulation:

Chinquapin and Glacier Point Road

Under both Alternatives 2 and 3, although there would be moderate changes by adding turn lanes and chaining lanes as well as modifications to existing parking areas, overall circulation patterns would continue, with the Glacier Point and Wawona Roads remaining the same, as well as turning, parking and travel occurring in the same general areas and no changes to foot trails.

Spatial Organization

Under Alternative 2, the spatial organization of the Chinquapin intersection / restroom parking area would be modified slightly, with the widening of the intersection area to the west and a slight modification to, but retention of the islands that separate the traffic lanes from the restroom parking area and the proposed Administrative Parking Area from Wawona Road. The turning radius for large vehicles into the Comfort Station would be improved with added width given by reconfiguration of the island that parallels Wawona Road. Nonetheless, the physical location of the intersection would remain the same and its juxtaposition with the Ranger Station and the Comfort Station would also remain.

A portion of the site of the former gas station / store would be modified to allow for an administrative vehicle parking area with a separation island mimicking the one near the restroom parking. The rest of the space would be used to construct a northbound chaining lane.

Under Alternative 3, several of these same minor changes in spatial organization would also occur, including the right hand turn lane from Glacier Point Road onto Wawona Road that would result in a slight width expansion of the Glacier Point Road into the former Gas Station / Lunchroom setting; the expanded restroom parking area, with its enhanced turning radius from Glacier Point Road, and the chain-down lane, shifted slightly north on Wawona Road that would occupy a portion of the Wawona Road edge, instead of being wholly within the existing disturbed area. In addition, a deceleration turn lane would be added to access the south end of the restroom parking area. As in Alternative 2, however, these changes would result in negligible to minor effects on spatial organization and the primary characteristics of the intersection would remain, including the juxtaposition of the road with the Ranger Station and Comfort Station.

Views and Vistas

Chinquapin: Views would be slightly enhanced under both Alternative 2 and 3 due to vegetation removal associated with proposed changes in the area. The enhancement of views would be negligibly greater under Alternative 2, because of the removal of some trees to construct the rock walls on either side of the Ranger Station. Although affected trees and vegetation being removed were clearly planted or have grown up since the construction of the intersection, the CLI notes the openness of the area as being a key characteristic that is no longer available and the vegetation as being overmature.

Glacier Point Road: One vista point is called out in the Glacier Point Road CLI – the El Portal View or Overlook and its associated turnouts. Under both Alternative 2 and 3, this view would be both preserved and restored, with enhancement of visitor facilities and selective removal or trimming of vegetation currently obscuring the view. Under both Alternatives, however, there would also be enhancement of the upper El Portal view turnout (C) by making it safer for visitors to use. Under Alternative 3, the turnout between the rock walls would disappear as the centerline of the roadway was modified to allow snowplows and other large vehicles to stay in their lane around the adjacent sharp curve and with the addition a guardwall (Alternative 3).

Buildings and Structures

This road rehabilitation project does not include any modifications to or removal of buildings or structures. *Chinquapin:* There would be no alterations to the Chinquapin Comfort Station, the Chinquapin Ranger Station or its associated garage, or the redwood water tank under either Alternative 2 or 3. There would, however, as noted above, be an accessible pathway constructed to the Chinquapin Comfort Station for the physically handicapped to access the restroom. This accessible pathway would not affect the Comfort Station. It would, however, slightly alter the setting of the Comfort Station by adding a sidewalk and landscaping that is currently not present and by adding designated accessible and service vehicle parking.

Glacier Point Road: Although the Badger Pass Lodge is considered a contributing structure to the proposed Historic District cultural landscape, it would not be affected by the actions proposed under either Alternative 2 or 3. There are no buildings or major structures within the proposed project area that would be changed under either action alternative. The proposed action would have no effect on buildings and structures in the proposed Glacier Point Road Historic District cultural landscape. Actions proposed within the Badger Pass Parking Lot would result in some indirect beneficial effects on the Badger Pass Lodge by providing more appropriate drainage pathways around the structures and by adding designated accessible parking.

Small Scale Features

Chinquapin: Three small scale features are called out in the Chinquapin Developed Area Cultural Landscape Inventory (CLI) (Sandy and DuBarton 2006): one pipe culvert, the drinking fountain in front of the Comfort Station and the islands that separate traffic along Wawona Road from parking areas at the Chinquapin Intersection. There would be no modifications to the drinking fountain and the pipe culvert would be reconstructed in kind, with photographs and stone numbering on the headwall assisting that process.

Islands: The islands, except for the one in front of the Ranger Station, retain little integrity because they have been widened and were recurbed with concrete. Under the proposed project in either Alternative 2 or 3, the two islands that were widened would be removed and reconstructed in the same vicinity. With the island in front of the Comfort Station, this would increase parking and increase the turning radius for large vehicles trying to turn into the Comfort Station Parking Lot from Glacier Point Road. The island on the south side of the former Gas Station setting would also be reconstructed to define the new edge of the site, out of the way of the turn lane and the Administrative Vehicle Parking Area. In addition, under Alternative 2, a new island separating the parking area from the chain-down lane would be added. Low-growing vegetation is being considered for the islands but will be difficult to maintain due to their small size and their use for snow storage. The island across from the Ranger Station would not be modified except to be recurbed. Care would be taken to not disturb the trees within it. Because the islands have already been modified as a result of previous intersection work and have lost integrity, proposed additional modifications to the same two would have minor cumulative adverse effects as well as minor beneficial effects if the recommendation in the CLI to use vegetation instead of paving were adhered to. There would be minor effects from the recurbing of the Ranger Station island.

Drinking Fountain: Although the historic drinking fountain in front of the Chinquapin Comfort Station lacks functionality (it was disconnected because the water system was rendered non potable) it would be retained and potentially restored as part of a future project.

Glacier Point Road: The effects of the road improvement project under Alternative 2 would perhaps be most widespread with respect to small scale features along the Glacier Point Road, including with respect to alteration of side ditches by increasing the number and length of paved ditches, and adding riprap rundowns and riprap aprons to culvert outlets. Approximately 1.21 miles of paved ditches would be constructed (See Figure III-3), compared to a small number of existing *paved* ditches now present. Regardless, ditches are a common feature of the historic road, particularly in this segment (DuBarton and Sandy 2007:37) and these ditches would be constructed to blend with the character of the road, with vegetation restoration occurring adjacent to them and with curbing being diminished. The paved ditches

are generally used to reduce impacts to cut slopes, to fit the road in without greater impacts to cutslopes. Paved ditches would also reduce ditch erosion and head cutting in steep locations with erodible soils, a long-term beneficial effect on preservation of the road itself. Existing ditches direct water to historic culverts, but have been accumulating sediment and debris from seasonal runoff and road sanding for many years and are in need of functional restoration (DuBarton and Sandy 2007:37).

Culverts: There are currently approximately 39 culverts within the project area on the Glacier Point Road. Of these 36 were found during the cultural landscape inventory and are considered historic and nearly without exception they contain constructed mortared and/or dry-laid headwalls, including one unique one carved into rock. Under Alternatives 2 and 3, the following modifications (approximate numbers) to these historic culverts would be made:

- 10 would be cleaned;
- 9 would have the inlet or outlet modified (5 of these would be cleaned and modified and 4 would be modified);
- 7 would be plugged and replaced;
- 8 would be removed and replaced;
- 1 would be removed; and
- 1 would be plugged and left in place.

In the 15 locations where existing culverts would be replaced, headwalls would be reconstructed or replaced with end sections or drop inlets. Additionally, the inlets of six culverts not being replaced would be modified by installing 10 re-engineered drop inlets that would retain the use of the headwall. These re-engineered inlets would ensure that in those locations where the headwall is directly adjacent to, but beneath the current surface of the road cars which left the pavement would be more likely to recover their position, as opposed to dropping abruptly off the pavement into a deep ditch. To the degree possible, these drop inlets would be disguised from the road.

In addition to the 15 new culverts added to replace historic culverts, there would be another 30 new culverts added, for a total of 45 new culverts. To reduce the erosion potential from roadside drainage modifications:

- 12 riprap aprons would be added (not associated with culverts)
- 11 riprap rundowns would be added at the ends of paved ditches and where needed on steep slopes.

Instead of stone mortared and dry-laid headwalls, inlets for added culverts would be modified with one of two designs [either a curb opening inlet (called *G0* in plans), or an area inlet (called *G1* in plans)], both including a top grate level with the surface of the road. Some would have end sections instead of drop inlets. Most would also have an outlet riprap apron. Some existing headwalls would not be disturbed. Elsewhere, where existing pipes are being plugged, the headwall would be removed and reconstructed on the new parallel pipe when it is the same size and added to when it is not.

Turnouts: Parking areas along the road, some only big enough for one or two cars are periodically located along the Glacier Point Road. Purposely developed turnouts are often lens-shaped and are either paved or unpaved and allow casual uses such as passing or emergency parking. As noted in the CLI (DuBarton and Sandy 2007), these turnouts, even though they may have been constructed as part of the original road, were not depicted on historic design drawings and are therefore apparently not an important part of the original design of the road. They do not display unique design or outstanding craftsmanship and do not contribute to the historic significance of the Glacier Point Road.

Rockwalls: The two low rockwalls at El Portal would be retained and reconstructed using original materials (when available) where stones are loose or missing. A new rockwall (Alternative 3) would also be constructed between them and would mimic historic construction in form and appearance. The small paved turnout between the existing rock walls would effectively be lost under Alternative 3 as the road centerline was shifted to allow large vehicles to stay in their lane around the curve across the road. Rehabilitation of the existing rock walls (Alternative 2) would have a negligible to minor beneficial effect,

while construction of the new rock wall (Alternative 3) would have a minor to moderate adverse effect on the proposed historic district.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to historic structures and cultural landscapes include the following (see also the description above under Affected Environment of the CLI recommendations):

Chinquapin:

- Although the exact historic configuration of the area in front of the comfort station is unknown, current conditions would be stabilized and improved in a future park project by the removal or burial of the utility box, and the appropriate design of pathways or terraces and landscaped vegetation that complement the style of the water fountain and remnants of stonework surrounding it. New infrastructure within this area would not compromise the ability to restore or enhance this landscaped area. Under the current project, placement of modern features such as garbage cans and display boards would be adjusted so as not to compete with the historic features of the area.
- Road rehabilitation would ensure that historic features are not adversely affected by the construction, and that no features incompatible with the historic character of the historic district are added.
- Remnant contributing vegetation in the area would be maintained. Revegetation of disturbed or restored areas within the intersection would borrow heavily from the historic plant palette, with the addition of other native plant species as necessary.
- The traffic island (and associated vegetation) outside of the ranger station would be preserved. Although the remaining traffic islands are non-contributing due to their substantially compromised integrity, their design would be compatible with the historic character of Chinquapin Intersection, including trying to maintain islands vegetated with either low-growing native shrubs (preferred) or low growing native herbaceous perennials.
- The new guardwalls proposed at the Chinquapin Intersection would be compatible with the design of other historic granite guardwalls along the Wawona Road.
- All contributing features within the Chinquapin Historic District shall be documented in accordance with Stipulation VIII A 1(b) of the 1999 Programmatic Agreement with black and white 5 x 7 photographic prints before and after construction. Copies of documentation would be deposited at the Yosemite archives and with SHPO.
- In accordance with Stipulation VIII A 2 of the 1999 Programmatic Agreement, if a contributing feature would be demolished, Yosemite historical architect, curator and/or preservation specialist would conduct a documented inspection to identify architectural elements and objects that may be reused in rehabilitating similar historic structures or that may be added to the Yosemite museum collection.

Glacier Point Road:

- The road's existing 10 foot travel lanes and vertical and horizontal alignment would be maintained.
- Road rehabilitation would ensure that historic features are not adversely affected by the construction, and that no features incompatible with the historic character of the historic district are added.
- Historic culvert headwalls would be maintained if possible or reconstructed in kind if necessary. If additional stone is necessary for these headwalls, it should match the size, texture, color and masonry pattern of the pre-existing stone. Reconstruction and/or addition of new stone would be done to replicate the character of the joints, including mortar if present.
- Yosemite Valley Loop Road Evaluation recommendations would be followed for drop inlet culverts including 1) paved ditch drop inlets would have the top exposed concrete edge covered with granite to help disguise the visual impacts. The granite should be of a color texture and weathering pattern similar to the existing historic headwall found along Glacier Point Road and 2) All drop inlets associated with existing, undisturbed contributing headwalls shall be constructed in

a manner that does not disrupt the original headwall. All new concrete and other construction should stand alone without the support of the existing headwall.

- Drop inlets would be used where needed and where they cannot easily be seen from the road. Unpaved ditch drop inlets should have the top exposed concrete edge covered with granite to help disguise visual impacts. The granite should be of a color, texture and weathering pattern similar to existing historic headwalls. All drop inlets associated with existing undisturbed contributing headwalls should be constructed in a manner that does not disrupt the original headwall. New concrete and other construction should stand alone, without the support of the existing headwall (DuBarton and Sandy 2006). Establishing a minimum setback from the road would minimize the potential for these drop inlets to be viewed from the road.
- Photographs of each culvert headwall would be used to verify reconstruction patterning.
- Riprap at culvert outlets would be as unobtrusive as possible. Stone would be selected to match the existing riprap along the road; using the riprap below the El Portal Overlook as a model.
- The historic guardwalls and retaining walls at the El Portal Overlook would be retained and repaired.
- The three historic turnouts at the El Portal Overlook would be retained.
- Limited tree removal would occur at El Portal Overlook to restore its historic viewshed.
- The existing visual character of the guardwalls and retaining walls for the new proposed guardwall and retaining wall at the El Portal Overlook would be matched.
- Asphalt curbing along the Glacier Point Road would be replaced sparingly with granite or concrete curb.
- New cut sections or fill sections along the road would use naturalistic design principles and minimize road scarring and any unnatural engineered forms.
- All contributing features and/or feature typologies within the Glacier Point Road Historic District would be documented in accordance with Stipulation VIII A 1(b) of the 1999 Programmatic Agreement by black and white 5 x 7 inch photographic prints before and after construction. Copies of documentation would be deposited at the Yosemite archives and with SHPO.
- In accordance with Stipulation VIII A 3 of the 1999 Programmatic Agreement, an interpretive panel would be placed at the El Portal Overlook, under a future park project, to ensure that the story of human interaction with nature and changes in that interaction is told. This interpretive panel would include a history of the anthropogenic alterations to the Glacier Point Road landscape and reasons for those changes.

Cumulative Impacts: The historic Glacier Point Road and contributing features have sustained previous loss or alteration as a consequence of repairs and modern improvements (including slight modifications to the road alignment, and modifications to the Chinquapin Intersection, including the removal of historic structures). The impacts from past actions in combination with the impacts of the Alternative 1 would continue to result in impacts on historic structures and cultural landscapes but would, if conducted in the manner described herein, with recognition and consultation regarding the significance of the historic structures and cultural landscape would have no adverse effect on the eligibility of these resources for the National Register of Historic Places under either Alternative 2 or 3. If, however, under Alternative 1, the road was allowed to continue to deteriorate, there could be an adverse cumulative effect on the road as a historic resource and cultural landscape, which would be mitigated based on the park's 1999 Programmatic Agreement.

Conclusion: Under Alternative 1, there would be no immediate changes to the Chinquapin Developed Area Historic District or its proposed contribution to a Wawona Road Historic District cultural landscape. There would also be no immediate changes to the Glacier Point Road under Alternative 1. Eventually, however, without rehabilitation, structures along the roadway would continue to deteriorate and result in an adverse effect. Actions involving contributing elements of historic properties under Alternatives 2 and 3 would be carried out according to the Secretary of the Interior's Standards for Rehabilitation and would have no adverse effect on historic structures or cultural landscapes either on or eligible for the National Register of Historic Places. Following preliminary recommendations noted in the two cultural landscape inventories and the guidelines above would minimize the effect of proposed actions. There would be no

impairment of historic buildings or structures or cultural landscapes or their values with the implementation of the alternatives described in this EA.

9a. Visitor Experience Affected Environment

Based on statistics from the last ten years, approximately 3.5 to 4.1 million people per year visit Yosemite National Park (NPS 2004:III-43). Between the Traffic Engineering Safety Study (1985 – see below) and the Traffic Safety Program Review (1995 – see below), visitation increased from 2.4 to 4.15 million people per year. Most people visit between late spring and early fall. Most visit Yosemite Valley. As shown by annual visitation analysis (Figure IV-5), visitation is lowest in December and January, with approximately 100,000 people per month. In February it begins to rise, until it peaks between July and August with an estimated 575,000 people. It then continues to drop off sharply through September, October and November.

Visitor experiences in the park range on a continuum from highly social to isolated, from independent to directed, from spontaneous to controlled, from easy to challenging, from natural to essentially urban (NPS 2004:III-44) depending on the season of the visit and the activities visitors engage in.

A. Visitor Use Access / Opportunities

The Glacier Point Road provides the only vehicle access to Glacier Point, noted for its spectacular view of upper Yosemite Valley and the high Sierra, and Badger Pass Ski Area. The road provides access to popular destinations such as Summit, Peregoy, Mono, and McGurk Meadows, Ostrander Lake, Sentinel Dome, Taft Point, Panorama Trail, and 4-Mile Trail. The road also provides access to Bridalveil Creek Campground and has numerous turnouts for casual scenic touring, and photography. The Glacier Point Road was constructed originally as a wagon trail and then later rebuilt for automobile travel during the 1930s. Comfort stations are also located at various places along the road, including at Chinquapin Intersection and Badger Pass in the section proposed for rehabilitation.

In winter the road is routinely plowed from Chinquapin intersection to Badger Pass Ski Area. The road beyond Badger Pass is closed in winter, and often groomed as a cross-country ski trail.

Chinquapin Intersection is the midpoint between Wawona and Yosemite Valley. It has a historic ranger residence, comfort station (restroom), and, until 1990, a gas station and sandwich shop. Visitor services present there today include the comfort station, public telephone, and parking. The comfort station parking lot contains space for approximately 30 vehicles, but because it unstriped, haphazard parking often limits the number of cars and buses that can park there. In winter, the parking lot is used as a chain-up area and to await the plowing of Glacier Point Road. The ranger station is currently occupied as an employee residence, and the former gas station site is now used by visitors as an informal chain-off area, and by park maintenance staff for equipment storage and staging.

One major scenic view exists in the portion of Glacier Point Road currently proposed for rehabilitation between Chinquapin and Badger Pass – El Portal Overlook. The overlook consists of three turnouts along the same edge of roadway. (For the purposes of this document the four turnouts in this area have been identified with the letters A, B, and C with A nearest Chinquapin – see *Chapter III: Alternatives*). Turnout “A,” the largest, is often used by buses for chain-down and provides the best opportunity for stopping. Turnout “B” is located between the two historic rock walls. Its view is partially screened by trees left to hold the slope in place. Turnout “C” contains an air quality interpretive wayside encouraging a variable look at distant views.

B. Visitor and Employee Safety

Numerous safety issues exist in the vicinity of the Chinquapin Comfort Station. The Comfort Station parking lot is unstriped and is often the site of haphazard parking while people remove or attach their snow chains or wait for the Glacier Point Road to open.

The following information was reported in a Traffic Engineering Safety Improvement Study (TESI) (Kimley-Horn and Associates, Inc. 1985) and the previous Environmental Assessment (NPS 1991).

Chinquapin (Wawona Road / Glacier Point Road intersection and the Glacier Point Road / Badger Pass intersection were identified as high accident sites. The Glacier Point Road / Badger Pass intersection was actually one of the five highest accident sites.

A *high accident site* was defined in the study as any location with six or more accidents during the study period. In addition, a 1.5 mile segment around the Chinquapin intersection (0.75 miles in each direction) was one of the five highest accident segments. A *high accident segment* was defined as an area having a density of 10 or more accidents per mile (Kimley-Horn and Associates, Inc. 1985). Altogether, there were 114 accidents on the Glacier Point Road and another 289 on Wawona Road (38 of which occurred near the Chinquapin area) (Peccia and Associates, Inc. 1995).

In the 1985 study, recommendations to increase conformance with the Manual on Uniform Traffic Control Devices (MUTCD) were categorized into high, medium and low priority to facilitate implementation as follows (only Glacier Point Road applicable recommendations noted):

High
- Install no-passing markings on two-way roadways.
- Install Winding Road signs at selected locations.
- Install ICY signs at selected locations.
- Implement program for extra sanding in problem areas.

Medium
- Restripe Chinquapin Intersection

Lower
- Adjust speed limits

Fatal Accidents: Of the nine fatal accidents during the 1985 study period, two were attributed to drinking or a controlled substance, four (including both of the foregoing) to excessive speed, one to driver having a heart attack, one to driver falling asleep, one to icy conditions, one to an animal, and one to pavement conditions (Kimley-Horn and Associates, Inc. 1985). Of the four fatal accidents during the 1995 study period, two were collisions with fixed objects, one a head-on collision, and one a run-off-the-road accident where the vehicle landed in the Merced River. None of these occurred in the project area.

HIGH ACCIDENT SITES

As noted above, two intersections on the Glacier Point Road were noted as *high accident sites*: Badger Pass and Chinquapin (see definitions above).

Badger Pass Intersection: In the 1985 study, most accidents at Badger Pass were attributed to a driver being out-of-control on icy or sanded pavement. Others were related to improper turning and sideswiping by opposing vehicles. The study recommended installing a new road sign to warn drivers of the intersection (a side road sign on the west approach).

Chinquapin Intersection: The Chinquapin Intersection poses a hazard to drivers who fail to negotiate curves under icy conditions. Drivers are unprepared for the intersection because of poor sight distance. Even in summer, the lack of separate turn lanes creates a hazard for vehicles exiting and entering the Wawona Road. Chinquapin Intersection accidents included drivers being out-of-control in winter conditions, as well as accidents from driver's rear ending other vehicles, backing up in traffic lanes, or turning from the wrong lane. The study recommended redesign of the intersection, adding chain-up lanes and re-striping the intersection to include left-turn lanes. Specific recommendations for the Chinquapin Intersection included:
- Restripe intersection to provide a left-turn lane for vehicles turning onto Glacier Point Road;
- Install a raised traffic island in intersection;
- Install a Stop sign in new traffic island;

- Install signing and pavement markings for intersection configuration;
- Install new guidance signs at intersection;
- Provide a new chain-up area east of intersection; and
- Long-term: Redesign intersection and approaches.

Note: These actions are proposed in the redesign of the Chinquapin Intersection under Alternatives 2 and 3. Minor differences include: 1) the proposed raised traffic island would be flush to minimize interference with snowplowing; 2) Alternative 3 would not include left turn lane from Wawona Road; and 3) intersection approaches nearest the intersection would be widened, but not redesigned.

Data summarized in the 1995 study for the 1985 study states: This high accident site consists of the T-Intersection formed by the junction of Wawona Road and Glacier Point Road in the southwest portion of the park. Both roads are paved and have two travel lanes. Nine property damage only accidents happened at this site during the study period. The accidents were the result of rear-end collisions, improper backing and turning, and icy-road conditions (Peccia and Associates 1995). According to the 1995 study, none of the above recommendations were implemented (Peccia and Associates 1995).

HIGH ACCIDENT SEGMENTS

As noted above, two segments on the Glacier Point Road were noted as *high accident segments*: the Chinquapin Segment and the Glacier Point Road Segment (see definitions above).

Chinquapin Segment: Data summarized in the 1995 study for the 1985 study states:

> Wawona Road is a winding, two-lane mountain road with 11-12 foot wide travel lanes and narrow dirt or gravel shoulders. The road is characterized by sharp turns and wooded embankments along the roadway. This 1.5 mile long high accident segment is centered on the Chinquapin Intersection and includes the Wawona Road and Glacier Point Road intersection. A total of 38 accidents occurred at this location, with eight producing injuries. Thirty-one accidents occurred in winter, with 23 occurring during snowy- or icy-road conditions.

Accidents along the Chinquapin segment were mostly due to sliding on snow and ice. Increased snow and ice removal were recommended. Specific recommendations for the Chinquapin Intersection segment included:

> This is another area which would benefit from increased snow and ice removal efforts. The sign informing southbound traffic of Chinquapin and the Side Road Ahead sign (W2-2) that were missing should be replaced. An ICY sign should be installed for both travel directions. The sign would be exposed when icy conditions exist (Kimley-Horn and Associates, Inc. 1985:76).

According to the 1995 study, none of the above recommendations had yet been implemented (Peccia and Associates 1995:3:12-13).

Glacier Point Road East of Chinquapin Segment: Data summarized in the 1995 study for the 1985 study states:

> This 0.5 mile long segment of Glacier Point Road is a two-lane, winding mountain road. The road segment begins 2.7 miles east of the intersection formed by Wawona Road and Glacier Point Road (Chinquapin Intersection). Travel lanes are paved and about 11 feet wide. Twelve accidents, including three that produced injuries were recorded during the study period. More than half of the accidents that occurred in the segment were attributed to icy- or snowy-road conditions (Peccia and Associates 1995).

Specific recommendations for the Glacier Point Road segment east of the Chinquapin intersection noted that this is one of several areas with a preponderance of snow and ice related accidents and offered the following recommendations:

- Provide additional funding to improve snow and ice removal capability.
- Install an ICY sign (flip-down) for both travel directions.

- Selectively clear trees to facilitate snow and ice melting (Kimley-Horn and Associates, Inc. 1985:68).

According to the 1995 study, the recommendation for increased efforts for snow and ice removal was implemented as was the ICY warning sign recommendations. Only the missing side road sign recommendation had not been implemented (Peccia and Associates 1995:3-14).

The following table illustrates the changes in number of accidents, accident rate and accident severity at the locations near or on the Glacier Point Road (within the proposed project area):

Table IV-5
Comparison of Accident Statistics between 1985 and 1995 Studies

High Accident Segment	Accident Density (Accidents / Mile)		Average Number of Accidents /Year		Accident Severity Index	
	1981-1984	1990-1993	1981-1984	1990-1993	1981-1984	1990-1993
Glacier Point Road east of Chinquapin	24.0	16.0	3.4	2.0	1.50	1.50
Glacier Point Road near Chinquapin	25.3	29.3	10.8	11.0	1.42	1.23
High Accident Site						
	1981-1984	1990-1993	1981-1984	1990-1993	1981-1984	1990-1993
Badger Pass Intersection	8.0	13.0	2.3	3.3	1.00	1.00
Chinquapin Intersection	9.0	16.0	2.6	4.0	1.00	1.25

from Table 3-3 and 3-4 (Peccia and Associates 1995)

From Table IV-5 above, it can be seen that accident density increased on the Glacier Point Road near Chinquapin (25.3 to 29.3) and at the intersection (9.0 to 16.0) as well as at the Badger Pass intersection (8.0 to 13.0), whereas it decreased on the Glacier Point Road east of Chinquapin (24.0 to 16.0). The accident severity index increased at the Chinquapin Intersection, decreased at the Glacier Point Road segment near Chinquapin and remained the same at the Glacier Point Road east of Chinquapin and at the Badger Pass Intersection. At both intersections and at the Glacier Point Road near Chinquapin, the number of accidents per year increased, while they decreased at the road segment east of Chinquapin. Similarly, a comparison of accident rates at these sites shows the following:

Table IV-6
High Accident Site and Segment Rates 1981-1984 Compared to 1990-1993

High Accident Segment	Accident Rate for Segment or Site (Accidents per Million Vehicle Miles Traveled)		Percent Change
	1981-1984	**1990-1993**	
Glacier Point Road east of Chinquapin	23.3	8.4	- 64.2
Glacier Point Road near Chinquapin	6.1	9.1	+ 49.2

High Accident Site	Accident Rate for Segment or Site (Accidents per Million Vehicle Miles Traveled)		Percent Change
	1981-1984	1990-1993	
Badger Pass Intersection	7.84	6.84	- 12.7
Chinquapin Intersection	3.29	3.84	+ 16.8

According to Peccia and Associates (1995), data with less than a 20 percent increase or decrease are insignificant.

C. Scenic Resources

Management Policies (NPS 2006) and the NPS Organic Act identify the need to protect the scenic values of parks. Park scenic resources include not only the scenes of grandeur in Yosemite Valley, but also scenic vistas from roads, including those where visitors are invited to stop at turnouts. While scenic resources were identified in Yosemite Valley, beginning as early as 1865, when the State of California appointed a board of commissioners that in turn commissioned three artists to study and document park scenery, analysis of scenic resources in other parts of the park has not been as systematic. Still, scenic resources in Wilderness are counted as the grand vistas in the Merced and Tuolumne river watersheds, including mountains, lakes, rivers, streams, granite domes, and the peaks of the Sierra crest. The roads that touch the edge of Yosemite's backcountry, including the Tioga Road, the Hetch Hetchy Road and the Glacier Point Road also provide stunning views of the valley, canyon bottoms and mountain tops. The view of Yosemite Valley from the end of the Glacier Point Road is one of the most recognizable of Yosemite scenes.

The park General Management Plan (NPS 1980) identified a number of significant views, however, maintenance of these views has been sporadic or absent (Hall 1997). A comprehensive vista management plan is needed to identify, designate and guide maintenance of historic and scenic vistas through approved methods and techniques. Known historic and scenic vistas have not been maintained, and in many cases have become obscured by plant growth. As a result, visitors have impacted adjacent meadows, woodlands, and riparian areas in attempts to capture the scenic views (Hall 1997).

Along the Glacier Point Road, scenic views are currently available just above the El Portal Overlook, with an air quality wayside exhibit that shows undulating hillsides into the distance on a clear day and the differences in this view on a hazy day. Numerous informal turnouts also exist, which often offer tantalizing views into the distance. Among the unsigned turnouts is the El Portal Overlook, located just below the air quality wayside noted above.

The Vegetation Management Plan (Hall 1997:101) calls for the development of a vista management plan which evaluates historic landscapes, vistas and scenic values under a set of criteria for ranking of views and established viewing areas including, but not limited to:

- Desirability of view,
- Historic significance and integrity,
- Resource impacts (soil type, erosion, compaction, etc.),
- Plant community, elevation, condition of plant community historically,
- Hazard tree potential,
- Proximity of threatened, endangered, or sensitive species (plants and wildlife),
- Proximity to archeological sites,
- Travel surfaces (i.e. pavement surface, curbing, fencing),
- Level of maintenance required,
- Waste disposal,
- Frequency of use,

- Length of potential stop-over,
- Distance to nearest viewing area, and
- Distance to desired view from viewing area.

9b. Visitor Experience Environmental Consequences

A. Visitor Use Access / Opportunities Impacts

Alternative 1: Continuing deterioration of the road would likely result in more frequent or extended road closures for emergency repairs and unsafe driving conditions for visitors and park staff, a long-term minor to moderate adverse impact. In addition, continued deterioration of the road could result in increasingly difficult navigation for vehicles. Road closures would be more likely to be complete and to affect periods of high visitation. This could result in visitors either not being able to access an area during their visit or for longer periods, while funding and materials were secured for repairs. In the event of a catastrophic road failure, access to Glacier Point could be seriously affected for either short time periods or longer if the road could not be repaired in a single construction season before winter snows close the road. This short-term, likely localized impact would range in intensity from a minor to major, depending on the severity of the road failure.

Alternatives 2 and 3: Among the impacts to visitor experience and park operations common to these alternatives would be:

- Traffic delays during road rehabilitation work, a short-term minor to moderate adverse effect on visitor use access.
- Changes in the visual character of the road (especially with respect to mature forest vs. areas with obvious construction disturbance or where selective vegetation removal occurred) a short- to moderate-term minor adverse or beneficial effect depending on the expectations of park visitors.
- Beneficial improvements in road conditions on areas of the Wawona Road near the Chinquapin Intersection, at the Chinquapin Intersection, and along the Glacier Point Road, a long-term moderate beneficial effect that would result in a better experience in traveling the roadway for many years.
- Improved visitor opportunities at the El Portal Overlook Turnout A and C, a long-term minor to moderate beneficial effect.
- Increased parking, as well as a pull-through waiting lane, at the Chinquapin Comfort Station, a long-term minor beneficial effect on visitor satisfaction, especially during crowded conditions.
- Designated chain-up (near El Portal) and chain-down (at Chinquapin and El Portal Overlook) lanes, a long-term moderate beneficial effect.
- Improvements leading to better preservation of historic features along the roadway, a long-term negligible to moderate beneficial effect, depending on the resource.
- Improved accessibility at El Portal Overlook, at the Chinquapin Comfort Station and at the Badger Pass Lodge, a long-term minor to moderate beneficial effect for some visitors.

As a result of the road rehabilitation, summer park visitors would encounter one-lane road closures with construction delays of up to 30 minutes during the week. On weekends and holidays, construction would cease unless occasional approval for work on these days was granted by the superintendent. The proposed project under either action alternative would take approximately one construction season to complete and would likely begin the year following approval of the FONSI (if applicable). Work that would affect major visitor use areas would be scheduled at the end of the season to avoid impacts to the greatest number of people. Materials deliveries would take place, as appropriate, in the early morning and late evening hours to minimize their impact and would generally proceed along the shortest route possible. Park visitors would be informed of construction delays through various means, including the park newspaper, press releases to local media, signs in the park, and state highway information road condition (phone) reports.

The rehabilitation of the road, in general, and of specific areas, such as the Chinquapin Restroom Parking Lot and the El Portal View Overlook would affect visitor access through a variety of means, including constructing smoother roadways, with clearer signage and turnouts and eliminating confusion associated with features no longer used.

At El Portal Overlook, visitors would be able to chain down, instead of waiting until reaching Chinquapin and would find interpretive signs and a walkway and a view enhanced by selective tree removal / trimming. Above El Portal Overlook the new chain-up lane would result in visitors being able to chain-up at a more appropriate location (snow level) than Chinquapin (for some road conditions). Alternatives 2 and 3 would also enhance the El Portal Overlook, a long-term beneficial effect. Where three turnouts now exist and visitors have difficulty accessing them, access would be facilitated under Alternatives 2 and 3 for all three turnouts. In both alternatives, the primary turnout (A) would contain a sidewalk and viewing platform with a low seating wall constructed to allow people to get a better view of the valley and the Merced River below. This would result in a long-term minor to moderate beneficial effect as a result of the formal turnout and the associated rehabilitation of the historic rock walls (Turnout B).

Visitor access for mobility impaired visitors would be improved by the rehabilitation (including increasing the accessibility of and parking at both the Chinquapin Intersection and at El Portal Overlook). Buses and other large vehicles would find increased turnaround space at the Chinquapin Restroom Parking Area and designated chaining areas wide enough to use along the Wawona Road. Dropping off visitors or parking for handicapped visitors at the Badger Pass Ski Area would be made easier through a designated unloading zone and accessible parking spaces.

Alternative 2: The following additional impacts would occur only under Alternative 2:
Turn Lanes: Two additional turn lanes, with accompanying signage, would be added at the Chinquapin Intersection, a long-term beneficial effect on reducing visitor confusion and improving anticipation of turns.

Chain-up Lane: One additional chain-up lane would be added at the Chinquapin Intersection across from the proposed Administrative Parking Area, a long-term minor beneficial effect on visitors, resulting in a formal, safer (wider) area to chain, instead of the existing informal area.

El Portal Area Turnouts: Turnout B would retained (rehabilitated and repaved in kind).

Other Turnouts: Minor changes to other turnouts would result in negligible to minor adverse and beneficial effects on visitor access and opportunities. Overall, visitors would continue to find turnouts widely distributed along the road, an ongoing long-term beneficial effect. Where turnouts were restored, formerly bare areas would be enhanced with vegetation and contouring, a long-term minor beneficial effect on aesthetics associated with the edge of the road. This beneficial effect on restored areas would be in contrast to the minor adverse effect of the loss of these unsafe or resource damaging turnouts for parking.

Alternative 3: The following additional impacts (differing from those in Alternative 2) would occur only under Alternative 3:
El Portal Area Turnouts: The construction of a new concrete-core rock-faced guardwall at Turnout B between the two historic rock walls, a long-term moderate adverse effect on visitors who previously would have stopped at this turnout. In contrast, enhancement of Turnout C by improving its safety (laying back the cutslope across the road) would be a long-term minor to moderate beneficial impacts for visitors who stopped to enjoy the views of the Merced River Canyon.

Turnouts: Minor changes to the number of turnouts would be made along the length of the Glacier Point Road, with paved turnouts being repaved, some unendorsed turnouts being paved and some gravel turnouts being retained as gravel turnouts. Combined, there would be both long-term negligible to minor beneficial and adverse effects.

B. Visitor and Employee Safety Impacts
Methodology: Visitor and employee safety impacts were assessed qualitatively based on past studies which identified specific problems in the project area.

Type of Impact: Beneficial impacts include those that would reduce the potential for accidents occurring, whereas adverse impacts would increase that potential.

Alternative 1: Not rehabilitating the road could fail to meet one objective of the road's use – that is to provide a safe road condition for all travelers and to reduce the possibility of catastrophic road failure. Current roadway problems, such as, settling, pavement cracking, and slumping are being caused by weather conditions and the age of the road. These conditions would continue to cause similar distress if stabilization repairs are not implemented. Catastrophic failures of this road could cause unexpected closures, threaten safety and health, incur additional expenses to the park and concessioners, and increase traffic on other parts of the park's road system. Failure to correct structural and design deficiencies would result in an increased potential for accidents. If the roadway is not repaired it will continue to deteriorate and could result in higher accident rates and/or catastrophic failures that may impact other park resources. Several recommendations in two traffic safety studies would not be implemented. This could result in a long-term negligible to moderate adverse impact on visitor and employee safety.

Alternatives 2 and 3: The following specific actions called for by these alternatives would have negligible to moderate improvements (beneficial effects) on visitor and/or employee safety as noted:

Negligible
- Adding formal chaining lanes (three in Alternative 2 and two in Alternative 3);
- Changing the location of the stop sign at Chinquapin Intersection (Alternative 2 and 3);
- Designating Administrative Vehicle Parking area at Chinquapin (Alternatives 2 and 3); and
- Adding a drop-off zone at Badger Pass and accessible parking at Badger Pass and Chinquapin.

Minor
- Adding a turn lane from Glacier Point Road onto the Wawona Road (Alternatives 2 and 3);
- Adding turn lanes from Wawona Road onto the Glacier Point Road (Alternative 2);
- Changing the superelevation of the road in select locations (Alternatives 2 and 3);
- Adding directional and warning signage near known problem areas (Alternative 2 and 3);
- Constructing an accessible path to the Chinquapin Comfort Station (Alternatives 2 and 3);
- Construction of a formal visitor use area, with improved accessibility at El Portal Overlook (Alternatives 2 and 3);
- Selective clearing of vegetation to increase pavement warming; and
- Improved pavement conditions as a result of repaving, rather than patching.

Moderate
- Modifying the turning radius into the Chinquapin Parking Lot from the Glacier Point Road (Alternative 2 and 3);
- Adding a deceleration lane from the Wawona Road into the Chinquapin Parking Lot (Alternative 3);
- Decreasing the grade on the Badger Pass Access Road (at the Glacier Point Road intersection) (Alternatives 2 and 3);
- Improving the delineation of Turnout C near El Portal Overlook by clearing off accumulated debris (Alternative 2) or by laying back the cut slope across the road (Alternative 3).

The proposed project under both action alternatives would contain a number of improvements to visitor safety. Among these would be the rehabilitation of the road itself, which would result in a smoother, more uniform travel surface for vehicles as well as clearer directional signage and improved turnouts / recovery zones and road shoulders. Overall, visitors would find a safer road, slightly wider in some places, with fewer tight radius curves and improved way-finding signage and features. These changes would improve visitor safety, lessening confusion and improving the ability of visitors to enjoy accessing these areas.

At El Portal Overlook, under each alternative, Turnout C would continue to have safety issues associated with poor sight distance on the curve for slow merging traffic and concerns about speed of approaching cars on a sharp downhill curve. Uphill vehicles have been noted crossing the double yellow line to access Turnout C and this will continue to be a safety concern. For vehicles traveling downhill, the safety concern is that there is still low visibility on the steep curve and a possibility of fast-moving downhill vehicles hitting slower merging vehicles. However, there are no accident data to warrant removal of the

historic turnout. New regulatory and advisory signs will be installed to alert drivers and reduce the possibility of accidents at this location.

Installation of the accessible walkway at the Chinquapin Comfort Station would assist visitors with mobility problems and increase compliance with federal regulations. Construction of the formal overlook at El Portal Overlook, including low seating walls and a separate concrete pathway would separate visitors from vehicles.

The greatest improvements to visitor safety, however, would be conducting the redesign of the Chinquapin Intersection and other improvements called for by the 1985 and 1995 traffic safety studies (see Affected Environment section), such as selective clearing of vegetation to increase pavement warming and sight distance. These improvements have been designed to address the safety issues that have been identified. With better signage, wider turning radius' for large vehicles, lessening the superelevation of the Glacier Point Road as it descends toward the Wawona Road and installing formal chaining lanes accidents at this intersection should be reduced.

In addition, reducing the superelevation at the Badger Pass Ski Area access road / Glacier Point Road intersection should reduce the number of vehicles sliding out into that intersection and therefore reduce the number of accidents that occur there. Other improvements that would likely improve safety include adding "Icy" road signage, and some curve warning and congested area signs. Overall, the recommendations called for in the traffic safety studies would be implemented if Alternative 2 or Alternative 3 is selected for implementation.

In addition, in Alternative 3, adding the deceleration turn lane into the Chinquapin Comfort Station parking and, in Alternative 2, adding formal turn lanes from the Wawona Road to the Glacier Point Road would improve visitor safety.

The proposed actions under Alternatives 2 and 3 would also have a localized, long-term minor to moderate adverse effect on visitor safety by retention of Turnout B. The rehabilitation of the historic rock walls and the retention of Turnout B in kind, with limited improvements under Alternative 2 would result in long-term minor adverse effects on visitor safety, due to its location on a narrow section of road adjacent to a cliff. In Alternative 3, construction of a concrete core, rock-faced guardwall between the existing historic rock walls would improve visitor safety by avoiding the possibility that a vehicle could go off the edge of the road at this location but would narrow or remove the opportunity for access to this historic turnout.

In both Alternatives (2 and 3), Turnout C would be improved but would remain unsafe due to its location on the edge of a steep downhill curve, where vehicles speed and have limited sight distance for pulling into or out of it. In Alternative 3, widening the road by laying back the cutslope across the road would improve sight distance conditions at this Turnout, but would result in associated long-term localized adverse effects to soils and vegetation and changes in the topography. Retaining it under Alternative 2, however, by moving it slightly downhill would offer limited improvements in safety conditions, a long-term moderate adverse effect. As noted in *Alternatives* visitors have been observed crossing the double yellow centerline on the uphill side of the road to access it from the opposite side of the road. Pulling into it on the steep downhill curve is also difficult; however, more difficult is pulling out of it due to limited sight distance. (Vehicles pulling out cannot see those coming downhill around the curve at speed and vehicles pulling into it on the downhill curve nearly miss it because it comes abruptly in this steep section.) Nonetheless, Turnout C offers the best views of the Merced River Canyon and El Portal and is historic and if it were to be lost it would also have a long-term minor to moderate adverse effect on other park resources (scenic views, cultural resources, and visitor access).

C. Scenic Resources Impacts

Methodology: Scenic resources impacts were assessed qualitatively based on how the proposed actions would change the appearance of scenery. Informal and formal turnouts were also assessed based on criteria developed by the park in the Vegetation Management Plan as well as for the Glacier Point Road Cultural Landscape Determination of Eligibility.

Type of Impact: Adverse impacts were considered those that would focus viewing on human constructed modifications, rather than natural scenery; beneficial impacts would enhance a natural scenic view.

Alternative 1: The Glacier Point Road and other elements of this project are now in place and have been for decades. Although the roads themselves do interrupt the scenic values of the park, they also provide access to them. The proposed action does not relocate or expand the roads; it does, however, maintain a leisurely, park-like setting for the road. There would be no additional impacts to scenic resources under Alternative 1.

Alternatives 2 and 3: The scenic driving experience on the Glacier Point Road would not change as a result of implementation of either of these alternatives. The road segment would continue to be a curvy, forested roadway, with occasional distant views of the mountains beyond or the valleys below. During construction there would be negligible short-term effects on views along the road due to the presence of construction equipment in the project area. Afterwards, because construction would include the selective removal of vegetation along the roadsides, there would be long-term adverse and beneficial effects. Initially, visitors would perceive that a change had occurred and would perhaps notice heretofore obscured views opened by the removal of some trees. Later as plants began to fill in the open spaces, the road edges would revert to an array of vegetation similar to that now present.

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize impacts to visitor experience include:

- Construction delays and one-lane closures would be enacted but would be no longer than 30 minutes per passage through the project.
- Evening, weekend and holiday work / construction delays or total road closures may require approval from the superintendent.
- Materials deliveries would (to the degree possible) take place in the early morning and late evening hours and would proceed along the shortest route possible.
- Press releases to local media, signs in the park and state highway information recordings would inform visitors about road conditions in the park during the project.
- Efforts will be made to schedule work around high visitor use days and times, such as holidays and weekends.
- Selective vegetation removal would be the minimum amount necessary to achieve road warming and increased sight distances or desired views.

Cumulative Impacts (Visitor Use Access / Opportunities, Transportation, Visitor and Employee Safety, and Scenic Resources): The majority of park visitation occurs along main roads, including the Glacier Point Road, where most of the park's recreational facilities and interpretive displays are found. Over time, new facilities (limited by the current developed footprint) could continue to be added or old facilities improved, resulting in negligible to minor adverse and beneficial cumulative impacts. Because the Glacier Point Road would continue to deteriorate if not rehabilitated, Alternative 1 would continue to contribute to a potential long-term minor to moderate adverse impact on visitor access and opportunities and negligible to moderate adverse impacts on visitor safety, while Alternative 2 would have some short-term negligible to minor adverse effects on visitor access and noise and an array of negligible to moderate beneficial effects on visitor access and opportunities and visitor and employee safety, as well as some combined beneficial and adverse effects on scenic resources. Alternative 3 would result in many of the same effects as Alternative 2; however, it would have diminished beneficial impacts on visitor and employee safety due to unimproved turns onto Glacier Point Road and, except for some improved sight distance, into the Chinquapin Comfort Station Parking Lot.

Conclusion (Visitor Use Access / Opportunities, Transportation, Visitor and Employee Safety, and Scenic Resources): Alternative 1 would have no additional impacts associated with visitor experience. Over time, however, as the road continued to deteriorate, visitor use would be more difficult and less safe

if improvements were not made and this could result in short- or long-term closures if catastrophic failure occurred. The proposed rehabilitation under Alternative 2 and 3 would result in negligible to minor adverse, primarily short-term, effects on visitor access and opportunities, largely beneficial effects on visitor and employee safety, and minor to moderate, short-term localized noise impacts, as well as short-term adverse and long-term beneficial impacts on scenic resources. Improvements to the roadway would compensate for the short-term inconvenience to visitors and would result in a better road for many years.

10a. Wilderness Affected Environment

Approximately 93 percent of the park was established as part of the National Wilderness Preservation System on September 28, 1984. Wilderness opportunities including exploring the natural beauty of geologic features, rivers, streams, lakes, and the many species of plants and animals are abundant. As dictated by the Wilderness Act, remote areas of Wilderness offer outstanding opportunities for solitude and primitive, unconfined recreation. Nearly 800 miles of trails provide for a variety of wilderness experiences. In addition, trail-less cross-country zones add another dimension to park wilderness opportunities. Camping is allowed most places in park Wilderness, provided campers are at least 100 feet from water; however, camping is discouraged in sensitive areas such as subalpine meadows. Overnight wilderness use is managed through a Wilderness permit process based on applicable established trailhead quotas.

Although the proposed project area is not located in Wilderness, Wilderness resources are close by and because it could be affected by the indirect effects of proposed activities it is included as an impact topic. The area of potential effects does not include wilderness – which extends 200 feet from the centerline of paved roads, including the Glacier Point Road. Area proposed to be affected by the road project is that directly within the road prism (primarily the existing paved area and adjacent road bed.

10b. Wilderness Environmental Consequences

Alternative 1: There would be no additional impacts to Wilderness under the implementation of Alternative 1.

Alternatives 2 and 3: Although some construction work on the road would be near the wilderness boundary (located 200 feet from the centerline of paved roads), proposed wilderness lands would be avoided during construction activities. Short-term effects would include noise and activity near wilderness associated with the proposed road construction project under the implementation of either alternative. These could affect the experience of wilderness visitors near the road edge, but would likely have limited effects on their experience as a whole since they would occur only in the developed area adjacent to, but not in, wilderness. There would be no long-term adverse consequences to, or impairment of, proposed or federally designated wilderness lands, wilderness values or wilderness solitude if the project was implemented.

Cumulative Impacts: Over time, wilderness resources in the park have been affected by the creation of access trails and amenities to allow for visitor use enjoyment. Some, before they were park lands, were used for minor development or other human activities, including logging in the vicinity of Chinquapin. Since these lands were designated under the Wilderness Act, they have remained largely untouched and impacts to them, aside from increases in visitor use have largely been diminished. The implementation of Alternative 1 would result in no impacts to wilderness and therefore would not contribute to cumulative effects on wilderness. The implementation of Alternative 2 or 3 would result in some short-term effects on wilderness, but because it would not occur in wilderness would not contribute to cumulative effects on wilderness.

Conclusion: Alternatives 1, 2 and 3 would have no long-term adverse effects on wilderness. Alternatives 2 and 3 would contribute short-term noise and disturbance associated with construction activities that would be noticed by wilderness visitors in the vicinity of the project area. There would be no impairment of park wilderness resources or values.

11a. Park Operations Affected Environment

Yosemite National Park has a complex road maintenance operation, which includes vegetation maintenance, snow management, road repair and a variety of other activities in season on the above system of developed roads and roadway structures. The road maintenance operation comprises a large part of the park budget, not including rehabilitation projects like that discussed in this Environmental Assessment. It includes the array of activities described in the No Action Alternative.

11b. Park Operations Environmental Consequences

Alternative 1: This alternative would not result in comprehensive improvements to the Glacier Point Road and would therefore continue to require increasing annual costs to maintain the road, including the ongoing and increasing need for emergency repairs to remedy failed sections of roadway. Asphalt deterioration, warped pavement, pavement cracking, spalling on the edge of the road and potholing would increase. Without a comprehensive project that would improve the road, opportunities to facilitate visitor access to minor and major developed areas along the road also would become increasingly difficult and there would be an increased likelihood of continuing accidents or incidents associated with the deteriorating and unsafe condition of some areas along the road. Impacts to park resources and visitors, including the current lack of handicapped accessibility at the Chinquapin restroom, poorly designed turnouts at El Portal Overlook, inadequate turning radii for buses and other large vehicles into the Chinquapin parking area, plugged and inadequately sized culverts, and other conditions would continue.

Incremental effects on the character of the road as a structure eligible for the National Register of Historic Places would also continue to occur, potentially altering the ability of the park to retain some character defining features of the road and therefore possibly jeopardizing the road's eligibility for inclusion on the National Register.

Taken together the effects of not repairing the road would result in a long-term minor to moderate effect on park operations, with annually increasing costs to maintain the road and potential failure to protect significant resources from damage.

Alternatives 2 and 3: The following specific actions called for by this alternative would affect park operations:

- Overall rehabilitation of the main park road and associated minor developed areas (including new paving, striping, signage, drainage improvements, turnout and road shoulder rehabilitation and other actions);
- Drainage improvements;
- Turnout modifications;
- Adding an Administrative Parking Area at Chinquapin;
- Safety improvements, such as the installation of turn lanes (four under Alternative 2 and one under Alternative 3) and changing the grade approaching the Chinquapin and Badger Pass intersections; and
- Interpretive improvements at El Portal Overlook.

Taken together, the systematic improvements to the main park road and associated minor and major developed areas under either Alternative 2 or 3, would result in long-term improvements that would benefit the road so that it would cost the park less to maintain annually, a minor to moderate beneficial effect. Instead of improvements funded out of special project or emergency funding and the annual park operations budget, improvements would be funded through the federal highways program and would be comprehensive. If implemented, the project, under either alternative, would take approximately one season to complete and would likely begin in 2008, depending on funding availability.

Drainage improvements, including the addition, replacement and lining of culverts throughout this section of roadway, paved and unpaved drainage ditch creation and cleanout, insertion of underdrains, and other drainage improvements would reduce the potential for washout or catastrophic failure of the road at or near these areas and would therefore diminish future long-term costs for maintenance and emergency repairs, resulting in a long-term minor to moderate beneficial effect on park operations.

The retention, restoration and improvement of turnouts would have varying effects on park operations, including long-term minor to moderate beneficial effects such as increasing the ability of park staff and visitors to pull safely off the road during emergencies (Alternatives 2 and 3), restoring a scenic edge to the road where informal turnouts have damaged vegetation and terrain (Alternatives 2 and 3), decreasing the likelihood for non-native plant invasion by restoration of devegetated areas (Alternatives 2 and 3), as well as a slight adverse (negligible) potential that turnouts would be somewhat further distant when needed in emergency situations under (Alternative 3).

Retaining and paving turnouts would aid in visitor management by enabling visitors to get to the places they want to be and by hardening surfaces and/or curbing edges so turnout widening would not occur during heavy visitor use periods, resulting in long-term negligible to minor beneficial effects on resource preservation (and the subsequent need not to restore these areas) (Alternatives 2 and 3). Obliterating some wide road shoulders and rehabilitating others would limit the amount of disturbed area available for non-native species to colonize and would, over time, result in a more vegetated roadside, thus decreasing the need for future revegetation or restoration of these disturbed areas and resulting in a long-term negligible to minor beneficial effect (Alternatives 2 and 3).

Safety improvements to the roadway, including selected roadway widening, decreasing superelevation in selected areas and installation of turn lanes would result in long-term beneficial impacts to park operations by reducing the potential for accidents in these areas, therefore freeing park and law enforcement staff to do other work to preserve park resources, such as spending more time in high visitor use areas when visitors are present.

Cumulative Impacts: Park operations are currently hampered by the lack of adequate facilities in some areas of the park. A number of development projects (e.g. new administration and maintenance facilities and upgraded utility systems could occur within the park that would enhance the efficiency of park operations. Regardless, the efforts needed to maintain the road, over time, would remain the same, with periodic systematic rehabilitation needs. Alternative 1 would contribute a minor, long-term, adverse increment to total cumulative effects on park operations (drawing time and money away from the management of other park resources to maintain an ever deteriorating roadway), while Alternative 2 would initially result in an easy to maintain roadway before once again contributing to increased expenditures for maintenance as the road deteriorated.

Conclusion: Alternative 1 would have a minor to moderate, long-term, adverse effect on park operations. Under Alternatives 2 and 3, visitors would be inconvenienced during road repairs, but the road would remain open and access to the park would continue over the long-term. The alternatives would have primarily long-term beneficial negligible to minor impacts, benefiting park cultural and natural resources by enhancing their preservation and enhancing visitor safety and visitor enjoyment while reducing the need for day-to-day maintenance. Alternative 3 impacts would be similar to Alternative 2, however, the slight benefit gained from adding additional turn lanes and facilitating the use of the upper El Portal turnout (“C”) would likely result in a reduced number of accidents, thus freeing staff for other pursuits, a long-term beneficial impact. None of the alternatives would impair park operations.

Table IV-7
Impact Comparison Chart

RESOURCE	ALTERNATIVE 1 (No Action) IMPACTS*	ALTERNATIVE 2 (Preferred) IMPACTS*	ALTERNATIVE 3 IMPACTS*
Air Quality	There would be no additional impacts to air quality. Overall effects from Alternative 1 would continue to be negligible to be minor, localized and short-term.	Impacts from dust and construction equipment emissions would be short term, and negligible to minor along the project corridor. There would be an undetectable effect on regional air quality. Negligible long-term beneficial effects associated with existing public / regional transportation programs would continue.	Impacts would be similar to Alternative 2, but would require less excavation and therefore would release fewer particulates.
Geology / Soils	This alternative would continue to result in negligible to minor, localized long-term adverse effects on soils.	Alternative 2 would result in a series of negligible to moderate, localized long-term adverse effects (excavation, movement, grading, compaction, construction of impervious surfaces) as well as some localized long-term minor beneficial effects (vegetation restoration, decreased potential for erosion).	Impacts would be similar to Alternative 2, but would required less excavation and therefore would have fewer impacts on area soils at Chinquapin and near E Portal Overlook.
Water Resources Hydrology	There would be no new impacts to water resources (hydrology, water quantity, water quality or wetlands) under Alternative 1. There would be no loss of wetlands under Alternative 1. Alternative 1 would continue to contribute minor to moderate localized adverse effects on water resources, particularly related to erosion and the application of sand for traction.	Proposed actions would contribute to modifying and redirecting the overland flow of water through developed areas, a minor long-term adverse effect. This would be coupled with moderate beneficial effects where redirection of overland flow would result in decreased water flow through developed areas, particularly at Badger Pass, where overland flow would go around or under the lot instead of percolating up through the lot. Increases in the number and changes in the location of culverts would result in a minor long-term beneficial effect in facilitating the passage of water across the road mimicking former natural flows.	Impacts would be the same as Alternative 2.
Water Resources Water Quantity	See above	The additional incremental use of water would be difficult to distinguish from the much greater use of water for administrative and park operations and would therefore result in a negligible short-term localized effect.	Impacts would be the same as Alternative 2.

Water Resources **Water Quality**	See above	A series of proposed project actions would have the potential to affect water quality, including excavation; stockpiling of topsoil and other materials; vegetation modifications; and drainage improvements. Combined, these would be minor to moderate short-term localized adverse effects. Negligible to minor beneficial effects would be realized from the formal delineation of turnouts and road-side parking. Long-term minor to moderate beneficial effects would result from the installation of stormwater runoff treatment in the Badger Pass Parking Lot. Ongoing impacts related to the application of sand would continue as in Alternative 1.	Impacts would be the same as Alternative 2, however,since stormwater treatment would not occur at the Badger Pass Parking Lot, minor to moderate localized adverse impacts would continue at that location.
Wetlands	See above	Approximately 2,600 square feet or 0.06 acres of wetland would be affected, with both short- and long-term localized minor to moderate adverse effects.	Impacts would be the same as Alternative 2.
Vegetation	Repair and vegetation maintenance activities would continue to include removal or disturbance of vegetation, a long-term localized negligible to minor localized impact.	Impacts to vegetation, including those associated with road rehabilitation, new construction and overdue vegetation maintenance activities would include removal, trimming and flush cutting and would result in negligible to moderate short- , moderate- and long-term adverse impacts. There would also be beneficial effects associated with the rehabilitation of areas disturbed during construction and from the restoration of selected turnouts.	Impacts would be similar to Alternative 2 but would result in additional vegetation removal to improve safety conditions on the roadway, including at the turnouts above El Portal Overlook and for the deceleration turn lane approaching the Chinquapin Comfort Station Parking Lot.
Wildlife	Alternative 1 would have short-and long-term negligible to minor adverse impacts from retention of the roadway and from minor repairs to it.	Alternative 2 would result in short-term negligible to moderate adverse impacts from noise and disturbance associated with the rehabilitation project and the loss of associated habitat (see Vegetation above) and long-term negligible to minor beneficial impacts from increasing plant cover associated with changing the condition of road shoulders and turnouts.	Alternative 3 would have impacts similar to Alternative 2, however, additional habitat loss impacts related to the removal of vegetation for another chain-up lane and for additional turn lanes would not occur.
Special Status Species			
Special Status Plants	There would be no effects on special status plants as a result of the implementation of this alternative.	Impacts would be the same as Alternative 1.	Impacts would be the same as Alternative 1.
Special Status Wildlife	There would be no additional impacts on special status wildlife as a result of the implementation of this alternative.	Most special status wildlife would remain unaffected by the implementation of this alternative.	Impacts would be the same as Alternative 2.

Special Status Wildlife (cont'd)		These species either do not occur in the project area or would not be affected by proposed actions. Except in the vicinity of Chinquapin intersection, no previously unaffected wildlife habitat would be removed by road rehabilitation. Due to the removal of potential foraging habitat in the Chinquapin area, the proposal would be not likely to adversely affect great gray owls. Elsewhere mature trees would be retained on both sides of the road.	
Archeological Resources	There would be no additional impacts on archeological resources as a result of the implementation of this alternative.	There would be no adverse effect on archeological resources. During surveys conducted to date, no archeological resources or evidence of their likelihood of occurrence has been found in the project area.	Impacts would be the same as Alternative 2, however,there would be slightly less potential to encounter previously undiscovered archeological res due to less excavation in this alternative.
Historic Structures / Cultural Landscapes	Under Alternative 1, there would be no immediate changes to the Chinquapin Developed Area Historic District or its propose contribution to a Wawona Road Historic District cultural landscape. There would also be no immediate changes to the Glacier Point Road. Eventually, however, without rehabilitation, structures along the roadway would continue to deteriorate and result in an adverse effect.	There would be a series of minor alterations to topography (retaining walls, turn lane, turnout changes), vegetation, small scale features (including islands, culverts, turnouts and rockwalls), buildings and structures (setting of the Comfort Station) associated with implementation of this alternative. Because these impacts would be carried out according to the Secretary of the Interior's Standards for Rehabilitation and would have no adverse effect on historic resources or cultural landscapes either on or eligible for the National Register of Historic Places. Proposed actions have been designed to retain character-defining features. In addition, following recommendations noted in the draft cultural landscape inventories would minimize the effect of proposed actions.	As in Alternative 2, there would be the same or similar minor effects on numerous contributing resources. In this alternative, however, there would be no discernible effect on topography. There would be no adverse effect on historic structur cultural landscapes.
Visitor Experience			
Access / Opportunities	Alternative 1 would have no additional impacts associated with visitor experience. Over time, however, as the road continued to deteriorate, visitor use would be more difficult and less safe if improvements were not made and this could result in short- or long-term closures if catastrophic failure occurred.		
Visitor and Employee Safety	Not rehabilitating the road could fail to meet one objective of the road's use – that is to	Proposed actions would result in a series of negligible to moderate beneficial impacts on	Impacts would be the same as Alternative 2, however,there would be slightly fewer beneficial

Visitor and Employee Safety (cont'd)	provide a safe road condition for all travelers and to reduce the possibility of catastrophic road failure. Current roadway problems, such as, settling, pavement cracking, and slumping are being caused by weather conditions and the age of the road. These conditions would continue to cause similar distress if stabilization repairs are not implemented.	visitor and employee safety associated with traveling a portion of the Glacier Point Road.	impacts under this alternative.
Scenic Resources	There would be no additional impacts to scenic resources under Alternative 1.	The scenic driving experience on the Glacier Point Road would not change from implementation of this alternative. During construction, there would be short-term effects on views due to the presence of construction equipment. Afterwards, there would be both short- and long-term adverse and beneficial impacts from vegetation removal and enhancement of overlooks.	Impacts would be the same as Alternative 2.
Wilderness	There would be no additional impacts to Wilderness under the implementation of Alternative 1.	Short-term effects would include noise and activity near wilderness associated with the proposed road construction project. There would be no long-term adverse impacts to wilderness lands, wilderness values or wilderness solitude if the project were implemented.	Impacts would be the same as Alternative 2.
Park Operations	Taken together the effects of not repairing the road would result in a long-term minor to moderate effect on park operations, with annually increasing costs to maintain the road and potential failure to protect significant resources from damage.	There would be a number of long-term beneficial negligible to minor impacts, benefiting park cultural and natural resources, and therefore park operations, by enhancing their preservation and enhancing visitor safety and visitor enjoyment while reducing the need for day-to-day maintenance.	Impacts would be similar to Alternative 2, however, the slight benefit gained from adding additional turn lanes and facilitating use of the upper El Portal t would likely result in a reduced number of accidents, and therefore a benefit to park staff time.

* There would be no impairment of any resource associated with implementation of Alternatives 1, 2 or 3.

Chapter V: Consultation and Coordination

This chapter contains a review of all consultation and coordination efforts undertaken for the Glacier Point Road Rehabilitation Environmental Assessment.

PROJECT SCOPING HISTORY

The NPS initiated a 30 day public scoping period for the proposed Glacier Point Road Rehabilitation project beginning August 17, 2005 and continuing through September 16, 2005. A public scoping announcement was placed in the local paper of record (*Mariposa Gazette*) and on the park's planning webpage. The park conducted both internal and external scoping with appropriate NPS staff, agencies, tribes, and the public to determine the range of issues to be analyzed in the EA. Internal scoping included analysis from specialists such as historical landscape architects, hydrologists, biologists, engineers and other NPS staff from Yosemite National Park, the Denver Service Center, and the Pacific West Region, as well as engineers and other staff from the Federal Highways Administration. Based on scoping comments received, and federal laws, regulations, and executive orders, the NPS determined that an EA was the appropriate level of compliance for this stage of the project. This scoping process was used to define the project purpose and need, identify issues and impact topics, outline reasonable and feasible alternative actions, and to describe and evaluate the relationship of the preferred alternative to other planning efforts in the park.

A postcard was mailed to those individuals on the park mailing list, with a checkbox for requesting additional information on the Glacier Point Road project. The NPS posted a project fact sheet and project planning updates on the park's website. Information was also available at monthly open houses in Yosemite Valley, with park staff present to answer questions and share design concepts. During the scoping period, eight written public scoping comments were received by fax, e-mail, and U.S. mail. These comments were analyzed to identify issues and concerns, and the input was incorporated into the project design as appropriate. Park staff also took into consideration issues and concerns that arose during development of the 1991 EA, and continued to consider public and internal concerns as they arose throughout project planning, and to integrate these additional ideas where possible and appropriate.

CONSULTATION

U.S. Army Corps of Engineers

The National Park Service is coordinating with the U.S. Army Corps of Engineers (ACOE) regarding wetland permitting for the Glacier Point Road Rehabilitation Project, under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. To determine whether the project can meet the conditions of a nationwide permit, a preliminary package of information has been requested by the ACOE. The National Park Service will submit a Preconstruction Notification package seeking concurrence with the park's ability to perform activities associated with this project under the Nationwide Permit program. The park fully expects that the Glacier Point Road Rehabilitation project will meet the criteria of the Nationwide Permit program. Final concurrence from the ACOE will be sought following the public comment period on this EA, and prior to the release of the park's decision document.

Central Valley Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) are the regulatory boards within California's Environmental Protection Agency which derive their authority from Section 401 of the Clean Water Act. The SWRCB allocates rights to the use of surface water and, along with the RWQCBs are charged with protecting surface, ground, and coastal waters throughout the state. The RWQCBs issue permits which govern and restrict the amount of pollutants that can be discharged into the ground or surface water, which includes regulating storm water during construction activities. Yosemite National Park is under the jurisdiction of Regional Board (5), Central Valley, and therefore consults with and obtains any necessary permits and/or certifications for construction activities from the Central Valley RWQCB.

The National Park Service is currently coordinating with the Central Valley RWQBC to obtain a Water Quality Certification (WQC) for the Glacier Point Road Rehabilitation project. A WQC stipulates requirements for water quality protection during reconstruction activities, such as calling for compliance with Best Management Practices (BMPs) during construction such as proper storage of materials in staging areas to avoid erosion during storm events. The park will prepare and submit a Storm Water Pollution Prevention Plan prior to construction.

U.S. Fish and Wildlife Service Consultation
Section 7 of the Endangered Species Act (1973) requires agencies to consult with the U.S. Fish and Wildlife Service (USFWS) regarding any action authorized, funded, or carried out by a federal agency to ensure that it does not jeopardize any listed species or its critical habitat. The NPS generated a project-area species list from the USFWS website on September 6, 2006. An informal consultation phone call was made to the Sacramento Fish and Wildlife Service office on November 13, 2006 to ensure compliance with current procedures. This list was used as the basis for the special-status species analysis in this EA. The list will be checked for updates prior to construction. This environmental assessment will be submitted to their office, with a request for concurrence with the park's finding of no effect. Their letter of concurrence, along with documentation and implementation of any additional suggested mitigation or avoidance measures, will complete the endangered species compliance process for this project.

American Indian Consultation
Yosemite National Park is consulting with American Indian tribes having cultural association with Chinquapin and Glacier Point, including the American Indian Council of Mariposa County, aka Southern Sierra Miwuk, and the Tuolumne Band of Me-Wuk, the North Fork Mono Rancheria of Mono Indians of California, and the Picayune Rancheria of Chukchansi Indians. Information sharing and project planning will continue with the American Indian tribes throughout the planning and implementation of the proposed project.

State Historic Preservation Officer / Advisory Council Consultation
In accordance with the 1999 Programmatic Agreement (NPS 1999), Yosemite National Park staff review activities determined by the park to have “No Effect” or “No Adverse Effect” to Historic Properties, as defined in 36 CFR Part 800. These activities may be implemented and are documented according to the agreement without further review by SHPO or the Advisory Council provided:

a) that the undertaking is not subject to Stipulation VIII (B) – if any action 1) may affect a National Historic Landmark, or properties of national significance listed on the National Register, 2) may affect a human burial, 3) adversely affect a traditional cultural property, 4) generates significant public controversy, or 5) involves a disagreement among the park, SHPO, any Indian Tribe, or Interested persons regarding proposed use.

b) that the applicable park management office has submitted a proposed undertaking to the park Section 106 Coordinator for review and concurrence.

c) that the park Section 106 Coordinator has reviewed the undertaking to ensure that identification and evaluation of historic properties in the area of potential effect has been completed according to Stipulation VII (A) and (B) in the agreement, and that adequate information has been compiled to identify and evaluate the effects of proposed undertakings on Historic Properties.

d) that the park ensures that decisions regarding proposed undertakings are made and carried out in conformance with the standards and guidelines in Stipulation 1 of the agreement.

e) that the park shall ensure that recovery of archeological data is based on the existing Yosemite Archeological Research Design and Archeological synthesis and Revised Research Design.

f) that the park has consulted with the appropriate Indian Tribe(s) regarding possible effects to Native American archeological or Traditional Cultural Properties.

g) that the park has determined the proposed action either does not affect or does not adversely affect Historic Properties based on the criteria of adverse effect found in 36 CFR Section 800.9.

h) Monitoring, when appropriate, shall be summarized in a brief letter report. If Historic Properties are discovered during implementation, a detailed monitoring report shall be prepared. Large-scale ground disturbing activities shall be monitored in accordance with a monitoring plan – that plan should include required elements listed in the agreement.

Public Review of this Environmental Assessment and Project Updates
This EA is available for a thirty (30) day public review and comment period which begins the date the EA is distributed. The availability of the EA is being announced in the *Mariposa Gazette* and the EA is being mailed or emailed to the list of persons and agencies that have expressed interest in Yosemite National Park proposed actions and events. This includes agencies, public libraries, and organizations such as The Wilderness Society, The Alpine Club, Sierra Club, etc. The EA will also be available at local libraries in Mariposa, Wawona, Oakhurst and Groveland. An electronic copy of the EA is also available on-line at http://www.nps.gov/yose/planning.

Comments on the EA, or requests for additional copies of this EA (please specify CD or printed copy) should be directed to:

Superintendent
Yosemite National Park
P.O. Box 577
Yosemite, CA 95389

For a copy of this document, please call Yosemite National Park at (209) 379-1365.

Comments will be documented and analyzed at the close of the public review period. If no significant impacts from the proposed action are identified, the EA will then be used to prepare a Finding of No Significant Impact (FONSI), which will be sent to the NPS Pacific West Regional Director for signature.

During the public review period, additional consultation will occur to affirm determinations of effect (if needed) with the California SHPO, the USFWS, and the U.S. Army Corps of Engineers. Notice of concurrence with the determinations of effect will be documented in the FONSI, if prepared, for this EA (see above).

For more information concerning this EA, please contact the park office of Environmental Planning and Compliance at (209) 379-1365.

List of Agencies, Organizations and Businesses that received the Glacier Point Road Rehabilitation Environmental Assessment

3 dGeo	National Park Service – Denver Service Center
AAM Design, Inc.	Oakhurst Chamber of Commerce
Advisory Council on Historic Preservation	Oakhurst Public Library
Alameda County Public Library	Parsons Brinckerhoff
American Alpine Club	Planning and Conservation League
Biophilia Society	Robert E. Boyer Construction, Inc.
Bioscience and Natural Resources Library	Sacramento County Public Library
California Bus Association	San Francisco City Public Library
California Department of Fish and Game	San Joaquin Valley Air Pollution Control District
California Department of Transportation	Saving Yosemite
California Office of Historic Preservation	Senate Subcommittee on Interior Appropriations
California State Horsemen's Association	Senator Barbara Boxer
California State Library, Sacramento	Senator Dianne Feinstein
California State University, Stanislaus	Sequoia and Kings Canyon National Park
California State Water Resources Control Board	Sierra Club
Californians for Western Wilderness	Sierra Club Tuolumne Group
Carter and Burgess, Inc.	Sierra Star
Central Sierra Environmental Resource Center	Slippery Rock University
Civic Center Library	Stanford University Green Library
Columbia College Library	The Access Fund
Cornell College	The Fresno Bee
David Evans and Associates, Inc.	The Modesto Bee
Diamond Coach Tours	The Redwoods in Yosemite
Earth Design, Inc.	Transportation Techniques
Earth First! – Santa Cruz	Tuolumne County Alliance for Resources and Env.
East Bay Municipal Utility District	Tuolumne County Board of Supervisors
Environmental Science Associates	Tuolumne County Community Development
Environmental Services	University of California, Berkeley – Capital Projects
Federal Highway Administration	University of Minnesota Forestry Library
Fish Camp Advisory Council	University of Vermont
Fresno County Planning and Resource Management	U.S. Army Corps of Engineers
Friends of Yosemite Valley	U.S. Congress, Representative Radonovich
Groveland Community Services District	U.S. District Court, Yosemite
Hayward Area Recreation and Park District	U.S. Fish and Wildlife Service
Institute of the Rockies	USDA, Forest Service, Rocky Mountain Research Stn.
Jakes Associates	USDA Natural Resource Conservation Service
John T. Doolittle, Representative	USGS Publications Department
Kennedy/Jenks Consultants	Wawona Area Property Owners Association
K-M-J Radio	Wawona Town Plan Advisory Committee
Law Office of Michael Wainman	Wilderness Society
Law Offices	William S. Miller Co.
Law Offices of J Wallace Oman	Woodbury University
Law Offices of Mark A. Kanai	YA Board of Trustees
Los Angeles City Public Library	Yosemite Area Audubon
Los Angeles Times	Yosemite Campers Association
Mammoth Mountain Ski Area	Yosemite Concession Services
Mariposa County Environmental Health Department	USGS Publications Department

Mariposa County Board of Supervisors	Wawona Area Property Owners Association
Mariposa County Chamber of Commerce	Wawona Town Plan Advisory Committee
Mariposa Gazette	Wilderness Society
Merced County Association of Governments	William S. Miller Co.
Merced Sun Star	Woodbury University
Mono County Board of Supervisors	YA Board of Trustees
Mountain Defense League	Yosemite Area Audubon
National Park Service – Pacific West Region (Oakland)	Yosemite Campers Association
National Park Service – Pacific West Region (Seattle)	Yosemite Concession Services
National Parks Conservation Association	Yosemite Fund
National Parks Foundation	Yosemite Institute
National Tour Association	Yosemite Research Center
NBC TV, Burbank	Yosemite Research Library
Newfields International, LLC	Yosemite Sightseeing Tours
Northcoast Environmental Center	Yosemite West Group
NPCA National Office	Yosemite West Homeowners

List of Persons and Agencies Consulted / Preparers

The following people and agencies were consulted during the preparation of this Environmental Assessment:

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Kathy Norton, Regulatory Specialist

Chapter VI: Glossary

A. Definitions

Affected Environment: Existing natural, cultural, social and recreational conditions of an area, subject to change indirectly or directly as a result of human action.

Alternatives: Sets of management elements that represent a range of options for how, or whether to proceed with a proposed action. An environmental assessment analyzes the potential environmental impacts of the range of alternatives, as required under NEPA.

Annosus root disease: Root rot. A widespread native fungus. In pines, the fungus spreads through the root system, attacking and killing the inner bark and sapwood. Within two to six years after infection, the fungus reaches the root crown and girdles the tree. The tree dies, but the fungus remains active in the butt of the dead tree. Pines weakened by annosus root disease are often killed by bark beetles. Incense cedars are not as strongly affected by annosus root disease and will stand for many years until finally weakened enough for failure to ensue. Incense cedars are though to act as a reservoir for the disease since they take so long to die.

Area of Potential Effect (APE)**:** means the geographic area or areas where an undertaking has potential to affect historic properties. Consider physical, visual, auditory, atmospheric effects; potential changes in land or building use, change in the setting, and potential for neglect.

Archeological resources: Historic and prehistoric deposits, sites, structures, and anything from a human culture from an archeological site.

Asphalt pulverizing: Pulverizing is the process of breaking apart existing road asphalt into an aggregate (gravel-like) mixture, sometimes blending the recycled aggregate with new aggregate and reusing it as subgrade for newly laid asphalt. Pulverizing is a cost effective and environmentally appropriate way to reconstruct existing pavement. The process eliminates the expensive and environmentally damaging excavation and trucking of the existing asphalt and it creates a stronger base course.

Berm: A shaped mound of earth. In the case of roadways it is intended to direct traffic away from road shoulders or to channel flow.

Best Management Practices (BMPs): Effective, feasible (including technological, economic and institutional considerations) conservation practices and land and water management measures that avoid or minimize impacts to natural and cultural resources. BMPs may be physical, organizational, prohibitions, or management practices.

CEQ Regulations: The Council on Environmental Quality (CEQ) was established by the National Environmental Policy Act (NEPA) and given the responsibility of developing federal environmental policy and overseeing the implementation of NEPA by federal agencies.

Crushed aggregate: gravel

Cultural Landscape: Cultural landscapes are defined as areas that reflect human adaptation and use of natural resources during one period or over time, as expressed in the way that land is organized and divided into patterns of settlement, land use, circulation systems, and structures. Cultural landscapes may be comprised of a series of historic districts or may be the landscape associated with one district.

Culvert: plastic, PVC, or corrugated metal pipe used to convey water under a road.

Cut slope: the upslope, the hill sloping up from the road bed

Decibel: A unit of measure for sound intensity.

Ecosystem: A geographically identifiable area that encompasses unique physical and biological characteristics. It includes the plant community, animal community and environment in a particular region or habitat.

End section: A structure at the culvert outlet designed to dissipate the energy of water flow and to direct the water to its natural channel.

Environmental Assessment (EA): A public document, required under NEPA that identifies and analyzes actions that might affect the human environment, including natural, cultural and social resources. An Environmental Assessment provides sufficient evidence and analysis to determine whether an Environmental Impact Statement (EIS) is necessary. An EA facilitates compliance with NEPA when no EIS is necessary and facilitates preparation of an EIS if one is necessary.

Environmental Impact Statement (EIS): A public document, required under NEPA that identifies alternatives and analyzes their effects on the human environment.

Environmentally Preferable Alternative: The alternative in an EA or EIS that best promotes the goals of NEPA and meets the identified CEQ criteria. In general, this is the alternative that causes the least damage to the environment and best protects natural, cultural and social resources.

Facilities: Buildings and the associated supported infrastructure, including roads, trails and utilities.

Finding of No Significant Impact (FONSI): The decision document for an environmental assessment.

Fill slope: the downslope, the hill sloping down from the road bed where fill from the construction of the road was cast.

Floodplain: The area surrounding a stream subject to flooding on some interval.

Guardwall: wall intended to keep cars on the road in case of loss of control.

Headwall: A vertical support structure at a culvert inlet or outlet.

Historic or Cultural Resources: under NEPA/CEQ means culturally valued pieces of real property that are not historic properties and non-tangible values such as cultural use of the biophysical and built environment, and sociocultural attributes such as social cohesion, social institutions, lifeways, religious practice, and other institutions.

Historic Property: under NHPA and NEPA/CEQ means a district, site, building, structure, or object that is included in or eligible for listing in the National Register of Historic Places, and includes resources to which American Indians attach cultural and religious significance (traditional cultural properties; see NR Bulletin 38).

Human Environment: means the natural and physical (e.g. built) environment and the relationships of people to that environment, i.e., social and cultural aspects and the relationships' between natural and cultural. Culturally valued aspects of the environment generally include NR historic properties, and other culturally values pieces of real property, cultural use of the

biophysical environment, and intangible sociocultural attributes as social cohesion, social institutions, lifeways, religious practices, and other cultural institutions.

Impairment: Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including opportunities that would otherwise be present for the enjoyment of those resources or values.

Inlet: The place where water enters a culvert or other drainage feature.

Invasive species: A non-native species of plant or wildlife that not only exists away from its natural habitat but also employs habits that allow it to take over the habitat (to displace) native species. Often (in the case of plants) becomes a monoculture.

Mitigation: Activities that avoid, reduce the severity of, or eliminate an adverse environmental impact.

National Environmental Policy Act (NEPA): The federal act requiring the development of an Environmental Assessment or Environmental Impact Statement for federal actions having an effect on the human environment.

Organic Act (NPS): 1916: The National Park Service Organic Act established the National Park Service to "promote and regulate the use of the parks. . ." and defined their purpose: ". . .to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Outlet: The location where water exits a culvert or other drainage feature.

National Register of Historic Places: The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed on or "determined eligible" for listing on the National Register must be given consideration for preservation in the planning for Federal or federally assisted projects.

No Action Alternative: The alternative that proposed to continue current management actions and direction. "No Action" means the proposed activity would not take place. The No Action Alternative sets the standards for comparing the action alternatives.

Non-native species: Also exotic species. Plants or wildlife not from a particular area and which may interfere with natural biological systems or ecosystems. Some non-native species are also invasive (see Invasive species).

Planning: An interdisciplinary process for developing short- and long-term goals and alternatives for visitor experience, resource conditions, projects, facility type and placement, and other proposed actions.

Preferred Alternative: The alternative in an EA or EIS that the agency believes would best fulfill the purpose and need for action.

Public Comment Process: A formalized process required by NEPA in which the action agency publishes a notice in the Federal Register which provides notice that the agency is preparing an EIS. Public meetings are a required part of the EIS process. For Environmental Assessments, the public comments process is less formal, with notification of the public by press release and optional public meetings.

Pullout (Turnout): A widened section of roadway that allows vehicles to pull off the road for viewpoints, access to terrain or emergencies. Pullouts may be formal (paved or graveled) or user-designated (created by visitor use over time).

Retaining wall: wall intended to hold the fill slope at a steep angle.

Riparian area or zone: The land area and associated vegetation bordering a stream or river.

Riprap: A layer of durable broken rocks or formed concrete selected and graded (in the same size), put together irregularly or fitted to prevent water erosion – often placed and the end of a constructed water flow zone, such as a culvert.

Road prism: Area affected by original construction – from cut slope to fill slope

Scoping: means establishing area of potential effect (APE), and determining the level of effort required to identify NR historic properties relevant to the undertaking. Scoping should be done during NEPA Internal Scoping.

Section 7 Consultation: Section 7 of the Endangered Species Act requires federal agencies, when proposing a federal action to obtain a species list for the project area from, and to consult with the U.S. Fish and Wildlife Service (USFWS) regarding potential impacts to listed species from the proposed action.

Superelevation: The slope or incline of a roadway cross-section that aides in curve negotiation (typically greater than two percent).

Threatened or Endangered Species: Plants or animals that receive special protection under federal or state laws, including the Endangered Species Act. Species may be "listed" in the state, but not by the federal government (USFWS) or vice versa. Some USFWS regional offices also maintain a list of those species of special concern either nationally or locally, which may be being or may have been previously considered for listing as threatened or endangered.

Traditional cultural resource: Any site, structure, object, landscape or natural resource feature assigned traditional, legendary, religious, subsistence or other significance in the cultural system of a group traditionally associated with it.

Traditional cultural property (TCP): Traditional cultural resources eligible for or listed on the National Register of Historic Places. They are resources to which American Indian tribes attach cultural or religious significance and may include structures, objects, districts, geological and geographical features and archeology.

Turnout: Pullout (see definition above).

U.S. Fish and Wildlife Service (USFWS): The federal agency responsible for implementing the provisions of the Endangered Species Act, including listing species, developing recovery plans, etc.

Visitor experience: The perceptions, feelings, reactions, and activities of a park visitor in relationship to the surrounding environment

Visitor use: The types of recreation activities engaged in by visitors, including the type of activity, visitor behavior, timing and distribution of use.

Wetland: As defined by the Army Corps of Engineers – an area inundated or saturated with surface or ground water at a frequency and duration sufficient to support, and that under normal

circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

B. Acronyms

AASHTO: American Association of State Highway and Transportation Officials

ACHP: Advisory Council on Historic Preservation

AIRFA: American Indian Religious Freedom Act

ARPA: Archeological Resources Protection Act

BA: Biological Assessment (under Section 7 of the Endangered Species Act an assessment of the adverse impacts of a proposed action on a species listed by the USFWS).

BMP: Best Management Practice

BO: Biological Opinion (a determination, under Section 7 of the Endangered Species Act) of the effects of a proposed action on a species listed by the USFWS).

CDFG: California Department of Fish and Game

CEQ: Council on Environmental Quality

CFLHD: Central Federal Lands Highways Division

CNPS: California Native Plant Society

cfs: Cubic feet per second

dB: decibel

dBA: “A” scale weighted decibel (a standard measure of noise)

DBH: Diameter-at-Breast-Height (a standard measure of tree size)

DOE: Determination of Eligibility (for the National Register of Historic Places)

EA: Environmental Assessment

EIS: Environmental Impact Statement

EPA: (United States) Environmental Protection Agency

FHWA: Federal Highways Administration

FLHP: Federal Lands Highway Program

FONSI: Finding of No Significant Impact

GMP: General Management Plan

MOA: Memorandum of Agreement

MOU: Memorandum of Understanding

mph: miles per hour

NAAQS: National Ambient Air Quality Standards

NAGPRA: Native American Graves Protection and Repatriation Act

NEPA: National Environmental Policy Act

NHPA: National Historic Preservation Act

NPS: National Park Service

$PM_{2.5}$: Particles of 2.5 microns or less (a standard measure of air quality)

PM_{10}: Particles of 10 microns or less (a standard measure of air quality)

ppm: parts per million

SHPO: State Historic Preservation Office or Officer

USACOE: United States Army Corps of Engineers

USDOI: United Stated Department of the Interior

USFWS: United States Fish and Wildlife Service

USGS: United States Geological Survey

VOC: Volatile Organic Compound

Chapter VII: References

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Appendices

Appendix A: Cumulative Projects List

Appendix A presents a summarized list and subsequent description of past, present, and reasonably foreseeable actions that have been evaluated in conjunction with the impacts of an alternative to determine if they have any additive effects on a particular resource. These projects were included in the cumulative effects analysis presented in Chapter 3.0 of this document.

REASONABLY FORESEEABLE ACTIONS

Comprehensive Transportation Plan
El Portal Concept Plan
El Portal Road Improvements Project (Narrows to Pohono Bridge)
Multi-Use Trail to West Yosemite Valley
Visitor Use and Floodplain Restoration in East Yosemite Valley Project
Yosemite Motels Expansion
Yosemite Village Interim Parking Improvements

PRESENT ACTIONS

Curry Village and East Yosemite Valley Campgrounds Improvements
El Capitan Meadow Restoration Project
Environmental Education Campus
Hetch Hetchy Communication System Upgrade Project
Hodgdon Meadow Housing Area Trailer Replacement Project
Indian Cultural Center
New Merced Wild and Scenic River Comprehensive Management Plan
Parkwide Communications Data Network
Parkwide Invasive Plant Management Plan
Reconstructing Critically Eroded Sections of El Portal Road
Rehabilitation of the Yosemite Valley Loop Road
The Tunnel View Overlook Rehabilitation
Tuolumne Meadows Concept Plan
Tuolumne Wild and Scenic River Comprehensive Management Plan
Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan
Yosemite Lodge Area Redevelopment
Yosemite Museum Master Plan
Yosemite Valley Shuttle Bus Stop Improvements

PAST ACTIONS

Cascades Diversion Dam Removal
Cook's Meadow Ecological Restoration
Curry Village Employee Housing
El Portal Road Improvement Project – Park Boundary to Big Oak Flat Road
Fern Spring Restoration
Happy Isles Dam Removal
Happy Isles Fen Habitat Restoration Project
Happy Isles Gauging Station Bridge Removal
Lower Yosemite Fall Project
Merced River Ecological Restoration at Eagle Creek Project
Yosemite Area Regional Transportation Service
Yosemite Valley Plan
Yosemite Valley Shuttle Bus Procurement

REASONABLY FORESEEABLE ACTIONS

Agency Name: National Park Service

Project Name: **Comprehensive Transportation Plan**

Description: This plan will study modern transportation solutions for the park. Many past park plans have studied transportation, both parkwide and in specific areas such as Yosemite Valley. However, many areas such as the Wawona and Tioga Road corridors have not been reexamined since the 1980 *General Management Plan*. Previous plans defined problems and solutions to deal with visitation and demographic projections that reflected trends characteristic of that time period. Since then, the park has continued to update transportation and visitor information through a grant from the Federal Transit Administration. This new data indicates that many previous predictions and assumptions are not consistent with today's conditions, and thus a fresh examination of transportation systems and solutions is warranted. Park planners, social and natural scientists, and transportation managers will work together to prepare a new plan. They will compile past plans and decisions regarding visitor experience, access, and resource conditions relative to our transportation system, examine how the system is currently functioning, and, with public input, identify issues, develop alternatives, and present solutions in a comprehensive transportation management plan.

Agency Name: National Park Service

Project Name: **El Portal Concept Plan**

Description: The *Yosemite Valley Plan* calls for relocating employee housing, administrative offices, and parking from Yosemite Valley to El Portal. The Concept Plan will provide a comprehensive site plan for the specific layout and design of administrative facilities, including employee housing, offices, and parking areas in the El Portal area. This plan will address the specific functions and spatial requirements of the facilities that the *Yosemite Valley Plan* recommends to be located in El Portal. Although the *Yosemite Valley Plan* generally outlined the facilities that would be relocated to El Portal, it did not provide specific details for each facility or for the interrelationships between existing, redeveloped, and new facilities. The Concept Plan would evaluate these interrelationships and determine the most efficient use of the limited developable areas in El Portal.

Agency Name: National Park Service

Project Name: **El Portal Road Improvements Project** (Narrows to Pohono Bridge)

Description: Original designs for El Portal Road improvements included the entire mile segment from just east of the Big Oak Flat Road intersection to Pohono Bridge to be completed as one project referred to as "Segment D." As a result of litigation, that project has been scaled back for the time being to only address an unstable portion of road beginning at the Big Oak Flat Road intersection and extending east approximately 1,350 feet. Road improvements will eventually be necessary throughout the remainder of El Portal Road. This segment of road has two narrow travel lanes, each 9.5 feet wide. Road improvements would be designed to improve safety and minimize the chance of roadway failures in the future.

Agency Name: National Park Service

Project Name: **Multi-Use Trail to West Yosemite Valley**

Description: Approximately 80 percent of Yosemite's nearly four million annual visitors stop at Yosemite Valley destinations. Bicyclists, hikers, visitors using wheelchairs, and those with strollers find that the multi-use paved trail in the east Valley ends abruptly near Swinging Bridge. To continue the trail to west Valley destinations (such as El Capitan or Bridalveil Fall), users must either confront automobile traffic by traveling along the edge of a busy roadway-a potentially life-threatening safety hazard – or return to private vehicles, ending an important aspect of their recreational experience and adding to traffic noise, emissions and congestion. This project would provide an accessible trail, separate from automobile traffic, to allow convenient, safe, accessible, and enjoyable access to destinations in the west Valley. The project would be accomplished as a shared cost partnership between the NPS and the nonprofit Yosemite Fund cooperating association.

Agency Name: National Park Service

Project Name: **Visitor Use and Floodplain Restoration in East Yosemite Valley Project**

Description: The ecological restoration program seeks to restore natural processes to ecosystems so that portions of Yosemite Valley can recover from past human development and activities. A plan is being developed for the ecological restoration of the Upper River, Lower River, North Pines, and the northwest end of Lower Pines campgrounds; as well as for Group Camp, Backpackers Camp; Housekeeping Camp within the River Protection Overlay of the Merced River; and The Ahwahnee tennis court in Yosemite Valley. As part of this project, surveys are being conducted for archeological sites; the history of human disturbance in the area is being investigated; the former distribution of meadow, wetland, and forest communities is being investigated; a restoration prescription is being developed that recognizes the retention, modification, or removal of bridges, bicycle paths, riprap, and roads; the necessity and extent of revegetation is being determined; a revegetation strategy is being developed; and monitoring of river channel morphology is being conducted.

Ecological restoration may include:

- Removal of imported fill material.
- Removal of abandoned roads and infrastructure.
- Re-establishment of natural contours on the land.
- Restoration of natural surface and groundwater movement.
- Replanting of native vegetation.
- Removal of non-native plant and animal species.
- Restoration of carbon and nitrogen cycles in degraded soils.

Agency Name: Mariposa County

Project Name: **Yosemite Motels Expansion**

Description: This project site is located along the north and south sides of Highway 140 at the existing Yosemite View Lodge development, within the El Portal Town Planning Area. Permitting has been requested to construct a 78-unit motel and a multi-purpose chapel/recreation building. Proposed access to the 78-unit motel and multi-purpose chapel/recreation building would be from the north side of Highway 140.

Agency Name: National Park Service

Project Name: **Yosemite Village Interim Parking Improvements**

Description: In keeping with the actions outlined in the *Yosemite Valley Plan*, an interim project is needed to improve the visitor experience and park operations at the Yosemite Village main day visitor parking area. The parking area is located south of Yosemite Village and east of Sentinel Bridge, between the Merced River and Northside Drive. This area has hosted a variety of uses over the past 100 years, and has historically been referred to as Camp 6.

The project may include some or all of the following components:

- Parking for day visitors, including recreational vehicles and disabled persons.
- The relocation of tour bus loading and unloading facilities.
- Roadway realignments to improve vehicular and pedestrian traffic circulation and safety
- Pedestrian/bicycle paths to improve pedestrian/bicycle traffic circulation and safety.
- Valley shuttle bus service operations and facilities.
- Interpretation facilities, including wayfinding signs.
- Other visitor facilities, such as restrooms.

PRESENT ACTIONS

Agency Name: National Park Service

Project Name: **Curry Village and East Yosemite Valley Campgrounds Improvements**

Description: A site plan is being developed for east Yosemite Valley to implement actions called for in the *Yosemite Valley Plan*. The project area generally extends south of the Merced River from the eastern boundary of Housekeeping Camp to Happy Isles, and encompasses the area along Tenaya Creek for proposed campsites. The site plan will ensure that all related actions proposed for the east Valley are implemented in a logical, feasible, and cost-effective manner. Most of the actions will not begin for several years, but in the meantime, the site plan will result in a more detailed picture of how and in what order the projects in the east Valley should be implemented. Following are examples of the many actions identified in the *Yosemite Valley Plan* (NPS 2000a) for east Yosemite Valley:

- Reconfiguring campgrounds at Upper and Lower Pines.
- Adding campsites at the new South Camp and Tenaya Creek Campgrounds.
- Removing Curry Orchard and restoring the area to natural conditions.
- Constructing new visitor cabins-with-bath in Curry Village.
- Relocating the Curry Village ice rink.
- Providing new and reconfigured food service and concession facilities at Curry Village.
- Relocating the concessionaire stable.
- Converting Southside Drive to two-way traffic.
- Constructing a fire station in the Curry Village area.

A Finding of No Significant Impact (FONSI) was issued in February 2004. Construction will commence following resolution of the *Merced River Comprehensive Management Plan* planning process.

Agency Name: National Park Service

Project Name: **El Capitan Meadow Restoration Project**

Description: The 60-acre El Capitan Meadow is located in west Yosemite Valley between El Capitan, and the Merced Wild and Scenic River. A popular destination for many park visitors, El Capitan Meadow affords people an opportunity to enjoy magnificent views of Cathedral Spires and El Capitan, as well as take part in other recreational activities. El Capitan is also a world renowned "big wall" that attracts rock climbers from all over with hopes of completing one of its many routes to the top. This often attracts people to the meadow where they wander the area and gaze, with necks craned, searching the massive rockface for climbers making the 3,589 foot ascent.

Vegetation and soils in the meadow are becoming increasingly degraded due to trampling from visitor foot- traffic and inappropriate vehicle parking. A significant impact to the meadow was the removal of a portion of the El Capitan Moraine in 1879, which lowered the water level four to six feet in the area. While this was beneficial to early settlers because it allowed for more useable dry land, it greatly reduced the amount of water available to the meadow. Other historic actions such as tilling, ditching, placing culverts and road building have also contributed to meadow deterioration.

The major goals of the proposed project are to:

- Restore meadow vegetation and natural processes.
- Minimize social trails.
- Develop ecologically appropriate visitor access.
- Improve visitor experience.
- Protect sensitive meadow areas.

Agency Name: National Park Service

Project Name: **Environmental Education Campus Project**

Description: Since 1972, Yosemite Institute (YI) has partnered with the National Park Service (NPS) to fulfill a shared mission of providing environmental educational opportunities for youth from diverse backgrounds, in Yosemite. YI's immersive environmental educational programs cover field science, arts, backpacking, and leadership, and are designed to complement California State Educational Content Standards. YI programs inspire a personal connection to the natural world and foster future generations of environmental stewards. Each year, YI's non-profit Yosemite programs serve over 13,000 students annually, and generate over 480,000 hours of visitor activities.

Yosemite Institute is a non-profit organization, and currently operates its environmental education campus at Crane Flat under a cooperative agreement with the park. The campus facilities are comprised of older buildings and structures that have been assembled over time and were not originally designed for educational purposes. These old buildings are deteriorating, in need of extensive repairs, and are barely adequate in terms of modern design standards for teaching, residential accommodations, or accessibility. NPS and YI are planning to create a new campus with upgraded/improved, sustainable facilities that will provide a more optimal learning environment and serve a greater number and diversity of students, for generations to come. The campus will be designed as an example of environmental sustainability, according to Leadership in Energy and Environmental Design (LEED) Green Building standards.

The goals of this project are to:

- Provide an environmental education campus location and program that serves the combined missions of Yosemite National Park and Yosemite Institute
- Facilitate multi- day educational programs that complement California state standards and offer opportunities for research and study of the natural world
- Provide a campus facility that is sustainable in design and enables high quality, immersive, and safe educational experiences for students
- Promote development of future stewards of the environment and the National Park System
- An Environmental Impact Statement (EIS) is currently being prepared.

Agency Name: National Park Service, USDA Forest Service, City and County of San Francisco - San Francisco Public Utilities Commission and Hetch Hetchy Water and Power (HHW&P)

Project Name: **Hetch Hetchy Communication System Upgrade Project**

Description: The proposed project is to update the communications infrastructure by replacing or updating components of the Hetch Hetchy communications system from the Bay Area to Tuolumne County, including adding one new communications site within Yosemite National Park, near Poopenaut Pass.

The current equipment utilizes existing phone lines to transmit voice and data communications essential to the operation and security of Hetch Hetchy Water and Power's (HHWP) electric and water supply utilities and Hetch Hetchy dam. It is also used by Yosemite personnel for park communications in that area. The existing radio and fiber optic equipment are obsolete and no longer supported by their manufacturers. The system upgrade would provide the framework necessary to support improved radio communications that are vital to park operational activities such as law enforcement, search and rescue, and fire management, and improve the capability to ensure dam security, visitor and staff safety, and protection of park resources.

The proposed project spans multiple jurisdictions; therefore, the NPS is currently working collaboratively with HHWP, the City and County of San Francisco and the USDA Forest Service, to prepare an Environmental Assessment/Initial Study (EA/IS).

Agency Name: National Park Service

Project Name: **Hodgdon Meadow Housing Area Trailer Replacement Project**

Description: The proposed project is to construct a duplex in the Hodgdon Meadow Housing Area. This project would replace two obsolete trailers that were previously removed from the housing area. The new duplex, which would house up to eight park employees or two park employees and their families, will be located on a previously impacted site formerly occupied by one of the two trailers. This project is part of an agency-wide effort to replace trailers and other substandard housing with new, cost-effective, energy-efficient structures. Upgrades to the well water disinfection system will accompany the duplex construction.

An EA is in process for this project.

Agency Name: American Indian Council of Mariposa County, Inc. (Southern Sierra Miwuk Nation)

Project Name: **Indian Cultural Center**

Description: An Indian Cultural Center would be established by the American Indian Council of Mariposa County, Inc. (Southern Sierra Miwuk Nation) at the site of the last-occupied Indian village in Yosemite Valley (west of Camp 4). This center would provide a location for culturally associated Indian people to conduct traditional ceremonies and to practice and teach techniques of traditional ways of life. While the center would be open to the public, access might be limited during special ceremonies. Some public interpretation would occur, but this cultural center would not replace the primary educational function of the current Indian Village of Ahwahnee at Yosemite Village.

Facilities at the Indian Cultural Center would consist of structures and landscape features typical of an Indian village from the mid- to late-19th century. One large, partly subterranean ceremonial roundhouse and a smaller sweatlodge would be constructed. Approximately 15 cedar bark umachas (conical houses) would be built in the vicinity of the roundhouse and sweatlodge. Plants important for food, basketry, and medicinal uses may be grown. Existing archeological features, such as mortar rocks, would remain in place and would be incorporated into the village design. The last extant structure from the original village, a small cabin (the former Westley and Alice Wilson home) currently being used as a National Park Service office, would be moved back to the village and adaptively reused as the cultural center office. A new kitchen and restroom facility would be constructed. Utilities (water, sewer, propane, unimproved road access, and electrical service) would be provided. Screening would be established where necessary to visually separate the cultural center and Northside Drive, Yosemite Lodge, Camp 4, and the Valley Loop Trail. The Valley Loop Trail could be relocated to a route south of the cultural center to minimize intrusions. Overnight parking for scheduled activities would be provided at the Indian Cultural Center or other administrative areas.

The environmental compliance for this project was finished in September 2003. The American Indian Council of Mariposa County, Inc. is presently preparing fundraising plans and activities to support this project.

Agency Name: National Park Service

Project Name: **New Merced Wild and Scenic River Comprehensive Management Plan**

Description: The NPS manages 81 miles of the Merced River, which includes the Main Stem and the South Fork that travels through Yosemite National Park and the El Portal Administrative Site. The Merced is a federally designated Wild and Scenic River protected by the provisions of the 1968 Wild and Scenic Rivers Act. Seventy-five percent of the Merced River in NPS jurisdiction is located in designated Wilderness, but most people experience the Merced in Yosemite Valley which, as a World Heritage Site, attracts millions of people from around the globe to gaze at the striking granite walls and thundering waterfalls each year. The focus of the agency's planning effort for the Merced River strives to strike a balance between access and use of the river while protecting and enhancing the "values" that made the river worthy of protection. These are known as Outstandingly Remarkable Values (ORVs) according to the Wild and Scenic Rivers Act. To protect the ORVs, a plan for the Merced River will be created to help guide future land managers in determining appropriate actions and uses along the river. Previous plans were developed for the Merced River in 2000 and again in 2005. However, due to ongoing litigation, the park was mandated by the US District Court to complete a new plan.

This new planning process will take approximately 33 months, with a final Record of Decision anticipated in September 2009.

Agency Name: National Park Service

Project Name: **Parkwide Communications Data Network**

Description: The proposed project is to update the communications data network for Yosemite National Park. The park serves nearly four million visitors per year, and has over 1,100 square miles of Wilderness, 800 miles of foot trails and covers extensive remote terrain from 2,500 to 13,100 feet in elevation. Communication reliability is vital to having situational awareness and prompt emergency response. The current communications infrastructure at Yosemite relies on dated technology and equipment that is difficult to maintain, has limited compatibility between various independent communication systems that exist throughout the park, and limited potential for equipment upgrades. The park often experiences outages during storms, and park emergency staff is forced to rely on a variety of different communication systems across the park. A communications data network upgrade would significantly improve connectivity, reliability and speed of service. This project would provide the necessary infrastructure for a modern communications data network that may include microwave and fiber optics to transfer computer LAN data, radio communications, security and safety video systems, telephony, alarm systems, traffic data, and telemetry. The upgraded network would also enhance narrowband and land mobile radio infrastructure and LAN connectivity for El Portal, Yosemite Valley, Wawona, Tuolumne, Crane Flat and Hetch Hetchy, and all the park entrances.

An EA has been initiated.

Agency Name: National Park Service

Project Name: **Parkwide Invasive Plant Management Plan**

Description: Today there are over 150 non-native plant species in Yosemite National Park, which is about 10 percent of the park's flora. Of these, 28 species are listed for control by the U.S. Department of Agriculture, California Department of Food and Agriculture, or California Exotic Pest Plant Council. Species targeted for control in Yosemite include bull thistle, mullein, yellow star thistle, spotted knapweed, perennial pepperweed, purple vetch, rose and burr clovers, Himalayan blackberry, white and yellow sweet clover, non-native wildflowers, and escaped landscaping plants such as foxglove, ox-eye daisy, pink mullein, French broom, tree-of-heaven, and black locust.

The current control program includes using Global Positioning System (GPS) technology to map plant populations. Crews then remove plants using a variety of techniques, including hand pulling. Treated areas are photographed and re-visited each year to assess the results and provide follow-up treatment.

The proposed Parkwide Invasive Plant Management Plan will define a set of comprehensive programs, including the following:

- Education and focused research.
- Prioritized prevention and control efforts using a variety of techniques and appropriate mitigation measures.
- Systematic monitoring and documentation of invasive plant status and the results of management efforts.
- Restoration of ecosystems altered by invasive plants.

Control methods being considered include some combination of the following: hand-pulling or using various machines to remove plants; releasing predatory insects or fungus to attack plants; educating users and staff about preventative measures; and using chemical treatments derived

from natural products like vinegar, or manufactured chemicals like glyphosate. Program goals include eradicating (or at least controlling) invasive plant species; preventing new invasions; restoring and maintaining desirable plant communities and healthy ecosystems; enhancing the visitor experience; and educating park staff, partners, and users.

An EA is currently being prepared for this plan.

Agency Name: National Park Service

Project Name: **Reconstructing Critically Eroded Sections of El Portal Road**

Description: This project is to repair a 1,350 foot section of the El Portal Road just east of the Big Oak Flat Road intersection. This section of road is immediately adjacent to and being undercut by the Merced Wild and Scenic River. As a result, its dry-laid walls are failing. The walls were severely damaged by the 1997 flood and have been spot-repaired several times over the past 10 years. In spite of these repairs, the road continues to be in jeopardy of collapse, especially during periods of high runoff. If approved, this project will be conducted during low flows in fall 2007.

An EA has been prepared for this project.

Agency Name: National Park Service

Project Name: **Rehabilitation of the Yosemite Valley Loop Road**

Description: The Yosemite Valley Loop Road is a historic feature in Yosemite National Park, first built as a stage coach road in 1872. The initial pavement was laid in 1909, and culverts were first installed a year later beneath stretches of Southside Drive. Spot repairs have been made along the roadway as required over time. However, much-needed, comprehensive maintenance and repair of the roadway and associated drainage structures has not been performed for many decades.

Since 1980, annual visitation to Yosemite National Park has averaged 3.4 million people, 95 percent of which is focused in Yosemite Valley. Dramatic scenery, the Merced Wild and Scenic River, and diverse recreational opportunities draw visitors to the Valley year round, making it one of the most heavily developed areas of the park. As a result, the Yosemite Valley Loop Road experiences the heaviest traffic volumes of any area in Yosemite National Park. Automobiles make up the majority of the volume, but tour buses and public transportation vehicles also contribute to Yosemite Valley traffic. Bus transportation in Yosemite National Park includes regional public transportation, charter and tour bus operators, concessionaire-operated tours, and shuttle bus services provided by the park concessionaire. With the exception of shuttle bus services in Tuolumne Meadows and between the Mariposa Grove and Wawona, nearly all park buses travel to, from, and within Yosemite Valley.

The purpose of this project is to repair and resurface existing roadway pavement, rehabilitate or replace adjacent drainage features (e.g., culverts, diversion ditches, and headwalls) and to improve the condition of adjacent roadside parking along approximately 12.5 miles of the Yosemite Valley Loop Road in Yosemite Valley. No roadway widening (outside of the original road prism width of 22 feet), realignment, or changes to vehicular or pedestrian circulation patterns as called for in the *Final Yosemite Valley Plan Supplemental Environmental Impact Statement (2000)*, will be undertaken.

The need for this project is evidenced by the fact that the existing road surface and associated drainage features are in poor condition because major maintenance repairs have not been undertaken for many years. Numerous existing culverts are undersized, in disrepair, and/or ineffectively located to capture peak seasonal run-off. In addition, informal roadside parking along stretches of the Yosemite Valley Loop Road presents visitor safety and resource impact concerns.

Agency Name: National Park Service

Project Name: **The Tunnel View Overlook Rehabilitation**

Description: The Tunnel View scenic overlook is a historic site located adjacent to Wawona Road. This overlook affords expansive views of Yosemite Valley, El Capitan, Bridalveil Falls, and Half Dome that have captured the awe of visitors for nearly 75 years. Tour buses, tram tours, and single-family vehicles bring an estimated 5-7,000 people to the site per day during the height of the visitor use season. The purpose of the Tunnel View Overlook Rehabilitation is to remedy long-standing vehicle-to-vehicle and vehicle-to-pedestrian safety issues, to correct drainage deficiencies, to provide clear circulation patterns for pedestrians and vehicles, to enhance and maintain viewing opportunities for visitors, to provide accessibility to viewing areas for visitors with disabilities, to correct safety problems associated with the Inspiration Point trailhead, and to address sanitation issues.

The environmental compliance process for the Tunnel View Rehabilitation is currently in progress.

Agency Name: National Park Service

Project Name: **Tuolumne Meadows Concept Plan**

Description: The Tuolumne Meadows, at an elevation of 8,600 feet, is the Sierra's largest subalpine meadow. Current facilities in the Tuolumne Meadows area include a 304-site campground, a visitor center, a service station, a 104-bed lodge, food services, government and concession stable operations, employee housing, a wastewater treatment plant, and several administrative buildings. These facilities support approximately 5,000 park visitors and 200 park staff daily from May through October. Although improvement or relocation has been considered for many of these facilities, there is no comprehensive plan that looks at the entire Tuolumne Meadows area as a whole and determines the desired extent and location of development. A Concept Plan will define management objectives, including resource protection goals for the entire area, and it will identify boundaries for specific types of development. This will allow implementation of management objectives and appropriate facility construction as incremental funding becomes available.

The environmental compliance process for the Tuolumne Meadows Concept Plan is currently in progress

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Agency Name: National Park Service

Project Name: **Tuolumne Wild and Scenic River Comprehensive Management Plan**

Description: The development of the Tuolumne Wild and Scenic River Comprehensive Management Plan will bring the park into compliance with the Wild and Scenic Rivers Act, and can be used to guide actions and evaluate the potential impacts of proposed improvement

projects within the river corridor. In addition, the watershed of the Tuolumne Wild and Scenic River covers over 50 percent of Yosemite's backcountry areas and wilderness. This plan would be a comprehensive tool for watershed planning and management of sensitive areas within the Tuolumne River watershed. In addition, this plan would include much needed natural and cultural data that have not been previously compiled for the river corridor and its watershed. These data would be used to create effective and modern management tools such as river protection overlays and much needed compliance necessary for managing resources and visitor use in the entire Tuolumne Meadows area as well as the Tuolumne River corridor. The plan would also be an important tool to examine many outstanding issues with the complicated management of the Hetch Hetchy Reservoir, including water quality management and watershed issues with the City of San Francisco.

The development of the Tuolumne Wild and Scenic River Comprehensive Management Plan EIS is currently in process.

Agency Name: National Park Service

Project Name: **Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan**

Description: The existing utility infrastructure serving Yosemite Valley was identified in the *Yosemite Valley Plan* as a potential problem due to its age, condition, inadequate capacity, inaccessibility to future facilities, and inappropriate location in environmentally sensitive areas. The NPS completed a *Utilities Master Plan* for east Yosemite Valley in 2003. This plan incorporated information on existing utility conditions and required repairs identified in the *Yosemite Valley Sanitary Sewer Capital Improvement Plan*, completed in 2002. The *Utilities Master Plan* assessed the current condition of utilities (water, wastewater, electric, and communications) in the Valley and the future Valley utility needs based on facilities proposed in the *Yosemite Valley Plan*. The *Utilities Master Plan* was developed to allow efficient relocation and upgrading of utility systems to provide for utility needs while reducing long-term environmental impacts from utility repair and maintenance activities.

An EA on the *Utilities Master Plan* was completed in June 2003 and a FONSI was signed in October 2003. Implementation of the utility improvements will occur in three phases over 10 years. Construction of phase 1 of the improvements began in 2005. The remaining phases of this project will commence following resolution of the *Merced River Comprehensive Management Plan* planning process.

Agency Name: National Park Service

Project Name: **Yosemite Lodge Area Redevelopment**

Description: This project is tiered off the *Yosemite Valley Plan*. The project collectively known as the Yosemite Lodge Area Redevelopment includes four separate actions as described in the *General Management Plan* (NPS 1980) and the *Yosemite Valley Plan* (NPS 2000): redevelopment of Yosemite Lodge, redesign of Camp 4, relocation of Northside Drive, and design of the Indian Cultural Center (this action is described as a separate project). All actions occur in the Yosemite Lodge area of Yosemite Valley and include the following:

- Yosemite Lodge will be changed from a motel type of experience to one more connected to a national park lodge experience in Yosemite Valley.
- Yosemite Lodge facilities in the river protection zone and the floodplain will be removed.
- Camp 4 will be redesigned to accommodate the expansion and improvements called for in the Yosemite Valley Plan (NPS 2000).

- Northside Drive in the Yosemite Lodge and Camp 4 area will be relocated south of the lodge to reduce conflicts between vehicles and pedestrians and to provide safer pedestrian access between the lodge and the Lower Yosemite Fall area.
- Through a cooperative agreement with the American Indian Council of Mariposa County, Inc., an Indian Cultural Center will be established at the site of the last historically occupied Indian village in Yosemite Valley (just west of Camp 4 and Yosemite Lodge). See the project description below.

An EA was prepared for this project in September 2003 and a FONSI was issued in February 2004. Construction will commence following resolution of the *Merced River Comprehensive Management Plan* planning process.

Agency Name: National Park Service

Project Name: **Yosemite Museum Master Plan**

Description: The Yosemite Valley Museum Master Plan is a joint project of the NPS and The Yosemite Fund to provide locations and conceptual designs for facilities housing museum exhibits, storage, work spaces, library, archives and museum collections of Yosemite National Park. The master plan must also address the potential reintegration of Valley museum collections with collections at several locations outside of Yosemite Valley, including El Portal and Wawona.

The environmental compliance process for the Yosemite Museum Master Plan is currently in process

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Agency Name: National Park Service

Project Name: **Yosemite Valley Shuttle Bus Stop Improvements**

Description: This project consists of the preparation of preliminary design plans, environmental compliance documents, and construction drawings; the construction of six 10 by 80-foot concrete braking pads; and the rehabilitation or replacement of 94,000 square feet of asphalt road approaches.

Construction has begun on this project.

PAST ACTIONS

Agency Name: National Park Service

Project Name: **Cascades Diversion Dam Removal**

Description: The Cascades Diversion Dam was located on the main stem of the Merced River at the far west end of Yosemite Valley. The dam was a timber "crib" structure with associated concrete abutments. Removing the dam was part of the overall intent of the *Merced Wild and Scenic River Comprehensive Management Plan and FEIS* and the *Yosemite Valley Plan* to restore free-flowing conditions to the Merced Wild and Scenic River. In its deteriorated condition, the dam presented a significant public health and safety hazard due to the potential for uncontrolled collapse. Cascades Diversion Dam was located adjacent to El Portal Road.

Removal of the structure and related facilities was completed in 2004.

Agency Name: National Park Service

Project Name: **Cook's Meadow Ecological Restoration**

Description: This project is restoring a dynamic and diverse wetland ecosystem. The Cook's Meadow restoration project involved the following actions:

- Filling four drainage ditches created by early Euro-American settlers.
- Removing a raised, abandoned roadbed and a trail that bisected the meadow.
- Reconstructing the trail on an elevated boardwalk that now allows water to flow freely and reduces foot traffic on sensitive meadow plants.
- Installing culverts under Sentinel Road to direct runoff into the meadow and restore the natural flow of water from the Merced River during seasonal periods of high water.
- Reducing non-native plant species encroaching on native species by using manual, mechanical, and chemical control methods.

The project was completed at the end of 2005 and ongoing monitoring will continue.

Agency Name: National Park Service

Project Name: **Curry Village Employee Housing**

Description: This project included the design and construction of new employee housing and related facilities to accommodate approximately 217 concessionaire employees in the area west of Curry Village in Yosemite Valley. This housing replaced concessionaire housing lost in the January 1997 flood. The employee housing units were designed in accordance with the character of the area, with particular focus on the Curry Village Historic District. The scope of this housing project included providing parking and access, an employee wellness center, concessionaire housing, management offices, maintenance facilities, postal facilities, and housing related storage.

The compliance for this project was completed in 2004 and construction was completed in 2007.

Agency Name: National Park Service

Project Name: **El Portal Road Improvement Project – Park Boundary to Cascades Diversion Dam**

Description: This federal jurisdiction transportation project, which was located entirely within Yosemite National Park boundaries, involved road improvements to 6.5 miles of El Portal Road, from the Yosemite National Park boundary in El Portal to just east of intersection with Big Oak Flat Road. The project improved access to Yosemite Valley and reduced safety concerns. El Portal Road is a primary route for visitors accessing Yosemite Valley, and is the shortest all-weather route to the Valley. It also serves as the primary commuting route for park employees living in El Portal, Midpines, and Mariposa. The project was completed in 2000.

Agency Name: National Park Service

Project Name: **Fern Spring Restoration Project**

Description: The Fern Spring Restoration Project included the restoration of the Fern Spring area, including plant relocation, construction of a split rail fence, and the installation of interpretive signage.

The compliance for this project was completed in 2004 and the project was completed in 2005.

Agency Name: National Park Service

Project Name: **Happy Isles Dam Removal**

Description: The Merced River supports one of the last unaltered high-elevation aquatic ecosystems in the Sierra Nevada. However, in the past, several small impoundments existed on the river, degrading the quality of the aquatic systems and depreciating its integrity as a Wild and Scenic River. The Happy Isles Dam impoundment, formerly located at the eastern end of Yosemite Valley, was abandoned in the mid-1980s. The remaining infrastructure consisted of a low rock and concrete dam, two steel-reinforced concrete and iron diversion gates, numerous pipes above and below ground near the dam, and an 8-foot by 12-foot granite powerhouse foundation. The dam and diversion gates caused a large eddy and scour pool (100 feet wide by 15 to 20 feet deep) directly upstream of the obstruction, which dramatically altered local hydrology, water chemistry, and ecology. In 2006 the two year project to remove the Happy Isles dam and associated infrastructure and the revegetation of the riverbanks to prevent post-project bank erosion was concluded.

Agency Name: National Park Service

Project Name: **Happy Isles Fen Habitat Restoration Project**

Description: The Happy Isles Fen is a 2-acre wetland immediately west of the Happy Isles Nature Center in east Yosemite Valley. In 1928, the NPS filled in about three additional acres of the fen to create a parking lot. The asphalt parking lot was removed in 1970, though imported fill remained. The area impacted by parking lot construction was restored to wetland conditions by removing imported fill and associated upland vegetation, and revegetating with native wetland plants.

This project was completed in the fall of 2003.

Agency Name: National Park Service

Project Name: **Happy Isles Gauging Station Bridge Removal**

Description: The Happy Isles Gauging Station Bridge spanned the Merced River in Yosemite Valley's east end. The bridge was badly damaged during the 1997 flood and was deemed unsafe by representatives of the Federal Highway Administration. The bridge began to show signs of immediate failure in 2000 when a large sinkhole appeared on the west abutment. Due to the threat to public health and safety, the bridge was removed in the fall of 2001. The east abutment was retained to protect the operation stream flow gauge. Landscaping was completed in 2002.

Agency Name: National Park Service

Project Name: **Lower Yosemite Fall Project**

Description: This project consisted of improving and rehabilitating the physical infrastructure at the 56-acre Lower Yosemite Fall area. The project work included rebuilding/rehabilitating trails; removing several trail segments; rebuilding/rehabilitating five pedestrian bridges; constructing one new pedestrian bridge; removing one pedestrian bridge; removing the existing parking area and revegetating it to natural conditions; constructing a new shuttle bus stop; replacing/relocating the restroom; creating new access points; fabricating and installing new directional signs; creating a meeting area for groups; restoring portions of forest and creekside habitat to natural conditions; installing amenities such as bike racks, picnic tables, public telephones, trash cans, and wayfinding signs; enlarging the viewing areas near the base of the fall; and providing educational exhibits.

The purpose of this improvement project was to enhance a world-class visitor experience, create a loop trail system that is fully accessible to people with mobility impairments, reduce the perception of crowding and congestion at main views and along the trail, and improve the hydrology of the braided stream system by replacing the narrow bridges that impede the natural stream flow.

To address removal of the tour bus loading/unloading and parking area from the Lower Yosemite Falls area, replacement loading/unloading and parking spaces was provided for tour buses. Long-term tour bus loading and unloading is planned to occur at the future new transit center in Yosemite Village.

This project was completed in 2005.

Agency Name: National Park Service

Project Name: **Merced River Ecological Restoration at Eagle Creek**

Description: Eagle Creek flows into Yosemite Valley immediately west of the Three Brothers rock formations and joins the Merced River about one-half mile downstream from Yosemite Lodge. The creek banks of the reach of Eagle Creek between Northside Drive and the Merced River are badly eroded and only sparsely vegetated, partly due to trampling by pedestrians. The eroded riverbank was recontoured, and then revegetated; the trampled river terrace was decompacted; and fences were constructed to direct visitors to sandbars for river access. The ecological restoration effort involved the following:

- Plug remaining portions of abandoned sewage lines with concrete and remove the manhole and the concrete structure that crosses the creek bed.
- Restore the eroded creek channel using methods previously tested on the banks of the Merced River. Restoration techniques require building up the bank with willow cuttings, woody debris, rock, and mulch.
- Revegetate the bank of Eagle Creek with native shrubs, cuttings, and seeds.
- Redirect visitors to access the river in a more appropriate location that will not cause bank impacts.

This project was completed in 2003.

Agency Name: Counties–Mariposa, Merced, Mono; National Park Service; U.S. Forest Service; California Department of Transportation; U.S. Department of Transportation.

Project Name: **Yosemite Area Regional Transportation System**

Description: The Yosemite Area Regional Transportation System is a collaborative, inter-agency effort begun in 1992 to evaluate the feasibility of a regional transportation system and to identify the best options for initial implementation and upkeep of such a system. The Yosemite Area Regional Transportation System Mission Statement is as follows:

Yosemite Area Regional Transportation System provides a positive alternative choice for access to Yosemite National Park for visitors, employees and residents. Yosemite Area Regional Transportation System service is not intended to replace auto access or trans-Sierra travel, but is intended to provide a viable alternative that offers a positive experience, maximizing comfort and convenience for riders while guaranteeing access into the park (Yosemite Area Regional Transportation Strategy 1999).

Agency Name: National Park Service

Project Name: **Yosemite Valley Plan**

Description: The National Park Service Pacific West Regional Director signed the Record of Decision for the *Final Yosemite Valley Plan* and its Supplemental *Environmental Impact Statement* on December 29, 2000. The purpose of the Yosemite Valley Plan is to present a comprehensive management plan for Yosemite Valley – from Happy Isles at the east end of the Valley to the intersection of the El Portal and Big Oak Flat Roads near the Cascades area at the west end. It also presents actions in adjacent areas of the park and the El Portal Administrative Site that directly relate to actions proposed in Yosemite Valley. The specific purposes of the *Yosemite Valley Plan* within Yosemite Valley are to:

- Restore, protect, and enhance the resources of Yosemite Valley.
- Provide opportunities for high-quality, resource-based visitor experiences.
- Reduce traffic congestion.
- Provide effective park operations, including employee housing, to meet the mission of the National Park Service.

Agency Name: National Park Service

Project Name: **Yosemite Valley Shuttle Bus Procurement**

Description: As called for in the *Yosemite Valley Plan*, a new fleet of low-emissions, low noise, and fuel-efficient shuttle buses have been purchased to replace the existing fleet of 1986 diesel buses currently servicing Yosemite Valley. The recommendation of hybrid electric-diesel buses was based on findings that they result in 50 to 60 percent fewer emissions than conventional diesel buses, with an improvement in fuel economy and noticeably quieter operations. The new buses began use in 2005.

Appendix B: Mitigation Measures

Impact Avoidance, Minimization or Mitigation Measures
Measures that would be included in the proposed project (as appropriate to the alternative actions) to minimize construction impacts to park resources are as listed below.

Air Quality

- Disposing of excess plant materials offsite (rather than burning onsite);
- Spraying water over exposed soil, particularly during dry conditions to minimize fugitive dust;
- Covering trucks transporting cut or fill material to reduce or eliminate particle release during transport;
- Encouraging contractor and NPS employees to travel together to and from the project site to the extent possible (rather than in multiple separate vehicles);
- Revegetating bare and staging areas as soon as possible; and
- Limiting vegetation removal within the project area.

Soils

- Locating staging areas where they will minimize new disturbance of area soils and vegetation.
- Minimizing ground disturbance to the extent possible.
- Minimizing driving over or compacting root-zones.
- Using mats or plywood to minimize soil compaction impacts in sensitive areas identified by the park.
- Salvaging topsoil from excavated areas for use in re-covering source area or other project areas.
- Not piling excavated soil alongside trees to remain, and provide tree protection for trees to remain.
- Minimize trenching around trees to remain in an effort to preserve the dripline soils. For roots two inches or larger in diameter, hand excavation would be used as appropriate to prevent damage.
- The drainage ditch at the Chinquapin Intersection which runs behind the Administrative Parking Area, which would be within the dripline of numerous trees, would be hand excavated to minimize impacts.
- Storing conserved topsoil in a separate location (segregated from subsoils).
- Windrowing topsoil at a height that will help to preserve soil microorganisms (less than three feet).
- Reusing (rather than removing from the project area) excavated materials for use in constructing berms or to level areas of impact.
- Revegetating project areas through native seeding or planting of appropriate areas along the road and obliterated turnouts.
- Berms created for roadside restoration would have a natural, undulating appearance and would use excavated fill as a first choice followed by clean fill as specified by the park.
- Importing weed-free clean fill and topsoil (if used).

Water Resources

- A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared by the Construction Contractor and implemented for construction activities to control surface run-off, reduce erosion, and prevent sedimentation from entering water bodies during construction. The SWPPP shall be submitted for park review and approval prior to construction.

- Develop and implement a comprehensive Spill Prevention/Response Plan that complies with federal and state regulations and addresses all aspects of spill prevention, notification, emergency spill response strategies for spills occurring on land and water, reporting requirements, monitoring requirements, personnel responsibilities, response equipment type and location, and drills and training requirements. The spill prevention/response plan will be submitted to the park for review/approval prior to commencement of construction activities.
- An Oil and Hazardous Materials Spill Prevention, Control, and Countermeasure Plan shall be prepared by the Construction Contractor for the project to address hazardous materials storage, spill prevention and response. The Plan shall be submitted for park review and approval prior to construction.
- Using temporary sediment control devices such as filter fabric fences, sediment traps, or check dams as needed during culvert replacement.
- Covering stockpiled soil throughout the duration of the project with semi-permeable matting or plastic or another type of erosion control material.
- Minimizing soil disturbance and re-seeding or revegetating disturbed areas as soon as practical.
- Retaining silt fencing or biodegradable sediment logs in disturbed areas until stabilization (by reseeding or revegetation).
- Using swales, trenches, or drains to divert storm water runoff away from disturbed areas.
- Locating staging areas away from areas where water would runoff to adjacent rivers and streams.
- Using tackifier / paper mulch for erosion control in revegetated areas and/or silt fences and seed-free sediment control barriers for erosion control.
- Requiring the submission of and reviewing an erosion control plan and storm water pollution prevention plan (as also required by California Water Quality Control Board).
- Requiring the contractor to install protective construction fencing around, adjacent to or near wetland and/or riparian areas that are to be protected or other erosion control measures to protect water resources (including near Grouse Creek) in the project area.

Vegetation

- Construction limits are mapped and may be flagged or fenced to protect sensitive areas. Work near wetland or riparian areas would follow best management practices to minimize impacts (siltation, erosion, compaction, etc.).
- Install temporary barriers to protect natural surroundings (including trees, plants, and root zones) and highly sensitive sites, such as creek edges and wetlands, from damage. Vegetation to be preserved within the project area would be clearly identified by marking, fencing, or another appropriate technique.
- Make every effort to protect wetlands from damage caused by construction equipment, erosion, siltation, and other ground-disturbing activities. Avoid fastening ropes, cables, or fences to trees and install signs as needed to direct use to more appropriate areas.
- Implement a noxious weed abatement program. Standard measures include the following elements: ensure construction-related equipment arrives on site free of mud or seed-bearing material, certify all seeds and straw material as weed-free, identify and treat areas of noxious weeds prior to construction, and revegetate with appropriate native species and monitor the restored site annually for three years to ensure absence of noxious weeds, successful revegetation, plant maintenance, and replacement of unsuccessful plant materials.
- Prior to entry into the park, steam-clean heavy equipment to prevent importation of non-native plant species, tighten hydraulic fittings, ensure hydraulic hoses are in good condition and replace if damaged, and repair all petroleum leaks.
- Inspect the project area to ensure that impacts stay within the parameters of the project area and do not escalate beyond the scope of the EA. Additionally, ensure that the project conforms with all applicable permits or project conditions. Store all construction

equipment within the delineated work limits. Confine work areas within creek channels to the smallest area necessary.

- Trees to be removed in selective vegetation removal would be flush cut, but not grubbed.
- Shrubs would be flush cut unless pre-identified for grubbing (such as those that root-crown sprout like ceanothus).
- Removal of vegetation would be done in a manner that would not affect vegetation not proposed for removal.
- A contractor damage clause for impacts to trees / vegetation not within the project area would be part of the contract for road rehabilitation.
- Imported topsoil and other materials sources would be submitted to the park for approval.
- The specific locations and type of vegetation work would be identified, specified in plans and approved by the Contracting Officer based on consultation with the park vegetation ecologist and forester (VMP).
- Only native species, appropriate to the site would be used in revegetation (seeding or planting).
- Salvage of topsoil and duff would occur in and adjacent to the rehabilitated shoulders and turnouts as appropriate, subject to approval from park staff.
- Salvage of vegetation would occur to the degree possible; staff time and need permitting, however, most plants would be propagated from seed collected within each plant community along the road where revegetation is needed.
- Park Resources staff will identify areas where Annosus root disease may be a problem, and where conifers (with a basal diameter of greater than eight inches) need to be treated with borax within 30 minutes of being cut and flush cut. (Annosus root disease colonizes freshly cut stump surfaces or wounds and can infect undamaged trees through root-to-root contacts) (VMP).
- Established vegetation on cut- or fill slopes would be retained unless it impedes visibility or road maintenance operations. Older plants have well-developed root systems that anchor soils on slopes. Younger plants have poorly developed root systems that hold only a small amount of soil and may actually destabilize slopes by adding extra weight (VMP).

Wildlife

- Installation of stream culverts would occur during low-flow conditions.
- Consult with Park Resources staff to minimize disturbance from construction activities in riparian areas during nesting and breeding season (spring and early summer).
- Routes of escape for animals that might fall into excavated pits and trenches would be maintained. During construction activities, Contractor personnel would maintain vigilance for animals caught in excavations and take appropriate action to free them.
- Limit the effects of light and construction noise where possible to avoid disturbance to nesting and breeding wildlife, especially if conducting night work.
- If any special-status species is observed nesting, a determination will be made as to whether or not the proposed action will affect the active nest or disrupt reproductive behavior. If it is determined that the action will not affect an active nest or disrupt breeding behavior, work will proceed without any restriction or mitigation measure. If it is determined that construction activities will affect an active nest or disrupt reproductive behavior, then avoidance strategies will be implemented.
- Proper food storage is mandatory, and important to protect the park's bear population.
- All food, toiletries, and scented items (i.e. bug spray) would be placed in bear boxes at the construction site. Bear boxes must remain closed and latched at all times, unless items are being retrieved. No trash, food, toiletries, or scented items would be stored in vehicles or left outside of bear boxes.
- All food waste and food-related waste would be disposed of promptly, in a bear-proof receptacle.
- All vehicles would be checked daily to ensure that no items that may attract bears remain inside an unattended vehicle. Items that would not be left in vehicles include canned

food, drinks, soap, cosmetics, toiletries, domestic trash, recyclable food containers, ice chests, grocery bags, and unwashed items used for preparing or eating meals.
- All windows and doors in recreational vehicles or trailers used for lodging or office space would be closed and latched when not occupied.
- The job site would be checked at the end of each day for trash, food, and food-related items remaining at the site.

Special Status Species
- Enhancement of hydrological flow patterns by locating more culverts in the project area.
- All reasonable efforts in accordance with the plans and specifications for the protection of threatened, endangered or candidate species including their habitat in accordance with federal, state, regional, and local laws and regulations.

Archeology
- The park archaeologist will be notified of the specific work schedule at Chinquapin prior to staging and construction.
- Monitoring will be focused in the vicinity of Chinquapin Intersection where buried historical deposits might be present beneath existing development. To ascertain presence/absence of archeological materials within the proposed construction zone, monitoring of ground-disturbing actions during construction would be conducted.
- Prior to construction, a monitoring plan would be prepared, detailing the final construction plans, the cultural material that might be encountered, important archeological questions that could be addressed (following the park's archeological research design [Hull and Moratto 1999]), and a range of treatment options (e.g., avoidance, data recovery) for any findings. If monitoring results in the discovery of important materials, then evaluating the eligibility of the site as a whole under the National Register of Historic Places criteria would be undertaken. This course of action could allow for a determination of "no adverse effect" to archeological resources under the 1999 Yosemite Programmatic Agreement.
- When it is necessary to stop work due to archeological resources discovery, the contractor would cease all activities in the area of discovery; allow the archeologist to complete investigations; and take measures to protect the resources discovered as directed by the park.
- In the unlikely event that human remains or any objects protected under the Native American Graves Protection and Repatriation Act (NAGPRA) are exposed, the NPS will follow procedures outlined in NAGPRA regulations (including the potential need to stop work for a minimum of 30 calendar days). Work may resume in non-sensitive areas during this time.

Historic Structures / Cultural Landscapes

<u>Chinquapin:</u>
- Although the exact historic configuration of the area in front of the comfort station is unknown, current conditions would be stabilized and improved in a future park project by the removal or burial of the utility box, and the appropriate design of pathways or terraces and landscaped vegetation that complement the style of the water fountain and remnants of stonework surrounding it. New infrastructure within this area would not compromise the ability to restore or enhance this landscaped area. Under the current project, placement of modern features such as garbage cans and display boards would be adjusted so as not to compete with the historic features of the area.
- Road rehabilitation would ensure that historic features are not adversely affected by the construction, and that no features incompatible with the historic character of the historic district are added.
- Remnant contributing vegetation in the area would be maintained. Revegetation of disturbed or restored areas within the intersection would borrow heavily from the historic plant palette, with the addition of other native plant species as necessary.

- The traffic island (and associated vegetation) outside of the ranger station would be preserved. Although the remaining traffic islands are non-contributing due to their substantially compromised integrity, their design would be compatible with the historic character of Chinquapin Intersection, including trying to maintain islands vegetated with either low-growing native shrubs (preferred) or low growing native herbaceous perennials.
- The new guardwalls proposed at the Chinquapin Intersection would be compatible with the design of other historic granite guardwalls along the Wawona Road.
- All contributing features within the Chinquapin Historic District shall be documented in accordance with Stipulation VIII A 1(b) of the 1999 Programmatic Agreement with black and white 5 x 7 photographic prints before and after construction. Copies of documentation would be deposited at the Yosemite archives and with SHPO.
- In accordance with Stipulation VIII A 2 of the 1999 Programmatic Agreement, if a contributing feature would be demolished, Yosemite historical architect, curator and/or preservation specialist would conduct a documented inspection to identify architectural elements and objects that may be reused in rehabilitating similar historic structures or that may be added to the Yosemite museum collection.

Glacier Point Road:

- The road's existing 10 foot travel lanes and vertical and horizontal alignment would be maintained.
- Road rehabilitation would ensure that historic features are not adversely affected by the construction, and that no features incompatible with the historic character of the historic district are added.
- Photographs of each culvert headwall would be used to verify reconstruction patterning.
- Historic culvert headwalls would be maintained if possible or reconstructed in kind if necessary. If additional stone is necessary for these headwalls, it should match the size, texture, color and masonry pattern of the pre-existing stone. Reconstruction and/or addition of new stone would be done to replicate the character of the joints, including mortar if present.
- Drop inlets will be placed where needed to accommodate drainage, and designed in consultation with Park Resources Staff to blend with the local site. Where granite is used, it should be of a color, texture and weathering pattern similar to existing local historic headwalls. New concrete and other construction should stand alone, without the support of the existing headwall.
- Riprap at culvert outlets would be as unobtrusive as possible. Stone would be selected to match the existing riprap along the road; using the riprap below the El Portal Overlook as a model.
- The historic guardwalls and retaining walls at the El Portal Overlook would be retained and repaired.
- The three historic turnouts at the El Portal Overlook would be retained.
- Limited tree removal would occur at El Portal Overlook to restore its historic viewshed.
- The existing visual character of the guardwalls and retaining walls for the new proposed guardwall and retaining wall at the El Portal Overlook would be matched.
- Asphalt curbing along the Glacier Point Road would be replaced sparingly with granite or concrete curb.
- New cut sections or fill sections along the road would use naturalistic design principles and minimize road scarring and any unnatural engineered forms.
- All contributing features and/or feature typologies within the Glacier Point Road Historic District would be documented in accordance with Stipulation VIII A 1(b) of the 1999 Programmatic Agreement by black and white 5 x 7 inch photographic prints before and after construction. Copies of documentation would be deposited at the Yosemite archives and with SHPO.
- In accordance with Stipulation VIII A 3 of the 1999 Programmatic Agreement, an interpretive panel would be placed at the El Portal Overlook, under a future park project,

to ensure that the story of human interaction with nature and changes in that interaction is told. This interpretive panel would include a history of the anthropogenic alterations to the Glacier Point Road landscape and reasons for those changes.

Visitor Experience

- Construction delays and one-lane closures would be enacted but would be no longer than 30 minutes per passage through the project.
- Evening, weekend and holiday work / construction delays or total road closures may require approval from the superintendent.
- Materials deliveries would (to the degree possible) take place in the early morning and late evening hours and would proceed along the shortest route possible.
- Press releases to local media, signs in the park and state highway information recordings would inform visitors about road conditions in the park during the project.
- Efforts will be made to schedule work around high visitor use days and times, such as holidays and weekends.
- Selective vegetation removal would be the minimum amount necessary to achieve road warming and increased sight distances or desired views.

Appendix C: Proposed Culverts and Other Drainage Modifications (Common to Alternatives 2 and 3)

** Estimated from 30 % plans*

LOCATION STATION	MAP NUMBER	SIZE DIAMETER X LENGTH	HISTORIC NEW NONHISTORIC	PROPOSED TREATMENT
Wawona Road				
18+70	W2	24" x 48' CMP	New	Add
21+55	A			Construct riprap rundown
24+37	W1	24" x 122' CMP	New	Add
Glacier Point Road				
3+05	GP1	24" x 46' CMP	New	Add
12+54	B		New	Construct riprap apron
14+75	GP2	24" X 40' CMP	New	Add
28+00	GP3	24" x 34' CMP	New	Add
33+50	C		New	Construct riprap rundown (50 feet)
35+73	GP4	24" x 32' CMP	New	Add
38+59	GP5	24" x 50' CMP	New	Add
near 44+00	D		Unknown	Remove paved asphalt waterway
52+00	E		New	Construct riprap apron
66+00	GP6	24" x 34' CMP	New	Add
70+35	F		New	Construct riprap rundown downhill TI 20 feet
70+50	G		New	Construct riprap apron uphill
84+00	GP7	24" x 36' CMP	New	Add
88+25	GP8	24" x 32' CMP	New	Add
90+72	GP9	24" x 38' CMP	New	Add
98+95	GP10	24" x 48' CMP	New	Add
99+11	GP11	24" x 16' CMP	New	Add
102+00	GP12	24" x 34' CMP	New	Add
106+00	GP13	24" x 42' CMP	New	Add
109+52	GP14	24" x 36' CMP	New	Add
115+66	GP15	36" x 66' CMP	New	Add
128+00	GP16	24" x 42' CMP	New	Add
132+60	H		New	Construct riprap apron
142+10	GP17	24" x 42' CMP	New	Add
151+70	I		New	Construct riprap rundown
154+90	GP18	24" x 40' CMP	New	Add
156+30 est	J		New	Construct riprap rundown
156+70	GP19	24" x 46' CMP	New	Add
158+70	GP20	24" x 42' CMP	New	Add

LOCATION STATION	MAP NUMBER	SIZE DIAMETER X LENGTH	HISTORIC NEW NONHISTORIC	PROPOSED TREATMENT
163+50	GP21	24” x 52’ CMP	New	Add
174+50 est	K		New	Construct riprap rundown
176+10	L		New	Construct riprap apron
179+50 est	M		New	Construct riprap rundown
184+60	N		New	Construct riprap apron
186+85	GP22	24” x 58’ CMP	New	Add
190+20	GP23	24 x 40 CMP	New	Add
195+00	O		New	Construct riprap apron
199+25	GP24	24” x 38’ CMP	New	Add
208+40	P		New	Construct riprap rundown at sag point 20 feet
218+16	GP25	30” x 50’ CMP	New	Add
220+40	Q		New	Construct riprap apron
221+00 est	R		New	Construct riprap rundown
223+50	GP26	24” x 42’ CMP	New	Add
229+40	GP27	24” x 32’ CMP	New	Add
234+90	S		New	Construct riprap rundown 20 feet
240+50	GP28	24” x 36’ CMP	New	Add
243+00	GP29	24 x 38 CMP	New	Add
245+00	GP30	24” x 42’ CMP	New	Add
248+70	T		New	Construct riprap rundown 20 feet
250+50 est	U		New	Construct riprap rundown
254+50 est	V		New	Construct riprap rundown
257+00	GP31	24” x 38’ CMP	New	Add
264+35	GP32	24” x 56’ CMP	New	Add
Badger Pass Ski Area Parking Lot				
D01	BP1	24” x 20’ CMP	New	Add
D02	W		New	Install 4-foot concrete gutter
D03	X	24” CMP	Unknown	Install 4-foot concrete gutter
D05	Y		New	Install standard underdrain system Connect to new inlet (D4)
D07	Z	see D8		Remove existing inlet
D08	AA		New	Install standard underdrain system
D12	BP2	24” x 154’ CMP	New	Add
D14	BP3	24” x 30’ CMP	New	Add
D15	BP4	24” x 96’ CMP	New	Add
D16	BP5	24” x 196’ CMP	New	Add
D17	CC		Unknown	Remove existing inlet
D18	DD		New	Construct riprap apron
D19	BB			Install 4-ft concrete gutter