FHWA-AZNV-EIS-98-03-F

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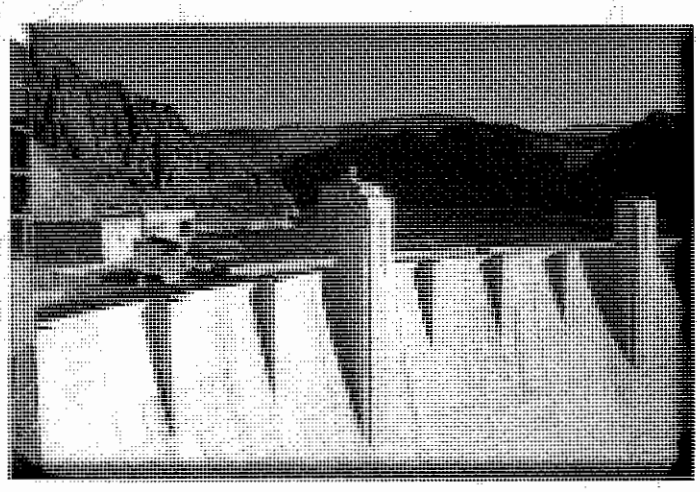
U.S. 93 Hoover Dam Bypass Project

Final Environmental Impact Statement and Section 4(f) Evaluation

Volume I



Federal Highway Administration

Central Federal Lands Highway Division

January 2001

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United States Government **Department of Ener**

Western Area Power Administrat

memorandum

DATE: MAR - 4 2003

REPLY TO ATTN OF: G0400

SUBJECT: Modification and Construction of Transmission Lines for the U.S. 93 Hoover Dam Bypass Project (DOE/EIS-0352)

TO:

Director of NEPA Policy and Compliance, EH-42

The Record of Decision (ROD) for the subject project was published in the Federal Register on October 1, 2002. In the ROD, Western Area Power Administration (Western) announced that an Environmental Assessment (EA) would be prepared for the second phase the Hoover Dam Bypass Project transmission line modifications. We are beginning EA activities for the second phase and are requesting you assign an EA number.

Under the second phase, Western proposes to double-circuit a portion of the Hoover-Mead #5 and #7 230-kV Transmission Lines with the Henderson-Mead #2 230-kV Transmission Line. A fiber optic cable will replace the overhead ground wire for the double-circuited transmission lines. The project is located east and south of Boulder City, Nevada, in Sections 29 and 30, T.22S., R.65E., Sections 25, 35 and 36, T.22S., R.64E., and Sections 2, 11, 14, 15, 22, 27 and 28, T.23.S., R.64E., MDM, Clark County, Nevada.

Ms. Alison Jarrett will be the NEPA Document Manager for the EA. If you have any questions please contact her at 602-352-2434 or jarrett@wapa.gov.

John R. Holt

John R. Holt
NEPA Compliance Officer
Desert Southwest Region

cc:
K. Nakata, Environmental Protection Specialist, EH-42, Washington, DC
1 hard copy of EIS-0352 received 3/18/03 (Vols I+II)✓
and ROD (March 2002)✓

FHWA-AZNV-EIS-98-03-F

U.S. 93 Hoover Dam Bypass
Final
Environmental Impact Statement
and Section 4(f) Evaluation

Submitted Pursuant to 42 U.S.C. 4332 (2) (c), 49 U.S.C. 303, and Section 404(b)(1) of the Clean Water Act, 33 U.S.C. 1344 by the U.S. Department of Transportation Federal Highway Administration and Cooperating Agencies:

- Arizona Department of Transportation
- Nevada Department of Transportation
- U.S. National Park Service
- U.S. Army Corps of Engineers
- U.S. Bureau of Reclamation
- U.S. Coast Guard
- U.S. Fish and Wildlife Service
- Western Area Power Administration

1/5/01
Date of Approval

Larry C. Smith, P.E.
Division Engineer
Central Federal Lands Highway Division

The following person(s) may be contacted for additional information concerning this document:

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Abstract

This final environmental impact statement (FEIS) and Section 4(f) Evaluation documents potential environmental impacts associated with the Hoover Dam Bypass Project on U.S. 93. The proposed project involves construction of a new bridge and highway access across the Colorado River in the vicinity of Hoover Dam. The length of the project is approximately 3.5 miles. The project is in Clark County, Nevada, and Mohave County, Arizona, and lies entirely on Federal Lands—Lake Mead National Recreation Area and the Hoover Dam Reservation. The new bridge and highway would correct alignment and capacity deficiencies on U.S. 93 and would eliminate truck traffic and reduce other through traffic over Hoover Dam. The FEIS addresses the social, environmental, and economic impacts associated with the preferred alternative, two other build alternatives, and a No Build Alternative. All three build alternatives use public recreation land and historic sites protected under Section 4(f) of the U.S. Department of Transportation Act of 1966.

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Preface

This Final Environmental Impact Statement (FEIS) consists of the complete text of the Draft EIS (DEIS) with revisions and additions based on supplemental research and public and agency comments. Substantive revisions to the DEIS are marked in this FEIS by a vertical line in the outside margin next to the revised or added text. The FEIS includes a new Volume II, which describes the DEIS notification and public hearing process, summarizes and reproduces all comments received on the DEIS, and provides responses to comments. This FEIS is also available for review on the U.S. 93 Hoover Dam Bypass Project web site at:

www.hooverdambypass.org

The Federal Highway Administration - Central Federal Lands Highway Division (FHWA) served as the lead agency in the preparation of this document. The following agencies served as cooperating agencies: Arizona Department of Transportation, Nevada Department of Transportation, U.S. National Park Service, U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, U.S. Coast Guard, U.S. Fish and Wildlife Service (USFWS), and the Western Area Power Administration.

On the basis of comments received on the DEIS, FHWA has identified the Sugarloaf Mountain Alternative, with the proposed mitigation measures incorporated herein, as the preferred alternative. The preferred alternative was identified on the basis of minimizing environmental impacts, engineering and operational advantages, and slightly lower construction cost. Sections of the DEIS that have been substantively rewritten or supplemented in response to public and agency comments consist of: Chapter 2 – Alternatives (discussion of preferred alternative identification); Chapter 3 – Biology (incorporation of USFWS Biological Opinion), Cultural Resources, Hazardous Materials, and Construction Impacts; Chapter 5 – Cumulative Impacts; Chapter 6 – Section 4(f) Evaluation; and Appendix B – Laughlin-Bullhead City Alternative.

The U.S. 93 Hoover Dam Bypass FEIS will be used by the FHWA to decide the various discretionary actions required to implement the project. FHWA's decisions will be identified in a Record of Decision. Statements on the FEIS will be accepted by the FHWA and considered in the decision on this proposed action. The FEIS is being distributed for a 30-day notification period that begins on January 19, 2001, and ends on February 20, 2001.

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Acronyms and Abbreviations

AADT	average annual daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACHP	Advisory Council on Historic Preservation
ACOE	United States Department of the Army, Corps of Engineers
A.D.	anno Domini
ADA	Americans with Disabilities Act
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADT	average daily traffic
AGFD	Arizona Game and Fish Department
ANSI	American National Standards Institute
APE	area of potential effects
APP	Aquifer Protection Permit
AQRV	air quality-related value
ARPA	Archaeological Resources Protection Act of 1979
ASC	Arizona Species of Concern
ASTIP	Arizona State Transportation Improvement Plan
ATR	automatic traffic recorder
BA	Biological Assessment
BARA	Bureau of Applied Research in Anthropology
BIA	Bureau of Indian Affairs
BMP	Best Management Practice
B.P.	Before Present (before 1950)
CAA	Clean Air Act
CAP	Central Arizona Project
CCDCP	Clark County Desert Conservation Program
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFLHD	Central Federal Lands Highway Division
CFR	Code of Federal Regulations
CO	carbon monoxide
CPI	Consumer Price Index

CPI-U	Consumer Price Index for All Urban Customers
dBA	decibels on the A-scale
DCS	Design Concept Study
DEIS	Draft Environmental Impact Statement
DOE	Department of Energy
DOI	U.S Department of the Interior
DOT	Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
e-mail	electronic mail
EO	Executive Order
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FE	Federally-Listed Endangered
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIA	Federal Insurance Administration
FONSI	Finding of No Significant Impact
FSC	Federal Species of Concern
FT	Federally-Listed Threatened
GCVTC	Grand Canyon Visibility Transport Commission
GMP	General Management Plan
g/VMT	grams per vehicle mile traveled
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HCS	Highway Capacity Software
HDNHL	Hoover Dam National Historic Landmark
HDR	Hoover Dam Reservation
HDRA	Hoover Dam Reservation Area
I-10	Interstate 10
I-15	Interstate 15
I-19	Interstate 19

IC	Interchange
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation Systems
km	kilometer
kV	kilovolt
LBA	Laughlin-Bullhead City Alternative
LCA	Laughlin Crossing Alignment
L_{eq}	equivalent sound pressure levels
LMNRA	Lake Mead National Recreation Area
LOS	level of service
LWCF	Land and Water Conservation Fund Act
M	Monitoring
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MP	mile post
mpg	miles per gallon
mph	miles per hour
MSCP	Multi-Species Conservation Program
NAAQS	National Ambient Air Quality Standards
NAFTA	North American Free Trade Agreement
NAGPRA	Native American Graves Protection and Repatriation Act of 1990
NDOT	Nevada Department of Transportation
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966, as amended
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NP	Nevada protected
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRA	National Recreation Area

NRHP	National Register of Historic Places
OHWM	ordinary high water mark
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
Pb	lead
PCB	polychlorinated biphenyl
PM_{10}	particulate matter with diameter less than 10 microns
$PM_{2.5}$	particulate matter with diameter less than 2.5 microns
PMT	project management team
ppm	parts per million
PSD	prevention of significant determination
R	receptor
RCRA	Resource Conservation and Recovery Act
Reclamation	Bureau of Reclamation
Reservation	Hoover Dam Reservation
ROD	Record of Decision
ROW	right-of-way
RV	recreational vehicle
SFHA	Special Flood Hazard Area
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulphur dioxide
SO_x	sulphur oxides
SR	State Route
STIP	Statewide Transportation Improvement Program
TCLP	toxicity characteristic leaching procedure
TCP	Traditional Cultural Property
TDS	total dissolved solids
TSCA	Toxic Substances Control Act
TSM	Traffic Systems Management
TVA	Tennessee Valley Authority
U.S.	United States
U.S. 93	United States Highway 93

U.S. 95	United States Highway 95
USDOT	United States Department of Transportation
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
V/C	volume to capacity
VMT	vehicle mile traveled
VOC	volatile organic compound
WAPA	Western Area Power Administration
WDM	Wetland Delineation Manual

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Executive Summary

Introduction

United States Highway 93 (U.S. 93) is part of the major transportation network in the western United States and has been designated as a North American Free Trade Agreement (NAFTA) route. The CANAMEX (Canada-Mexico) Corridor was formally designated a high-priority corridor by the National Highway System Designation Act of 1995. However, it cannot accommodate all of the traffic where it crosses over the top of Hoover Dam. To remedy this, the Federal Highway Administration (FHWA), in cooperation with affected state and federal agencies,[1] proposes to bypass Hoover Dam with a new bridge crossing of the Colorado River. This Environmental Impact Statement (EIS) describes the baseline conditions, anticipated impacts, and recommended mitigation. It was prepared in accordance with FHWA guidelines and the provisions of the National Environmental Policy Act (NEPA).

Scoping and Public Involvement

In 1989, the Bureau of Reclamation (Reclamation) created the "Colorado River Bridge Project Management Team" (PMT). The focus of the PMT was to perform engineering and environmental studies, to develop funding agreements, and to manage the design and construction of the new crossing. The PMT is still guiding the project and is made up of Reclamation, the FHWA, Arizona and Nevada Departments of Transportation, Western Area Power Administration (WAPA), and the National Park Service (NPS).

In May 1990, a Notice of Intent was published in the *Federal Register* initiating the EIS by Reclamation as lead agency and beginning the scoping process. Public scoping meetings were held in June 1990 in Kingman, Arizona, and Boulder City and Las Vegas, Nevada. In Boulder City, there was general concurrence that a new crossing was needed to remove traffic from Hoover Dam; however, some preferred to have a bypass around Boulder City in addition to Hoover Dam, while others felt that any road that bypassed Boulder City would severely impact downtown businesses. A newsletter, titled Update, was published in January 1991 and sent to interested individuals. Interviews with numerous community members and several meetings with interested members of the public, the Boulder City Chamber of Commerce, members of the Boulder City Council, and other organizations also occurred.

Prior to completion of the Draft Environmental Impact Statement (DEIS), Reclamation withdrew from the project as the lead agency in 1993. Reclamation's emphasis changed from construction of major public works projects to water resource management. With no lead agency or funding to continue the environmental process for a new crossing, the project was officially put on hold in 1995.

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[1]Arizona Department of Transportation, Nevada Department of Transportation, National Park Service, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Coast Guard, U.S. Fish and Wildlife Service, and Western Area Power Administration.

FHWA filed a Notice of Intent in September 1997 to announce FHWA as the new lead agency for environmental review of the project. FHWA conducted three public open houses to allow comment on the alternatives carried forward from the June 1990 scoping meetings. The open houses were held in Kingman, Boulder City, and Las Vegas in late October 1997 to provide information on the alternative alignments under consideration and solicit input for the environmental review process. Approximately 250 people attended. In addition to concerns about various environmental impacts from all three locations, many of the comments from Boulder City focused on considering other alternative crossings in addition to the three build alternatives.

FHWA completed and approved the DEIS on September 14, 1998. The DEIS was circulated to the public on September 25, 1998, with publication of the Notice of Availability in the *Federal Register*. From October 13 to 15, 1998, FHWA held DEIS public hearings on successive evenings in Kingman, Arizona, and Boulder City and Las Vegas, Nevada. Approximately 250 people attended the DEIS public hearings. The court reporter transcripts of oral comments received at the hearings are included in Volume II of the final EIS (FEIS). The entire DEIS was also accessible on the project web site; by November 10, 1998, the close of the DEIS comment period, the web site was accessed over 1,500 times. There were approximately 160 public and agency commenters on the DEIS, including comments received after the close of comment period. See Volume 2 for a full description of the DEIS public input process, the comments received, and the responses to comments.

Description of Proposed Alternatives

Along with the No Build Alternative, three build alternatives are evaluated in detail in this document. From north to south, they are Promontory Point, Sugarloaf Mountain (the preferred alternative), and Gold Strike Canyon. They share common termini, near MP 2.2 in Clark County, Nevada, and MP 1.7 in Mohave County, Arizona. Each alternative would entail construction of a four-lane highway, a new steel or concrete four-lane bridge over the Colorado River near Hoover Dam, four-lane approaches, and the approach bridges and tunnels needed for the approximately 3.5-mile-long project. Current highway design standards for a 60-mile-per-hour (mph) design would be required. Under the build alternatives, commercial trucks would be restricted from Hoover Dam according to vehicle weight or number of axles. The project would be located on lands under the jurisdiction of the U.S. Department of the Interior, Reclamation, and NPS.

Summary of Alternatives Considered

A range of alternatives was considered, and the identification of a preferred alternative was not made until the alternatives' impacts and comments on the DEIS and from the public hearings were fully evaluated. The four most reasonable alternatives fully evaluated (including the No Build Alternative) were developed to a comparable level of detail in the DEIS so that their comparative merits could be analyzed.

Cost Estimate Basis

The cost estimates shown for the alternatives studied in detail are based on the August 1992, Reclamation Phase B Study. The estimates shown in the Phase B Study were actually computed in 1991. Therefore, costs were inflated at 4 percent per year for 11 years, establishing a base year of 2002.

Promontory Point Alternative

The Promontory Point Alternative crosses Lake Mead about 1,000 feet upstream of Hoover Dam. This alternative requires constructing approximately 2.7 miles of highway approach in Nevada; a 2,200-foot-long bridge; and an approximately 0.9-mile highway approach in Arizona. The estimated cost is $204 million for base year 2002.

Sugarloaf Mountain Alternative (Preferred Alternative)

The Sugarloaf Mountain Alternative crosses the Colorado River about 1,500 feet downstream of Hoover Dam. This alternative requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,900-foot-long bridge, and an approximately 1.1-mile highway approach in Arizona. The estimated cost is $198 million for base year 2002.

Sugarloaf Mountain has been identified as the preferred alternative on the basis of minimizing environmental impacts, engineering and operational advantages, and slightly lower construction cost. A detailed discussion of the screening criteria used to identify the preferred alternative is in Section 2.6.2.1.

Gold Strike Canyon Alternative

The Gold Strike Canyon Alternative crosses the Colorado River about 1 mile downstream of Hoover Dam. This alternative requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,700-foot-long bridge, and a 1.1-mile highway approach in Arizona. The estimated cost is $215 million for base year 2002.

No Build Alternative

The No Build Alternative is no action being taken. No Hoover Dam Bypass is developed; no change in the current highway configuration occurs; and no other structural or nonstructural improvements are developed on U.S. 93 near Hoover Dam. Existing hairpin curves, bottleneck conditions, inadequate sight distances, narrow dam crest roadway, and steep grades on U.S. 93 in the Hoover Dam vicinity remain unchanged.

The No Build Alternative does not meet the project purpose and need (see Chapter 1) because it does not decrease travel times or increase travel speeds in the vicinity of the dam. The increased traffic, which will continue to travel at slower speeds, contributes to decreased air quality in the Hoover Dam vicinity and increases accidents and congestion for tourists at Hoover Dam and the Lake Mead National Recreation Area (LMNRA). The potential for a catastrophe involving vehicles containing hazardous materials reasonably may be expected to increase with increasing traffic volume. Risks to innocent bystanders, property damage to the dam and its facilities, contamination of Lake Mead or the Colorado River, and interruption of the power and water supplies to Southwest residents remains or increases.

Summary of Environmental Impacts

Table ES-1 summarizes the impacts identified for the three build alternatives and the No Build Alternative.

Table ES-1
Summary of Environmental Impacts

Resource	Alternative: Promontory Point	Alternative: Sugarloaf Mountain	Alternative: Gold Strike Canyon	Alternative: No Build
Air Quality	Construction would cause an increase in localized airborne dust and microscopic particulate matter. After mitigation, this impact would be reduced to an acceptable level. A beneficial impact would occur after construction because traffic-caused exhaust fumes would be reduced at Hoover Dam.	Construction would cause an increase in localized airborne dust and microscopic particulate matter. After mitigation, this impact would be reduced to an acceptable level. A beneficial impact would occur after construction because traffic-caused exhaust fumes would be reduced at Hoover Dam.	Construction would cause an increase in localized airborne dust and microscopic particulate matter. After mitigation, this impact would be reduced to an acceptable level. A beneficial impact would occur after construction because traffic-caused exhaust fumes would be reduced at Hoover Dam.	Air quality in the proposed project area would decrease because traffic would continue to move slowly over the Hoover Dam crossing.
Noise	Short-term noise impacts during construction. No noise impact during operation.	Short-term noise impacts during construction. No noise impact during operation.	Short-term noise impacts during construction. Even with mitigation, operation would result in a 20-decibel increase from existing noise levels at the upper end of Gold Strike Canyon.	Noise impacts at Hoover Dam from increased traffic associated with this alternative would exceed any of the build alternatives.
Biological Resources	Disturbance of 0.6 acre of desert wash habitat. Peregrine falcon: breeding territory within 1 mile of bridge site. Desert tortoise[a]: loss of 129 acres of marginal habitat; may affect 8 tortoises in low density population.	Disturbance of 0.3 acre of desert wash habitat. Peregrine falcon: may forage within project area. Desert tortoise[a]: loss of 120 acres of marginal habitat; may affect 8 tortoises in low density population.	Disturbance of 11.0 acres of desert wash habitat. Peregrine falcon: possible breeding territory within 1 mile of bridge site. Desert tortoise[a]: loss of 131 acres of marginal habitat; may affect 9 tortoises in low density population.	No impacts.

Table ES-1
Summary of Environmental Impacts

Resource	Alternative			
	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon	No Build
	Desert bighorn sheep: impact to 25 acres of lambing habitat; access to 1 natural water source disrupted.	Desert bighorn sheep: impact to 20 acres of lambing habitat; impact to 1 human-made water source.	Desert bighorn sheep: Impact to 55 acres of lambing habitat; access to 3 natural water sources disrupted.	
Water Resources	Erosion of cut and fill slopes; sediment and containment transport; and increased surface runoff.	Erosion of cut and fill slopes; sediment and containment transport; and increased surface runoff.	Erosion of cut and fill slopes; sediment and containment transport; and increased surface runoff. Gold Strike has the greatest potential for construction impacts.	Continued danger of major hazardous material spill on dam and contamination of lake and river waters.
Cultural Resources [acreage impacted included under Section 4(f)]	Nonmitigable adverse effect to historic views of Hoover Dam (National Historic Landmark).	Mitigable adverse effect to historic setting of Hoover Dam (National Historic Landmark).	No adverse effect to historic setting of Hoover Dam (National Historic Landmark).	No impacts
	Adverse effect on seven historic features eligible for or listed in National Register. A portion of this route is also located in a traditional cultural property.	Adverse effect on eight historic features eligible for or listed in National Register[b]. A portion of this route is also located in a traditional cultural property.	Adverse effect on five historic features eligible for or listed in National Register. A portion of this route is also located in a traditional cultural property.	
Section 4(f)	74 acres of Section 4(f) lands would be impacted. Potential spill in lake could impact additional thousands of acres of recreational waters in LMNRA. Adversely impacts historic "first impression" views of the landmark.	92 acres of Section 4(f) lands would be impacted.	128 acres of Section 4(f) lands would be impacted.	No impacts.

Table ES-1
Summary of Environmental Impacts

Resource	Alternative: Promontory Point	Alternative: Sugarloaf Mountain	Alternative: Gold Strike Canyon	Alternative: No Build
Visual Resources	Would alter view of Lake Mead and upstream landforms from dam and adjacent shores.	Would alter view of downstream landforms from dam and of Hoover Dam from the river and adjacent shores.	Would alter views of Gold Strike Canyon and Black Canyon. Bridge would not be visible from Hoover Dam.	No impacts.
Recreation Resources [acreage impact included under Section 4(f)]	Restrictions on recreation activities within construction safety zone during construction.	Restrictions on recreation activities within construction safety zone during construction. Minor effect on rafting concessions during construction.	Restrictions on recreation activities within construction safety zone during construction. Effect on river rafting, rock climbing, nature study, and hiking. Canyon Trail closed for 5- to 6-year construction period.	Increased traffic at the dam would diminish the quality of recreational experience.
	New bridge would become a tourist attraction.	New bridge would become a tourist attraction.		
Socio-economics	Beneficial impacts from improvements to transportation and circulation.	Beneficial impacts from improvements to transportation and circulation.	Beneficial impacts from improvements to transportation and circulation.	Adverse impact on transportation and circulation. Beneficial impacts associated with a build alternative would not occur.
Hazardous Materials	Impacts Reclamation warehouse storage yard, which has known past and present use and storage of chemicals, and leaking underground fuel storage tanks; impacts two contractor staging and disposal areas where petrochemicals were stored; impacts dump pile, from original dam construction, with rusted metal drums and scrap; also	Impacts Reclamation warehouse storage yard, which has known past and present use and storage of chemicals, and leaking underground fuel storage tanks; impacts two contractor staging and one disposal area where petrochemicals were stored; possibly impacts Arizona-Nevada Switchyard, with noted ground	Impacts the Nevada Spoil Pile, which has numerous metal drums, potential asbestos-containing roofing material, and potential contamination from chemical releases.	See Water Resources.

Table ES-1
Summary of Environmental Impacts

Resource	Alternative			
	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon	No Build
	impacts abandoned switchyard with potential polychlorinated biphenyl (PCB) contamination in soil.	staining and potential PCB contamination in soil; also impacts Reclamation sewage ponds with potential industrial wastewater contamination.		

[a] These are combined impacts to both Mojave (Nevada) and Sonoran (Arizona) desert tortoises. For the federally listed threatened Mojave desert tortoise, the following impacts would occur: Promontory Point – 95 acres of habitat and 6 tortoises lost; Sugarloaf Mountain – 80 acres of habitat and 5 tortoises lost; and Gold Strike Canyon – 89 acres of habitat and 5 tortoises lost.

[b] An additional, comprehensive historic resources survey was conducted on the Sugarloaf Mountain alignment after it was identified as the preferred alternative, resulting in recordation of seven additional historic features relating to the construction and operation of Hoover Dam. Two of the eight impacted sites would be affected only by a change in historic setting.

Section 4(f) Evaluation

Section 4(f) of the U.S. Department of Transportation Act of 1966, codified in federal law at 49 U.S.C. § 303, declares, "It is the policy of the United States government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation land, wildlife and waterfowl refuges, and historic sites." Section 4(f) specifies, "The Secretary [of Transportation] may approve a transportation program or project...requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site), only if:

1. There is no feasible and prudent alternative to using that land; and

2. The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

Initial alternatives that avoid Section 4(f) land were determined to be unfeasible and imprudent due to: (1) the geographic extent of LMNRA and the location of the proposed project; (2) unfeasible engineering economics; (3) not accomplishing the project purpose and need; and (4) imprudent increases in travel time, user costs, and environmental impacts.

Alternatives using Section 4(f) land were then screened to determine the least-harm alternative based on the amount of area used, the location of the portion used, severity of the portion used, and the function of the portion used. The alternatives south of the Sugarloaf Mountain alignment to Cottonwood Cove and the Temple Bar Alternative were eliminated based on extensive impact to essentially undisturbed Section 4(f) land. The Laughlin-Bullhead City Alternative was eliminated because it does not meet the purpose and need and it would cost an additional $1.4 billion in 20-year total costs. Modifications to

the crest of Hoover Dam would not meet the purpose and need and would result in direct physical alteration of the Hoover Dam National Historic Landmark. The remaining alternatives are therefore Sugarloaf Mountain and Promontory Point.

From these two, the Sugarloaf Mountain Alternative was determined to be the least harm alternative based on the following factors:

- Strong public concern regarding hazardous materials spills in Lake Mead from the Promontory Point Alternative
- Resource and regulatory agency support for Sugarloaf Mountain due to least impact to wildlife, wildlife habitat, and water quality
- No effect on the "first impression" historic views of Hoover Dam
- Ability to more readily blend the Sugarloaf Mountain Alternative into the landscape
- Sugarloaf Mountain Alternative traverses National Register-eligible Traditional Cultural Property (TCP) in an area of extensive disturbance
- Ability to minimize and mitigate impacts through continuing consultation and Native American participation on the Design Advisory Panel (DAP)

Areas of Controversy

One area of controversy has been the elimination of the Willow Beach South Route as a feasible alternative. This alternative would cross the Colorado River about 14 miles downstream of Hoover Dam and would require constructing approximately 22.3 miles of new highway approaches in Nevada and Arizona. This route was eliminated from further consideration because it requires about 19 miles of additional construction, has significantly greater environmental impacts and impacts to Section 4(f) lands, higher costs, and potential adverse economic impacts to Boulder City as a result of bypassing the city and diverting traffic away from downtown businesses.

An alternative Colorado River crossing for rerouted trucks near Laughlin, Nevada, and Bullhead City, Arizona, was initially evaluated and eliminated because the route is 23 miles longer, has 17 more miles of steep grades than the U.S. 93 route via Hoover Dam, and fails to meet the purpose and need for the project. It was re-evaluated in response to public comments made during the preparation of this document. Additional analyses were conducted (Appendix A, Traffic Analysis, and Appendix B, Laughlin-Bullhead City Alternative Study); and it was eliminated from detailed consideration because it would not meet the purpose and need of the project; would not reduce travel time; had much higher operational costs; would have adverse impacts on public safety, sensitive wildlife species, and air quality; would not protect the Hoover Dam Historic Landmark; and would not fully address long-term traffic issues on Hoover Dam.

Other Federal Actions Required for This Project

Federal actions and approvals needed for this project include those listed in Table ES-2.

Table ES-2
Permits and Approvals Anticipated for the Hoover Dam Bypass Project

Agency	Regulated Activity	Required Permit or Approval
Federal		
U.S. Army Corps of Engineers	Discharge of dredge or fill material into U.S. waters	Section 404 Permits
Federal Advisory Council on Historic Preservation (ACHP)	Adverse effects on Historical and Cultural Properties	Programmatic Agreement (PA) between FHWA, Nevada State Historic Preservation Officer (SHPO), the Arizona SHPO, and the ACHP
U.S. Bureau of Reclamation	Use of additional right-of-way for roadway and bridge	Easement
U.S. Bureau of Reclamation	Water use during construction	Water Use Permit
National Park Service	Acquisition of additional right-of-way for roadway and bridge	Easement
U.S. Coast Guard	Impacts on navigable waters (Promontory Point Alt. only)	Section 9 Permit
U.S. EPA	Stormwater discharges	National Pollution Discharge Elimination System (NPDES) Permit
U.S. Fish and Wildlife Service	Impacts on special-status vegetation and wildlife species	Biological Opinion

Summary of Mitigation Measures

Table ES-3 summarizes the measures to minimize harm identified for the three build alternatives.

Table ES-3
Summary of Mitigation Measures[a]

Promontory Point Alternative	Sugarloaf Mountain Alternative	Gold Strike Canyon Alternative
	Air Quality Effects	
Construction	Construction	Construction
Adherence to Clark County dust abatement permit restrictions and requirements in state of Nevada. Comply with ADEQ permit stipulations for portable sources of air pollution in Mohave County, Arizona.	Adherence to Clark County dust abatement permit restrictions and requirements in state of Nevada. Comply with ADEQ permit stipulations for portable sources of air pollution in Mohave County, Arizona.	Adherence to Clark County dust abatement permit restrictions and requirements in state of Nevada. Comply with ADEQ permit stipulations for portable sources of air pollution in Mohave County, Arizona.
Operation	Operation	Operation
No mitigation required.	No mitigation required.	No mitigation required.

Table ES-3
Summary of Mitigation Measures[a]

Promontory Point Alternative	Sugarloaf Mountain Alternative	Gold Strike Canyon Alternative
Noise Effects		
Construction	Construction	Construction
Comply with equipment manufacturer standards and specifications.	Comply with equipment manufacturer standards and specifications.	Comply with equipment manufacturer standards and specifications.
Implement remedial measures in response to specific noise complaints.	Implement remedial measures in response to specific noise complaints.	Implement remedial measures in response to specific noise complaints.
Develop/implement blasting control provisions and limitations.	Develop/implement blasting control provisions and limitations.	Develop/implement blasting control provisions and limitations.
Operation	Operation	Operation
No mitigation required.	No mitigation required.	Consider construction of noise barriers along about 7,000 feet of the roadway facing the canyon trail.
Biological Resource Effects		
Construction	Construction	Construction
Revegetate disturbed land; protect desert washes with barriers; construct offsite watering facilities; build wildlife overpasses and underpasses; place fencing along corridor to guide bighorn sheep and other wildlife to crossing structures; implement monitoring plan to assess effectiveness of bighorn sheep mitigation; contribute project funds to desert tortoise habitat compensation program; conduct preconstruction and preblasting tortoise surveys; relocate tortoises from construction areas; initiate construction worker desert tortoise education program; remove trash to minimize predation on tortoises; minimize destruction of desert tortoise habitat; designate a biologist to oversee tortoise mitigation compliance during construction; construct barriers and underpasses to prevent tortoise road kills, conduct monitoring program of peregrine falcon breeding pairs before/during/after construction; restrict blasting operations during peregrine falcon breeding season; monitor bald eagle use of bridge sites prior to construction; protect bald eagle perch sites; construct a catch net and temporary spill containment	Revegetate disturbed land; protect desert washes with barriers; construct offsite watering facilities; build wildlife overpasses and underpasses; place fencing along corridor to guide bighorn sheep and other wildlife to crossing structures; implement monitoring plan to assess effectiveness of bighorn sheep mitigation; contribute $46,960 in project funds to desert tortoise habitat compensation program; conduct preconstruction and preblasting tortoise surveys; relocate tortoises from construction areas; initiate construction worker desert tortoise education program; remove trash to minimize predation on tortoises; minimize destruction of desert tortoise habitat; designate a biologist to oversee tortoise mitigation compliance during construction; conduct monitoring program of peregrine falcon breeding pairs before/during/after construction; restrict blasting operations during peregrine falcon breeding season; monitor bald eagle use of bridge sites prior to construction; protect bald eagle perch sites; construct a catch net and temporary spill containment system, scale loose rocks prior to/during excavation, and use	Revegetate disturbed land; protect desert washes with barriers; construct offsite watering facilities; build wildlife overpasses and underpasses; place fencing along corridor to guide bighorn sheep and other wildlife to crossing structures; implement monitoring plan to assess effectiveness of bighorn sheep mitigation; contribute project funds to desert tortoise habitat compensation program; conduct preconstruction and preblasting tortoise surveys; relocate tortoises from construction areas; initiate construction worker desert tortoise education program; remove trash to minimize predation on tortoises; minimize destruction of desert tortoise habitat; designate a biologist to oversee tortoise mitigation compliance during construction; conduct monitoring program of peregrine falcon breeding pairs before/during/after construction; restrict blasting operations during peregrine falcon breeding season; monitor bald eagle use of bridge sites prior to construction; protect bald eagle perch sites; construct a catch net and temporary spill containment system, scale loose rocks prior to/during excavation, and use

Table ES-3
Summary of Mitigation Measures[a]

Promontory Point Alternative	Sugarloaf Mountain Alternative	Gold Strike Canyon Alternative
system, scale loose rocks prior to/during excavation, and use netting on canyon slopes to minimize rock-fall impacts on Devil's Hole pupfish, razorback sucker, and bonytail chub; preconstruction surveys and possible salvage of bicolored penstemon.	netting on canyon slopes to minimize rock-fall impacts on Devil's Hole pupfish, razorback sucker, and bonytail chub; preconstruction surveys and possible salvage of bicolored penstemon; replace Reclamation sewage evaporation ponds as a wildlife watering source.	netting on canyon slopes to minimize rock-fall impacts on Devil's Hole pupfish, razorback sucker, and bonytail chub; preconstruction surveys and possible salvage of bicolored penstemon.
Operation	Operation	Operation
Wildlife underpasses, overpasses, and alternate watering sources will be maintained.	Wildlife underpasses, overpasses, and alternate watering sources will be maintained.	Wildlife underpasses, overpasses, and alternate watering sources will be maintained.
Water Resource Effects		
Construction	Construction	Construction
Comply with National Pollutant Discharge Elimination System (NPDES) permit requirements as necessary and appropriate; implement best management practices (BMPs) to reduce potential for degrading offsite water quality; develop extensive BMPs for dewatering during pier construction; construct sediment basins to treat runoff before discharge and for containment of hazardous material spills; inspect construction equipment for leakage; locate refueling and vehicle maintenance facilities away from water pathways; design and construct temporary sanitary waste facilities to protect surface and subsurface water resources; construct bridge under accelerated schedule; utilize catch net for falling debris.	Comply with NPDES permit requirements as necessary and appropriate; implement BMPs to reduce potential for degrading offsite water quality; construct sediment basins to treat runoff before discharge and for containment of hazardous material spills; inspect construction equipment for leakage; locate refueling and vehicle maintenance facilities away from water pathways; design and construct temporary sanitary waste facilities to protect surface and subsurface water resources; relocate sewer evaporation ponds; utilize catch net for falling debris.	Comply with NPDES permit requirements as necessary and appropriate; implement BMPs to reduce potential for degrading offsite water quality; construct sediment basins to treat runoff before discharge and for containment of hazardous material spills; inspect construction equipment for leakage; locate refueling and vehicle maintenance facilities away from water pathways; design and construct temporary sanitary waste facilities to protect surface and subsurface water resources; utilize catch net for falling debris.
Operation	Operation	Operation
Proper design of discharge control features; bridge runoff control/ collection system; protection of roadside conveyance structures; settling basins for roadway runoff capture.	Proper design of discharge control features; bridge runoff control/ collection system; protection of roadside conveyance structures; settling basins for roadway runoff capture.	Proper design of discharge control features; bridge runoff control/ collection system; protection of roadside conveyance structures; settling basins for roadway runoff capture.
Cultural Resource Effects		
Construction	Construction	Construction
Consultation with Nevada and Arizona SHPOs and Native American Tribes for adverse effect	Consultation with Nevada and Arizona SHPOs and Native American Tribes; PA with Advisory	Consultation with Nevada and Arizona SHPOs and Native American Tribes for adverse

Table ES-3
Summary of Mitigation Measures[a]

Promontory Point Alternative	Sugarloaf Mountain Alternative	Gold Strike Canyon Alternative
on National Historic Landmark (NHL), related properties eligible for National Register, and TCP.	Council, SHPOs, NPS, Reclamation, WAPA, NDOT, ADOT, and Native American Tribes for adverse effect on NHL, related properties eligible for National Register, and TCP; apply mitigation measures developed through the PA relating to bridge and corridor design elements and TCP treatment plan.	effects on National Register properties related to Hoover Dam; impacts on TCP would be severe, and it is uncertain if any mitigation would be acceptable to the tribes.
Operation	Operation	Operation
Consultation with SHPOs and tribes for resolution of long-term effects.	Apply measures developed through the PA to minimize long-term effects.	Consultation with SHPOs and tribes for resolution of long-term effects.
Land Use/Section 4(f) Effects		
Construction	Construction	Construction
PA with SHPOs, Advisory Council, and other parties for adverse effects on NHL and TCP; HAER photo documentation of historic dam views and features; consult with Tribes for TCP mitigation; coordinate access under bridge construction for boat tours and recreationists.	PA with SHPOs, Advisory Council, NPS, Reclamation, WAPA, NDOT, ADOT, and Native American Tribes for measures to minimize harm to NHL, related properties eligible for National Register, and TCP; coordinate construction access with raft tours and recreationists.	PA with SHPOs, Advisory Council, and other parties for adverse effects on National Register properties; impacts on TCP would be severe, and it is uncertain if any mitigation would be acceptable to the tribes; coordinate access under bridge construction for raft tours and recreationists.
Operation	Operation	Operation
Provision for bicycle trail grade separation for access to dam crossing and connections to new U.S. 93 crossing; form and color of bridge structure compatible with NHL and visual environment.	Provision for bicycle trail grade separation for access to dam crossing and connections to new U.S. 93 crossing; form and color of bridge structure compatible with NHL and visual environment.	Provision for bicycle access to dam crossing and connections to new U.S. 93 crossing; form and color of bridge structure compatible with visual environment; consider construction of noise barriers to minimize impact on hikers in upper canyon.
Visual Resource Effects		
Construction	Construction	Construction
Implement public information program; provide visual simulation and project information.	Implement public information program; provide visual simulation and project information.	Implement public information program; provide visual simulation and project information.
Operation	Operation	Operation
Impacts could be lessened for the bridge by coloring the concrete or steel to blend with the surroundings; use of colored concrete on cable stayed and suspension bridge would reduce effect; use of desert varnish stain on rock slopes.	Use of colored concrete or steel on bridge would reduce effect; use of desert varnish stain on rock slopes; set arch bridge deck height to retain mountain view from dam, if feasible.	Impacts would be reduced by coloring the concrete or steel to blend with the surroundings.

Table ES-3
Summary of Mitigation Measures[a]

Promontory Point Alternative	Sugarloaf Mountain Alternative	Gold Strike Canyon Alternative
	Recreation Resource Effects	
Construction Properly post/restrict access to construction areas; coordinate construction activities with Lake Mead Cruises; mark construction zone in Lake Mead with buoys; use netting to prevent debris from falling into river/lake and to protect recreationists.	Construction Properly post/restrict access to construction areas; coordinate construction activities with Colorado River raft and canoe launching sites; use netting to prevent debris from falling into river/lake and to protect recreationists.	Construction Properly post/restrict access to construction areas; coordinate construction activities with Colorado River raft and canoe launching sites; use netting to prevent debris from falling into river/lake and to protect recreationists; closure of hiking trail is unmitigable.
Operation Use unobtrusive, nonglare color for bridge; no additional mitigation required.	Operation Use unobtrusive, nonglare color for bridge; no additional mitigation required.	Operation Use unobtrusive, nonglare color for bridge; consider installation of noise barriers adjacent to hiking trail.
	Socioeconomic Effects	
Construction No mitigation required.	Construction No mitigation required.	Construction No mitigation required.
Operation No mitigation required.	Operation No mitigation required.	Operation No mitigation required.
	Hazardous Materials Effects	
Construction Investigate hazardous material use and releases, and analyze soil samples at Reclamation warehouse storage yard; assess contractor staging and disposal areas, and conduct soil sampling if needed; conduct sampling at dump pile and remediate any contaminated soils, also control runoff to site; conduct soil sampling at abandoned switchyard and remove/remediate any PCB-contaminated soils, also control runoff to site.	Construction Investigate hazardous material use and releases, and analyze soil samples at Reclamation warehouse storage yard; assess contractor staging and disposal areas, and conduct soil sampling if needed; possibly conduct soil sampling at the Arizona-Nevada Switchyard and remove/remediate any PCB-contaminated soils, also control runoff to site; conduct soil and sludge sampling at the Reclamation sewage evaporation ponds, and properly remove any contaminated soils.	Construction Control roadway runoff from Nevada Spoil Pile through use of barriers or diversion channels.
Operation No mitigation required.	Operation No mitigation required.	Operation No mitigation required.

[a] No mitigation measures were identified for the No Build Alternative.

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CHAPTER 1

Purpose and Need

1.1 Introduction

United States Highway 93 (U.S. 93) is the major commercial corridor for interstate commerce among the states of Arizona, Nevada, and Utah. It is also a direct link between Phoenix and Las Vegas, which are two of the fastest growing areas in the United States. It carries a high volume of traffic from Interstate 40 to Las Vegas and Interstate 15 (I-15). Approximately 30 miles southeast of Las Vegas, U.S. 93 crosses the Colorado River over Hoover Dam. Traffic on Hoover Dam has become highly congested and hazardous vehicle/pedestrian conflicts have increased as a result of large traffic volumes from both private and commercial vehicles that use these routes from the south, southwest, and southeast. The traffic volumes, combined with the mountainous terrain, hairpin curves, inadequate sight distance, narrow dam crest roadway, and steep grades in the Hoover Dam vicinity, create a major bottleneck with high accident potential and substantial delays.

The U.S. 93 corridor, in combination with other highways, creates a continuous north to south corridor between Canada and Mexico, through the United States from Calgary, Alberta, to Nogales, Sonora (Figure 1-1). These highways, consisting generally of four-lane divided facilities with structural sections capable of supporting heavy vehicles, provide north-south linkages from the international border with Mexico via Interstate 19 (I-19) from Nogales to Tucson and Interstate 10 (I-10) from Tucson to Phoenix, in Arizona; and Interstate 15 (I-15) in Nevada, Utah, Idaho, and Montana to the Canadian border. U.S. 93 provides a north-south link between I-10 near Phoenix and I-15 in the Las Vegas metropolitan area. Much of U.S. 93, along with other roadway facilities in the corridor, consists of two-lane undivided highway.

Currently the Nogales, Mexico, border crossing handles more than 250,000 truck crossings annually and is the primary point of entry for produce shipped by truck into the United States from Mexico (*U.S. 93 Development Study*, ADOT, 1993). The U.S. 93 corridor has been recommended by the Arizona Department of Transportation (ADOT) to become Arizona's link in the international trade route proposed by the North American Free Trade Agreement (NAFTA). In addition to connecting Las Vegas and Phoenix, this corridor also links these cities with Tucson and Salt Lake City, Utah.

ADOT plans to improve U.S. 93 to a four-lane divided facility from the Phoenix area to north of Kingman, Arizona. In Nevada, U.S. 93 is a four-lane facility from Las Vegas to Boulder City. The Nevada Department of Transportation (NDOT) is currently evaluating transportation improvements in the Boulder City/U.S. 93 Corridor. After implementing ADOT and NDOT improvements, the only section of U.S. 93 between Phoenix and Las Vegas to remain a two-lane facility will be the 19-mile segment that includes Hoover Dam. While most of the corridor would consist of a high-speed divided facility, the segment in the Hoover Dam vicinity creates a traffic bottleneck between Nevada and Arizona, potentially interfering with interstate and international commerce.

Hoover Dam is the only Colorado River crossing near Las Vegas. The closest alternate crossings are at Davis Dam, 67 miles downstream or at Laughlin, Nevada, 70 miles downstream (Figure 1-2). Because shorter travel times and distances reduce accident exposure and transit costs, the shorter Hoover Dam crossing is preferred by the commercial trucking industry for travel in the Las Vegas-to-Phoenix corridor.

Alternatives to crossing the Colorado River at Hoover Dam are United States Highway 95 (U.S. 95) and State Route 163 (SR 163) in Nevada to Arizona State Route 68 (SR 68) (Figure 1-2), which would add 23 miles to the trip from Las Vegas to Kingman. Another route from Las Vegas to Kingman—U.S. 95 to Interstate 40 to Needles, California, and then east to Kingman—adds 70 miles to the trip.

If the existing bottleneck is eliminated at the dam, U.S. 93 across the Colorado River would be the shortest and fastest route for through traffic between Arizona and Nevada. Traffic flow is generally at speeds near posted limits except at the roadway approaches to Hoover Dam. Average speeds recorded on dam approaches and across the dam crest were as low as 8 miles per hour (mph) (*Traffic Study: Colorado River Bridge*, December 1991).

1.2 History

Hoover Dam, dedicated in 1935, is approximately 9 miles east of Boulder City and 80 miles northwest of Kingman (Figure 1-2). The dam is 1,244 feet long and is situated in the Black Canyon of the Colorado River at the southeastern border of Nevada and the northwestern border of Arizona.

In 1955, the American Society of Civil Engineers named Hoover Dam one of America's seven modern civil engineering wonders. In 1985, it was designated by the U.S. Department of the Interior (DOI) as a National Historic Landmark (NHL) and by the American Society of Civil Engineers as a National Historic Civil Engineering Landmark.

Hoover Dam is key to controlling and regulating the lower Colorado River. It controls floods; stores water for irrigation, municipal, and industrial uses; and provides hydroelectric power generation, recreation opportunities, and wildlife habitat. Except for the tourist facilities, the area surrounding Hoover Dam (known as the Hoover Dam Reservation) is designated as a security-restricted area and is not accessible to the public.

The original road from Boulder City to Hoover Dam was built to provide access for dam construction. From 1934 until the early 1940s, vehicular traffic to the dam came primarily from Las Vegas and Boulder City on U.S. 93. Because few vehicles crossed the dam at that time, there was no interference with dam operations and no traffic safety hazards for dam visitors.

Originally, the highway from Kingman to the dam was a lightly traveled primitive dirt road. Since the early 1940s, ADOT has been improving U.S. 93 between the dam and Kingman, the shortest travel route between Arizona and Nevada. As a result of these highway improvements and the shorter travel distances between Kingman and Las Vegas, through traffic over the dam has steadily increased. This increase, together with population growth in southern Nevada and increasing tourist traffic to Las Vegas, has resulted in serious traffic congestion on U.S. 93 on and near the dam.

As early as 1965, Reclamation recognized the U.S. 93 problems, including sharp turns; narrow roadways; inadequate shoulders; poor sight distances; low travel speeds; and the associated potential for loss of life, contamination of Lake Mead and the Colorado River from hazardous material spills, and effects to Hoover Dam because of these roadway deficiencies.

FIGURE 1-1
U.S. 93 TRANSPORTATION CORRIDOR
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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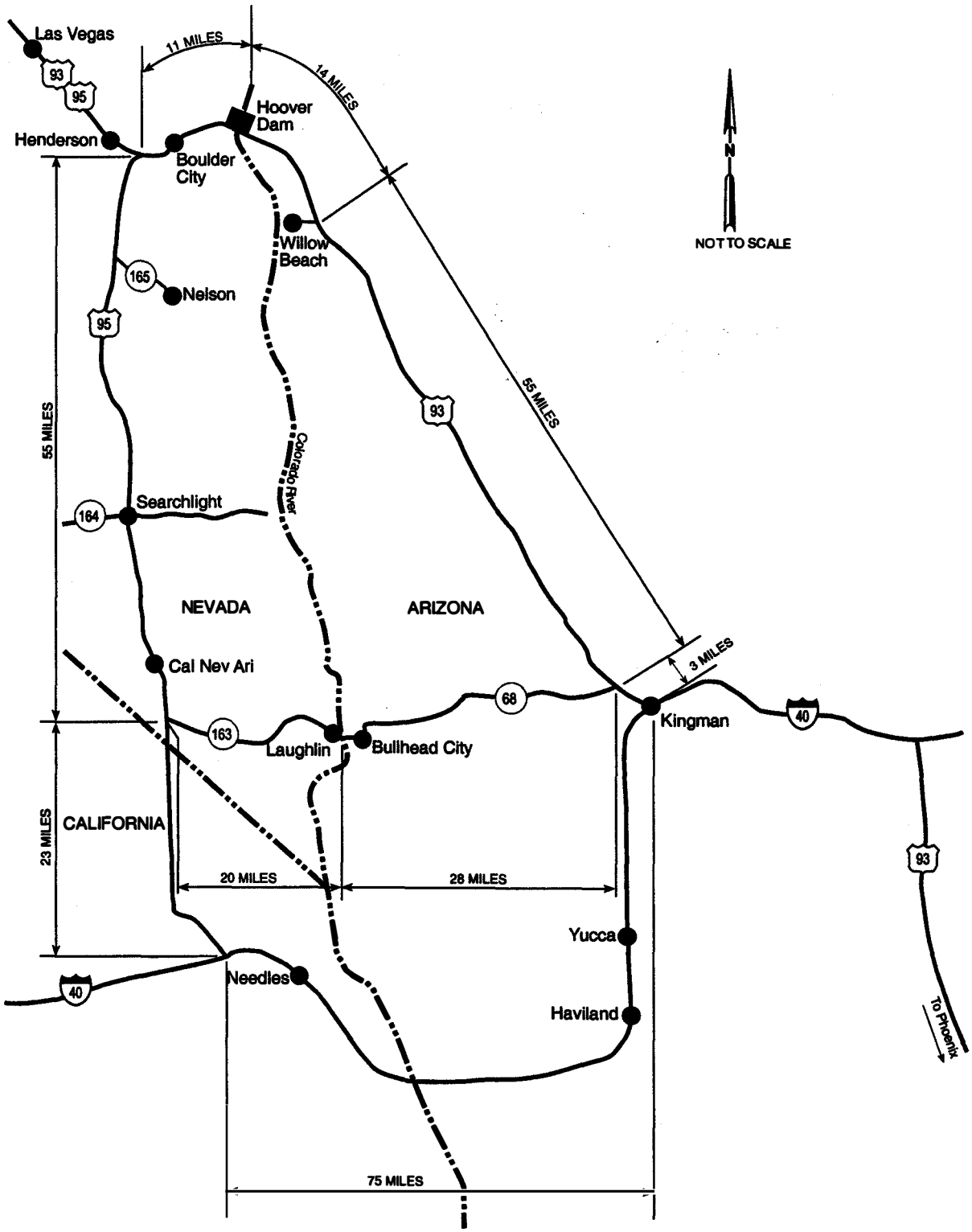

LEGEND

STATE BOUNDARY

HIGHWAYS

FIGURE 1-2
EXISTING ALTERNATE ROUTES TO U.S. 93 AND HOOVER DAM CROSSING
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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Reclamation took the lead in seeking a solution to the roadway problems at Hoover Dam. They conducted the following studies: an origin and destination analysis in 1966, a preliminary U.S. 93 relocation corridor study in 1990, and a detailed alignment and bridge type selection study for three bypass alternatives in 1992 (see Chapter 2, Alternatives).

In 1989, Reclamation created the "Colorado River Bridge Project Management Team" (PMT), which directed engineering and environmental studies, developed funding agreements, and managed the preliminary design of a new crossing. The PMT was made up of Reclamation, ADOT, NDOT, Federal Highway Administration (FHWA), and the National Park Service (NPS).

Before releasing the Draft Environmental Impact Statement (DEIS) for public review in 1993, Reclamation withdrew from the project as the lead agency because their mission emphasis changed from constructing major public works projects to water resource management. With no lead agency or funding to continue the environmental process for a new crossing, the project was officially put on hold in 1995.

In the spring of 1997, governors and Congressional representatives from Nevada and Arizona appealed to the U.S. Secretary of Transportation to help fund the completion of the environmental studies. A federal appropriation provided funds to resume studies to evaluate removing truck traffic from Hoover Dam. ADOT and NDOT agreed to contribute funds to complete the studies. In May 1997, the FHWA, Central Federal Lands Highway Division (CFLHD), was named lead agency to resume the Hoover Dam Bypass Project—the project being evaluated in this Environmental Impact Statement (EIS).

1.3 Previous Studies Conducted

As discussed above, U.S. 93 deficiencies in the Hoover Dam vicinity were identified as long ago as 1965. Recognition of these roadway deficiencies resulted in a series of studies that evaluated alternative methods to alleviate deficiencies. Table 1-1 lists the studies conducted to date and provides a brief description of study purposes and findings.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
U.S. 93 – 466 Hoover Dam Origin and Destination Study, prepared by State of Nevada Department of Highways and U.S. Department of Commerce, Bureau of Public Roads, November 1968.	Study determined the characteristics of traffic congestion at Hoover Dam. Determined that traffic near Hoover Dam can be divided into two categories: through traffic (defined as vehicles using the dam as a bridge to complete their trip), and Hoover Dam dead-end trips (defined as vehicles whose destination is Hoover Dam). Suggested four methods to alleviate traffic problems: (1) develop more parking areas and modify the dam to add two traffic lanes; (2) construct an upstream crossing; (3) construct a downstream crossing; and (4) construct a downstream crossing near Willow Beach (not considered economically justified in 1966 because of Davis Dam crossing downstream).

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
A Study and Recommendations for Handling Traffic and Conducting Visitors at Hoover Dam, prepared by Perkins & Will Corporation for Reclamation, April 1971.	Study determined methods and facilities to handle vehicle traffic and conduct visitors on dam tour. Study assumed that through traffic would bypass the dam by relocating U.S. 93 to a new downstream bridge and that all other traffic would continue to travel across the dam. Recommended a highway bypass, parking structures, and minor highway improvements.
Resume of Studies on Colorado River Crossing Below Hoover Dam, prepared by Reclamation, January 1972.	Study requested Congressional authorization to construct an alternative Colorado River crossing near Hoover Dam.
Facilitating Traffic Flow, Alleviating Safety Hazards, and Expediting Access - Hoover Dam, prepared by Reclamation, September 1977.	Study requested Congressional authorization to increase the cost ceiling of the Boulder Canyon Project Act (authorized in 1928). Additional funds would have provided new facilities to improve traffic flow, alleviated safety hazards, and provided a safe experience for Hoover Dam visitors.
1983 Analysis of Colorado River Crossing Below Hoover Dam, prepared by Reclamation, June 1983.	Study described the project; explored potential hazards to the dam; updated traffic, visitor use, and construction cost data; recommended a portion of construction costs for a bridge be allocated to power revenues; and concluded that a bridge is needed to bypass the dam to provide safe conveyance of traffic on U.S. 93 for safe, efficient operation of Hoover Dam.
Black Canyon Bridge, Colorado River Crossing, Hoover Dam, prepared by Reclamation, January 1986.	Study described the project; provided a basis for seeking funding; explored potential dam hazards; updated traffic, visitor use, and construction cost data; and concluded that a bridge crossing could eliminate some future potential costs to government facilities at Hoover Dam by eliminating commercial vehicles from using the dam crest.
Preliminary Geologic Report for Colorado River Bridge Crossing, Nevada Approach, Clark County, Nevada, prepared by Reclamation, March 1988.	Contains text, photos, and geologic plan maps at a scale of 1 inch equals 200 feet of the Nevada side approach of the Gold Strike Canyon alignment.
Colorado River Bridge – Hoover Dam, Phase A Route Study, prepared by Reclamation, October 1990.	Study determined the preferred general corridor to relocate U.S. 93 crossing the Colorado River. The study considered nine routes. A January 14, 1991, memorandum recommended that six of the routes be eliminated because of increased environmental impacts, disturbance of large amounts of currently undisturbed NPS lands, and increased costs. Routes recommended for further study included Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
Reconnaissance Geologic Investigation Highway Relocation, prepared by Reclamation, November 5, 1991.	Provided the designers with geologic data including photos and rough geologic mapping for the Phase B Report. Geologic features are approximate as no stationing or surveying had been done along the proposed alignments.
Traffic Study: Colorado River Bridge – Hoover Dam, prepared by CH2M HILL for Reclamation, December 1991.	This traffic study analyzed U.S. 93 from the Gold Strike Casino (now the Hacienda Hotel) to the Arizona lookout south of the dam. Its purposes were to perform a Traffic Systems Management (TSM) study and to provide support to the Reclamation Phase B Corridor Study and EIS for the Colorado River Bridge project. Findings included the existing level of service to be LOS D; through trips represented 70 percent of the total traffic across the dam; average travel time from the Arizona lookout to the Nevada park-n-ride was between 8 minutes (off peak) and 13 minutes (during peak hours); and 30 percent of accidents on the dam involved semitrailer trucks.
Colorado River Bridge Crossing Phase B Corridor Study Developed Bridge Alternatives, prepared by Parsons, Brinkerhoff, Quade & Douglas and HDR Engineering for ADOT and NDOT, January 1992.	Reclamation conducted the Phase B Corridor Studies in conjunction with preparation of the project EIS. The studies identified initial bridge concepts, preliminary design parameters, and costs. This final phase of the bridge type studies began in August 1991 and developed the selected bridge alternatives and their estimated costs.
Movements and Habitat Use of Desert Bighorn in the Black Canyon Area, Arizona Game and Fish Department for Reclamation, March 1992.	The study involved collaring and 2-year monitoring of 49 desert bighorn in the Black Mountains adjacent to Hoover Dam to determine areas of importance, movement corridors, habitat use, and reactions to U.S. 93. Three separate ewe groups/areas were found with significantly different habitat use and home range size. All three of the build alternatives were found to bisect one or more of the ewe groups' home range. The Gold Strike alignment presented the greatest potential difficulties for bighorn.
Colorado River Bridge – Hoover Dam: Public Involvement Plan, prepared by CH2M HILL for Reclamation, May 15, 1992.	The goals of the plan are to: (1) identify issues of concern to the community; (2) provide a plan to address community concerns; and (3) inform the public about the NEPA procedures for selecting a preferred alternative. Formulation of the plan involved in-depth interviews with residents, community and civic leaders, business people, public officials, and members of environmental organizations.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
Presence and Movements of Peregrine Falcons in the Area of the Proposed Black Canyon Bridge Project, prepared by Arizona Game and Fish Department for Reclamation and NPS, June 1992.	The purpose of the study was to assess impacts of proposed bridge and associated construction action on the peregrine falcon. Specific objectives of this study were: 1) to locate peregrine falcon breeding areas, 2) to identify important foraging habitats along the river corridor, and 3) to document presence/ absence of peregrines during the nonbreeding season. The area covered in this study was Lake Mead from Fortification Hill to Hoover Dam, and the Black Canyon of the Colorado River from Hoover Dam downstream to Windy Cove. The report recommendations were: 1) continue to monitor all Black Canyon peregrines discovered during this study from 1992 through a minimum of at least 3 years after completion of the roadway and bridge, and 2) in the event that the preferred bridge corridor is possibly within 2 kilometers (km) of an active peregrine eyrie, monitor impacts of the construction.
Traffic and Revenue Study for Colorado River Crossing, prepared by CH2M HILL and Price Waterhouse for Reclamation, August 1992.	The purpose of the study was to support the new crossing EIS and prepare financial feasibility data to determine the maximum amount of revenue obtainable if the crossing were a toll facility. The study area included U.S. 93 from the U.S. 95 junction to the junction of Arizona Route 68; Arizona 68 west to the Colorado River; Nevada 163 west to U.S. 95; and U.S. 95 north to the junction with U.S. 93. It was concluded that the only feasible alternative route, the Colorado River crossing at Laughlin-Bullhead City, is sufficiently distant to discourage most traffic from diverting around the proposed toll bridge.
Colorado River Bridge – Hoover Dam, Phase B Corridor Studies, prepared by Bureau of Reclamation, August 1992. (Note: This includes the "Developed Bridge Alternatives" report listed above.)	Studies assessed Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon alternatives. Included were a highway approach study and a bridge type study. Identified physical factors that would affect the design, cost estimates, or schedules; developed preliminary mitigation features; included preliminary designs; included a construction cost estimate; and included a final design schedule and construction schedule.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
Cultural Resource Report: Colorado Bridge Crossing/Hoover Dam Project Bridge Crossing and Highway Alignment Survey, prepared by Reclamation, 1992.	This study reports the results of a 145-acre cultural resource survey of the proposed bridge crossing locations and highway corridors. Forty-four features were identified within the area of potential effect. Eight features had been identified in previous cultural resource activities. The remaining 36 sites were identified during cultural resource surveys for this project. One feature, Hoover Dam, is listed on the National Register of Historic Places (NRHP) and is also a National Historic Landmark (NHL). Two features, the Old Government Railroad and the Old Boulder City Water System, have been determined eligible for listing in the NRHP. Most of the remaining features are associated with the construction, operation, or maintenance of Hoover Dam. These features are not individually eligible but may contribute to the NHL or a historic district focused on the dam. Reclamation determined that a World War II anti-aircraft bunker located on the Arizona side of the river is individually eligible for the NRHP. This study also determined that all alignment options would affect the historic and visual setting of Hoover Dam.
Arizona and Nevada Site Forms for Colorado Bridge Crossing/Hoover Dam Project Bridge Crossing and Highway Alignment Survey, prepared by Reclamation, 1992.	This volume was prepared as a stand-alone supplement to the report prepared by Reclamation. It includes site forms for all the cultural resource features investigated by Reclamation in connection with the survey.
Hoover Dam Bridge Crossing Cultural Resource Site Reassessment: Nevada Sites 26CK4698, 26CK4739, 26CK4750, 26CK4751, 26CK4752, and 26CK4763, prepared by Reclamation, 1993.	Reclamation determined that 23 of the 29 Nevada cultural resource sites originally identified were eligible for NRHP listing as contributing elements to a potential, undefined historic district associated with the construction and/or operation and maintenance of Hoover Dam. The remaining six sites were determined not eligible. The Nevada SHPO questioned Reclamation's determinations and asked for additional information and clarification. This report documents a survey to relocate and reassess the six sites which the SHPO expressed concern about. Reclamation determined that except for portions of the railroad grade (26CK4751), none of the reassessed cultural resource sites would be affected by any of the Hoover Dam bridge crossing alternative alignments.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
Hoover Dam Bridge Crossing Cultural Resource Site Reassessment: Arizona Sites DD:14:15, DD:14:16, DD:14:17, and DD:14:19, prepared by Reclamation, 1993.	Reclamation determined that four of the eight Arizona cultural resource sites originally identified were NRHP eligible as contributing elements to a potential, undefined historic district associated with the construction and/or operation and maintenance of Hoover Dam. The remaining four were not eligible. The Arizona SHPO questioned Reclamation's determinations and asked for additional information. This report documents a survey to relocate and reassess the four sites which the SHPO expressed concerns about. Reclamation determined that none of the reassessed cultural resource sites would be affected by any of the Hoover Dam bridge crossing alternative alignments.
Desert Bighorn Movements and Habitat Use in Relation to the Proposed Black Canyon Bridge Project: Nevada, Cooperative National Park Resources Studies Unit, University of Nevada for Reclamation, May 1993.	This study characterized bighorn sheep habitat quality and information on movements of radio-collared bighorn to estimate home range size and patterns of movement. Total home range size was determined. It was found that bighorn sheep heavily use the area of the proposed alignments on a year round (ewes) and seasonal basis (rams in fall). The Sugarloaf Mountain Alternative was found to intrude the least on high-use areas and that habitat loss will be greatest for the Gold Strike Canyon Alternative. Big game fencing is recommended along the new highway to reduce bighorn sheep/motor vehicle collisions.
U.S. 93 Colorado River Crossing Corridor Study, prepared by Parsons Brinkerhoff Quade & Douglas for NDOT, December 1994.	A continuation of Reclamation studies, this report analyzed two longer alternatives: Willow Beach South (26 miles) and Hoover Dam/Boulder City Bypass (31 miles). Study purpose was to determine the relative feasibility of these corridors. Feasibility was determined by relative cost, technical engineering difficulty, major impacts, and user benefits.
Biological Assessment for the Hoover Dam Bypass Project, prepared by CH2M HILL for Federal Highway Administration, Central Federal Lands Highway Division, February 1999.	Determined that the preferred alternative may affect the desert tortoise but will not affect any of the other listed species in the project area. Impacts to the desert tortoise would be avoided or minimized with conservation measures.
U.S. 93 Hoover Dam Bypass Project, Sugarloaf Mountain Alternative, Historic Resources Survey, prepared by Kurt P. Schweigert, Associated Cultural Resource Experts for Federal Highway Administration, Central Federal Lands Highway Division, and CH2M HILL, August 1999.	This survey recorded 14 historic features within the area of potential effects (APE) of the preferred alternative, including the Hoover Dam National Historic Landmark. The report evaluated the 13 other historic features for eligibility to the National Register of Historic Places as elements relating/ contributing to the construction and operation of the Hoover Dam. The report also analyzed the affect of the preferred alternative on these historic sites.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
U.S. 93 Hoover Dam Bypass Project Archaeological Resources Survey Report, prepared by CH2M HILL for Federal Highway Administration, Central Federal Lands Highway Division, April 2000.	This report documents the results of a Class III (intensive) archaeological survey of the three alternative alignments of the proposed bypass. It documents a field survey conducted for all alignments in March 1998 and an intensive archaeological site mapping and recording investigation on two sites in June 1999. The survey and mapping recorded a total of five prehistoric archaeological sites, all located in Arizona, within the APE of the Promontory Point and Sugarloaf Mountain Alternatives. The report concluded that none of the five sites had sufficient research value for prehistoric archaeology, and all were thus found ineligible for the National Register.
Hoover Dam Bypass Bridge Financial Feasibility Study, prepared by Hagler Bailly Services, Inc. for Arizona Department of Transportation and Nevada Department of Transportation, June 2000.	This study outlines options available to meet the financial demands of constructing the Hoover Dam Bypass Project, to aid policymakers in their selection of alternate strategies. The study analyzed the following funding options: federal funding, existing state program funding, new state funding sources (statewide taxes, transportation taxes and fees, tourism-related taxes and fees, and value-capture programs), and tolls or other user charges.
Ha'tata (The Backbone of the River): American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project, prepared by Richard W. Stoffle et al., University of Arizona for Federal Highway Administration, Central Federal Lands Highway Division, and CH2M HILL, October 2000a.	This study recorded and evaluated the results of field visits conducted by University of Arizona anthropologists with Native American tribal elders. Interviews were conducted in May/June 1998 and May 2000 with representatives from 13 tribes. The report documents feelings of the tribal representatives about the cultural values of the lands in the project area, tribal concerns about the impact of the bypass project, and tribal recommendations for minimizing the impacts.
Hoover Dam Bypass Project: Ethnohistoric Overview and Assessment, prepared by David S. Whitley and Peter Nabokov, W&S Consultants, for Federal Highway Administration, Central Federal Lands Highway Division, and CH2M HILL, October 2000b.	Examined ethnohistoric data from archaeological, historical, and ethnographic sources from the general region of the Hoover Dam Bypass Project study area. Identified traditional Native American land use practices, values, and beliefs. It provided a context for the contemporary ethnographic (FHWA, October 2000) and archaeological (FHWA, April 2000) studies conducted for the project, with the goal of aiding the determination of whether National Register-eligible traditional cultural properties (TCPs) are present in the project area.

Table 1-1
Previous U.S. Highway 93 and Hoover Dam Studies

Study Name, Author, and Date Prepared	Summary of Study
The Land Still Speaks: Traditional Cultural Property Eligibility Statement, prepared by University of Arizona and the American Indian Core Consultation Work Group for Federal Highway Administration, Central Federal Lands Highway Division, October 2000c.	Summarized and evaluated the findings from the ethnographic (FHWA, October 2000a) and ethnohistoric (FHWA, October 2000b) studies conducted for the project. This report identified the Gold Strike Canyon and Sugarloaf Mountain TCP, and determined it to be eligible for the National Register of Historic Places.

1.4 Need for the Project

Several deficiencies on U.S. 93 from the Gold Strike Inn (recently rebuilt as the Hacienda Hotel), Nevada, to Milepost 1 (MP 1) in Arizona have been identified, both from a highway operational standpoint and from a dam operational standpoint. These deficiencies not only create travel delays, but also contribute to accidents and vehicle conflicts.

1.4.1 Highway Deficiencies

The U.S. 93 roadway approaches to Hoover Dam include numerous substandard geometric elements. These elements include horizontal curves with radii too short to provide adequate turning room and that are bounded by rock walls that limit sight distance along the road. The existing roadway cross section does not provide adequate width for disabled vehicles or passage by emergency vehicles; and, at several locations, the roadway width is not adequate for turning.

The highway speed limit is reduced from 55 to 15 mph before the dam from each direction. The primary reasons for the speed reduction are the numerous hairpin curves required for the highway to reach the dam crest roadway and the steep grade. Three curves are of particular concern: one on the Nevada side, referred to as the Nevada Hairpin Curve; and the other two on the Arizona side, referred to as the Arizona Hairpin Curve and the Arizona Horseshoe Curve (see Figure 2-3).

Each of these curves provides less than a 20-mph design speed, and each is located less than 1 mile from the dam. The extreme hairpin curves do not allow adequate width for commercial trucks to pass in opposite directions. Trucks meeting at these locations usually must come to a complete stop, and one truck often must back up to allow the other room to negotiate the curve. The overall impact of these highway deficiencies on the traffic level of service at the dam is discussed in Section 1.4.2 below.

1.4.2 Inadequate Roadway Capacity

The Hoover Dam section of U.S. 93 has reached its capacity during peak periods and cannot provide additional capacity with the current roadway alignment. In 1991, average travel speeds of the 2 miles of roadway on either side of Hoover Dam were 8 to 18 mph. The crest road at Hoover Dam has reached its maximum traffic-carrying capacity and has been at that level since at least 1991. Table 1-2 compares 1997 traffic on the dam with that projected for the years 2017 and 2027.

Table 1-2
Traffic Volumes and Level of Service at Hoover Dam

	1997	2017	2027
Traffic Volumes (Average Annual Daily Traffic)[a]	11,500	21,100	26,000
Level of Service	F	F	F

[a] Actual Reclamation 2000 traffic counts indicate a somewhat greater growth rate than that used for these projections.
Source: Appendix A, Traffic Analysis.

The method used to describe and determine capacity and traffic operating conditions in this study is outlined in the Highway Research Board's *Highway Capacity Manual - Special Report 209* (3rd Edition, 1994), which expresses levels of service (LOS). The LOS concept is a qualitative measure to describe traffic operational conditions and motorist perceptions; it describes speed, convenience, and safety. Six LOSs are used to define operating conditions, designated by the letters A through F. LOS A represents the best operating conditions, while LOS F represents heavily congested flow with traffic demand exceeding highway capacity (Figure 1-3).

Considering the existing highway configuration, speed limit, pedestrians, and vehicle mix (passenger vehicles, semitrucks, and recreational vehicles) of through traffic, highway capacity is 1,200 vehicles per hour. This calculation is based on average operating speeds between 15 and 20 mph and does not consider peak periods such as weekends, holidays, or special events that further exacerbate traffic conditions. The 1991 peak volume of 1,168 vehicles per hour was 97 percent of highway capacity, resulting in traffic congestion (traffic count, August 8, 1991). Traffic counts taken in 1996 indicated peak volumes at or exceeding the total highway capacity. Traffic congestion is increased when vehicles have mechanical difficulties because the shoulders are too narrow to pull off the road.

Primary factors that limit capacity through this section of U.S. 93 are tight curves and steep grades associated with the approach roadways on both sides of the dam; and a single lane in each direction. On the dam crest, conditions are degraded by numerous conflicts with pedestrians crossing the roadway. Neither the improvement of these geometric constraints nor widening of the corridor is feasible with the current alignment over the dam.

1.4.3 Travel Times

Based on current posted speeds along U.S. 93 from the Hacienda Hotel, Nevada, to MP 3 in Arizona (6.3 miles), the estimated average travel time for the existing alignment is 16.5 minutes. A bypass roadway could be estimated to operate at 55 mph. The Sugarloaf Mountain and Gold Strike Alternatives would reduce the distance to 5.5 miles, resulting in a travel time of 6 minutes. This estimate represents a 10.5-minute reduction for each through-vehicle. The Promontory Point Alternative would reduce the distance to 6.1 miles, with a time savings of approximately 10 minutes.

Based on projections that 26,000 vehicles will cross the dam in the year 2027, the peak-hour traffic volume is estimated at 2,340 vehicles. This projection indicates that more than 1,170 hours of travel time delay during the 3 peak hours could be eliminated (see Appendix A, Traffic Analysis).

1.4.4 Interference in Dam Operation

The high volume of vehicles crossing the dam interferes with the vehicle movements needed for operating and maintaining the dam and its facilities.

Vehicular traffic affects most highway and dam maintenance activities. These activities include repairing and replacing turbines and generators, replacing lights along the highway on the dam, maintaining the highway approaches, repairing the spillway, and using the overhead cable that transports heavy equipment and material to the power house. The traffic interference results in additional time and higher costs to complete these activities.

1.4.5 Accident Rate and Potential for Pedestrian-Vehicular Accidents on Hoover Dam

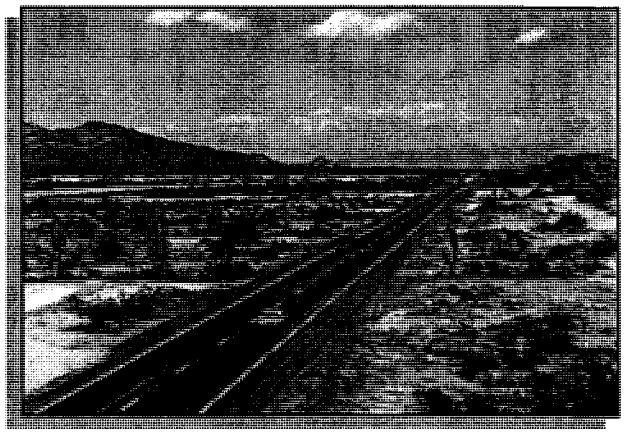
The number of tourists to the Lake Mead National Recreation Area (LMNRA) and Hoover Dam is increasing. Visitors taking the guided tour at the dam have more than tripled (300,000 per year in 1937 to 1.03 million in 1997). This increase is partially due to the opening of the new Hoover Dam Visitor Center in 1996. In addition to pedestrian traffic, about 11,500 vehicles per day cross Hoover Dam; this volume is projected to be about 26,000 vehicles daily in the year 2027.

Since 1964, more than 500 accidents have occurred between Nevada MP 2.2 and Arizona MP 1.2 (a 3.4-mile stretch of highway including the dam). Forty-three accidents between 1985 and 1991 involved one or more personal injuries, including two fatalities. Commercial trucks were involved in 96 of the accidents. In every accident, the cause was partially attributable to existing highway conditions, such as sharp curves, narrow highway width, insufficient shoulder width, poor sight distances, and slow travel speeds. Accident causes that are aggravated by the existing U.S. 93 configuration can be classified as either mechanical failure (engine problems, tire blowouts, or brake failure) or human error resulting from fatigue, intoxication, or judgment errors. As the average annual daily traffic (AADT) across the dam continues to increase, the number of accidents continues to increase accordingly.

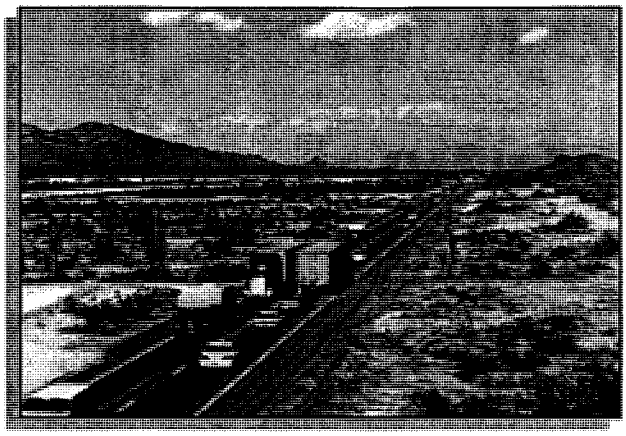
Detailed accident data were obtained from both NDOT and ADOT for the years 1994 through 1997 (Table 1-3). The following data are for the section of U.S. 93 from the Hacienda Hotel in Nevada to MP 3 in Arizona.

Table 1-3
Accident Data for 1994 to 1997

Accident Type	Arizona	Nevada	Total	Percent of Total
Opposing Direction	11	34	45	34
Rear-end	7	21	28	21
Sideswipe	5	9	14	11
Hit Fixed Object	5	3	8	6
Overturned/Off-Road	7	6	13	10
Other	10	13	23	18
Total	**45**	**86**	**131**	**100**



Level of Service A.



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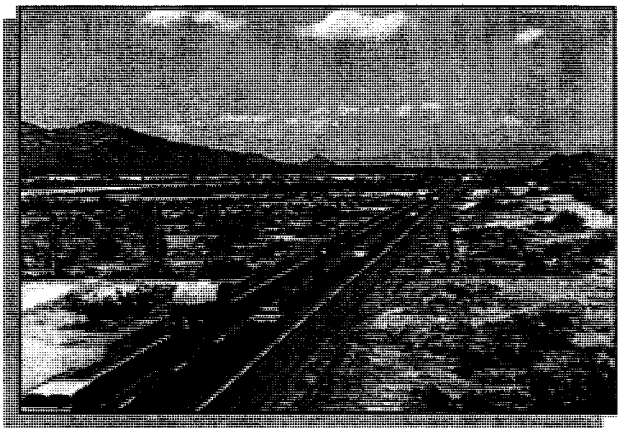

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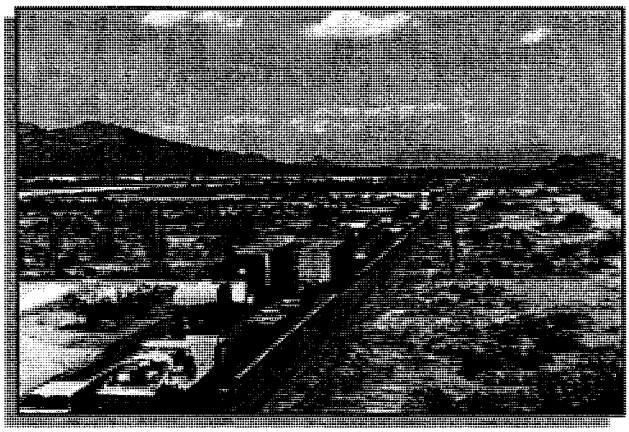

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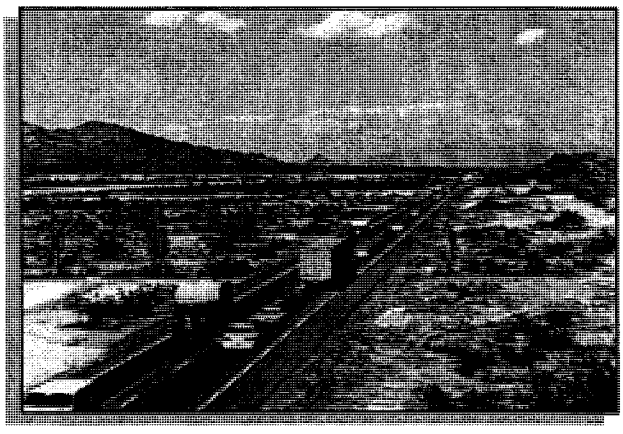
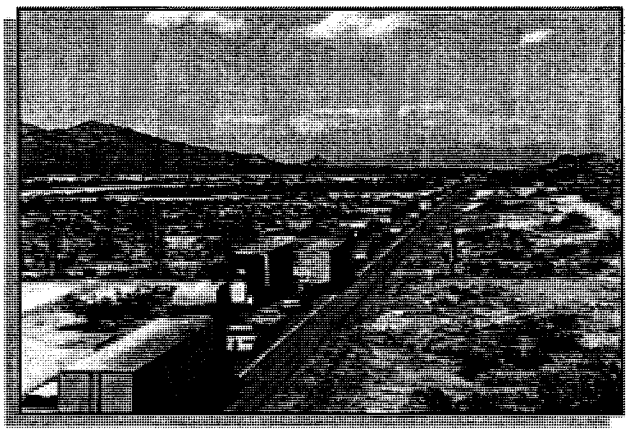


Level of Service C.



Level of Service F.

FIGURE 1-3
LEVEL OF SERVICE CLASSIFICATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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Table 1-3 shows a high percentage of multiple-vehicle accident types (opposing direction, rear end, and sideswipes) indicating heavy congestion in the study area. The accident rate along this 6.38-mile section of U.S. 93 is 1.35 per million vehicle miles traveled. This rate is slightly higher than the Nevada average of 1.15 accidents per million vehicle miles traveled. Analysis of the same data for the U.S. 93 within 1 mile of Hoover Dam shows a much higher accident rate than the 3-mile approaches. The 0.5-mile segments of U.S. 93 approaching Hoover Dam have an accident rate of 3.97 per million vehicle miles traveled. This rate is over three times the Nevada average of 1.15 per million vehicle miles traveled for rural principal arterials. Similar to the conclusion that can be drawn from the types of accidents, this high rate near Hoover Dam also indicates high levels of congestion.

1.4.6 Safeguarding Hoover Dam Power Plant, Lake Mead, and Colorado River from Hazardous Spills or Explosions

Hoover Dam is a major power supplier for Southern California industry (generating about 4 billion kilowatt-hours of electricity annually); and Lake Mead is an essential storage facility for the water supply for Southwest industries, municipalities, and farmlands.

Many vehicles currently crossing the dam carry volatile fuels, chemicals, or hazardous materials (including explosives, flammable fuels, radioactive materials, acids, and caustic chemicals). Potential hazards resulting from these materials include ignition of combustible materials, contamination of Lake Mead or the Colorado River, and damage to the power house and associated equipment if the materials entered the dam power plant and outlet works. A reasonable worst-case scenario would be the release of gasoline (the flammable liquid most commonly transported across the dam), followed by delayed ignition, resulting in loss of life, severe injuries, and long-term interruption of power generation.

Of particular concern is the highway drainage system in the area near the dam on the Nevada side of the river. Currently, the drainage flows off the edge of the road, down the canyon face, onto the Nevada power house roof, and into the Colorado River. In addition to potential water pollution issues, materials spilled onto the road would drain off the road onto the Nevada power house, possibly resulting in power house damage or destruction. The proposed project may not specifically remedy these conditions, but will remove vehicles transporting large volumes of hazardous materials from the dam crest and provide them a straight, four-lane highway crossing, which will result in a corresponding reduction in potential spill risks.

1.4.7 Quality of Visitors' Experiences at Hoover Dam

There were 9.7 million visitors to the LMNRA in 1997 (personal communication, Bill Burke of the NPS, 1998). Hoover Dam is a popular national and international tourist destination. Tourists enter the visitor center, take the tour, patronize the snack bar, and walk across the dam crest to photograph the facilities from various upstream and downstream vantage points. These activities contribute to traffic congestion and can result in vehicle and pedestrian conflicts. Through-vehicle and truck traffic also emit noise and vehicle exhaust, which diminishes the visitors' experiences at the dam.

1.5 Purpose of Project

The purpose of the project is to reduce or eliminate through traffic over Hoover Dam to accomplish the following objectives:

- Minimize the potential for pedestrian-vehicle accidents on the dam crest and on the Nevada and Arizona approaches to the dam
- Remove a major bottleneck to interstate and international commerce and travel in the west by reducing traffic congestion and accidents in this segment of the major commercial route between Phoenix and Las Vegas
- Replace an inadequate federally owned highway river crossing with a new crossing that meets current roadway design criteria, and improves through-vehicle and truck traffic capacity on U.S. 93 at the dam
- Reduce travel time in the dam vicinity
- Protect Hoover Dam employees, visitors, equipment, power generation capabilities, and Colorado River waters while enhancing the visitors' experience at Hoover Dam by:
  - Safeguarding dam and power plant facilities and the waters of Lake Mead and the Colorado River from hazardous spills or explosions
  - Protecting the dam and power plant facilities from interruptions in electricity and water delivery
  - Providing improved conditions for operating and maintaining Hoover Dam facilities

1.6 Relationship of the Proposed Project to the Statewide Plan or Urban Transportation Plan

This section describes travel demand in relation to the Nevada and Arizona plans and pertinent legislation.

1.6.1 Nevada

The NDOT's Statewide Transportation Improvement Program (STIP) was developed through coordinated efforts of the NDOT; federal, state, local, and tribal governments; and with agencies, planning organizations, transportation providers, and the general public (NDOT, 1997). Evaluating a Hoover Dam bypass is included in the STIP (1998). Constructing a bypass at Hoover Dam is one of six projects listed in NDOT's billion dollar Highway Superproject Program and is shown in NDOT's Work Program—Long Range Element (1998 through 2007).

1.6.2 Boulder City/U.S. 93 Corridor

NDOT, in cooperation with FHWA, began the Boulder City/U.S. 93 Corridor Study and EIS in November 1999. The proposed project involves traffic improvements to U.S. 93 in the Boulder City area, referred to as the U.S. 93 Corridor. The EIS will study the corridor between a western boundary on U.S. 93 in Henderson, Nevada, approximately 1 mile north of the Railroad Pass Hotel Casino, and an eastern boundary on U.S. 93 approximately 4.7 miles east of downtown Boulder City. The eastern boundary is coincident with the planned western end point of the Hoover Dam Bypass project. The project covers a total distance of approximately 10.4 miles on the present route of U.S. 93. The purpose of the project includes reducing traffic congestion and accidents in the corridor, accommodating current and

projected traffic demand, and improving system linkage and route continuity on U.S. 93 for interstate commerce. The planned completion date for the EIS process is June 2002.

NDOT is pursuing development of Boulder City/U.S. 93 Corridor improvements primarily to reduce traffic congestion and accidents in the corridor (see Chapter 2, Alternatives). Previously, NDOT evaluated the feasibility of two alternative Colorado River crossings associated with a bypass (NDOT, 1994). The options were the Willow Beach South Crossing and the Hoover Dam/Boulder City Bypass. To ensure uniformity in the analyses and to provide a more meaningful comparison between the two routes, it was assumed that the two alternatives had the same starting and ending points, and the longer of the two routes (Willow Beach) was used to establish the termini. The western terminus was located at Railroad Pass west of Boulder City near the U.S. 93/U.S. 95 interchange in Nevada. In Arizona, the eastern terminus was approximately 1 mile south of the LMNRA boundary where the existing road narrows from a four-lane divided facility to two lanes before reaching Hoover Dam along U.S. 93.

The Boulder City/U.S. 93 Corridor improvements and the Hoover Dam Bypass are separate projects with independent utilities conceived to meet separate needs; each could be constructed without the other, and each would still fulfill its own objectives. The Boulder City Corridor improvement objective is to reduce traffic congestion and accidents in Boulder City and on U.S. 93; constructing a Hoover Dam Bypass will not reduce or eliminate traffic in Boulder City. The objectives described in the purpose and need for the Hoover Dam Bypass—reducing travel time, eliminating substandard design geometry at the dam and approaches, increasing public safety at the dam, and enhancing visitor experience at the dam—would not be achieved by routing traffic around Boulder City or making other improvements in the Boulder City/U.S. 93 Corridor.

1.6.3 Arizona

The *Arizona State Transportation Improvement Plan* (ASTIP) (ADOT, December 1994) has identified the Phoenix to Nevada (U.S. 93) corridor as one of the top priority corridors within Arizona. The document states:

> *"Existing concerns within the Phoenix to Nevada corridor include the levels of recreation travel and trucking usage with the resulting conflicts and safety concerns. Long-term economic opportunities exist in this corridor, particularly as it relates to completion of a Mexico-Canada link and improvements of access and travel opportunities in Northwest Arizona."*

The U.S. 93 corridor connects Phoenix to I-15 in southern Nevada and has been designated by ADOT to become Arizona's link in the international trade route proposed by NAFTA. ADOT has programmed over $160 million to improve U.S. 93 as a four-lane divided facility from the Phoenix area to north of Kingman, Arizona, within the next several years. ADOT has also programmed $300,000 to begin studies for improving U.S. 93 from MP 0 to MP 15 in the LMNRA.

1.7 Legislation Regarding the Proposed Project

The following sections summarize legislation regarding the proposed project.

1.7.1 Hoover Powerplant Act (Public Law 98-381)

The Hoover Powerplant Act was passed in 1984, and it authorized Reclamation to construct this bridge project. The authorizing legislation specifically prohibits construction of the project through reimbursement from power generation at the dam.

1.7.2 Nevada Senate Joint Resolution 26

This Resolution, dated June 19, 1995, urges Congress to take necessary actions to alleviate problems caused by heavy commercial traffic over Hoover Dam. This remedy includes constructing a highway bypass around Hoover Dam to:

- Divert the heavy flow of trucks transporting highly flammable or hazardous materials, or both, and the heavy flow of regular traffic from traveling over Hoover Dam
- Prevent further air pollution of the area
- Reduce traffic accidents in the area
- Reserve the portion of U.S. 93 over Hoover Dam to accommodate dam tourists
- Prevent Colorado River pollution resulting from potential spills resulting from heavy traffic flow

1.7.3 Nevada Senate Concurrent Resolution 60

This Resolution, dated June 19, 1995, directed the Nevada Department of Motor Vehicles and Public Safety and the Public Service Commission of Nevada to jointly study current regulations governing the transportation of hazardous materials from Arizona to Nevada via U.S. 93 over Hoover Dam; it further directed NDOT to study the feasibility of prohibiting commercial traffic over Hoover Dam, and to study methods of financing road and highway construction projects to divert commercial traffic from traveling over Hoover Dam (see Section 2.5).

1.7.4 Transportation Equity Act for the 21st Century (TEA-21)

This legislation was approved with broad congressional support and was signed into law by President Clinton on June 9, 1998. It reauthorizes the Federal transportation program for years 1998 through 2003.

The legislation authorizes $10 million specifically for the Hoover Dam Bypass project under Arizona High Priority Project 383 and another $31 million under Arizona High Priority Project 1814. In Fiscal Year (FY) 1999, two FHWA discretionary programs allocated additional funds—$4 million from the Public Lands Highway program and $2 million from the National Corridor and Development Program. In FY 2000, the project received $6 million from the Public Lands Highway program and $2 million from the National Corridor and Development Program. An additional $3 million was appropriated in FY 2001 as an add-on to a Defense Bill. In addition, an FY 2001 DOT appropriation included $20 million for the project. The legislation also makes the Hoover Dam Bypass project eligible for additional Federal funding on a year-by-year basis under the Federal Lands Highway Program and the National Corridor Planning and Development Program.

1.8 Relationship of the Proposed Project to Other Modes of Transportation

U.S. 93 does not currently serve airports, rail or port facilities, bike routes, or mass transit services near Hoover Dam. The NPS, in partnership with Reclamation, is planning to establish a bicycle/pedestrian trail that will extend from Boulder City, Nevada, to Hoover Dam. This approved trail will parallel U.S. 93 along the Old Government Railroad grade. As discussed previously, a high-volume mix of passenger, freight, and recreational vehicles in addition to many pedestrian tourists on the dam crest crosses Hoover Dam daily.

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CHAPTER 2

Alternatives

2.1 Introduction

This chapter describes project alternatives being evaluated, previous studies of those alternatives, screening criteria developed to aid in selecting alternatives to be evaluated, the preferred alternative, and alternatives eliminated from detailed impact evaluation.

A range of alternatives was considered, and the identification of a preferred alternative was not made until the alternatives' impacts and comments on the DEIS and from the public hearings were fully evaluated (see Section 2.6.2). The four most reasonable alternatives fully evaluated (including the No Build Alternative) were developed to a comparable level of detail in the DEIS so that their comparative merits could be analyzed.

2.2 Initial Identification of Alternatives

Study summaries in Table 1-1 include descriptions of potential build alternatives that were identified during the public meetings conducted for this EIS. Figure 2-1 shows alignments of these alternatives. In addition, a No Build Alternative is considered. The following sections briefly describe these alternatives.

2.2.1 Promontory Point

This alternative crosses Lake Mead about 1,000 feet upstream from Hoover Dam and requires constructing approximately 2.7 miles of highway approach in Nevada, a 2,200-foot-long bridge, and a 0.9-mile highway approach in Arizona.

2.2.2 Sugarloaf Mountain (Preferred Alternative)

This alternative crosses the Colorado River about 1,500 feet downstream from Hoover Dam and requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,900-foot-long bridge, and a 1.1-mile highway approach in Arizona. Sugarloaf Mountain has been identified as the preferred alternative (see Section 2.6.2.1).

2.2.3 Gold Strike Canyon

This alternative crosses the Colorado River about 1 mile downstream from Hoover Dam and requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,700-foot-long bridge, and a 1.1-mile highway approach in Arizona.

2.2.4 Boulder City North

This alternative crosses the Colorado River about 2.5 miles downstream from Hoover Dam and requires constructing approximately 5.6 miles of highway approach in Nevada, a 2,200-foot-long bridge, and a 2.1-mile highway approach in Arizona.

2.2.5 Boulder City South

This alternative crosses the Colorado River about 2.5 miles downstream from Hoover Dam and requires constructing approximately 9.4 miles of highway approach in Nevada, a 2,200-foot-long bridge, and a 2.1-mile highway approach in Arizona.

2.2.6 Boulder City South Option

This alternative crosses the Colorado River about 2.5 miles downstream from Hoover Dam and requires constructing approximately 8.8 miles of highway approach in Nevada, a 2,200-foot-long bridge, and a 2.1-mile highway approach in Arizona.

2.2.7 Willow Beach North

This alternative crosses the Colorado River about 8 miles downstream from Hoover Dam and requires constructing approximately 13 miles of highway approach in Nevada, a 2,000-foot-long bridge, and a 4-mile highway approach in Arizona.

2.2.8 Willow Beach South

This alternative crosses the Colorado River about 14 miles downstream of Hoover Dam and requires constructing approximately 14.3 miles of highway approach in Nevada, a 2,080-foot-long bridge, and 8 miles of highway approach in Arizona.

2.2.9 Temple Bar

This alternative begins at I-15, approximately 30 miles northeast of Las Vegas. The alignment would proceed in a southeast direction and would require a long bridge to span the "Narrows" in Lake Mead. From the "Narrows," the alignment would generally follow the existing road corridor west of Detrital Wash until it ties with U.S. 93 near the LMNRA boundary. This alternative requires the construction of approximately 28 miles of new road north of Lake Mead and 26 miles of new road along the existing road corridor between Lake Mead and the tie to U.S. 93 in Arizona.

2.2.10 Nelson

This alternative begins at the U.S. 93/U.S. 95 interchange west of Boulder City. It follows the U.S. 95 corridor for 10 miles and then the NV 165 corridor for approximately 20 miles. A new bridge across the Colorado River, 21 miles downstream of Hoover Dam, would be constructed. Approximately 12 miles of new road construction through previously undisturbed lands would be required on the Arizona side to tie back in with U.S. 93 about 40 miles north of Kingman.

2.2.11 Cottonwood

This alternative begins at the U.S. 93/U.S. 95 interchange west of Boulder City and proceeds southerly to Searchlight for approximately 35 miles. The alternative then proceeds easterly for approximately 14 miles, along the existing road corridor to Cottonwood Cove. A new bridge across Lake Mohave and an additional 26 miles of construction would be required on the Arizona side to tie back in with U.S. 93 about 24 miles north of Kingman.

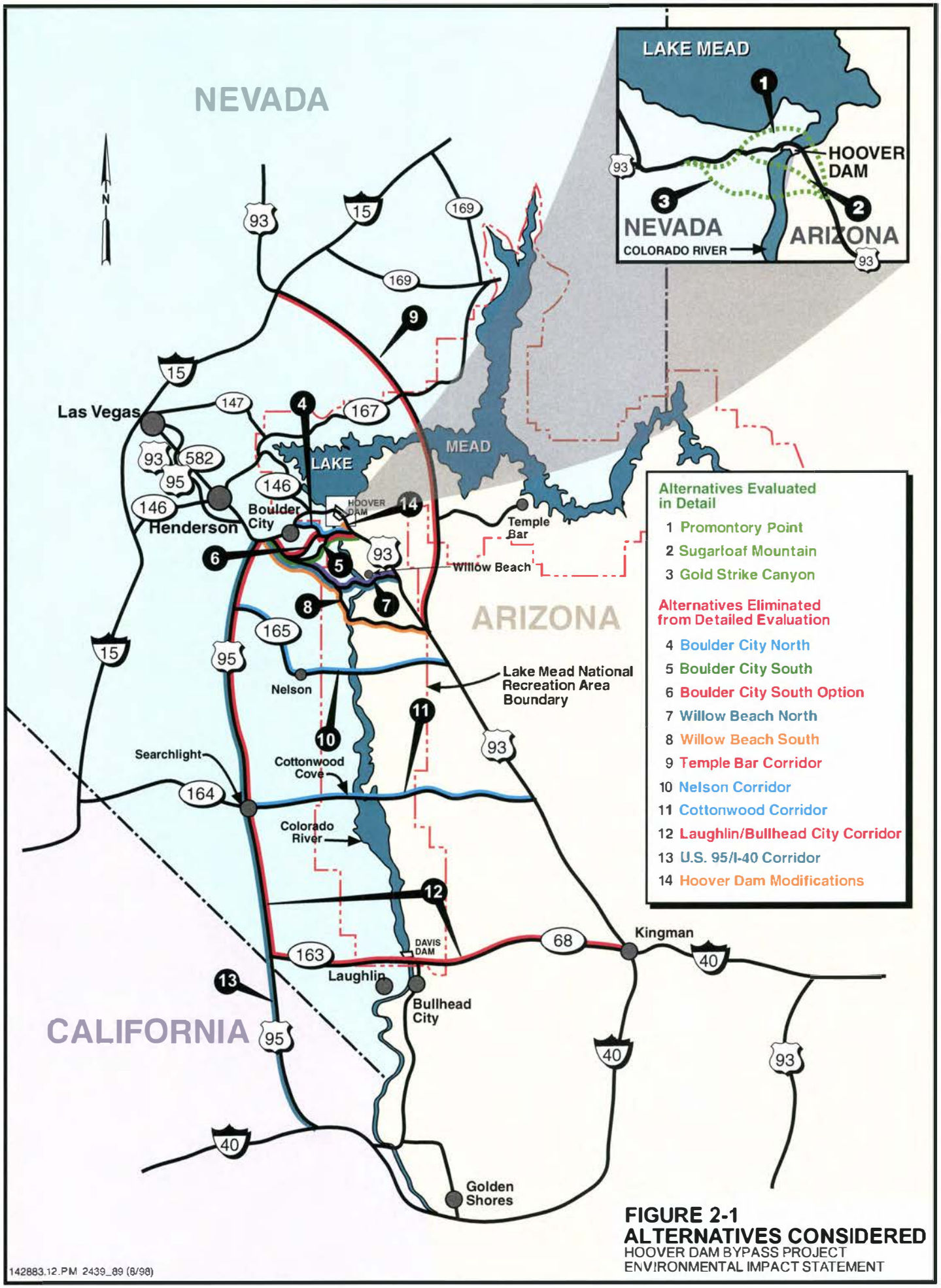

FIGURE 2-1
ALTERNATIVES CONSIDERED
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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2.2.12 Laughlin-Bullhead City

This alternative to U.S. 93 improves the existing route between Boulder City and Kingman via Laughlin and Bullhead City. This alternative uses existing U.S. 95, SR 163, and SR 68. It requires widening approximately 55 miles of U.S. 95 and 14.5 miles of SR 68 to four lanes, adding more pavement to the existing lanes, and constructing a new multi-span bridge crossing the Colorado River between Davis Dam and the existing Laughlin Bridge. This alternative restricts truck traffic from crossing Hoover Dam and reroutes the traffic along the corridor discussed above. Passenger car traffic would not be regulated in any way. This alternative is discussed in detail in Appendix B, Laughlin-Bullhead City Alternative.

2.2.13 U.S. 95/I-40

This alternative to U.S. 93 improves the existing route between Boulder City and Kingman via Needles, California. Approximately 56 miles of U.S. 95 in Nevada and 13 miles of U.S. 95 in California would be widened to four lanes, and existing U.S. 95 would be overlaid with new pavement. No improvements to existing I-40 and its crossing of the Colorado River south of Needles are necessary.

2.2.14 Modifications to Hoover Dam

This alternative includes two options for modifying existing U.S. 93 where it crosses the Colorado River on the crest of Hoover Dam: widening Hoover Dam and constructing an elevated roadway on the dam.

2.2.14.1 Widening Hoover Dam

This option widens the roadway to four lanes on the dam crest and its approaches.

2.3.14.2 Elevated Roadway on Hoover Dam

This option adds an elevated crossing structure to be supported by a portion of Hoover Dam. It also includes new and straighter highway approaches.

2.2.15 Restricting Motorized Traffic from Crossing Hoover Dam

This alternative includes two options: restricting truck traffic and restricting all vehicle traffic from crossing Hoover Dam.

2.2.15.1 Restricting Truck Traffic Only

This option restricts truck traffic from crossing Hoover Dam by restricting specific vehicle classifications. It diverts trucks to alternate routes, but allows automobile traffic to cross Hoover Dam. The most likely diversions are over Davis Dam or the Laughlin Bridge.

2.2.15.2 Restricting All Traffic

This option restricts all motorized vehicle traffic from crossing Hoover Dam by diverting all vehicles to alternate routes; it allows only bicycle and foot traffic on Hoover Dam. The most likely diversions are over Davis Dam or the Laughlin Bridge.

2.2.16 Traffic Systems Management

This alternative includes relatively low-cost, nonstructural improvements designed to reduce traffic congestion, improve traffic flow, and increase existing highway capacity. This alternative could include signs, traffic signals, turn lanes, barriers, traffic controls, and other devices to direct traffic and pedestrians.

2.2.17 No Build

This alternative consists of no action being taken. No Hoover Dam Bypass would be developed, no change in the current highway configuration would occur, no traffic restrictions would be imposed, and no other structural or nonstructural improvements would be developed on U.S. 93 near Hoover Dam.

2.3 Criteria for Screening Alternatives

After the initial identification of alternatives, criteria were developed to screen alternatives. Comparing alternatives to the screening criteria is the process used to reduce the number of alternatives subject to detailed environmental evaluation in this EIS. The following criteria were used to evaluate and eliminate alternatives:

- The purpose and need (discussed in Chapter 1), including engineering and operational standards, safety, and traffic/freight capacity, should be achieved with a reasonable cost.
- Section 4(f) land required for a route alignment should be avoided or minimized pursuant to Section 4(f) of the Department of Transportation Act of 1966.
- Impacts to federally and/or state listed threatened or endangered vegetation and wildlife species and sensitive habitats, such as wetlands, should be avoided or minimized.
- Impacts to cultural resources, including Hoover Dam (a National Historic Landmark) and archaeological (prehistoric and historic) resources, should be avoided or minimized.
- Impacts to aesthetic resources (including visual, noise, dust, and odors) should be avoided or minimized.
- Impacts on recreation resources and to tourists should be avoided or minimized.

2.4 Public Input

Since 1965, the public has had periodic opportunities to comment on this project. Public involvement activities have included scoping meetings held in June 1990 in Kingman, Arizona, and Boulder City and Las Vegas, Nevada. A Notice of Intent was published in May 1990 to advertise the three public scoping meetings; newspaper and press releases were also used to publicize these meetings. The Kingman meeting, held on June 6, 1990, was attended by 12 persons in addition to Reclamation representatives. Attendees expressed interest in selecting the alternative that would solve the traffic problems and be the least damaging environmentally. The Boulder City meeting, on June 7, 1990, was attended by 91 persons in addition to representatives from Reclamation, the State of Nevada, NPS, and the news media. In Boulder City, there was general concurrence that a

new crossing was needed to remove traffic from Hoover Dam; however, the public was divided on the solution. Some preferred to have a bypass around Boulder City in addition to Hoover Dam, while others felt that any road that bypassed Boulder City would severely impact downtown businesses. The Las Vegas meeting, on June 7, 1990, was attended by 17 people in addition to Reclamation representatives.

A newsletter, titled *Update*, was published in January 1991 and sent to interested individuals. Interviews with numerous community members and several meetings with interested members of the public, the Boulder City Chamber of Commerce, members of the Boulder City Council, and other organizations also occurred.

Subsequent to FHWA taking over as lead agency, meetings were held in Kingman, Boulder City, and Las Vegas in late October 1997 to provide information and solicit input for the environmental review process. Approximately 250 people attended and commented at the three meetings. Most comments supported one alternative or another. In Boulder City, many comments focused on considering other alternative crossings in addition to the three build alternatives, specifically those to the south that would bypass Boulder City. Many comments at all three locations raised concerns about various environmental impacts.

FHWA initiated public circulation of the DEIS on September 25, 1998, with publication of the Notice of Availability in the *Federal Register*. From October 13 to 15, 1998, FHWA held DEIS public hearings on successive evenings in Kingman, Arizona, and Boulder City and Las Vegas, Nevada. Approximately 250 people attended the DEIS public hearings. The court reporter transcripts of oral comments received at the hearings are included in Volume II of the final EIS (FEIS). The entire DEIS was also accessible on the project web site; by November 10, 1998, the close of the DEIS comment period, the web site was accessed over 1,500 times. There were a total of approximately 160 public and agency commenters on the DEIS, including comments received after the close of the comment period. See Volume II for a full description of the DEIS public input process.

2.5 Alternatives Considered but Eliminated from Detailed Evaluation

After applying the previous screening criteria to the alternatives, all were eliminated from further consideration except for the three alignments closest to Hoover Dam: Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon. After further analysis and evaluation of comments received on the DEIS, Sugarloaf Mountain was identified as the preferred alternative based on these and other criteria. The other alternatives were eliminated for reasons described below and summarized in Table 2-1.

1. Some alternative routes did not meet the project purpose and need because they would not substantially eliminate roadway deficiencies and reduce traffic congestion on U.S. 93 at Hoover Dam and the dam approaches, eliminate through traffic from the dam, enhance public safety, or protect Hoover Dam and its visitors. Alternatives were also dropped from further consideration if they substantially increased travel time and did not provide system continuity to enhance travel within the U.S. 93 NAFTA corridor. The Laughlin and U.S. 95/I-40 Alternatives were eliminated because motorists would avoid driving the additional 23 and 70 miles, respectively, by continuing to use the Hoover Dam crossing. Therefore, meeting the objectives of enhanced safety and reduced congestion on U.S. 93 at the dam would not be achieved. As described in

Appendix B, Laughlin-Bullhead City Alternative, the Laughlin Alternative would not improve the LOS on U.S. 93 on Hoover Dam.

2. Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. §303) declares that, "it is the policy of the United States government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation land, wildlife and waterfowl refuges, and historic sites." Section 4(f) specifies that the Secretary of Transportation may approve a transportation program or project...requiring the use of 4(f) land only if:

   1. There is no feasible and prudent alternative to using that land; and

   2. The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use

   Many alternatives would affect these lands; however, some routes have considerably more impact than others (Reclamation, July 1993). The Temple Bar Alternative and all the highway alternatives south of Gold Strike Canyon except the Laughlin and U.S. 95/I-40 Alternatives would affect much more Section 4(f) land than the three northern alternatives near Hoover Dam. Based on the requirement to minimize harm to Section 4(f) property, these southerly alternatives were eliminated from further consideration.

3. Routes nearest Hoover Dam would pass through lands already extensively disturbed by human-made features. Conversely, the Willow Beach, Nelson, Cottonwood, Boulder City, and Temple Bar Alternatives were eliminated because those routes would pass through areas of extensive pristine habitat.

4. Alternatives were eliminated from consideration because their impacts on known peregrine falcon breeding areas, bighorn sheep habitat and movement corridors, desert tortoise habitat, and other wildlife were more severe than the three northern alternatives near the dam.

5. The cost of constructing the routes would increase as the distance away from the dam increases because longer sections of new highway would be required; therefore, longer, more costly alternatives were eliminated. The Laughlin-Bullhead City Alternative, for example, would cost an estimated $130 million to construct and an additional $87 million for improvements that are programmed based on existing needs, versus $198 million to $215 million for alternatives closer to Hoover Dam (see Appendix B, Laughlin-Bullhead City Alternative). Furthermore, considering traffic volumes over a 20-year period, an additional $1.4 billion in total user costs would be incurred due to the increased length of the Laughlin-Bullhead City Alternative (see Appendix B).

6. Alternatives that require keeping the existing highway open to through traffic to provide visitor access to the dam were dropped from further consideration if they also required operating and maintaining extensive lengths of duplicate highway. Alternative routes not close to Hoover Dam (Willow Beach, Nelson, Cottonwood, and Temple Bar) were eliminated for this reason.

7. Restricting truck traffic does not fully meet two critical elements of the project purpose and need; it removes only a portion of the truck traffic contributing to Hoover Dam congestion and results in a substantial increase in travel distance and time for truck traffic. Additionally, closing the dam to commercial truck traffic is subject to FHWA

approval under the provisions of Title 23 of the Code of Federal Regulations (23 CFR). 23 CFR Section 658.11 pertains to additions and deletions of roads on the National Network of Highways, of which U.S. 93 is a part. The NDOT prepared a preliminary evaluation of criteria for network deletion of U.S. 93 as specified by 23 CFR and concluded it would not be feasible to remove the route from the National Network of Highways. Consequently, NDOT concluded it is not feasible to prohibit commercial trucks from crossing Hoover Dam unless a practical alternative crossing is provided.

8. Restricting all traffic from Hoover Dam, with the exception of bicycle and foot traffic, was eliminated because it does not meet the need to remove a major bottleneck to interstate and international commerce. Further, this alternative would not meet other critical elements of the project purpose; specifically, it would not reduce traffic congestion and accidents near the dam on the major commercial route between Phoenix and Las Vegas, and it would not reduce vehicle travel time or improve speed.

9. Alternatives related to Hoover Dam widening were eliminated from further consideration for technical, economic, and cultural reasons. Because tourist traffic would not be separated from through traffic, this option does not solve the public safety problem, and does not protect power and water supplies. No practical way exists to modify Hoover Dam without impacting the historic appearance of the dam or disrupting traffic during construction.

Attaining the required highway design criteria by adding an elevated crossing structure (which would be supported by some portion of Hoover Dam) would require new and straighter highway approaches. Deep and lengthy excavations, or possibly tunnels, are necessary to connect such a structure to the existing highway. Support piers for the elevated structure would cause traffic interference during construction and would permanently affect the space available on the dam crest for tourist movement and dam maintenance operations.

Concerns identified with both dam modification options also include interference with existing transmission lines, towers, and other power facilities; impacts to the historical significance of the site (the integrity and setting of the dam and its status as a NHL); and limited space available for separating traffic, vehicle turning movements, and parking maneuvers.

Table 2-1 summarizes the results of applying screening criteria and rationale for eliminating certain alternatives.

2.6 Alternatives Studied in Detail

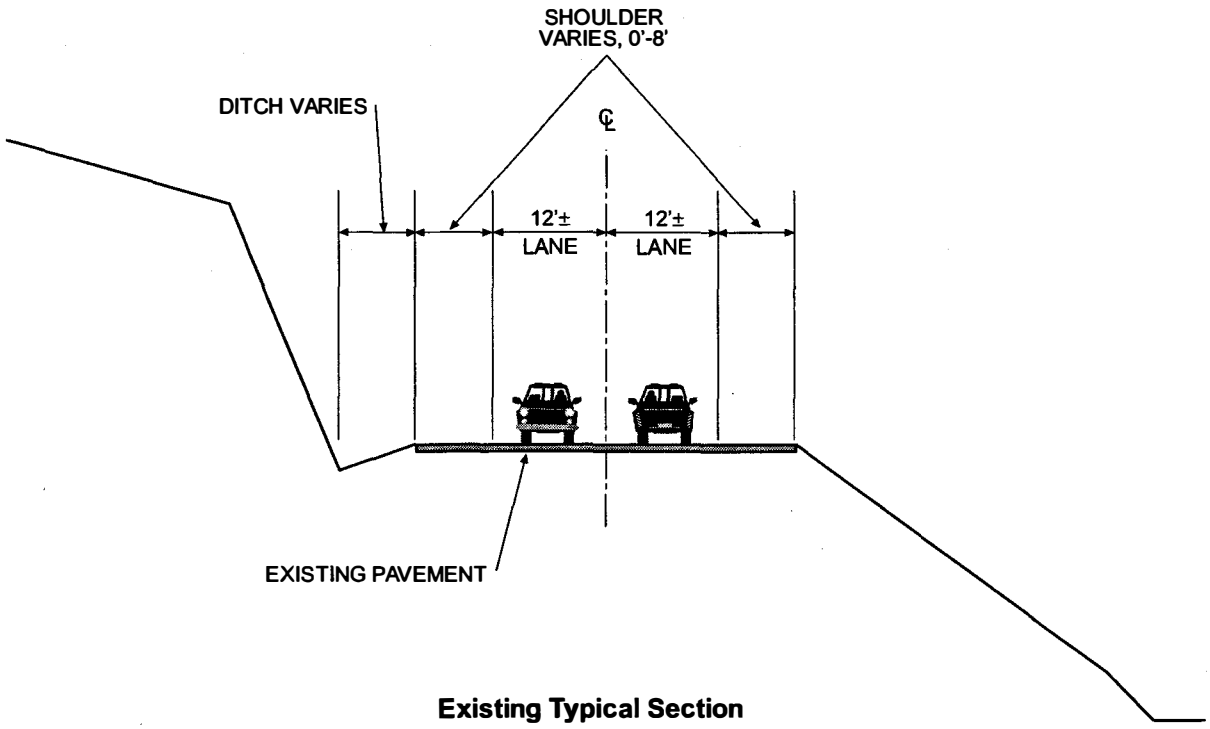
Three build alternatives met the screening criteria and were studied to a feasible level of engineering design and cost analysis, including line-item estimates, as described in the 1992 Phase B Corridor Studies report. For these three alternatives, a new four-lane highway and four-lane bridge would be constructed near Hoover Dam (see Figure 2-2, showing the typical roadway section). Current highway design standards for a 60-mph design are proposed for all three build alternatives. The Nevada and Arizona connections of the old highway/dam crossing to the new U.S. 93 bypass roadway will be designed to provide ingress/egress for bicycles. Detailed traffic analysis will be completed during final design

Table 2-1
Comparison of Alternatives Considered

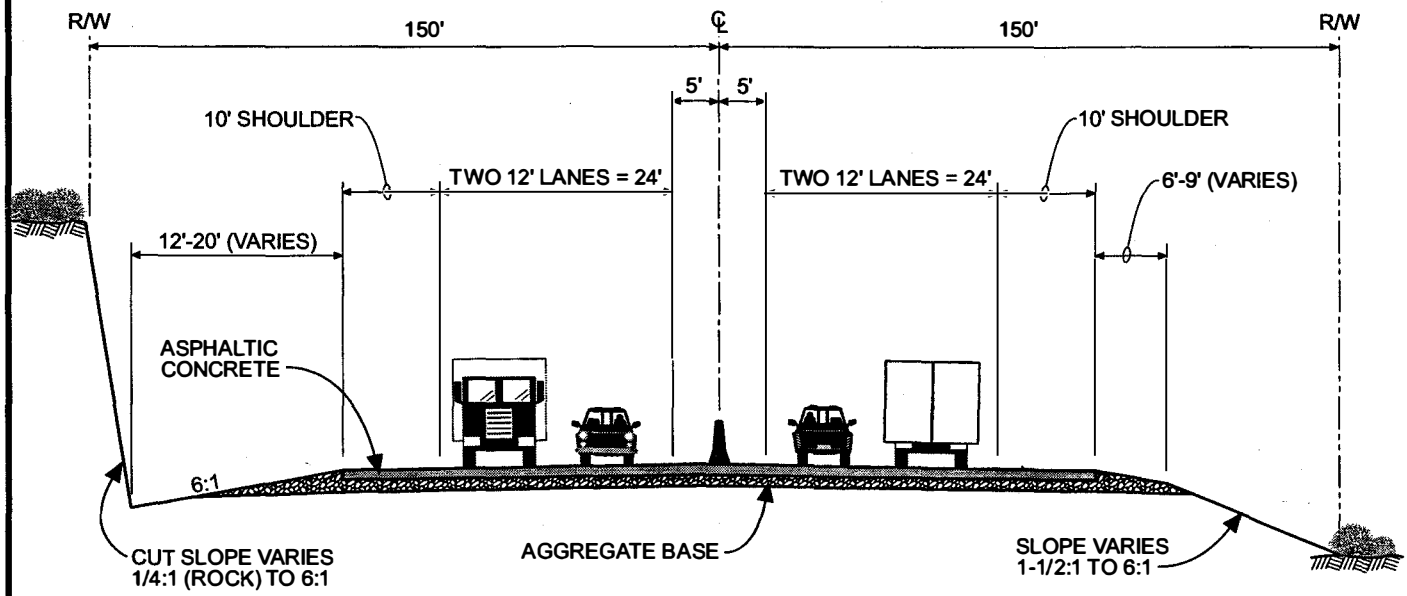
Alternative Name	4(f) Lands Potentially Disturbed (acres)	Distance from the U.S. 93/95 Interchange NV to Kingman, AZ (miles)	Results of Applying Screening Criteria
Promontory Point	74	83	Meets criteria
Sugarloaf Mountain (Preferred)	92	83	Meets criteria
Gold Strike Canyon	128	82	Meets criteria
			Reason for Elimination
Boulder City North	145	82	2, 3, 4
Boulder City South	165	83	2, 3, 4
Boulder City South Option	135	82	2, 3, 4
Willow Beach North	405	81	2, 3, 4, 5, 6
Willow Beach South	575	80	2, 3, 4, 5, 6
Nelson	491	82	2, 3, 4, 5, 6
Cottonwood	436	99	2, 3, 4, 5, 6
Laughlin-Bullhead City	36	106	1, 4, 5
U.S. 95/I-40	0	153	1, 5
Temple Bar	818	149	2, 3, 4, 5, 6
Modifications to Hoover Dam	n/a	n/a	1, 9
Restricting Motorized Traffic to Hoover Dam	n/a	n/a	1, 7, 8
Traffic Systems Management	n/a	n/a	1, 7, 8

Screening Criteria
1. Does not meet purpose and need.
2. Substantial Section 4(f) Impacts.
3. Severe impacts to pristine habitat.
4. Severe impacts to wildlife.
5. Excessive costs.
6. Requires operation and maintenance of duplicate parallel roadways.
7. NDOT determined a commercial truck ban infeasible.
8. No reduction in congestion.
9. Does not solve public safety problem or protect power and water supplies; impacts to historic appearance of dam.

to determine whether at-grade crossings or interchanges are required at or near the project termini. Provision of an interchange connection of existing U.S. 93 with the new Hoover Dam Bypass at or near the western project terminus (east of the Hacienda Hotel) will remove the need for an interchange connection at the Reclamation warehouse, where both the Sugarloaf Mountain and Promontory Point alignments cross existing U.S. 93 (see Figure 2-3). Under the build alternatives, commercial trucks will be restricted from Hoover Dam according to vehicle weight or number of axles; local delivery trucks and



Existing Typical Section



Proposed Typical Section

GENERAL NOTES

1. High quality rock is expected throughout the majority of the study area. Cut slopes vary depending on rock type. Though not shown, widened ditches may be required in areas of very deep cut. In addition, rockfall areas may need special catchment ditches and/or concrete barrier rail installations to protect the highway and its users.
2. More detailed typical sections are depicted in the Phase B Corridor Studies.
3. Two-lane existing typical section shown. Some portions of existing road include a climbing lane.

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FIGURE 2-2
TYPICAL ROADWAY SECTION
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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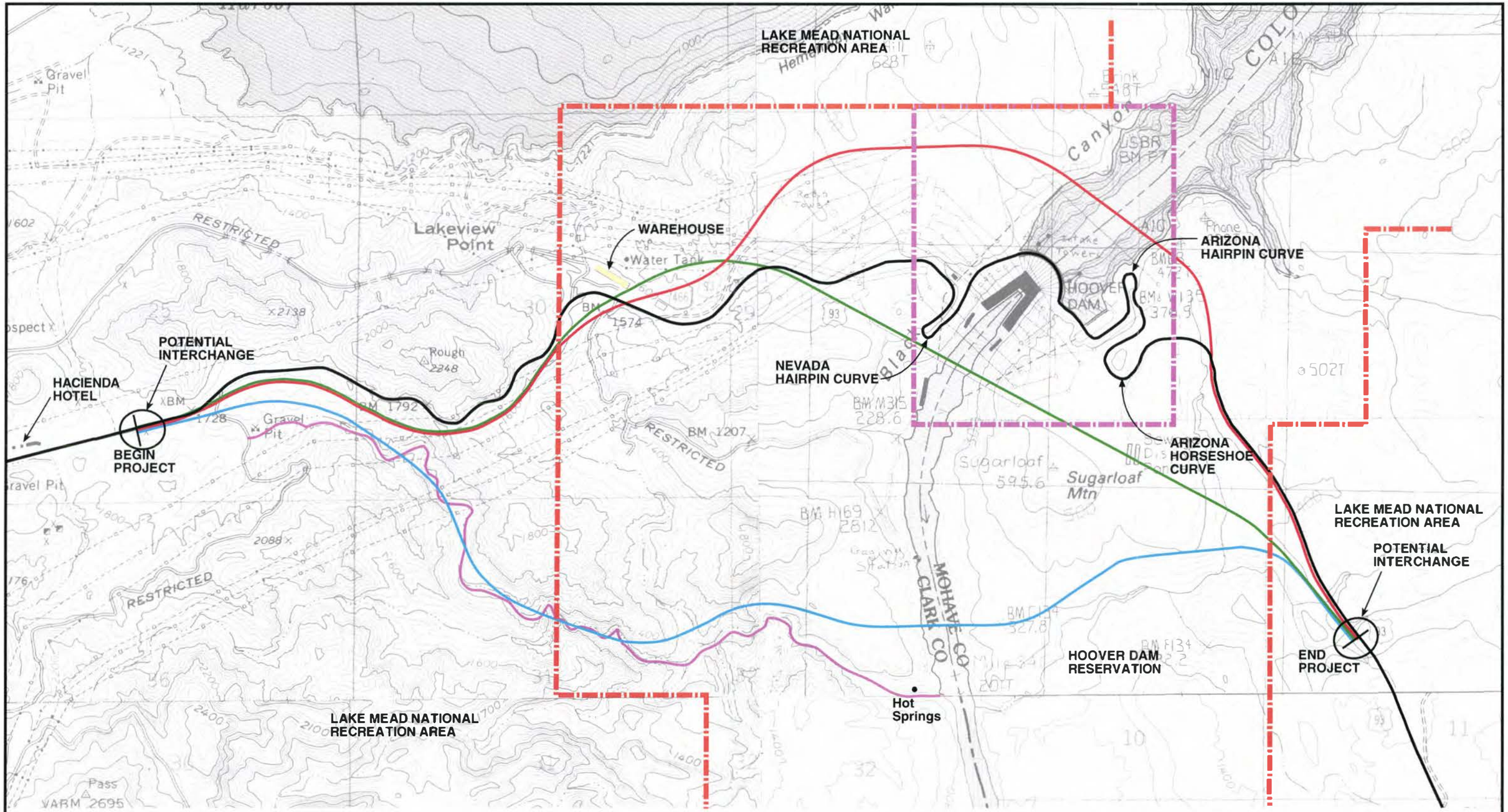

FIGURE 2-3
ALTERNATIVES BEING EVALUATED IN DETAIL
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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administrative/maintenance trucks would be exempted. The No Build Alternative is also described. The following alternatives are shown in Figure 2-3 and are described in the following sections:

- Promontory Point
- Sugarloaf Mountain (Preferred Alternative)
- Gold Strike Canyon
- No Build (Existing U.S. 93)

During the 1992 Colorado River bridge crossing study conducted by Reclamation, generic bridge designs that were determined to be suitable were presented as viable structure alternatives for each river crossing. Presentation of specific bridge designs in this EIS is not intended to preclude other feasible structures. A Design Advisory Panel (DAP), established as part of a Programmatic Agreement (PA) for this project under requirements of the National Historic Preservation Act (NHPA), will provide input on bridge design concepts, structure type, and materials (see Section 3.5). The DAP consists of members from FHWA, NDOT, ADOT, the Nevada and Arizona State Historic Preservation Offices, the Advisory Council on Historic Preservation, the National Historic Landmark Coordinator, NPS, Reclamation, WAPA, and consulting Native American tribes, as well as an independent architectural historian and a registered landscape architect. The FHWA will establish a project development schedule, with design review milestones acceptable to the DAP. The DAP will provide input on bridge design concepts, addressing structure type and materials, in light of the historical visual context of the Hoover Dam National Historic Landmark (HDNHL). The DAP will also provide input on corridorwide design elements, with the goal of developing acceptable aesthetic and material treatments throughout the bypass corridor to mitigate the total project effects on the HDNHL and other proximate historic properties. The DAP, with FHWA as the lead agency, also will be responsible for development of a process for public involvement as design concepts evolve.

The cost estimates shown for the alternatives studied in detail are based on the Reclamation Phase B Study of August 1992. The estimates shown in the Phase B Study were actually computed in 1991. Therefore, costs were inflated at 4 percent per year for 11 years, establishing a base year of 2002.

2.6.1 Promontory Point Alternative

The Promontory Point Alternative crosses Lake Mead about 1,000 feet upstream of Hoover Dam. This alternative requires constructing approximately 2.7 miles of highway approach in Nevada, a 2,200-foot-long bridge, and an approximately 0.9-mile highway approach in Arizona (Figure 2-4).

2.6.1.1 New Highway

The new highway begins about 1,000 feet east of the Hacienda Hotel, following a route just south of existing U.S. 93 to the Reclamation warehouse area. This route traverses the hillside just north of the present Reclamation service road, and follows about the same alignment as the existing service road for approximately 1,300 feet. The highway grade through this segment is about 1 percent as it continues its descent. After crossing the north end of the switchyard, the highway intersects a high narrow ridge, and crosses over a mass of rock fragments below cliffs, descending on a 5 percent grade for a distance of about 2,000 feet to a long-span bridge crossing at Lake Mead.

On the Arizona side of the bridge, the highway traverses an area requiring a deep cut, then follows along the side of a high bluff. The highway then descends at a 6 percent grade to the intersection with existing U.S. 93. A frontage road, approximately 1,700 feet long, must be constructed to provide continued access to the dam for recreation, operation, and maintenance.

2.6.1.2 Bridge Designs

Three bridge designs were initially studied for the Promontory Point Alternative: a concrete cable-stayed bridge, a steel truss rib through-arch bridge, and a suspension bridge (see Figures 2-5, 2-6, and 2-7). The design elevation at the center of the proposed bridge would be 1,463 feet, about 273 feet above the normal water surface elevation of Lake Mead and 231 feet higher than the elevation of the current highway across Hoover Dam.

2.6.1.3 Other Features

This alternative requires several project features in addition to the proposed highway and bridge crossing Lake Mead. These other features include the following:

- A 400-foot-long highway bridge crossing a bend in Gold Strike Canyon
- A 300-foot-long tunnel passing through a high, narrow ridge separating the canyon from the open valley to the northeast
- Wildlife crossings, provided by six underpasses, two overpasses, and the top of one tunnel functioning as an overpass, fencing to guide wildlife to the crossing structures, fencing to continue approximately 2,400 feet beyond the intersection of the new highway with existing U.S. 93 in Arizona, and out-jumps (mounds adjacent to fences) to allow bighorn sheep to exit the fenced highway right-of-way

2.6.1.4 Project Construction

The Promontory Point Alternative requires 5 years to construct. Assuming that funding becomes available and environmental clearances are obtained, the project would be completed by 2007. The estimated cost of this alternative is $204 million, including preliminary and construction engineering.

No major detours, closures, or traffic delays are expected to occur during construction of the lake bridge and highway approaches. The existing highway could remain open with minimal interference, except during construction at the beginning and ending locations of the project. Construction specifications for the project would provide for maintaining two traffic lanes during construction. In Arizona, the access road must be completed before the existing highway is closed to public traffic.

2.6.2 Sugarloaf Mountain Alternative (Preferred Alternative)

The Sugarloaf Mountain Alternative crosses the Colorado River about 1,500 feet downstream of Hoover Dam. This alternative requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,900-foot bridge, and an approximately 1.1-mile highway approach in Arizona (Figure 2-8).

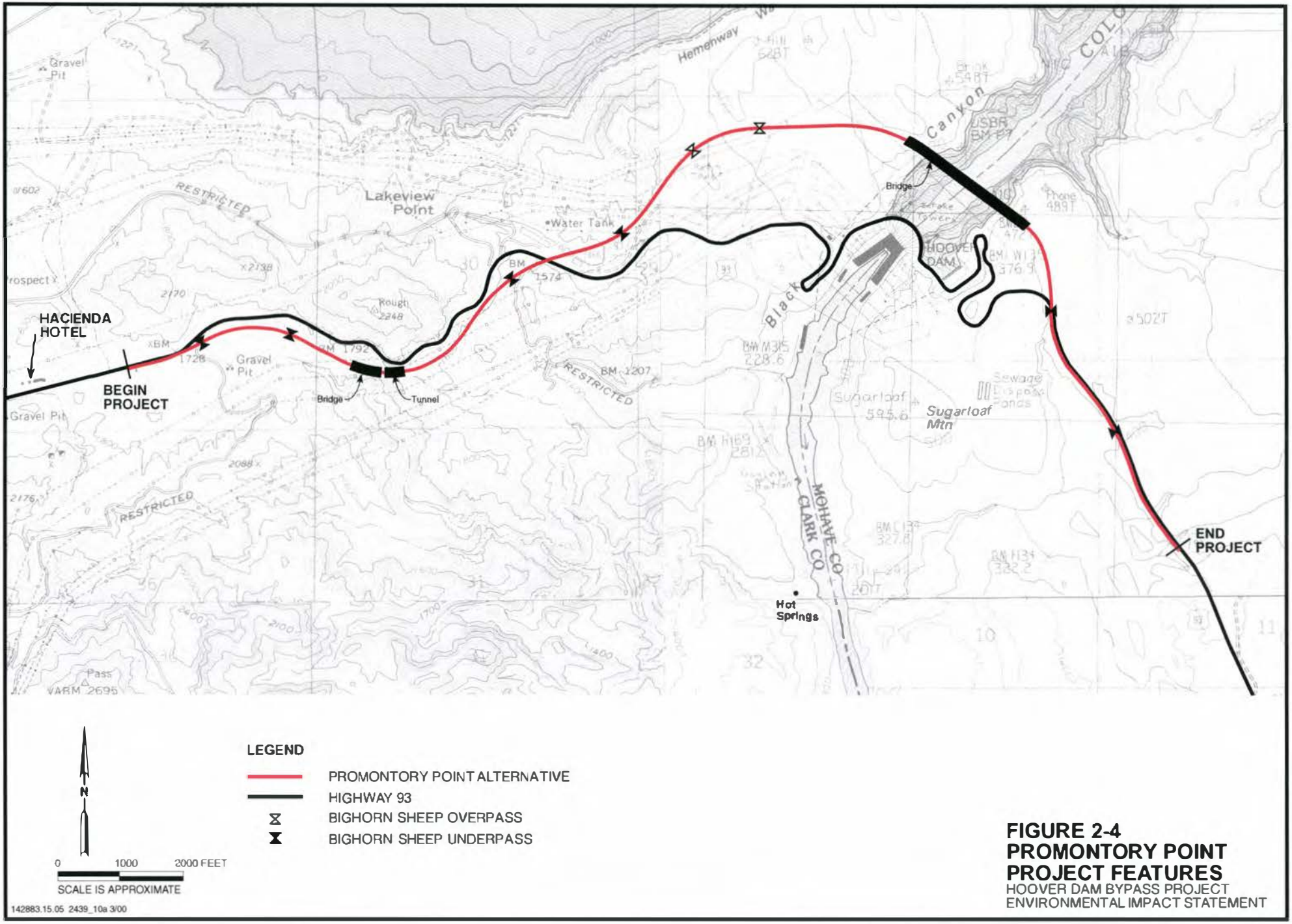

FIGURE 2-4
PROMONTORY POINT PROJECT FEATURES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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FIGURE 2-5
PROMONTORY POINT
SUSPENSION BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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FIGURE 2-6
PROMONTORY POINT
CABLE-STAYED BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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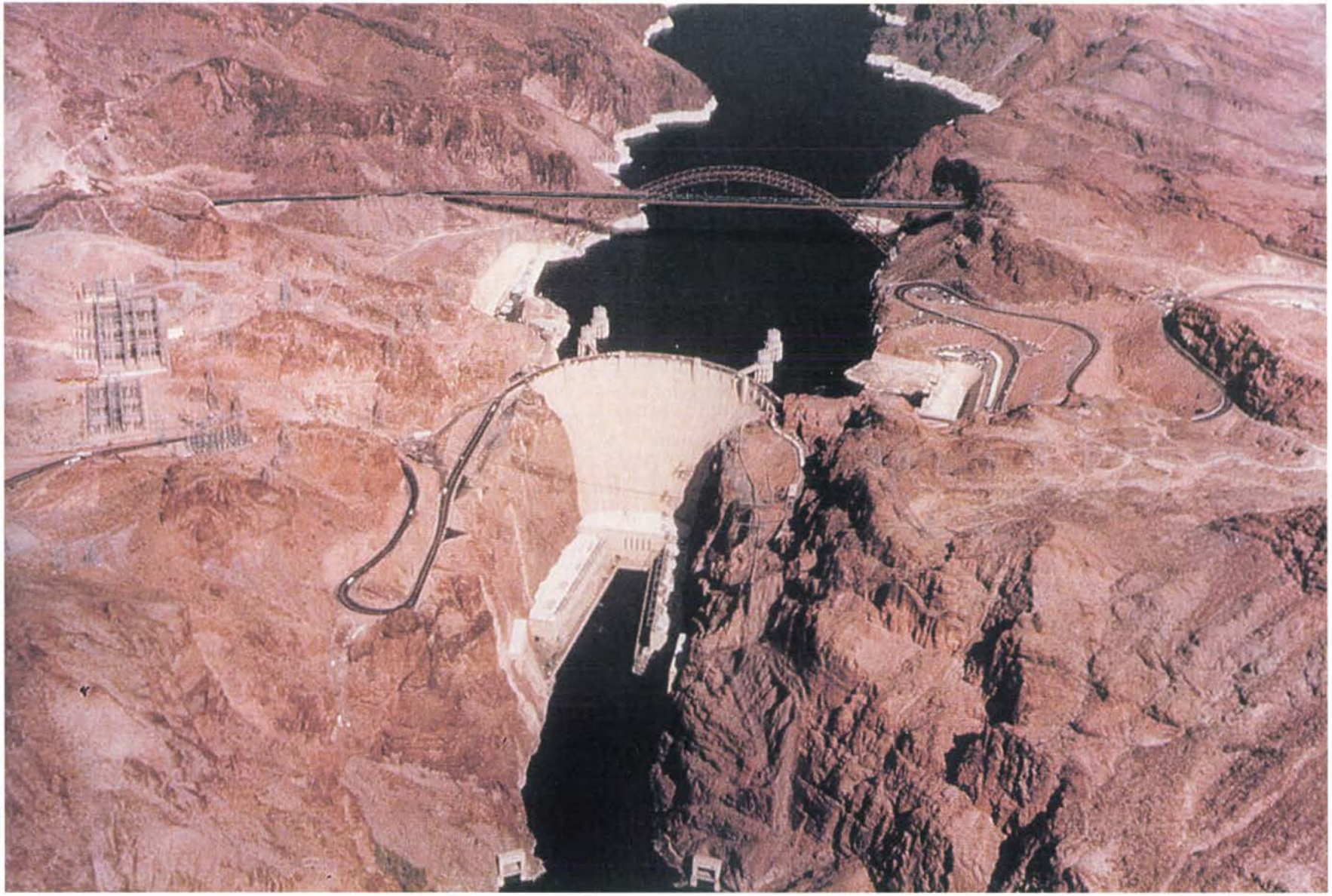

FIGURE 2-7
PROMONTORY POINT
STEEL TRUSS RIB THROUGH ARCH BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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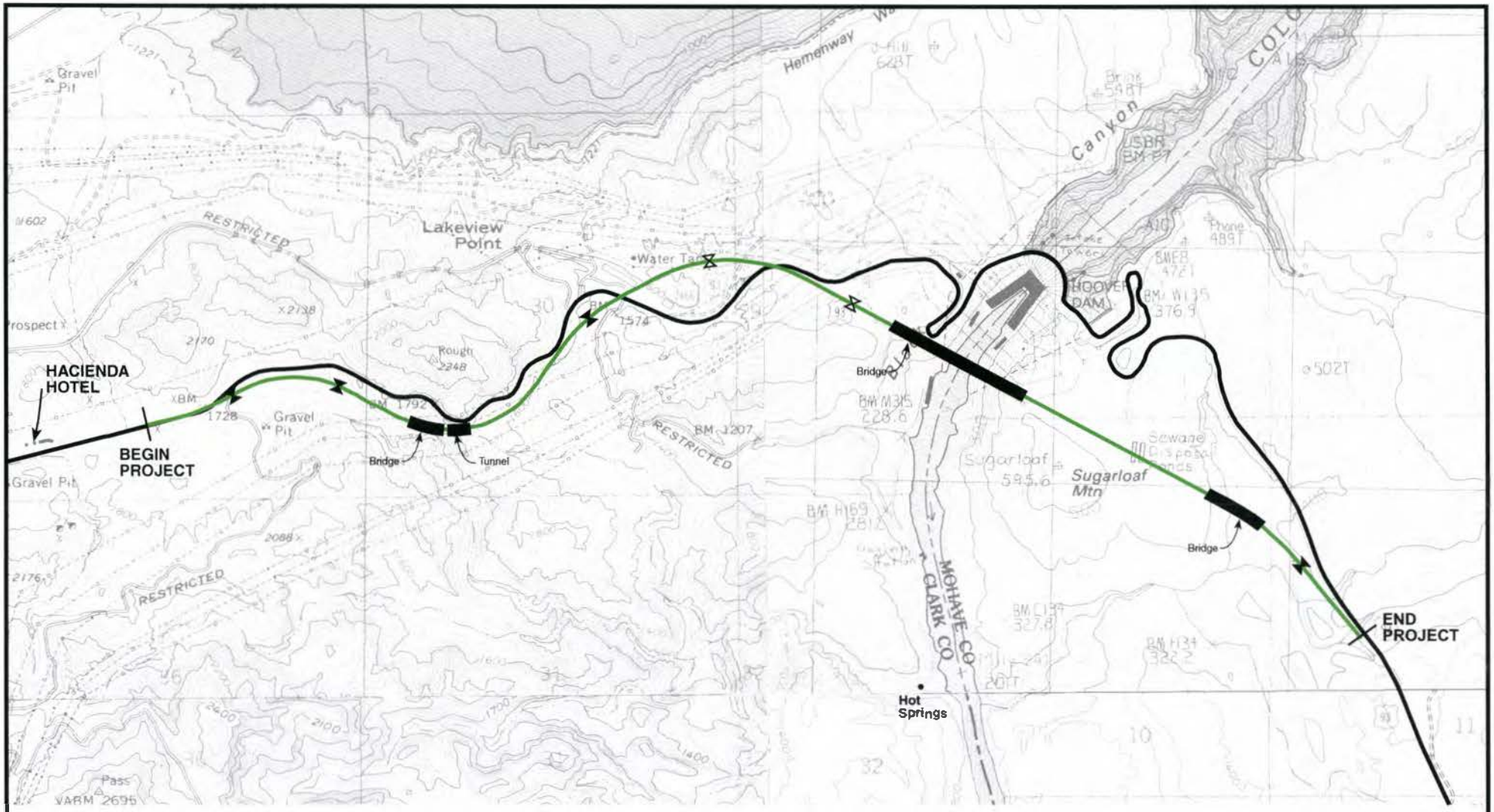

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FIGURE 2-8
SUGARLOAF MOUNTAIN PROJECT FEATURES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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2.6.2.1 Basis for Identification as the Preferred Alternative

The criteria used in screening the alternatives are described in Section 2.3. The following discussion summarizes the suitability of each of the Hoover Dam Bypass alternatives based on these criteria. A seventh criterion has been added to account for the public and agency input received during circulation of the DEIS.

Criterion 1. ***The purpose and need, including engineering and operational standards, safety, and traffic/freight capacity, should be achieved with a reasonable cost.***

The No Build Alternative (No Build) does not meet the purpose and need of the project (as discussed in Section 2.7). All three "build" alternatives meet the purpose and need of the project. The Sugarloaf Mountain and Promontory Point Alternatives have the best roadway geometry; however, the Promontory Point Alternative has a curve at each end of the proposed bridge, whereas the Sugarloaf Mountain Alternative has long, straight approaches to the bridge. This maximizes sight distance and minimizes the possibility of an accident at the Sugarloaf Mountain Alternative bridge. Numerous agencies and citizens opposed the Promontory Point Alternative because of the risk of a hazardous material spill into Lake Mead.

The Gold Strike Canyon Alternative, although 0.1 mile shorter than Sugarloaf Mountain and 0.6 mile shorter than Promontory Point, has the poorest horizontal and vertical alignments. It also has a curve at each end of the proposed bridge. The profile grade is by far the worst of the three build alternatives and includes more than 2.5 miles of grades steeper than 5 percent. The Promontory Point Alternative and the Sugarloaf Mountain Alternative have only 0.5 mile of grades steeper than 5 percent. Gold Strike Canyon requires the construction of 10 bridges in addition to the Colorado River Bridge, whereas Promontory Point has 1 additional bridge and Sugarloaf Mountain has 2 additional bridges. As shown in Figures 2-4, 2-8, and 2-11, each of the three build alternatives would also require one relatively short tunnel.

Construction access and constructability of the Gold Strike Canyon Alternative are the most difficult, although these criteria are difficult to quantify. Gold Strike Canyon is also the most expensive at $215 million, although it is only 9 percent higher than the Sugarloaf Mountain Alternative, which is $198 million. The cost of the Promontory Point Alternative is $204 million.

The preferred alternative under this criterion is the Sugarloaf Mountain Alternative.

Criterion 2. ***Impacts to Section 4(f) land (public parks, recreation areas, wildlife refuges, and historic sites) should be avoided or minimized pursuant to Section 4(f) of the Department of Transportation Act of 1966.***

There are no feasible and prudent alternatives that avoid the use of Section 4(f) land (see Chapter 6). Although the Promontory Point Alternative uses 74 acres of Section 4(f) land and the Sugarloaf Mountain Alternative uses 92 acres, the Sugarloaf Mountain alignment has been determined to be the harm-minimizing alternative based on the following key factors:

- Strong public concern regarding hazardous materials spills in Lake Mead and resulting impact on LMNRA with the Promontory Point bridge

- Resource and regulatory agency support for Sugarloaf Mountain due to least impact to wildlife, wildlife habitat, and water quality
- No adverse impact to the "first impression" historic views of Hoover Dam
- Ability to more readily blend the Sugarloaf Mountain Alternative into the landscape
- Sugarloaf Mountain Alternative traverses the National Register-eligible TCP in an area of extensive disturbance
- Ability to minimize and mitigate impacts through continuing consultation and Native American participation on the DAP

The Gold Strike Canyon Alternative uses 128 acres of Section 4(f) land, impacts existing recreational use, substantially impairs pristine scenic conditions, and has a substantial and potentially unmitigable impact on the Gold Strike Canyon TCP. Therefore, it cannot be considered the harm-minimizing alternative.

Criterion 3. ***Impacts to federally and/or state-listed threatened or endangered vegetation and wildlife species and sensitive habitats, such as wetlands, should be avoided or minimized.***

The Gold Strike Canyon Alternative involves constructing through previously undisturbed areas, whereas the Sugarloaf Mountain and Promontory Point Alternatives are generally located along existing road corridors or through other disturbed areas. Therefore, the Gold Strike Canyon Alternative has substantially more impacts under this criterion. NPS, the U.S. Fish and Wildlife Service (USFWS), the Nevada Division of Wildlife (NDOW), and the Arizona Game and Fish Department (AGFD) are opposed to the Gold Strike Canyon Alternative.

Because of the least impacts to the peregrine falcon, desert bighorn sheep, and desert tortoise, the Sugarloaf Mountain Alternative is preferred under this criterion.

Criterion 4. ***Impacts to cultural resources, including Hoover Dam NHL and archeological (prehistoric and historic) resources, should be avoided or minimized.***

The "build" alternatives adversely affect between 6 and 10 historic properties, including a Traditional Cultural Property (TCP), although the Gold Strike Canyon Alternative is considered to have the least historic impacts because it is located the farthest from Hoover Dam. The Promontory Point and Sugarloaf Mountain Alternatives have an adverse effect on the "historic" setting of Hoover Dam. Consultation with the Native American tribes indicates that the tribes generally do not support any of the "build" alternatives; however, when asked about a preference, they favored the Promontory Point Alternative and strenuously opposed the Gold Strike Canyon Alternative because of significant disturbance to the TCP.

Therefore, the Gold Strike Canyon Alternative has the least historic impacts but has the greatest TCP concerns. The Promontory Point and Sugarloaf Mountain Alternatives have the greatest historic concerns (from a visual standpoint).

Consequently, only the No Build Alternative can be considered to meet this criterion; however, it does not meet the purpose and need of the project.

Criterion 5. ***Impacts to aesthetic resources (including visual, noise, dust, and odors) should be avoided or minimized.***

All of the "build" alternatives will enhance the visitors' experience at Hoover Dam since truck traffic and much of the vehicular traffic will be removed from the dam. The Gold Strike Canyon Alternative is the only alternative that results in a substantial noise increase over existing levels; however, the Gold Strike Canyon Alternative is preferable for the visitors' experience at Hoover Dam since it moves the traffic out of sight and farther away than the other two alternatives. Traffic-generated noise, dust, and odors would be minimized. The number of hikers and recreationists downstream from Hoover Dam is very small compared to the number of visitors at Hoover Dam; therefore, under this criterion, it is reasonable to select an alternative which minimizes impacts and maximizes benefits for the visitors at Hoover Dam.

The Gold Strike Canyon Alternative is considered the preferred alternative under this criterion.

Criterion 6. ***Impacts on recreation resources and to tourists should be avoided or minimized.***

All of the "build" alternatives will have a major beneficial effect on recreation and tourism—primarily for the visitors at Hoover Dam. The visitors' experience at Hoover Dam will be enhanced by removing the truck traffic and much of the vehicular traffic from the crest of the dam. The Gold Strike Canyon Alternative has the greatest negative impact on recreation since the hot springs hiking trail would be closed during construction. The Gold Strike Canyon Alternative would also have a long-term effect on the hiking trail because the highway would be adjacent to or bridged over the trail for most of its length. The Promontory Point Alternative has the most potential impact to the planned bicycle path along the historic railroad grade north of the Reclamation warehouse area. It also has the most impact to water recreation since boating restrictions would be implemented during construction.

The Sugarloaf Mountain Alternative is the preferred alternative under this criterion.

Criterion 7. ***Public and agency input should be taken into consideration.***

The approximately 160 commenters on the DEIS favored the Sugarloaf Mountain Alternative over either of the other two "build" alternatives and the No Build Alternative by a three to one margin (see Section 2.4 and FEIS Volume II). Public comments supported the Sugarloaf Mountain Alternative because of its lowest cost and least environmental impacts. Numerous citizens expressed concerns about the Promontory Point Alternative because of the possibility of a hazardous material spill into Lake Mead. The resource and regulatory agencies, with the exception of the SHPOs, unanimously supported the Sugarloaf Mountain Alternative because of its least impact to wildlife, wildlife habitat, water quality, and jurisdictional waters of the United States (U.S.). The Sugarloaf Mountain Alternative is the preferred alternative under this criterion. Gold Strike Canyon was widely disfavored due to the adverse effects on pristine habitat and recreation area.

Table 2-2 shows which alternative is favored for each of the specific criteria discussed above. The Sugarloaf Mountain Alternative is clearly the preferred alternative using the screening criteria established in the DEIS. Chapter 3 describes the proposed mitigation measures for the preferred alternative.

Table 2-2
U.S. 93 – Hoover Dam Bypass Alternative Preference by Individual Criteria

Alternative	Engineering & Cost	Section 4(f)	Biological	Cultural	Aesthetic/ Visual	Recreation	Public/ Agency Opinion
No Build				X[a]			
Promontory Point							
Sugarloaf Mountain	X	X	X			X	X
Gold Strike Canyon					X		

[a] Does not meet the purpose and need of the project (see Section 2.7).

2.6.2.2 New Highway

Similar to the Promontory Point Alternative, the Sugarloaf Mountain Alternative begins about 1,000 feet east of the Hacienda Hotel, following a route just south of existing U.S. 93 to the Reclamation warehouse area. The highway grade then steepens to 3 percent, passes through a gap in the high rock ridge that parallels the river, and then descends to the southeast to the long-span bridge over the Colorado River. Depending on the final design details, the new bypass roadway would probably cross U.S. 93 at two locations on grade-separated structures and traverse the Reclamation property east of the warehouse. Existing U.S. 93 would continue to provide access to Hoover Dam, Lakeview Point, and the Reclamation warehouse (see Figure 2-4).

From the Arizona end of the proposed river bridge, the highway traverses a deep cut along the north slope of Sugarloaf Mountain. The highway then passes through an area containing two existing sewage evaporation ponds that Reclamation owns and operates. To the east of the sewage ponds, the highway turns south, crosses a wide ravine at a 6 percent downgrade, and intersects existing U.S. 93 approximately 1.1 miles from the dam.

2.6.2.3 Bridge Designs

Bridge design options initially studied for the Sugarloaf Mountain Alternative include: a concrete or steel deck arch bridge and a concrete cable-stayed bridge (see Figures 2-9 and 2-10). Other feasible bridge design types will be considered during final design. The design elevation at the center of the proposed bridge is 1,486 feet, about 836 feet above the water surface of the Colorado River and 254 feet higher than the elevation of the existing highway across Hoover Dam.

2.6.2.4 Other Features

This alternative requires several project features in addition to the proposed highway and bridge crossing the Colorado River. These other features include the following:

- A 400-foot-long highway bridge crossing a bend in Gold Strike Canyon
- A 300-foot-long tunnel passing through a high, narrow ridge separating the canyon from the open valley to the northeast
- An 800-foot-long highway bridge crossing a large ravine on the Arizona highway approach

FIGURE 2-9
SUGARLOAF MOUNTAIN
CONCRETE OR STEEL ARCH BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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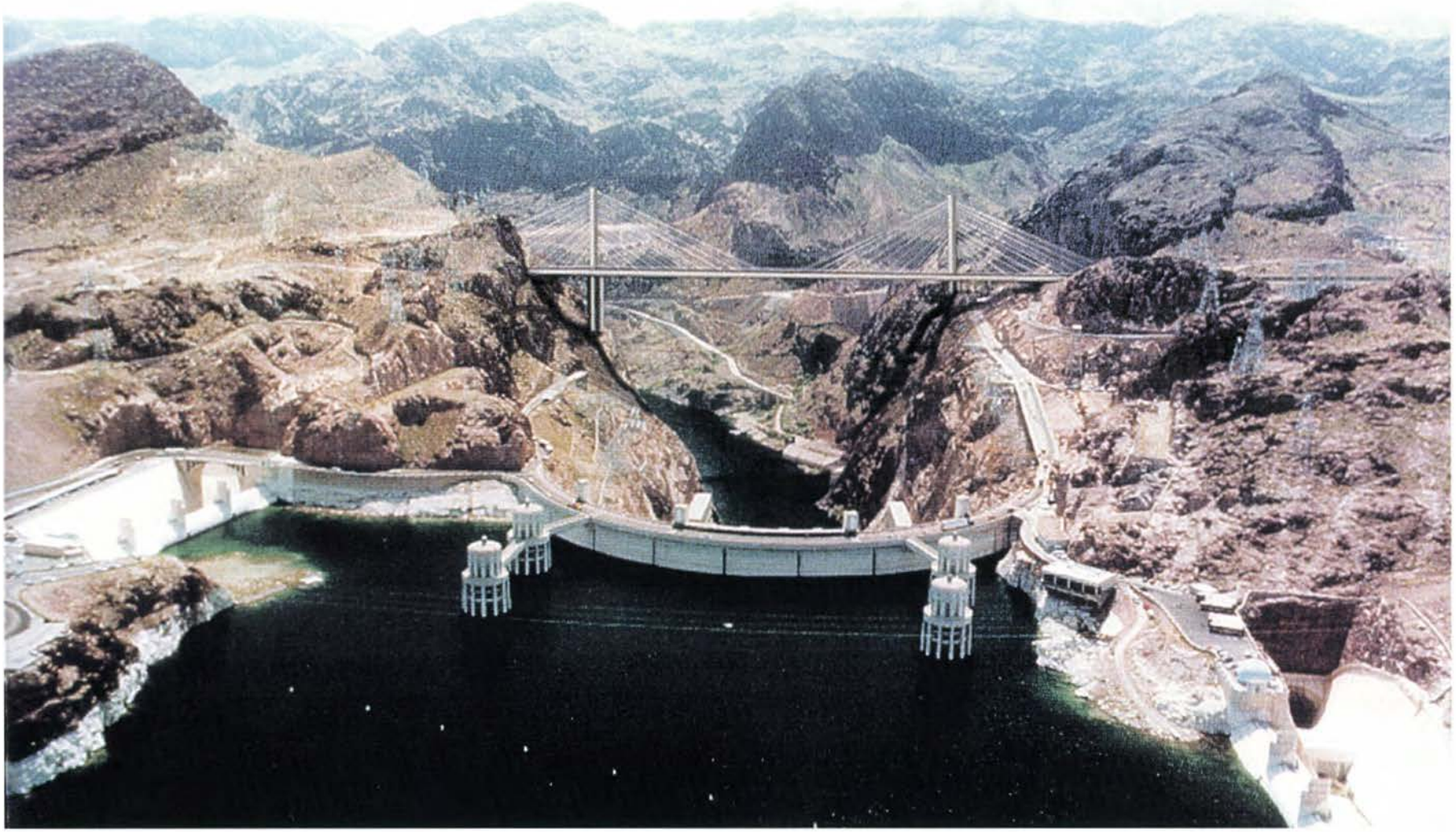

FIGURE 2-10
SUGARLOAF MOUNTAIN
CABLE-STAYED BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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- Sewage evaporation pond relocation
- Four wildlife underpasses, three wildlife overpasses, two additional wildlife underpasses provided by the two bridges outlined above, one additional wildlife overpass provided by the tunnel outlined above, fencing to guide wildlife to the crossing structures, fencing to continue approximately 2,400 feet beyond the intersection of the new highway with existing U.S. 93 in Arizona, and out-jumps to allow bighorn sheep to exit the fenced highway right-of-way

2.6.2.5 Project Construction

The Sugarloaf Mountain Alternative requires approximately 5 years to construct. Assuming that funding becomes available and environmental clearances are obtained, the project would be completed by 2007. Estimated construction cost of this alternative is $198 million, including preliminary and construction engineering.

No major detours, closures, or traffic delays are expected to occur during construction of the river bridge and highway approaches. The existing highway could remain open to two-lane traffic with minimal interference, except during construction at the beginning and ending locations of the project and briefly during placement of girders at the two proposed highway overpasses in the vicinity of the Reclamation warehouse.

2.6.3 Gold Strike Canyon Alternative

The Gold Strike Canyon Alternative crosses the Colorado River about 1 mile downstream of Hoover Dam. This alternative requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,700-foot-long bridge, and a 1.1-mile highway approach in Arizona (Figure 2-11).

2.6.3.1 New Highway

From the Nevada side, about 2.2 miles of new highway follow the Gold Strike Canyon to within about 4,000 feet of the Colorado River where it veers northeast from the canyon. The mouth of the canyon is wide, with the sides sloping at 3 feet horizontally for about every 1 foot of elevation change. The highway reaches the 6 percent maximum grade approximately at Station 48+00 and continues that rate of descent for about 1.5 miles.

From the Arizona end of the proposed river bridge, the highway crosses a spoil site created during the original Hoover Dam construction. A highway bridge spans an area between the spoil pile and the hillside, then traverses an area of bench cut with some fills until it bridges a ravine. The highway then turns southeast to intersect with existing U.S. 93. The entire Arizona approach from the abutment of the river bridge on the Arizona side to the intersection with U.S. 93 ascends at a 5.3 percent grade for a distance of about 4,000 feet.

2.6.3.2 Bridge Designs

Two bridge designs were initially studied for the Gold Strike Canyon Alternative: a concrete deck arch and a steel deck arch (see Figures 2-12 and 2-13). The design elevation at the center of the proposed bridge is 1,132 feet, about 482 feet above the water surface of the Colorado River and 100 feet below the elevation of the current highway across Hoover Dam.

2.6.3.3 Other Features

This alternative requires several project features in addition to the proposed highway and bridge crossing the Colorado River. These other features include the following:

- A 300-foot-long tunnel passing through a ridge that separates the canyon from the river
- Bridge structures used in areas where large roadway fills would otherwise encroach on the Gold Strike Canyon hiking trail; retaining walls used to avoid large fills interfering with trails and drainages
- Possible construction of noise barriers along the Gold Strike Canyon trail
- Two wildlife underpasses, 1 wildlife overpass, 10 additional wildlife underpasses provided by the highway bridges outlined above, 1 additional wildlife overpass provided by the tunnel outlined above, fencing to continue approximately 2,400 feet beyond the intersection of the new highway with existing U.S. 93 in Arizona, and out-jumps to allow bighorn sheep to exit the fenced highway right-of-way. NDOT and ADOT will maintain the wildlife underpasses and overpasses within their respective states.

2.6.3.4 Project Construction

The Gold Strike Canyon Alternative requires 5 to 6 years to construct. Assuming that funding becomes available and environmental clearances are obtained, the project would be completed by 2007. Estimated construction cost of this alternative is $215 million, including preliminary and construction engineering.

No major detours, closures, or traffic delays would occur during construction of the bridges and highway approaches. The existing highway remains open with minimal interference, except at the beginning and ending points in Nevada and Arizona. The specifications for the project provide for maintaining two traffic lanes during construction.

2.7 No Build Alternative

Under the No Build Alternative, no Hoover Dam Bypass is developed, no change in the current highway configuration occurs, and no other structural or nonstructural improvements are developed on U.S. 93 near Hoover Dam. Existing hairpin curves, inadequate sight distances, narrow dam crest roadway, and steep grades on U.S. 93 in the Hoover Dam vicinity remain unchanged. No direct construction costs result from this alternative.

However, an increase in operations and maintenance costs is foreseeable because of increased traffic and congestion. The public also incurs added cost because of more frequent traffic delays and accidents.

The No Build Alternative does not meet the project purpose and need because this alternative does not reduce traffic congestion and accidents at the dam or minimize impacts on recreation resources and tourists; and the increased traffic volume, traveling at slower speeds, contributes to decreased air quality in the Hoover Dam vicinity and increases congestion for tourists at Hoover Dam and parts of the LMNRA.

The potential for a pedestrian-vehicle catastrophe or catastrophe involving vehicles containing hazardous materials may reasonably be expected to increase with increasing

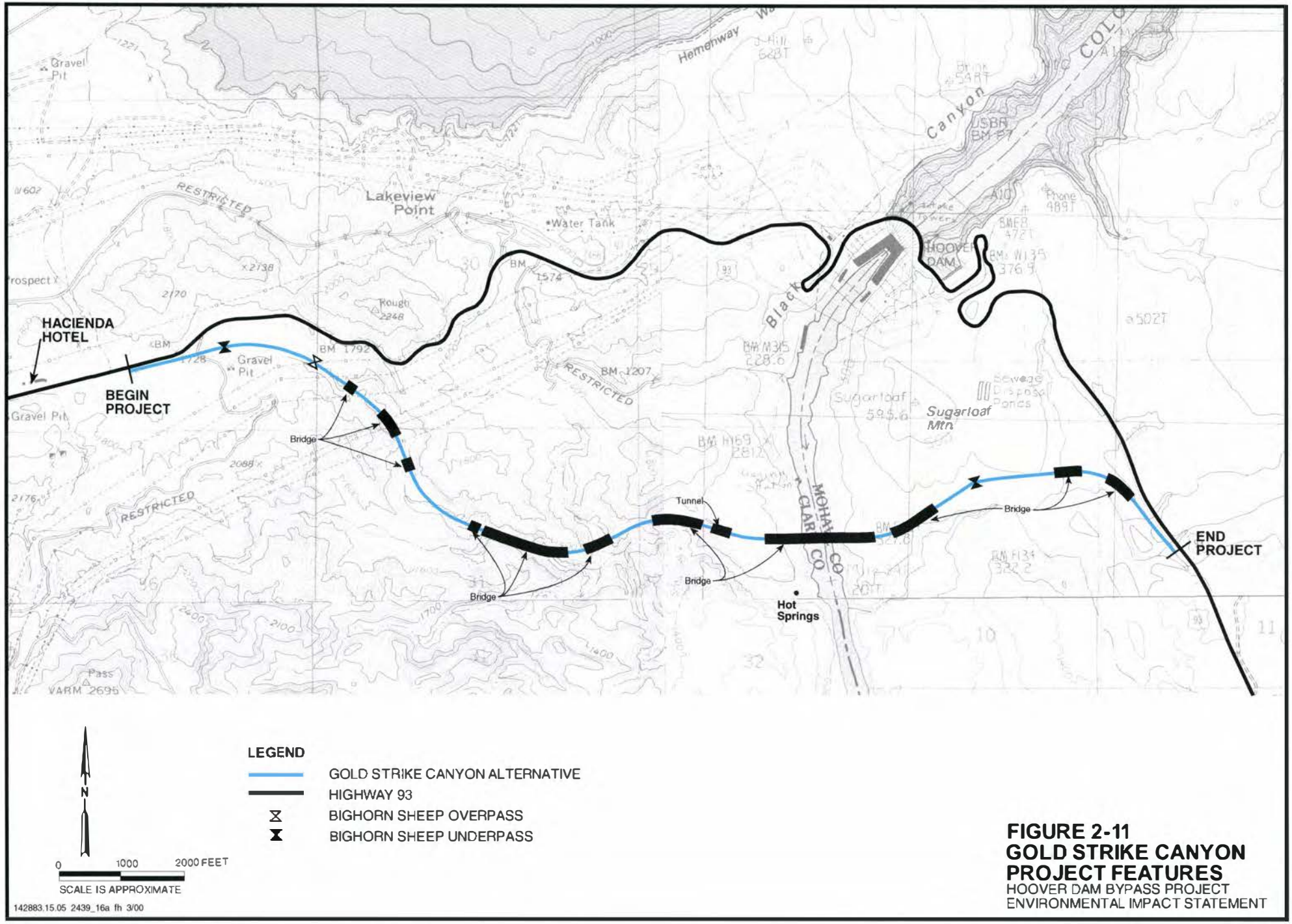

FIGURE 2-11
GOLD STRIKE CANYON PROJECT FEATURES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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FIGURE 2-12
GOLD STRIKE CANYON
CONCRETE ARCH BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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FIGURE 2-13
GOLD STRIKE CANYON STEEL ARCH BRIDGE
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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traffic volume. The risks to innocent bystanders, property damage to the dam and its facilities, contamination of Lake Mead or the Colorado River, and interruption of the power and water supplies to Southwest residents remain the same or increase.

2.8 Logical Termini

An important aspect of developing highway improvement alternatives is to define the logical termini, or begin and end project points. All three proposed build alternatives begin at the same point on the Nevada side, located about 1,000 feet east of the Hacienda Hotel. All the alignments end at the same point on existing U.S. 93 on the Arizona side, approximately at MP 1.7.

The termini of the Hoover Dam Bypass alternatives were defined to be consistent with the project purpose and need (Chapter 1) and not necessitate other improvements outside the defined project limits (i.e., cumulative or segmental effects). In other words, the project can function independently for its design life, while not requiring or precluding future adjacent highway projects. This action does not change current traffic compositions on regional routes. Thus, it does not generate traffic on the U.S. 93 corridor or other regional routes, nor does it predetermine the alternative selection in adjacent, but unrelated, projects. Two such highway projects are in early planning stages: an NDOT project to address the traffic problems along U.S. 93 in Boulder City that is coincident with the planned western terminus of the Hoover Dam Bypass alignments; and an ADOT project to widen the existing two-lane section of U.S. 93 south of Hoover Dam approximately 15 miles to the existing four-lane divided highway section.

Other alternative routes to U.S. 93 between Kingman and Las Vegas exist. All require substantial out-of-direction travel, as shown in Table 2-1. The Hoover Dam Bypass will provide improved travel time benefits to regional traffic and freight movement among the Phoenix, Kingman, and Las Vegas areas over the design life of the project. Improved overland goods and freight movement is an important NAFTA goal to be achieved by the project to eliminate the traffic bottleneck at Hoover Dam.

2.9 Toll Option

A user fee or toll charge was evaluated as an option for partially funding the new bridge and highway approaches for each of the three build alternatives. A *Traffic and Revenue Study* (Reclamation, August 1992) determined the anticipated toll revenues and the feasibility of financing through a potential bond issue. ADOT and NDOT completed a *Hoover Dam Bypass Bridge Financial Feasibility Study* to determine viable funding sources for the Hoover Dam Bypass (June 2000). The study assessed toll crossings and other financial options. A toll facility would require legislative action and is not supported by ADOT or NDOT, thus it is not considered viable or anticipated. The study recommended that Arizona and Nevada should: 1) continue to pursue full federal funding, and 2) simultaneously pursue "debt backed by federal and by state funds" approaches.

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CHAPTER 3

Affected Environment, Environmental Consequences, and Measures to Minimize Harm

Introduction

This chapter provides a description of the existing social, economic, and environmental settings for the area affected by the three build alternatives and the No Build Alternative. The affected environment is described for each resource of concern in the proposed project area. The discussion contains data, information, issues, and values that have a bearing on possible impacts, mitigation measures, and identification of the Sugarloaf Mountain alignment as the preferred alternative.

Probable beneficial and adverse social, economic, and environmental effects of alternatives under consideration are described. The information provides a basis for evaluating the comparative merits of the alternatives and for identifying the preferred alternative. Some impacts to specific resources were evaluated for each build alternative and the No Build Alternative, while others were evaluated regionally. Where data were available for each alternative and effects differed, individual alternative analyses were performed. This chapter also presents mitigation measures to reduce identified impacts to the preferred alternative and others considered.

This EIS was prepared consistent with FHWA's *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA Technical Advisory T 6640.8A, October 30, 1987). This guidance lists potentially significant impacts most commonly encountered by highway projects and directs that these factors should be discussed for each reasonable alternative where a potential for impact exists. Environmental and socioeconomic factors potentially impacted by the proposed project are analyzed in detail in this chapter. Factors which were found to have no potential for project-related impacts and are not discussed in this chapter are as follows:

- Wetlands
- Relocation Impacts
- Joint Development
- Wild and Scenic Rivers
- Coastal Barriers
- Coastal Zone Impacts

The following additional technical reports were prepared for the Hoover Dam Bypass DEIS, and they are available through the Federal Highway Administration, Central Federal Lands Highway Division (contact Dave Zanetell at 303/716-2157 for additional information):

- Air Quality Analysis
- Noise Analysis
- Section 404 Jurisdictional Delineation Report
- Visual Resources Analysis
- Biological Assessment
- Archaeological Resources Survey Report

- Historic Resources Survey Report
- American Indian Ethnographic Study

3.1 Air Quality

3.1.1 Affected Environment

National ambient air quality standards (NAAQS) have been established for several major pollutants referred to as "criteria" pollutants. The NAAQS are two-tiered: primary—to protect public health; and secondary—to prevent degradation to the environment (e.g., impairing visibility, damaging vegetation and property). The six criteria pollutants are:

- Carbon monoxide (CO)
- Particulate matter with diameters less than 10 microns (PM_{10})
- Nitrogen dioxide (NO_2)
- Sulfur dioxide (SO_2)
- Ozone
- Lead (Pb)

In addition, the U.S. Environmental Protection Agency (EPA) recently set new standards for particulate matter with diameters less than 2.5 microns ($PM_{2.5}$) and revised the ozone standard. Both Nevada and Arizona have adopted the federal standards.

The Clark County Health District Air Pollution Control Division regulates air quality in Clark County. The Arizona Department of Environmental Quality (ADEQ) regulates air quality in Mohave County.

Because of the larger population density, Clark County has considerably more emissions than Mohave County. Clark County also has several large coal-fired power plants, which account for 93 percent of all SO_2 emissions in Clark County. No large coal-consuming sources exist in Mohave County; therefore, SO_2 emissions are negligible.

Vehicle exhaust creates a significant amount of volatile organic compounds (VOCs), nitrogen oxides (NO_x), and CO emissions. Motor vehicle emissions (particularly CO) are primary contributors to air pollution. CO is a colorless, odorless gas typically formed as a result of incomplete combustion. Elevated concentrations typically occur during the winter because vehicle engines operate less efficiently in cold weather. Concentrations tend to be higher during stable atmospheric conditions when limited mixing and low wind speeds tend to keep pollutants near the ground. They usually occur in the immediate vicinity of congested roads and intersections where vehicles are idling.

Ozone is a pollutant formed through a complex series of temperature-dependent photochemical reactions involving precursor pollutants such as NO_x and VOCs, which are emitted as vehicle exhaust. High ozone concentrations typically occur during multiday periods of hot, sunny days accompanied by stagnant weather patterns. Under these conditions, pollution from outside the region may be transported into the area, compounding the problem. This makes ozone a regional-scale pollutant and can affect rural areas outside the major metropolitan areas.

In addition to ozone formation, exhaust gases (NO_X, hydrocarbons, and SO_2) released into the atmosphere can be converted to fine particulate matter through similar (and related) chemical and photochemical reactions. Fossil-fuel combustion (resulting from motor vehicles and industry) is the major source of gases in secondary particle formation. These secondary particles are generally very small ($PM_{2.5}$ or less) and are of concern because they stay suspended longer and can go deeper into the lungs. In addition, fine particulate is a major component of regional haze and visibility impairment. The formation of nitrates and sulfates resulting from these reactions creates acid deposition (acid rain) downwind.

Fine particulate matter can also be directly emitted into the atmosphere. Sources of direct particulate emissions include:

- Wind-blown dust from construction activities, unpaved roads, agriculture, and barren lands
- Fine soot generated from residential wood-burning stoves, fireplaces, wildfire, and brush/waste burning
- Fine soot and particulate from motor vehicle emissions and industrial sources
- Sand and gravel operations
- Off-road recreational vehicles

Because of the dry, hot conditions, this region is susceptible to high particulate (PM_{10}) concentrations, especially during construction. The Clark County Air Pollution Control Division estimates that construction activity produces more than 40 percent of the PM_{10} emissions in the Las Vegas Valley.

The Las Vegas and Henderson urban area does not meet air quality standards (nonattainment) for PM_{10} and CO. The southern edge of the nonattainment area is located at Railroad Pass where U.S. 93 and U.S. 95 meet. All other areas in Clark County outside of the Las Vegas Valley (Las Vegas, North Las Vegas, and the Henderson urban area) are in attainment for all pollutants. The proposed project is located outside the nonattainment area. Mohave County (Arizona) does meet air quality standards (attainment) for all pollutants, except in Bullhead City, which is nonattainment for PM_{10} and is located in the southwestern part of the County. Table 3-1 shows the attainment status for Clark and Mohave counties.

Table 3-1
Attainment Status

Location	Status
Clark County	
Las Vegas/Henderson urban area	Nonattainment for PM_{10} and CO
All other areas	Attainment for all pollutants
Mohave County	
Bullhead City	Nonattainment for PM_{10}
All other areas	Attainment for all pollutants
Hoover Dam Area	Attainment for all pollutants

Because the project is located in an area that is meeting air quality standards and no Statewide Improvement Program-related transportation control measures exist, the conformity procedures of 23 CFR 770 do not apply to this project.

Vehicle exhaust is the primary source of project-related air pollution. Pollutants include NO_X, CO, fine particulate, hydrocarbons, and SO_2. Table 3-2 shows existing traffic volumes in the proposed project area.

Table 3-2
Existing Traffic Conditions

Location	AADT	Peak Hour	LOS
West of Hoover Dam	13,200	1,188	E
At Hoover Dam	11,500	1,035	F
East of Hoover Dam	9,300	837	E

Source: Appendix A, Traffic Analysis

Vehicle emissions were estimated using EPA-approved models. Table 3-3 shows estimated emissions per vehicle mile traveled (VMT) as a function of speed for 1997.

Emissions of sulphur oxides (SO_X) and PM are insensitive to vehicle speed. For CO and hydrocarbons, the highest emissions occur at low vehicle speeds, are lowest at about 45 to 55 mph, and then peak again at higher speeds.

Table 3-3
Estimated 1997 Vehicle Emission Rates

Speed	Pollutant Emissions in g/VMT[a]				
(mph)	CO	NO_X	Hydrocarbons	SO_X	PM
10	82.86	3.35	7.84	0.114	5.22
15	60.80	3.11	5.81	0.114	5.22
25	40.13	2.98	3.94	0.114	5.22
35	29.55	3.02	3.02	0.114	5.22
45	23.97	3.15	2.52	0.114	5.22
50	22.87	3.42	2.40	0.114	5.22
55	23.00	3.97	2.39	0.114	5.22
60	37.96	4.58	2.83	0.114	5.22

[a] grams per vehicle mile traveled

Using these emission factors, an estimate of the daily pollution burden around the project site was calculated. A speed of 10 mph was assumed for an average LOS F traffic flow condition, and 25 mph was assumed for a typical free-flow speed near the dam. Using the project-burden relationship (the ratio between vehicle speeds, numbers of vehicles, and emissions), the existing project burden was estimated as shown in Table 3-4.

Table 3-4
Existing Project Burden

	Pollutant Emissions in Pounds per Day				
	CO	NO_x	VOC	SO_2	PM_{10}
Existing Burden	6,890	442	669	17	759
	Burden Emissions in Tons/Year				
Project Burden	1,257	81	122	3	138
Clark and Mohave Counties Emissions	287,614	99,838	52,719	51,302	32,017
Fraction of Inventory	0.0044	0.0008	0.0023	> 0.001	0.004

The existing Hoover Dam crossing, which is a very small segment of the regional roadway system, contributes a small fraction of the total regional pollution inventory and has a minor role in regional pollution impacts such as ozone and regional haze.

CO is considered a microscale pollutant and is usually evaluated for short-term 1-hour and 8-hour hot-spot impacts. For this study, CO impacts in the area immediately around Hoover Dam were evaluated because of worker and visitor density. The dam roadway and the 1,000-foot approaches on either side were included in the analysis. For this analysis, the EPA-approved dispersion model for evaluating CO and particulate impacts from roadway vehicles was used. Worst-case conditions under LOS F were evaluated. The maximum 1-hour CO impact was found to be 6.3 parts per million (ppm) without background. Rural backgrounds ranged from 1 to 2 ppm, well below the standard of 35 ppm.

3.1.2 Environmental Consequences

3.1.2.1 Construction Impacts

Any of the build alternatives, including the preferred alternative, would generate dust emissions during construction. Construction emissions vary from day to day and activity to activity, with each activity having its own potential to release emissions. Construction activities that can produce dust (PM_{10}) emissions include rock blasting and handling, vehicle and truck travel over unpaved roads, blowing wind over disturbed areas, and tail-pipe exhaust being emitted from vehicles and equipment. Because of the variability in timing and intensity of construction, estimating construction-phase pollutant emissions is difficult. Furthermore, activities such as blasting do not have accepted and recognized emission factors. Nevertheless, it is assumed that there will be adverse PM_{10} impacts.

Other pollutants (CO, NO_x, VOC, and SO_x) are primarily emitted from construction equipment exhaust pipes. These pollutants are of less concern because construction activities are generally short-term, spread over a wide area, and do not impede regional air quality standards.

3.1.2.2 Operational Impacts

Daily pollutant emission estimates for the project alternatives are shown below in Table 3-5. Under the No Build Alternative, pollutant emissions increase substantially as the number of vehicles increase and the length of time at LOS F in the proposed project area increases.

The three build alternatives, in contrast, enable lessened CO and VOC emissions as LOS in the proposed project area is improved. In fact, year 2027 CO concentrations for each build alternative are less than existing CO concentrations. With construction of any of the build alternatives, CO emissions at the Hoover Dam roadway would be less: 6,439 pounds per day in year 2027 compared to 6,890 pounds per day currently.

Table 3-5
Daily Emissions by Alternative

	Pollutants in Pounds per Day				
Scenario	**CO**	**NO_x**	**VOC**	**SO_2**	**PM**
Existing	6,890	442	669	17	759
			Year 2017		
No Build	11,182	677	1,177	32	1,712
Build Alternatives[a]	5,120	691	628	32	1,712
			Year 2027		
No Build	14,724	850	1,547	40	2,144
Build Alternatives[a]	6,439	855	785	40	2,144

[a] Build—Differences in air quality impacts between the build alternatives are negligible.

3.1.3 Measures to Minimize Harm

3.1.3.1 Construction Mitigation

The project will obtain and maintain all applicable permits pertaining to dust abatement and blasting. Clark County requires dust control permits for such construction. For Mohave County, the ADEQ stipulates that portable sources of air pollution (i.e., rock, sand, gravel, and asphaltic concrete plants) will require an ADEQ permit. Reasonable steps will be taken to prevent fugitive dust emissions 24 hours a day, seven days a week, during project construction. Specific dust abatement measures (per Clark County Health District dust control permit requirements, revised July 1, 1997) include:

- Keeping all dirt access roads and staging areas watered
- Keeping dirt off paved roads by sweeping, scraping, or flushing with water
- Installing a gravel pad at least 30 feet wide by 50 feet long by 6 inches deep consisting of 1-inch- to 3-inch-thick material at truck exits to minimize dirt tracked out—if necessary, washing down trucks leaving proposed project area
- Stabilizing disturbed areas by watering, revegetating, or applying dust suppressants where no continuing development occurs within 30 days of the disturbance of that area
- Prohibiting open burning onsite without appropriate permits
- Stopping all operations, except watering trucks, during high-wind conditions that result in dust emissions that leave the proposed project area, and applying appropriate mitigation (e.g., soil stabilizers and wind breaks) to areas susceptible to high winds to prevent further occurrences
- Limiting vehicle speeds to reduce dust emissions

3.1.3.2 Operational Mitigation

No mitigation measures exist for the operational phase of the project.

3.2 Noise

3.2.1 Affected Environment

A noise study was performed and a technical report was prepared to meet the requirements of FHWA's *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772, April 1992) and the guidelines in FHWA Technical Advisory T6640.8A *(Guidance for Preparing and Processing Environmental and Section 4(f) Documents, 1987).*

All noise levels referred to in this report are stated as hourly equivalent sound pressure levels (L_{eq}), which is the average noise energy level for a stated period of time (e.g., hourly), in terms of decibels on the A-scale (dBA). Noise levels stated in dBA approximate the response of the human ear by filtering out some noise in the low and high frequency ranges that the ear does not detect well. The A-scale is used in most ordinances and standards.

Project traffic noise levels are evaluated against the traffic noise impact criteria established by FHWA, NDOT, and ADOT. The FHWA noise level criterion for noise-sensitive land uses, called Activity Category B sites (e.g., residences, churches, schools, recreational uses, and similar areas), is considered exceeded when the exterior noise level approaches or exceeds 67 dBA. The noise level criterion for extra-sensitive land uses, called Activity Category A sites (i.e., lands where serenity and quiet are of extraordinary significance), is an exterior noise level of 57 dBA. The federal criteria are based on peak-hour traffic noise levels.

Table 3-6 shows the FHWA Design Level/Activity Relationship used to determine the noise abatement criterion for specific land uses (e.g., residential and commercial). FHWA considers a traffic noise impact to occur if predicted peak-hour traffic noise levels approach or exceed the noise abatement criteria or substantially exceed existing levels. NDOT defines "approach" as within 1 dBA of the noise abatement criteria; ADOT defines "approach" as within 2 dBA of the noise abatement criteria. Therefore, in Nevada, the noise abatement threshold is 66 dBA-L_{eq} for Activity Category B, and 56 dBA-L_{eq} for Activity Category A. In Arizona, the noise abatement threshold is 65 dBA-L_{eq} for Activity Category B and 55 dBA-L_{eq} for Activity Category A. NDOT and ADOT both consider 15 dBA to be a substantial increase. Mitigation measures are analyzed based on NDOT and ADOT's policies.

Existing noise levels in the proposed project area were determined by field measurements at five sites identified by the Project Management Team and by modeling existing peak-hour traffic noise levels (see Tables 3-7 and 3-8). These sites were located to best represent the primary sensitive receptors/human activity areas affected by the project. The actual measurements served as verification of the modeling estimates at locations where vehicular traffic was the dominant noise source. Noise levels from traffic for existing and future conditions were calculated using the FHWA traffic noise prediction model (STAMINA 2.0/OPTIMA). Input to the model included traffic volume and vehicle speed data generated for the project.

Table 3-6
Federal Highway Administration Design Noise Level/Activity Relationships

Activity Category	Design Noise Levels (dBA)[a] L_{eq} hourly	Description of Land Use Activity Category
A[a]	57 (Exterior)	Land tracts where serenity and quiet are of extraordinary significance and which serve an important public need and where the preservation of those qualities is essential if they are to continue to serve their intended purpose. Such areas could include amphitheaters, parks or portions of parks, open spaces, or historic districts that are dedicated or recognized by appropriate local officials.
B[a]	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, and parks not included in Category A; and residences, motels, hotels, public meeting rooms, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A and B above.
D	—	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: 23 CFR Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*. Federal Highway Administration, April 1992.

[a] Parklands in Categories A and B include all such lands (public or private) used as parks as well as those public lands officially set aside or designated by a governmental agency as parks on the date of public knowledge of the proposed highway project.

Table 3-7
Measured Noise Levels (dBA-L_{eq})

Monitoring Location	Description	Measured Noise Level	Dominant Noise Sources
M1	Lakeview Point	47	Vehicle traffic on U.S. 93, small aircraft overhead, birds
M2	Boat Launch below Hoover Dam	52	Water hitting shore and booms below Hoover Dam
M3	Nevada Intake Tower	72	Vehicle traffic on U.S. 93
M4	Gold Strike Canyon Trail	39	Wind through bushes, birds, small aircraft overhead
M5	Gold Strike Canyon Hot Springs	60	Rushing water

Construction noise levels were also estimated using the methods described in *Highway Construction Noise: Measurement, Prediction, and Mitigation* (1977). However, these estimates should be considered less precise than the traffic noise level calculations because, at this preliminary project stage, assumptions must be made about the construction equipment to be used, location and duration of use, and noise characteristics of each piece of equipment.

Table 3-8
Existing Peak-Hour Noise Levels (dBA-L_{eq})

Receptor Location	Activity Category	Impact Criterion	Modeled Noise Level
R1/M1	B	67	50
R2/M2	B	67	52[a]
R3/M3	B	67	73[b]
R4/M4	B	67	39[a]
R5/M5	B	67	60[a]

[a] Noise levels at this receptor location are dominated by sources other than vehicle traffic. Therefore, existing noise levels are based on measured noise levels rather than modeled.

[b] Noise levels approach or exceed the FHWA noise abatement criterion.

3.2.1.1 Noise Level Measurements

Existing noise levels were measured at 5 monitoring (M) sites. Monitoring location M1 is at Lakeview Point, an overlook to Lake Mead (see Figure 3-1). Monitoring location M2 is at the boat launch below Hoover Dam. This area has restricted access, with groups being allowed access twice daily to launch canoe trips. Monitoring location M3 is on Hoover Dam on the sidewalk by the Nevada Intake Tower. Monitoring location M4 is on the Gold Strike Canyon Trail, and monitoring location M5 is located at the Gold Strike Canyon Hot Springs. Monitoring locations M1 through M5 are all recreational uses (Activity Category B), but are not considered areas where quiet is of significant importance. Table 3-7 shows the measured noise levels at each site.

3.2.1.2 Model Verification

At monitoring locations M1 and M3, which have vehicular traffic as a dominant noise source, noise levels were also estimated by using the FHWA highway noise prediction model. The model uses data on traffic volumes, vehicle mix, speed, vehicle noise emission levels, and roadway geometry to predict traffic-generated noise levels at chosen receptors. To test agreement between calculated and measured noise levels, traffic volumes counted during the monitoring period are used in the model. These levels are then compared with the measured noise levels. For this project, the modeled and measured results agreed within 3 dBA. A traffic noise level variation of 3 dBA or less is considered barely perceptible to imperceptible. Therefore, an agreement between measured and modeled traffic noise levels resulting in 3 dBA or less is acceptable.

3.2.1.3 Existing Noise Levels

Five computer modeling receptor (R) locations, corresponding to the five monitoring (M) locations, were selected for use in predicting noise levels in the proposed project area. To calculate existing peak-hour noise levels, traffic data generated for the project were used in the verified noise model. Existing peak-hour noise levels for the 5 receptors are summarized in Table 3-8. FHWA criteria are shown for comparison.

3.2.2 Environmental Consequences

3.2.2.1 Construction Impacts

Promontory Point Alternative. Construction impacts under the Promontory Point Alternative are the same as those discussed below under the preferred alternative.

Sugarloaf Mountain Alternative (Preferred Alternative). Heavy equipment used during construction would have short-term noise impacts on the recreational areas along the proposed alignment. Receptor locations R1/M1 and R3/M3 are the nearest sensitive sites to construction activity along the Promontory Point Alternative (see Figure 3-1). Each is approximately 1,000 feet from the alternative. Table 3-9 shows estimated noise levels for construction activities at 50 and 1,000 feet.

Blasting would also occur along the alignment during construction. Blasting would be short-term and would occur only when normal excavating methods could not remove solid rock formations. Noise and vibration levels resulting from blasting are dependent on size, timing, and number of blasts; the blast area; transmitting medium; and distance to the receptor.

Gold Strike Canyon Alternative. Heavy equipment used during construction would have short-term noise impacts on the Gold Strike Canyon recreational areas represented by R4/M4 and R5/M5. Receptor locations R4/M4 and R5/M5 are approximately 50 feet and 1,000 feet from the alternative, respectively (see Figure 3-1). Table 3-9 shows estimated noise levels for different construction activities at 50 feet and 1,000 feet.

Table 3-9
Estimated Peak Construction Noise Levels (dBA)

Construction Phase	Loudest Equipment	Noise Level at 50 and 1,000 feet
Clearing and grubbing	Bulldozer, backhoe	89/63
Earthwork	Scraper, bulldozer	91/65
Foundation	Backhoe, loader	88/62
Superstructure	Crane, loader	89/63
Base Preparation	Trucks, bulldozer	91/65
Paving	Paver, trucks	92/66

Source: *Highway Construction Noise: Measurement, Prediction, and Mitigation*. U.S. Department of Transportation, 1977.

Blasting would occur under the Gold Strike Canyon Alternative as discussed under the Promontory Point Alternative.

No Build Alternative. Because no construction would occur under the No Build Alternative, no construction impacts would occur.

3.2.2.2 Operational Impacts

Table 3-10 shows future (year 2017) peak-hour noise levels for the build alternatives and the No Build Alternative. The results show that future predicted traffic noise levels will increase from 1 dBA to 26 dBA above existing ambient levels. However, comparing future noise levels for the three build alternatives with the No Build Alternative indicates that levels will range from a 3 dBA decrease to a 26 dBA increase with the U.S. 93 bypass alternatives. The results also show that traffic-generated noise from the proposed project

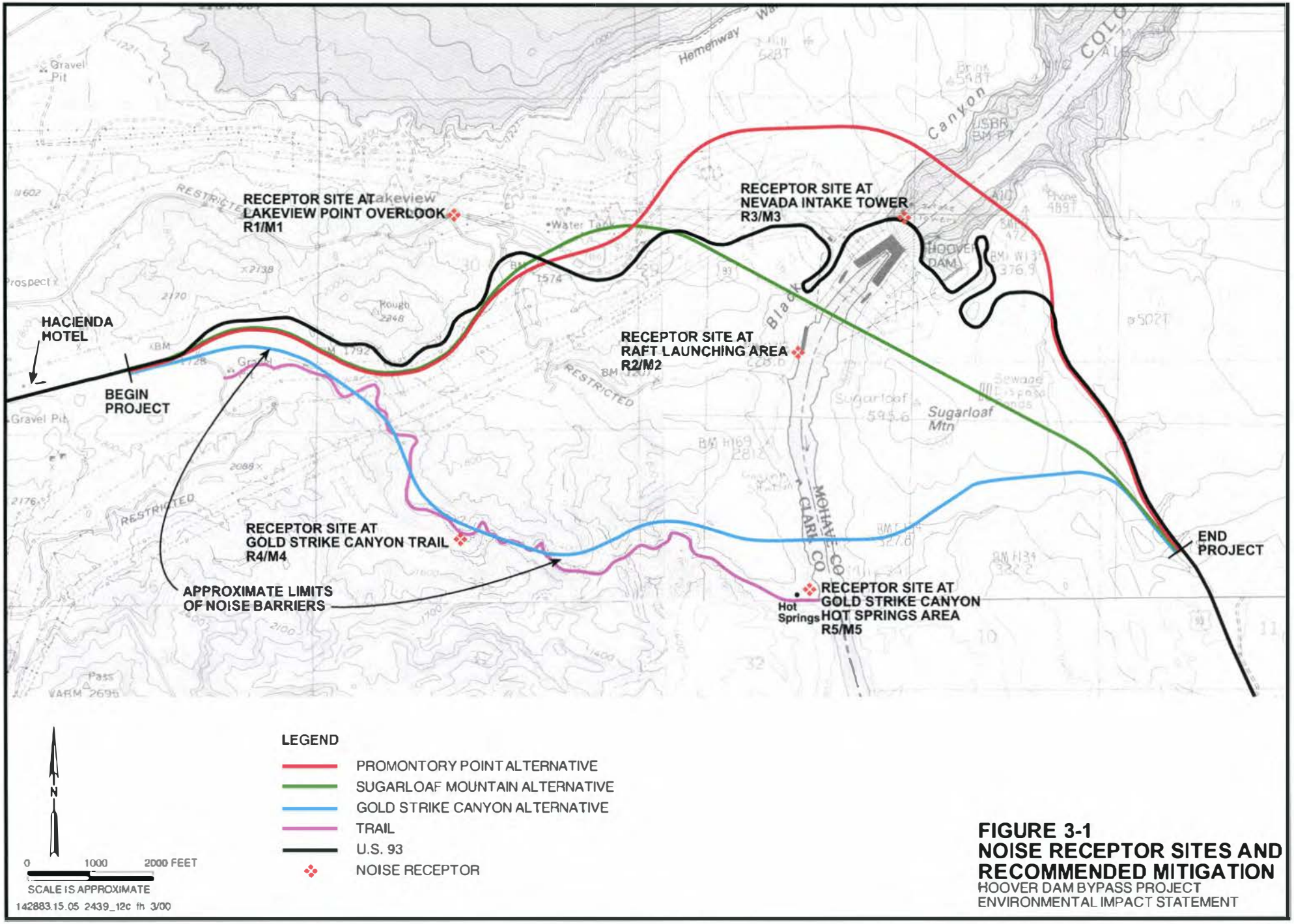

FIGURE 3-1
NOISE RECEPTOR SITES AND RECOMMENDED MITIGATION
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results in the federal and state noise abatement criteria being exceeded at receptors R3/M3 and R4/M4, the Nevada intake tower and Gold Strike Canyon Trail, respectively. For R3/M3, it should be noted that the project results in only a 1 dBA increase over existing and 3 dBA under the projected no build noise level. Federal and state noise criteria will not be exceeded at R1/M1, representing the Lakeview Point Overlook and planned Historic Railroad Trail, R2/M2 or R5/M5, which represent the raft launching area and the Gold Strike hot springs, respectively.

Based on a study completed by FHWA, the noise produced by a truck traveling at 20 mph is as loud as 85 cars traveling at 20 mph (FHWA, August 2000). Therefore, although modeling shows no perceptible change in future peak-hour average noise levels, high noise emissions from individual trucks crossing the dam will be eliminated, thereby improving the noise environment for HDNHL visitors.

Table 3-10
Future Peak-Hour Noise Levels (dBA-L_{eq})

Receptor Location	Impact Criterion	Existing	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon	No Build
R1/M1	67	50	56	56	51	54
R2/M2	67	52[a]	52[a]	57	52[a]	52[a]
R3/M3	67	73[b]	74[b]	74[b]	74[b]	77[b]
R4/M4	67	39[a]	42	42[a]	65[c]	39[a]
R5/M5	67	60[a]	60[a]	60[a]	60[a]	60[a]

[a] Noise levels at this receptor location are dominated by sources other than vehicular traffic. Therefore, noise levels are based on measured noise levels rather than on modeled.

[b] Noise levels approach or exceed the FHWA noise abatement criterion.

[c] Noise level represents a substantial exceedance of existing levels (i.e., greater than 15 dBA).

Promontory Point Alternative. Noise levels at location R3/M3 would exceed the 67 dBA-L_{eq} criterion because of traffic along U.S. 93. No noticeable noise impacts would occur as a result of U.S. 93 bypass operations.

Sugarloaf Mountain Alternative (Preferred Alternative). Noise levels at location R3/M3 would exceed the 67 dBA-L_{eq} criterion because of traffic along U.S. 93. No noticeable noise impacts would occur as a result of U.S. 93 bypass operations.

Gold Strike Canyon Alternative. Noise levels at location R3/M3 would exceed the 67 dBA-L_{eq} criterion because of traffic along U.S. 93. Noise levels at location R4/M4 would increase to 65 dBA-L_{eq} with the addition of the U.S. 93 bypass. This level would not exceed the 67 dBA-L_{eq} threshold for Category B land uses, but it would constitute a substantial increase (> 15 dBA) under FHWA, NDOT, and ADOT noise abatement policies.[1]

No Build Alternative. Noise levels at location R3/M3 would further exceed the 67 dBA-L_{eq} criterion because of projected increased future traffic volumes on U.S. 93. The projected future noise levels at location R3/M3 would actually be higher because through-trips by

[1]The Nevada Department of Transportation defines the noise abatement criterion as 1 dBA below the FHWA criterion, or 66 dBA.

automobiles and trucks would not be diverted off the dam crossing onto the new bridge alternatives.

3.2.3 Measures to Minimize Harm

3.2.3.1 Construction Mitigation

Promontory Point Alternative. Construction mitigation measures for the Promontory Point Alternative would be the same as those discussed below for the preferred alternative.

Sugarloaf Mountain Alternative (Preferred Alternative). To reduce construction noise levels, the following measures will be implemented:

- Ensure that all engine-powered equipment has mufflers installed according to the manufacturer's specifications
- Require all equipment to comply with applicable equipment noise standards

If specific noise complaints are received during construction, remedial measures will be taken by the resident engineer. These measures could include the following:

- Locate stationary construction equipment as far from nearby noise sensitive properties as possible
- Shut off idling equipment
- Reschedule construction operations to avoid periods of noise annoyance, as determined through consultation with NPS and Reclamation and defined in special provisions
- Notify nearby affected parties whenever extremely noisy work will be occurring
- Install temporary or portable acoustic barriers around stationary construction noise sources

Short-term noise increases from blasting operations may be addressed by the following mitigation measures:

- Publicize the blasting schedule through the local media
- Time blasts so that shock waves created by blasts dissipate or cancel shock waves created by subsequent blasts

Gold Strike Canyon Alternative. Construction mitigation measures for the Gold Strike Canyon Alternative would be the same as those discussed above for the preferred alternative; however, hikers would be excluded along the canyon trail from U.S. 93 to the hot springs for a period of 5 to 6 years (see Chapter 6, Section 4(f) Evaluation).

3.2.3.2 Operational Mitigation

Traffic noise impacts can be mitigated by using several available methods. Available traffic noise abatement measures include traffic management, highway design, and construction of noise barriers.

Traffic management measures include modifying speed limits and restricting or prohibiting truck traffic. Trucks are louder than cars; therefore, restricting their use on project roadways would reduce noise levels at nearby sensitive receptors. However, as U.S. 93 is

projected to be a major NAFTA truck route, predicted year 2017 traffic volumes used for this noise analysis assume a fairly high (18 percent) level of truck traffic. Reduction of traffic speeds would also result in lowered traffic noise levels. However, restricting the types of vehicles or reducing vehicle speeds would conflict with the purpose of this project, which is to decrease congestion and increase safety on Hoover Dam and improve regional traffic flow.

Constructing noise barriers between roadways and affected receptors reduces noise levels by physically blocking the transmission of traffic-generated noise. Barriers can be constructed as walls or earthen berms. As a general guideline, barriers should be high enough to break the line-of-sight between the noise source and the receptor. Barriers must also be long enough to prevent significant flanking of noise around the ends of the barrier. Openings in barriers, such as for driveways, can significantly reduce barrier effectiveness. Earthen berms require more right-of-way than walls and are usually constructed with a 3-to-1 slope. Because the terrain is very steep along the proposed project area roadways, which will have a high percentage of steep cuts, fills, and structures, using earthen berms for noise mitigation may not be reasonable. Walls can be constructed using concrete, wood, or metal.

Promontory Point Alternative. No noise impacts are expected as a result of the Promontory Point Alternative; therefore, no noise mitigation would be required.

Sugarloaf Mountain Alternative (Preferred Alternative). No noise impacts are expected as a result of the Sugarloaf Mountain Alternative; therefore, no noise mitigation would be required.

Gold Strike Canyon Alternative. Noise receptor location R4/M4 would be impacted under the Gold Strike Canyon Alternative due to a substantial exceedance of existing noise levels. Table 3-11 shows the effects of noise barriers constructed along the U.S. 93 bypass in the vicinity of location R4/M4. Figure 3-1 shows the approximate limits of the noise barriers.

Table 3-11 shows that noise barriers, located on the outside shoulder of the roadway on the trail side, could reduce noise levels at R4/M4 to 59 dBA-L_{eq} under the Gold Strike Canyon Alternative. Noise levels would continue to substantially exceed existing levels (by 20 dBA). Although the noise impact would not be completely mitigated, an insertion loss of up to 6 dBA would be possible with the addition of noise barriers.

Table 3-11
Gold Strike Canyon Alternative
Future Peak-Hour Noise Levels (dBA-L_{eq})

Receiver Location	Build, No Mitigation	8-Foot Barrier[a]	10-Foot Barrier	12-Foot Barrier	14-Foot Barrier	16-Foot Barrier
R4/M4	65	59	59	59	59	59

[a] Minimum barrier height required to break the line-of-sight between an 11.5-foot-truck exhaust stack and the noise receptor.

3.3 Biology

3.3.1 Affected Environment

The proposed project area consists of the Black Canyon of the Colorado River where it crosses the eastern Mojave Desert. The Black Mountains to the east and the El Dorado Mountains to the west dominate the area's topography. These ranges are part of the Basin and Range Geologic Province, with numerous isolated mountain ranges running north to south throughout the Great Basin.

The Black Canyon has winter habitat for bald eagles. Portions of the proposed project area have been previously disturbed by human-made developments, including Hoover Dam, Lake Mead, U.S. 93, electric transmission line towers, construction spoil sites, maintenance facilities, and access roads. Figure 3-2 shows the locations of sensitive biological resources in the proposed project area.

3.3.1.1 Terrestrial Vegetation and Wildlife Communities

Plant communities and associated wildlife in the proposed project area are typical of the Eastern Mojave Desert. Within areas adjacent to the LMNRA, about 463 vertebrate animals are known to occur (Niles et al., 1977). The checklist of vascular plants for the LMNRA is at 800 specific and intraspecific taxa (Holland et al., 1979). This species list is maintained by NPS. Vegetation-type classifications (Brown, 1982) and typical landscapes, plant communities, and wildlife habitats found in the proposed project area are described below.

Creosote-Bursage Plant Community. Creosote-bursage is the dominant vegetation found in the proposed project area, comprising about 70 percent of the LMNRA (NPS, 1986) and most of the Mojave Desert below the 3,000-foot elevation. Dominant plant species include creosote bush, white bursage, sweetbush, white ratany, brittlebush, indigo bush, and Mojave yucca. Associated cacti include single barrel cactus, silver cholla, and beavertail. Common perennial plant species include globemallow and desert trumpet.

Desert Wash Community. Desert washes that support the desert wash community provide relatively higher soil moisture than the creosote-bursage plant community. Within the proposed project area, this community is limited to the bottom of a few narrow drainages found in Gold Strike Canyon. Species composition is similar to the creosote-bursage plant community, with the addition of catclaw acacia, and less occasionally, honey mesquite and desert willow. This plant community has a more complex vegetative structure than the surrounding creosote-bursage plant community, which contributes to more abundant and diverse wildlife. More bird species are found in desert washes than in the surrounding creosote-bursage plant community.

Seep Wetlands and Riparian Areas. A concentration of active springs and seeps occurs on both sides of the Colorado River between Hoover Dam and Willow Beach and in some side canyons including Gold Strike Canyon. Many of these springs and seeps are geothermal, highly mineralized, and support specialized aquatic plants and invertebrates. Riparian and wetland plant species associated with these areas include maidenhair fern, bushy beardgrass, sedges, cattails, salt grass, arrowweed, and salt cedar. The natural riparian vegetation in Gold Strike Canyon has been disturbed by recreational use. The large wash in Arizona immediately south of the Gold Strike Canyon Alternative supports a dense stand of saltcedar and other riparian vegetation. Riverbanks along the Colorado River immediately

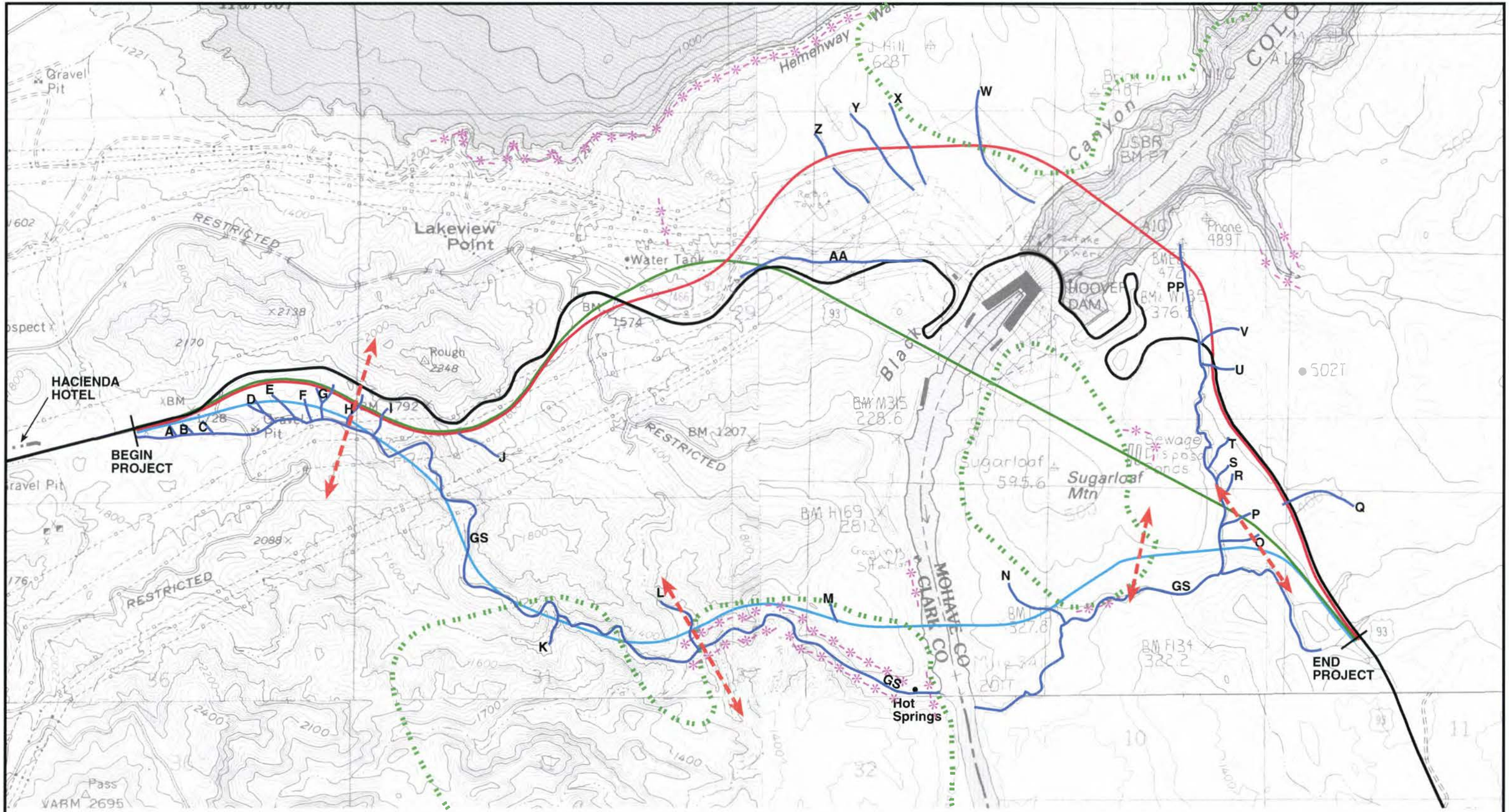

FIGURE 3-2
LOCATION OF SENSITIVE BIOLOGICAL RESOURCES
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downstream of Hoover Dam support only widely scattered stands of sparse riparian plants, of which saltcedar is the predominant shrub species.

Waters of the United States. Well-defined drainage paths generally exist throughout most of the proposed project area (see Figures 3-2 and 3-3). Approximately 27 small, natural intermittent washes occur along the proposed alignments that drain relatively small watersheds (designated as A through Z, AA, GS, and PP on Figures 3-2 and 3-3). These are narrow washes (1 to 3 feet wide) that drain a local watershed of approximately 2 acres. Two larger, intermittent desert washes also occur in the study area. These washes are broader (from a few feet to over 20 feet wide) and drain watersheds that cover more than 50 acres. One of the larger washes (Gold Strike Canyon Wash) runs along the Gold Strike Canyon Alternative (GS on Figure 3-3). The lower end of the wash has perennial flow. Hot springs occur before the terminus at the Colorado River, producing year-round runoff into the river. A medium-sized, unnamed drainage runs in a north-south direction west of U.S. 93 in Arizona, intersecting each of the build alternatives (PP on Figure 3-3). The major perennial water source in the area is the Colorado River. As shown on Figure 3-3, the river (Lake Mead) is approximately 1,000 feet wide upstream of Hoover Dam and approximately 400 feet wide downstream of Hoover Dam. The width of the river varies both daily and seasonally depending on the amount of rainfall and the amount of water released by Hoover Dam to Lake Mohave.

A field delineation was performed in March 1998 (see Figure 3-3) to determine the extent of waters of the United States under the jurisdiction of the U.S. Army Corps of Engineers. All of the desert washes shown on Figure 3-3 and the Colorado River are considered waters of the United States. No jurisdictional wetlands were identified in the proposed project area.

Cliff Habitat. Extensive cliff habitat exists immediately adjacent to the Colorado River and in Gold Strike Canyon. Many of these areas are composed of basalt and andesite, which have the necessary cracks, ledges, and caverns to provide cover for many wildlife species. These volcanic rocks resist erosion, thus providing relatively stable habitat. Plants adapted for steep cliffs in Black Canyon include cloak fern, pungent brickellia, desert tobacco, pygmy cedar, and desert rock nettle. Cliffs in Black Canyon support reptiles, birds, and mammals. Various raptor species use upward-flowing warm air currents associated with the higher cliffs. Cliff habitat in arid landscapes within 0.25 mile of water has an especially high wildlife value (Maser et al., 1979).

Examples of wildlife species found in the cliff habitat of Black Canyon include collared lizard, chuckwalla, peregrine falcon, bald and golden eagle, great horned owl, white-throated swift, common raven, canyon wren, several bat species, and desert bighorn sheep. A colony of double-crested cormorants has nested recently on the cliffs on the Nevada side of the canyon about 100 yards downstream of Hoover Dam.

3.3.1.2 Aquatic Communities

Colorado River. After Hoover Dam was built, the portion of the Colorado River downstream of the dam changed from a warm, silt-laden river to a cold-water river system. Thus, native warm-water fish, such as the Colorado River squawfish, humpback and bonytail chub, and razorback sucker have been affected by introduced cold-water species. The area downstream of Hoover Dam has subsequently become a popular trout fishery. The Colorado River has been stocked with rainbow trout to maintain the fishery because natural reproduction rates are low or nonexistent.

The Colorado River supports birds during migration and in winter. Yearlong resident waterbird species include the pied-billed grebe, double-crested cormorant, ruddy duck, common gallinule, and American coot (Blake, 1978).

Lake Mead. The LMNRA, although seemingly barren, contains a surprising variety of plants and animals, some of which are found nowhere else in the world. This reservoir, described as a deep, subtropical, moderately productive desert impoundment, supports a valuable sport fishery (Baker et al., 1977). Fish species occurring in Lake Mead are striped and largemouth bass, channel catfish, bluegill, and black crappie (Liston and Grabowski, 1988).

3.3.1.3 Wildlife Resources

The proposed project area supports wildlife characteristic of the eastern Mojave Desert. Biological diversity varies according to topography, plant community, proximity to water, soil type, and season. A literature search and field survey revealed 64 mammal species, 313 bird species, and 46 amphibian and reptile species occurring in the LMNRA (Niles et al., 1997).

The most abundant mammals in the proposed project area are cactus mice and Merriam kangaroo rats. Desert kangaroo rats and desert pocket mice are relatively uncommon and are restricted to areas with sandy soil, such as desert washes. Species associated with rocky habitats include the wood rat, rock pocket mouse, and rock squirrel. Species such as the black-tailed hare, desert cottontail, and southern grasshopper mouse also have widespread distribution in the proposed project area.

The most widespread and numerous predators in the proposed project area are the coyote, gray fox, and several species of raptors (birds of prey). Mountain lion and bobcat are less common and are associated with cliff habitat, dependent on availability of prey.

The proposed project area supports diverse and abundant reptile populations. According to NPS, common species include zebra-tailed, long-tailed brush, desert spiny, and western whiptail lizards, and western diamondback and speckled rattlesnakes.

Birds are the most diverse and abundant class of vertebrate animals found in the proposed project area. The greatest number of birds are associated with major desert washes. Typical breeding birds found in the desert washes include Gambel's quail, mourning dove, ash-throated flycatcher, verdin, and black-tailed gnatcatcher. Breeding birds found in the creosote-bursage plant community include black-throated sparrow and cactus wren. Numerous migratory birds (including Brewer's sparrow, western flycatcher, and species of warblers) move through the proposed project area. Wintering birds include phainopepla, horned lark, and ruby-crowned kinglet.

Special-status species are protected pursuant to federal and state laws. These include those species listed as threatened and endangered and those proposed for listing as threatened and endangered. Although candidate species (federal) and species of concern (federal and state) are not currently protected under federal or state laws, they are also considered special-status species in this analysis, since during the project these species may be upgraded to threatened or endangered status. These special-status species include:

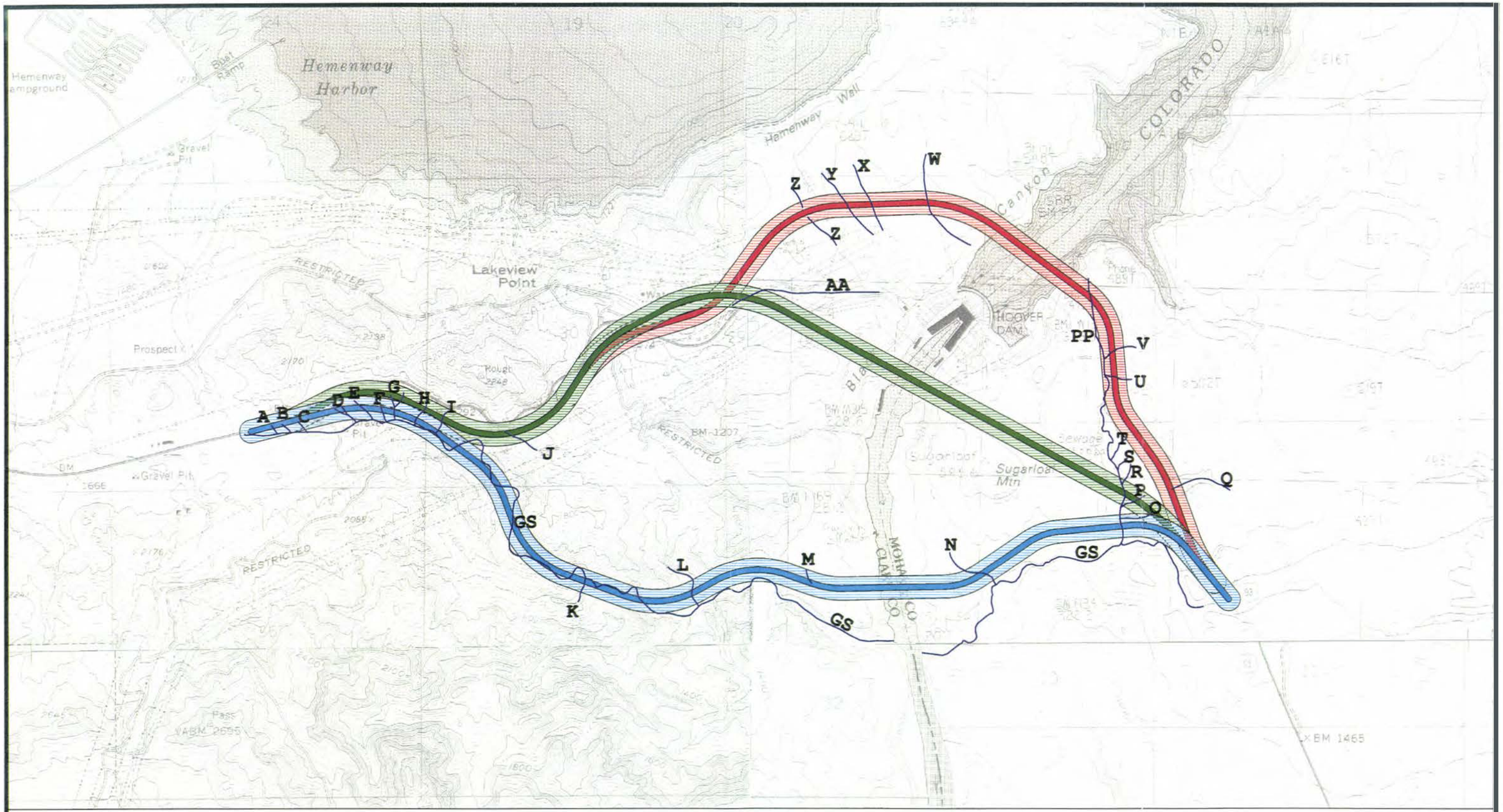

FIGURE 3-3
LOCATION OF WATERS OF THE UNITED STATES POTENTIALLY IMPACTED BY EACH ALIGNMENT

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- Wildlife and plant species listed or proposed for listing as threatened or endangered pursuant to the federal *Endangered Species Act* (50 CFR 17.11 for wildlife, 50 CFR 17.12 for plants; and various notices in the *Federal Register* for proposed species)
- Wildlife and plant species that are candidates for listing as threatened or endangered pursuant to the federal *Endangered Species Act* (50 CFR 17, February 28, 1996) (USFWS 1997a, b)
- Species listed by the State of Arizona as threatened or endangered
- Wildlife species identified by AGFD as a species of concern (wildlife species that do not have state or federal status but may still be threatened with extinction)
- Species listed by the State of Nevada as protected (Nevada Administrative Code, Section 503.001-XX); and wildlife species identified by the Nevada Division of Wildlife (NDOW) as a species of concern (wildlife species without state or federal status, but which may be threatened with extinction)

Table 3-12 lists federal special-status species that may occur in the proposed project area, their status, and the likelihood of their presence there. State special-status species (Nevada and Arizona) potentially occurring in the proposed project area are also included in Table 3-12.

Table 3-12
Special-status Vegetation and Wildlife Species Potentially Occurring in the Proposed Project Area and Likelihood of Occurrence

Common Name	Scientific Name	Federal/State Status	Likelihood of Occurrence in Proposed Project Area
Plants			
Las Vegas bear paw poppy	*Arctomecon californica*	FSC/NP& ASC	The Las Vegas bear paw poppy occurs in the LMNRA, but has not been observed within the proposed project area.
Bicolored penstemon	*Penstemon bicolor* ssp. *roseus*	FSC/NP & ASC	Bicolored penstemon occurs in wash gravels or disturbed roadsides at elevations from 1,950 to 5,500 feet. It occurs in the LMNRA, but has not been observed within the proposed project area.
Fish			
Bonytail chub	*Gila elegans*	FE/NP & ASC	The lack of suitable habitat near Hoover Dam and cold water temperatures prevent the area from supporting a viable population.
Razorback sucker	*Xyrauchen texanus*	FE/NP & ASC	Unsuitable habitat and non-native predatory fish prevent reproduction, recruitment, or the occurrence of viable population in the river directly downstream of Hoover Dam (Reclamation, 1992). Some individual adult razorback suckers inhabit the Black Canyon area of the river.
Devil's hole pupfish	*Cyprinodon diabolis*	FE/NP	Devil's hole pupfish are not present at Hoover Dam. A refugium (fish stocking tank) near the raft put-in is being restored to repopulate pupfish in the area.

Table 3-12
Special-status Vegetation and Wildlife Species Potentially Occurring In the Proposed Project Area and Likelihood of Occurrence

Common Name	Scientific Name	Federal/State Status	Likelihood of Occurrence in Proposed Project Area
Amphibians			
Relict leopard frog	*Rana onca*	/NP & ASC	This species has been found in springs downstream of Hoover Dam and in springs on the Overton Arm of Lake Mead (USFWS, 1997b). Surveys conducted by NPS in April and May 1998 at Sugarloaf Spring and Gold Strike Canyon hot spring did not find *Rana onca* at either drainage (Bill Burke, NPS, June 5, 1998 memorandum report).
Reptiles			
Desert tortoise (Mojave population)	*Gopherus agassizii*	FT/NP	Low-density tortoise habitat (supporting fewer than 40 tortoises per square mile) was found throughout the proposed project area. The area was determined to be marginal habitat because of the large amount of rocky terrain and disturbance to the more suitable habitat. The area supports a few desert tortoises of both Mojave and Sonoran populations in Nevada and Arizona, respectively.
Desert tortoise (Sonoran population)	*Gopherus agassizii*	FSC/ASC	
Chuckwalla	*Sauromalus obesus*	FSC/	This species is found in rocky creosote bush habitat along the three build alternatives, especially in talus at the base of cliffs.
Banded gila monster	*Heloderma suspectum cinctum*	FSC/NP & ASC	This species occurs in the project area. Population is at an unknown density.
Birds			
Peregrine falcon	*Falco peregrinus anatum*	FE/NP & ASC	This species is usually found in areas near permanent water with nearby cliffs. Five breeding territories in Black Canyon, 1 mile upstream of Hoover Dam and 14 miles downstream, were identified by the AGFD in 1990. It is likely that the peregrine falcon population in Black Canyon has breeding areas every 3 miles along the river.
Bald eagle	*Haliaeetus leucocephalus*	FE/NP & ASC	A wintering bald eagle population exists, fluctuating between 14 and 24 birds in the LMNRA. The proposed project area contains suitable wintering habitat. No eagles were observed at the three build alternative bridge sites during mid-winter from 1981 through 1991. During 1991 through 1998, 26 bald eagles were observed by the NPS over a 24-mile stretch of Black Canyon, from Hoover Dam to El Dorado Canyon. Most of these sightings occurred during 1996 (12) and 1998 (11). Not more than one or two eagles were observed within 3 miles of the proposed bridge sites.

Table 3-12
Special-status Vegetation and Wildlife Species Potentially Occurring in the Proposed Project Area and Likelihood of Occurrence

Common Name	Scientific Name	Federal/State Status	Likelihood of Occurrence in Proposed Project Area
Southwestern willow flycatcher	*Empidonax trailii extimus*	FE/NP & ASC	In 1997, nesting pairs of southwestern willow flycatchers were documented along the Colorado River at least 40 miles from the proposed project area (Reclamation, 1998). The desert wash/ riparian areas that would be affected by the three build alternatives have no potential to be used by breeding southwestern willow flycatchers.
Mammals			
Spotted bat	*Euderma maculatum*	FSC/NP & ASC	Bat surveys were conducted by NPS in April and May 1998 to inventory the species present within the build alternative corridors. Three locations were surveyed. The surveyed sites, chosen for their proximity to water and vegetation, were Sugarloaf Canyon, Arizona; Gold Strike Canyon, Nevada; and the Hoover Dam sewer lagoons, Arizona. Mist netting proved unsuccessful in all three locations due to a variety of factors, including weather conditions, time of year, and low densities and numbers of bats present. Echolocation calls were recorded using the "Anabat II" system, and species identification was obtained after analysis of the calls. Identification has been confirmed by Biologist Mike O'Farrell, an authority in the analysis of Anabat recordings. High densities of bats were not found at any of the survey locations (Bill Burke, NPS, June 5, 1998 memorandum report).
Yuma myotis bat	*Myotis yumanensis*	FSC/ASC	
Small-footed myotis bat	*Myotis ciliolabrum*	FSC/	
Fringed myotis bat	*Myotis thysanodes*	FSC/ASC	
Long-legged myotis bat	*Myotis volans*	FSC/ASC	
Big free-tailed bat	*Nyctinomops macrotis*	FSC/ASC	
Desert bighorn sheep	*Ovis canidensis nelsoni*	/NP	The combination of the rugged topography of Black Canyon and the water sources along the Colorado River provides exceptional, high-quality desert bighorn sheep habitat.
Yuma puma (mountain lion)	*Felis concolor browni*	/ASC	The historic distribution of the mountain lion includes the mountainous terrain on both sides of the lower Colorado River from Lake Mead to the Gulf of California. Predation on desert bighorn sheep by mountain lions in the proposed project area has been documented (Cunningham and Hanna, 1992; Cooperative National Park Resources Studies Unit, 1990).

Notes

Source: USFWS, 1997a; The Wildlife Society, 1996

Federal Status Codes:
FE—Federally-listed endangered
FT—Federally-listed threatened
FSC—Federal species of concern. These species were formerly known as "Category 2 Candidates." USFWS does not have enough scientific information to support a listing proposal for these species. The USFWS is still concerned about these species and continues to gather information about them.

State Status Codes:

NP—State of Nevada protected (either endangered, threatened, or species of concern)

AT—State of Arizona threatened

ASC—Arizona species of concern

3.3.2 Environmental Consequences

Construction and maintenance activities have disturbed much of the habitat in the proposed project area. Between 20 and 70 percent of the land within the proposed highway right-of-way corridors show signs of past disturbance resulting from dam construction and construction of access roads, electric transmission towers and switchyards, and building sites. In many areas, the land has been scraped down to mineral soil or covered with spoil material. However, wildlife does occur in the altered/disturbed areas, which have minimal human presence and recent disturbance.

Habitats along the three build alternatives were evaluated to determine whether disturbance has occurred. Table 3-13 summarizes those results. Impacts from the No Build Alternative are summarized in Tables 3-13 and 3-14.

3.3.2.1 Construction Impacts

Impacts to biological resources normally occur during construction. Construction impacts identified below were determined based on an average construction right-of-way of 300 feet.

Aside from Lake Mead and the Colorado River, water sources valuable to wildlife are scarce in the proposed project area. As Figure 3-2 shows, each of the build alternatives could affect at least one water source. The Promontory Point Alternative could affect a sump field located near the Reclamation warehouse. The Sugarloaf Mountain Alternative would affect sewage disposal ponds, used as a wildlife watering source, and warehouse water sources. The Gold Strike Canyon Alternative would affect water flow through the lower course of the canyon. According to NDOW, this is a very important perennial water source to wildlife, specifically bighorn sheep. Noise disturbance during construction could affect wildlife using the Colorado River near the hot springs south of the Gold Strike Canyon Alternative. Adverse impacts, as a result of construction, will not occur with the No Build Alternative. This alternative assumes continuation of existing conditions.

Impact of Construction on Common and Special-Status Plant Species. Because no special-status plant species occur along the three build alternatives, no impacts to such species would occur as a result of construction of any of the build alternatives. Construction impacts from equipment storage, parking, and staging areas would, however, result in disturbing several common plant species within the construction zone. Construction of the proposed alternative, including the construction zone itself, would result in the removal of approximately 122 to 143 acres (depending on the alternative) of creosote-bursage habitat (see Table 3-13).

Table 3-13
Comparison of Impacts to General Terrestrial Communities from All Alternatives (Colorado River Bridge – Hoover Dam)

	Alternative			
Impact	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon	No Build
Total land disturbance[a]	3.55 miles 134 acres	3.35 miles 122 acres	3.30 miles 143 acres	No change
Impact from soil disposal sites	5 acres	0 acre	23 acres	No change

Table 3-13
Comparison of Impacts to General Terrestrial Communities from All Alternatives (Colorado River Bridge – Hoover Dam)

	Alternative			
Impact	**Promontory Point**	**Sugarloaf Mountain**	**Gold Strike Canyon**	**No Build**
Habitat previously undisturbed[b]	29 acres 22 percent	26 acres 21 percent	100 acres 70 percent	No change
Desert wash habitat loss	0.6 acre	0.3 acre	11 acres	No change
Seep wetlands and riparian loss	No impact	No impact	No impact	No change
Cliff habitat loss	About 4.2 acres affected by road construction	About 1.4 acres affected by road construction	About 12.7 acres affected by road construction	No change
	Slight disturbances at bridge site	Slight disturbances at bridge site	Slight disturbances at bridge site	
General habitat concerns	Habitat quality is low due to existing disturbances	Habitat quality is low due to existing disturbances	Relatively high quality due to area's isolation	No change
Other miscellaneous impacts	Movement of existing transmission lines and towers would result in minor land disturbance	Movement of existing transmission lines and towers would result in minor land disturbance	No impact	No change

[a] Based on average construction of 300-foot right-of-way. Most vegetation loss is creosote-bursage habitat. About 50 percent of loss could be rehabilitated.

[b] Estimated by aerial photograph interpretation and ground truthing by a Reclamation biologist.

None of the alternatives traverse the seep wetlands or riparian areas, and measures would be taken to protect these areas from indirect impacts during construction. The loss of creosote-bursage habitat (caused by any of the alternatives) is not considered substantial because of the large amounts of similar habitat in the nearby Mojave Desert.

Impact from Construction on Cliff Habitat. Some impact would occur to cliff habitat at the bridge piers and abutments for all build alternatives. Highway construction would remove about 50 vertical feet of cliff habitat on the Arizona side of the Sugarloaf Mountain and Promontory Point bridges (out of about 800 vertical feet). The Gold Strike Canyon Alternative would affect the greatest amount of cliff habitat, or 12.7 acres (Sugarloaf Mountain, 1.4 acres and Promontory Point, 4.2). Loss of cliff habitat is more critical than loss of creosote-bursage habitat because cliff habitat occurs in a limited area and provides unique value to certain plants and wildlife. Cliff habitat near the Colorado River is especially valuable because of its proximity to water.

Impact from Construction on Common and Special-Status Wildlife. During construction, common and special-status wildlife species may be temporarily displaced due to habitat alteration or noise disturbances from construction equipment. Implementing the build alternatives would result in the permanent loss of 26 to 100 acres of potential wildlife habitat (see Table 3-13). These habitats provide roosting, nesting, hiding, and foraging

habitat for wildlife species. Without migration, wide-ranging species such as predators and desert bighorn sheep would permanently lose a portion of their foraging and breeding habitat, resulting in lowered overall carrying capacities from loss of habitat and reduced food sources. Breeding birds such as the black-throated sparrow would permanently lose nesting habitat, cover, and feeding areas.

Construction would have the most pronounced and immediate affects on burrowing rodents and reptiles with small territories. Individuals of those species would either be killed or permanently displaced by excavation and other ground disturbance. It is anticipated that the more mobile wildlife species using the proposed project area would move from the area into surrounding habitats during construction.

Table 3-14 summarizes impacts of the three alternatives to special-status species. A Biological Assessment prepared in 1992 by Reclamation addressed potential impacts to listed species (Reclamation, 1992). This assessment determined that the alternatives may affect the desert tortoise (all three build alternatives), peregrine falcon (Promontory Point and Gold Strike Canyon Alternatives), and chuckwalla (Promontory Point and Gold Strike Canyon Alternatives).

An updated Biological Assessment (BA) was prepared by FHWA and submitted to USFWS with a letter dated February 17, 1999, requesting formal consultation on the Sugarloaf Mountain Alternative (FHWA, 1999). On June 3, 1999, USFWS issued a Biological Opinion for the Hoover Dam Bypass Project (Appendix E). This document represents the opinion of USFWS on the potential effects of the proposed bypass project on federally listed species under the Endangered Species Act of 1973.

The Biological Opinion concludes that the project will not likely affect the following endangered species: bald eagle, American peregrine falcon, razorback sucker, southwestern willow flycatcher, bonytail chub, and Devil's Hole pupfish. For the Mojave desert tortoise, a federally listed threatened species, USFWS found that the project is not likely to jeopardize its continued existence or adversely impact designated critical habitat. USFWS stipulated "reasonable and prudent" measures to minimize project effects on the desert tortoise (see Section 3.3.3.1).

A letter dated November 21, 1997 from the USFWS to the FHWA verified the list of species addressed in the 1992 Biological Assessment (USFWS, 1997). This list was recently updated by USFWS in a letter dated December 5, 2000; this verified the 1997 list for threatened and endangered species (Appendix C).

Table 3-14
Comparison of Impacts of All Alternatives to Special-Status Species

	Alternative			
Species	**Promontory Point**	**Sugarloaf Mountain**	**Gold Strike Canyon**	**No Build**
Devil's hole pupfish	No effect	No effect	No effect	Potential impacts from hazardous material spills
Bonytail chub	No effect	No effect	No effect	Potential impacts from hazardous material spills
Razorback sucker	No effect	No effect	No effect	Potential impacts from hazardous material spills

Table 3-14
Comparison of Impacts of All Alternatives to Special-Status Species

Species	Alternative			
	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon	No Build
Chuckwalla	Impact to rocky habitat in mostly disturbed habitat	Impact to the least amount of rocky habitat in mostly disturbed areas	Impact to the greatest amount of rocky habitat in mostly undisturbed areas	No impacts anticipated
Desert tortoise	Impact to 129 acres of marginal habitat; may affect 8 tortoises in low-density population	Impact to 120 acres of marginal habitat; may affect 8 tortoises in low density population[a]	Impact to 131 acres of marginal habitat; may affect 9 tortoises in low-density population	Future minor loss of habitat from expansion of transmission lines
Peregrine falcon	Impact possible without mitigation; breeding territory is within 1 mile of bridge site (NDOW, 1993)	Impact possible without mitigation; peregrines may forage within project area	Impact possible without mitigation; possible breeding territory within 1 mile of bridge site (NDOW, 1993)	No impacts anticipated; expanding population will stabilize
Bald eagle	Impact unlikely; no known roosting sites near bridge site	Impact unlikely; no known roosting sites near bridge site	Impact unlikely; no known roosting sites near bridge site	No impacts anticipated; possible establishment of breeding population
Desert bighorn	Adverse impact to 25 acres of lambing habitat; access to one natural water source disrupted; need for 9 crossing structures	Adverse impact to 20 acres of lambing habitat; impact to one human-made water source; need for 8 crossing structures	Adverse impact to 55 acres of lambing habitat; access to 3 natural water sources disrupted; need for 13 crossing structures	Gradual increase in highway mortality
Mountain lion[b]	Impact unlikely; loss of 4.2 acres of cliff habitat near developed area	Impact unlikely; loss of 1.4 acres of cliff habitat near developed area	Impact possible; loss of 12.7 acres of cliff habitat in mostly undisturbed, isolated area	No impacts anticipated; population appears to be expanding
Las Vegas bear paw poppy	No impact; gypsum soil not found in this area	No impact; gypsum soil not found in this area	No impact; gypsum soil not found in this area	No impacts anticipated
Bicolored penstemon	Impact possible; disturbance to 0.3 acre of desert wash	Impact possible; disturbance to 0.3 acre of desert wash	Impact possible; disturbance to 10 acres of desert wash	No impacts anticipated

[a] Based on a review of the updated Biological Assessment (FHWA, 1999), USFWS determined in their Biological Opinion that construction of the Sugarloaf Mountain Alternative may result in the direct loss of 5 federally threatened Mojave desert tortoises in Nevada and 80 acres of Mojave desert tortoise habitat in Nevada (see Biological Opinion, Appendix E).

[b] Mountain lions have been sighted several times throughout the proposed project area. Although the area is within the historic range of the Yuma puma, the classification of lions presently residing in the proposed project area is unknown.

Impact from Construction on Desert Tortoise (USFWS Biological Opinion, Appendix E). USFWS determined in their June 3, 1999, Biological Opinion that building the Sugarloaf Mountain Alternative may result in the direct loss of 5 federally threatened Mojave desert tortoises and 80 acres of Mojave desert tortoise habitat in Nevada. In addition, desert

tortoises found in the construction area and on access roads may be harassed by capture and removal, resulting in an estimated 20 tortoises being harassed in association with construction of the preferred alternative. An unknown number of desert tortoise eggs may be destroyed during construction activities. Furthermore, an unknown number of tortoises may be taken in the form of indirect mortality or harm due to increased predation by ravens drawn to trash in the project area and from increased noise and ground vibrations associated with construction.

Impacts will occur from grading and removal of vegetation, digging of tunnels, deposition of spoil material, construction of new roads and bridges, and other activities requiring the use of blasting, heavy equipment, and machinery. Desert tortoises may be killed or injured by vehicles and may be harassed through removal from the construction area. The proposed project could result in the death or injury of desert tortoises that move onto the construction site and roads used by preconstruction and construction crews (Bury, 1978; Luckenbach, 1975; and Nicholson, 1978). Vehicles that stray from the construction area and roads may crush desert tortoises above ground or in their burrows. Habitat used by tortoises for foraging, breeding, and cover will be temporarily disturbed or permanently destroyed. Desert tortoises may be harmed by noise and ground vibrations produced by vehicles and heavy equipment and by blasting operations (Bondello, 1976; and Bondello et al., 1979). Shock waves from blasting may collapse burrows, thereby crushing tortoises.

Tortoises might be unlawfully collected as pets by project personnel, thereby removing them from the wild population. Tortoises that are physically moved out of project areas to prevent mortality or injury could be inadvertently harmed if not handled properly. Urine and large amounts of urates are frequently voided during handling, which may cause a severe water loss, particularly to juveniles (Luckenbach, 1982). Overheating can occur if tortoises are not placed in the shade when ambient temperatures equal or exceed temperature maximums for the species (Desert Tortoise Council, 1996).

However, as discussed in the Biological Opinion (Appendix E), USFWS determined that the level of effect resulting from the project will not reduce appreciably the likelihood of survival and recovery of the Mojave population of the desert tortoise in the wild because:

1. Desert tortoise densities within the proposed project area are very low
2. The proposed project does not occur within conserved habitat or an area designated for recovery of the desert tortoise
3. Impacts to desert tortoises within the project area represent a small impact to the Mojave population of the desert tortoise when total desert tortoise population numbers and geographical extent are considered.

Impact from Construction on Desert Bighorn Sheep. Construction and post-construction activities would render some of the bighorn habitat unusable to a portion of the population in the Black Mountains of Arizona and the El Dorado Mountains of Nevada. Construction activities would occur in habitat where desert bighorn are accustomed to human activities (e.g., traffic, blasting, and maintenance activities around Hoover Dam). However, it is possible that construction could affect ewes during lambing season, causing a temporary lambing decrease in a localized area. Ewes may breed late, prolonging lambing until later in the spring when environmental conditions are less favorable (Cunningham and Hanna, 1992). Table 3-15 compares impacts of the alternatives on desert bighorn.

Table 3-15
Comparison of Impacts of Build Alternatives on Desert Bighorn Sheep

Impact	Alternative		
	Promontory Point	Sugarloaf Mountain[a]	Gold Strike Canyon[a]
Overall quality and quantity of habitat		**Nevada**	
	Moderate amount of bighorn use	Lowest amount of bighorn use	Highest amount of bighorn use
		Arizona	
	Relatively lower amount of bighorn use	Relatively higher amount of bighorn use	Relatively higher amount of bighorn use
Lambing habitat		**Nevada**	
	Loss of about 25 acres of lambing habitat	No loss of lambing habitat	Loss of about 35 acres of lambing habitat
		Arizona	
	No loss of lambing habitat	Loss of about 20 acres of lambing habitat	Loss of about 20 acres of lambing habitat
Movement corridors		**Nevada**	
	Alternative crosses one major movement corridor	Alternative crosses one major movement corridor	Alternative crosses two major movement corridors
		Arizona	
	Alternative does not cross major movement corridor	Alternative crosses one or more major movement corridors	Alternative crosses two major movement corridors
Water sources		**Nevada**	
	Alternative would not affect water source	Alternative would not affect water source	Alternative would affect the Gold Strike Canyon ephemeral wash and tributaries
		Arizona	
	Construction could disrupt movement to water source in Lake Mead	Alternative would affect one human-made water source	Alternative would affect one natural water source

[a] Numerous minor crossings exist in both states.

Impact from Construction on Nesting Raptors and Protected Migratory Birds. Breeding raptors (i.e., birds of prey), including peregrine falcon or other birds protected by the *Migratory Bird Treaty Act* may be nesting in the cliff habitat during construction. Construction impacts, such as noise from equipment and increased traffic, may cause nest abandonment by nesting birds. This would be an adverse impact.

Impact from Construction on Aquatic Communities. Construction of the new bridge and associated highway approaches would minimally affect the aquatic environment in the proposed project area of the three build alternatives. Cable-stayed and suspension bridge types in the Promontory Point Alternative would require placing a pier in Lake Mead, resulting in temporary, minor affects to Lake Mead water quality during construction in that specific area. Implementing the project would increase turbidity and suspended sediment during construction. Without mitigation, excessive sedimentation could

adversely affect the feeding, growth, and survival of downstream fish by reducing feeding success, and by causing avoidance of rearing habitat.

The improved highway conditions with the build alternatives would significantly reduce the potential for hazardous material spills in Lake Mead and the Colorado River by reducing the risk of truck accidents on U.S. 93. Features to lessen the effects of hazardous spills on the new bridge would include a drainage system on the bridge that would collect liquid spills and drain the spills to holding basins at both ends of the bridge.

Impact from Construction on Waters of the United States. Figure 3-2 shows the three proposed alignments and the washes that will be intersected by each alternative alignment. Table 3-16 identifies the potential acreage of fill in waters of the United States for each alignment based on the roadway and bridge designs in the Reclamation Phase B – Corridor Studies (1992). The calculations of fill are separated into permanent and temporary impact categories based on the assumptions listed below. The acreage of fill in waters of the United States should be reassessed as more detailed highway designs become available.

Table 3-16
Acreage of Permanent and Temporary Fill in Waters of the United States for Each Alignment

Alignment	Temporary Fill 200-Foot Construction Area Each Side of the Centerline	Permanent Fill 50-Foot Impact Area Each Side of the Centerline
Promontory Point[a]	0.76	0.14
Sugarloaf Mountain	0.66	0.11
Gold Strike Canyon	2.77	0.67

[a] Impact areas of suspension bridge west tower: temporary 0.07 ac, permanent 0.06 ac

The following assumptions were used in calculating acreage of fill in waters of the United States:

- An area 200 feet on each side of the centerline of the alignments would temporarily be used for access, construction staging and material stockpiling, or would be filled by adjacent excavated materials. All stockpiled material would be removed following construction.
- For the Gold Strike alignment, all of Gold Strike Canyon Wash from U.S. 93 to Station 117+00, within and outside of the area 200 feet on each side of the centerline, would be used for heavy equipment access resulting in permanent alteration of the wash and temporary fill in waters of the United States.
- An area 50 feet on each side of the centerline of each alignment would be permanently filled by either construction of the road base or side slopes.
- With the exception of the Promontory Point cable-stayed and suspension bridge types, the area below the plane of the ordinary high water mark (OHWM) of the Colorado River (Lake Mead and Lake Mohave) will not be filled by bridge construction on any alignment. Span or arch bridges will be constructed. The Promontory Point bridge west tower would be in the lake, and the impacted acreages are included in Table 3-16.[2]

[2]If the Promontory Point Alternative were selected, a U.S. Coast Guard permit under Section 9 of the Rivers and Harbors Act would be required for construction of the bridge over Lake Mead. The fill for bridge pier construction would also be subject to U.S. Army Corps of Engineers Nationwide Permit #15 under Section 404 of the Clean Water Act.

- Bridge construction for all other drainages will result in permanent fill in waters of the United States. Structural piers, retaining walls, and abutment excavation associated with the bridge construction will result in fill in waters of the United States.

3.3.2.2 Operational Impacts

Impact of Operation on Common and Special-Status Wildlife. Without planned fencing, increased road kill of wildlife is expected. Wildlife regularly using the area in the vicinity of the new alternative would be expected to cross the roadway at some location. Nocturnal birds and mammals are especially at risk of collision due to temporary blindness from vehicle lights (Schultz, 1986).

Impact of Operation on Desert Tortoise. According to the USFWS Biological Opinion (Appendix E), postconstruction indirect effects will result from operation of the proposed project. These effects are later in time and are reasonably certain to occur. Obviously, road kills of tortoises on the new highway are a direct, adverse impact on this wildlife population. However, indirect effects during operation and maintenance are subtle and may affect tortoise populations and habitat quality over an extended period of time. Indirect effects are of particular concern for long-lived species such as the tortoise because project-related effects may not become evident in individuals or populations until years later.

Operation and maintenance (as well as construction) activities associated with the project may create trash and litter or standing water adjacent to the highway facility that could attract tortoise predators such as the common raven, kit fox, and coyote (Berry, 1985; and BLM, 1990). Natural predation in undisturbed, healthy ecosystems is generally not an issue of concern. However, predation rates may be altered when natural habitats are disturbed or modified. Common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman, 1992). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM, 1990).

Impact of Operation on Desert Bighorn Sheep. Results of studies by Cunningham and Hanna (1992) and Ebert and Douglas (1993) show that the main threat of project implementation to desert bighorn is an increase in vehicle and bighorn collisions. The main concern of NDOW and AGFD has been the existence of a new four-lane, high-speed highway in bighorn habitat that would increase the number of animals killed along the highway.

No Build Alternative. Existing conditions will continue under the No Build Alternative. An increase in truck accidents, as a result of traffic congestion and current highway conditions, could increase in the potential for hazardous material spills in Lake Mead and the Colorado River. In addition, the added congestion and increase in road traffic may result in an increase of vehicle-wildlife collisions on U.S. 93.

3.3.3 Measures to Minimize Harm

3.3.3.1 Construction Mitigation

Approximately 50 percent of the total land disturbed within the highway right-of-way will be revegetated. Topsoil will be stockpiled as much as possible during construction and replaced on disturbed areas directly outside the highway shoulders after construction to

re-establish desert vegetation. Salvaged cacti, yucca, and candidate plant species will be removed, stockpiled, and replanted.

Desert washes will be protected by placing barriers below excavation areas to prevent construction spoil from falling in the washes. In addition, several sections of washes will be bridged. Culverts placed in fill areas will be installed to allow runoff to flow unrestricted, and erosion protection devices will be placed at the ends of each culvert. For construction of bridge abutments, loose rocks will be scaled prior to and during excavation work, and netting on the canyon slopes will be used during blasting to minimize rock fall and contamination of Colorado River waters.

Wildlife drinking sources currently used by desert bighorn sheep, which could be directly affected by construction, will be relocated to nearby areas. They will be placed so that they are easily found by resident sheep but are far enough from the construction site so that sheep could use the new water source without being disturbed by construction. Specific types and locations of these offsite watering facilities will be determined through consultation with the AGFD, NPS, and NDOW.

Several underpasses and overpasses will be strategically located near traditional bighorn sheep movement corridors to provide safe crossings for them and other wildlife and to prevent small populations from being isolated. Additionally, highway bridges (included in the highway because of topographic demands) will also provide safe crossings. The location, design, and number of crossing structures were determined during consultations among wildlife biologists from AGFD, NDOW, NPS, and Reclamation. These criteria were based on studies conducted by AGFD and NPS from 1989 through 1992 in conjunction with this project. The numbers of crossing structures are summarized in Table 3-17 and are shown on Figures 2-4, 2-8, and 2-11.

Table 3-17
Estimated Number of Wildlife Crossing Structures for Each Alternative[a]

	Alternative		
Crossing Structure Type	**Promontory Point**	**Sugarloaf Mountain**	**Gold Strike Canyon**
Wildlife underpass	6	4	2
Wildlife overpass	2	3	1
Highway bridge	1	2	10
Tunnel	1	1	1

[a] Source: Reclamation, 1992

Fencing will be placed along both sides of the highway corridor to guide wildlife to crossing structures, thereby reducing the potential for animals being killed. Fencing will be continued approximately 0.5 mile beyond the intersections of the new highway with existing U.S. 93 in Arizona. Monitoring to determine the effectiveness of the above-mentioned physical mitigation features will be conducted following construction activities. Specific monitoring procedures and duration of effort will be determined through consultation with NPS, AGFD, USFWS, and NDOW.

Desert Tortoise. In the Biological Opinion regarding construction of the Sugarloaf Mountain Alternative, USFWS determined the reasonable and prudent measures necessary and appropriate to minimize take of Mohave desert tortoises in Nevada. The Biological Opinion also stipulates terms and conditions for implementation of the reasonable and prudent measures, as follows (see Biological Opinion, Appendix E, for full details):

1. Measures shall be taken to minimize mortality or injury of desert tortoises due to construction activities, blasting operations, and use of heavy equipment.

   a. Prior to the initiation of construction, a desert tortoise education program will be presented to all personnel who will be onsite, including surveyors, construction engineers, employees, contractors, contractors' employees, supervisors, inspectors, subcontractors, delivery personnel, and all visitors operating a vehicle in the project area. This program will contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the project area, the definition of "take" and associated penalties, the measures designed to minimize and mitigate the effects of construction activities, the means by which employees can help facilitate this process, and reporting procedures to be implemented in case of desert tortoise encounters.

   b. At least 7 days, and no more than 30 days, prior to the initiation of construction within right-of-ways without tortoise-proof fencing, a qualified biologist(s) will survey the site for desert tortoises using techniques providing 100 percent coverage. Transects will be no greater than 10 meters apart. The site boundaries will be flagged prior to the biological survey.

      All burrows found in the construction zone, whether occupied or vacant, will be excavated by a qualified biologist and collapsed or blocked to prevent desert tortoise re-entry. All burrows will be excavated by hand with hand tools to allow removal of desert tortoises or desert tortoise eggs. All desert tortoise handling and burrow excavations will be conducted by a qualified desert tortoise biologist in accordance with USFWS-approved protocol (Desert Tortoise Council, 1994 [revised 1996]).

   c. All desert tortoises and desert tortoise eggs located in the linear right-of-way will be relocated 300 to 1,000 feet into adjacent undisturbed habitat. Tortoises found above ground will be placed under a marked bush in the shade. A tortoise located in a burrow will be placed in an existing unoccupied burrow of the same size and orientation as the one from which the tortoise was taken. If a suitable natural burrow is unavailable, a qualified biologist will construct one of the same size and orientation as the one from which the tortoise was removed utilizing the protocol for burrow construction in section B.5.f (Desert Tortoise Council, 1994 [revised 1996]). Any tortoise found within 1 hour before nightfall will be placed in a separate clean cardboard box and held overnight in a cool location. The box will be covered and kept upright at all times to minimize stress to the tortoise. Each box will be used once and then disposed of properly. The tortoise will be released the following day in the same area from which it was collected, using the procedures described above. Each tortoise will be handled with a different pair of disposable latex gloves. After each use, the gloves will be properly discarded and a fresh set used for each subsequent tortoise handling.

   d. Desert tortoises will be moved only by a qualified desert tortoise biologist and solely for the purpose of moving them out of harm's way. Appropriate State permits will be acquired from NDOW prior to handling any live desert tortoise, desert tortoise carcass, or desert tortoise egg.

   e. All desert tortoises observed by project workers will be reported immediately to the qualified biologist, who will move the tortoise offsite into adjacent undisturbed

habitat. Tortoises will be handled only when necessary and in accordance with guidelines provided in the Biological Opinion.

f. If blasting is required in desert tortoise habitat, a desert tortoise biologist will be assigned to each blasting crew or to each area in which blasting will occur. Prior to any blast, a 200-foot radius around the blast site will be surveyed for desert tortoises using techniques providing 100 percent coverage; transects will be no greater than 10 meters apart. Aboveground tortoises will be relocated at least 500 feet from the blast site. Desert tortoises located in burrows that are within 50 feet of the blast site will be relocated at least 75 feet away from the blast site to an unoccupied existing burrow of the same size and orientation. If a suitable existing burrow is unavailable, an artificial burrow of the same size and orientation will be constructed by an approved biologist utilizing USFWS-approved protocol (Desert Tortoise Council, 1994 [revised 1996]). Burrows either occupied by desert tortoise or with undetermined occupancy status and located 50 feet or further away from the blast site will be flagged and stuffed with newspaper prior to the blast. The newspaper will be removed immediately after the blast and the burrows assessed for damage.

g. Any time a vehicle is parked in desert tortoise habitat, the ground around and underneath the vehicle will be inspected for desert tortoises prior to moving the vehicle. If a desert tortoise is observed, an authorized biologist will be contacted. If possible, the tortoise will be left to move on its own. If the tortoise does not move within 15 minutes, the tortoise will be removed and relocated by the authorized biologist in accordance with the tortoise handling provisions of the Biological Opinion.

h. Herbicides shall not be used in the project area unless approved in writing by USFWS.

i. Vehicles shall not exceed the legal speed limit (posted or unposted) of the roads used during construction activities. The Clark County speed limit for unposted roads is 25 mph.

2. Measures shall be taken to minimize predation on tortoises by ravens drawn to the project area.

   Trash and food items will be disposed of promptly in predator-proof containers with resealable lids. Trash includes, but is not limited to, cigarettes, cigars, gum wrappers, tissue, cans, paper, and bags. Trash containers will be removed regularly (at least once per week). This effort will reduce the attractiveness of the area to opportunistic predators such as desert kit fox, coyotes, and common ravens. Any construction refuse, including, but not limited to, broken parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, boxes, and welding rods will be removed from the site each day and disposed of properly.

3. Measures shall be taken to minimize destruction of desert tortoise habitat, such as soil compaction, erosion, or crushed vegetation, due to construction and maintenance activities.

   a. Project vehicles will remain within designated areas or on existing roads. Off-road travel is prohibited except to complete a specific task within designated areas or in emergency situations.

b. All areas to be disturbed will have boundaries flagged prior to construction, and all disturbance will be confined to the flagged areas. All employees will be instructed that their activities must be confined to locations within the flagged areas. Disturbance beyond the actual construction zone is prohibited.

c. Stockpile areas, vehicle turn-arounds, and vehicle service locations will be approved by Reclamation or NPS prior to the initiation of construction activities. These areas will be surveyed for desert tortoise and desert tortoise eggs. Any desert tortoises or desert tortoise eggs found within these areas will be removed in accordance with the tortoise handling provisions of the Biological Opinion. Whenever possible, stockpile areas, vehicle turn-arounds, and vehicle service locations will be restricted to previously disturbed areas. If not in previously disturbed sites, stockpile areas, vehicle turn-arounds, and vehicle service locations will be considered habitat disturbance for payment of remuneration fees.

d. Topsoil will be removed to a depth of 6 to 12 inches in all areas of potential seed-bearing soil where ground breaking will take place. The determination of which soils are potentially seed-bearing will be the responsibility of the tortoise biologist.

e. Removed topsoil will be stockpiled in a separate area and designated as "topsoil" to prevent contamination by or combination with other excavated soils. Reasonable measures will be taken to ensure the protection and preservation of the stockpiled topsoil to prevent loss of the seed bed from wind and rain or contamination by other soils or manmade contaminants. Stockpile areas for topsoil will be located in areas that are secure from construction traffic or flash floods.

f. Excavated tunnel material will be disposed of in designated areas previously approved by the individual Federal agency that has administration authority over the affected land.

g. Equipment and materials storage will be located in previously disturbed areas whenever possible. If not in previously disturbed sites, equipment and storage areas will be considered habitat disturbance for payment of remuneration fees.

h. Any fuel or hazardous waste leaks or spills will be stopped or repaired immediately and cleaned up at the time of occurrence. USFWS/maintenance vehicles will carry a bucket and pads to absorb leaks or spills.

i. Contaminated soil will be removed and disposed of at an appropriate facility. If spills occur in a maintenance yard, they will be cleaned up after construction is complete.

j. All waste and leftover materials remaining after construction of this project will be removed from the site after project completion.

k. Prior to initiation of construction, FHWA shall ensure that $587 per acre of disturbance is paid into the account administered by Clark County for the Clark County Desert Conservation Plan (CCDCP) as offsite mitigation for destruction of desert tortoise habitat resulting from the project. This rate will be indexed for inflation based on the Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U) on January 31 of each year. Fees assessed or collected for projects covered under the Hoover Dam Bypass Biological Opinion after January 31st of each year will be adjusted based on the CPI-U.

This fee will be paid directly to the Desert Tortoise Public Lands Conservation Fund Number 730-9999-2315 administered by Clark County. The administrator serves as the banker of these funds and receives no benefit from administering these funds. These funds are independent of any other fees collected by Clark County for desert tortoise conservation planning.

The payment shall be accompanied by the *Section 7 Fee Payment Form* (Biological Opinion, Appendix E) and completed by the payee. The project proponent or applicant may receive credit for payment of such fees and deduct such costs from desert tortoise impact fees charged by local government entities.

FHWA anticipates that 80 acres of desert tortoise habitat will be disturbed as a result of the proposed project, requiring $46,960 in remuneration fees.

4. Measures shall be taken to ensure compliance with the reasonable and prudent measures, terms and conditions, reporting requirements, and reinitiation requirements contained in this biological opinion.

   a. FHWA will designate a field contact representative responsible for overseeing mitigation compliance and for coordination with the agencies.

   b. A qualified biologist(s) will be available during all phases of construction. In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise* (USFWS, 1992), a biologist should: (1) possess a bachelor's or graduate degree in biology, ecology, wildlife biology, herpetology, or related fields; (2) demonstrate a minimum of 60 days of prior field experience using accepted resource agency techniques to survey for desert tortoises; and (3) have the ability to recognize and to accurately identify and record all types of desert tortoise sign.

   c. The qualified biologist(s) will be responsible for determining compliance with mitigation measures as defined by the Biological Opinion. Qualified biologist(s) will have the authority to briefly halt construction and maintenance activities that are not in compliance with the terms and conditions of the Biological Opinion. Construction and maintenance activities will be halted only long enough to remedy the immediate situation and will apply only for the equipment and parties involved in the situation. All actions of noncompliance or conditions of threat to federally proposed or listed species will be recorded immediately by the qualified biologist(s) and reported to FHWA. FHWA will immediately report all such actions and conditions to USFWS.

   d. All fuel or hazardous waste leaks, spills, or releases will be reported immediately to FHWA and the Federal agency that administers the land where the incident occurs.

   e. Upon locating dead or injured desert tortoises, the field contact representative will notify FHWA immediately by phone and within 5 days by writing. Initial notification also must be made immediately to the Division of Law Enforcement of the USFWS in Las Vegas, Nevada. Written notification to USFWS will be made within 15 days of the date of the finding or incident and will include the following information: (1) date and time of finding or incident; (2) location of carcass or injured tortoise; (3) a photograph; (4) cause of death or injury; and (5) other pertinent information. Care will be taken in the handling of sick or injured specimens to ensure effective treatment and care, and in the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of a sick or injured desert tortoise or

preservation of the biological materials from a dead desert tortoise, the finder has the responsibility to carry out instructions provided by the Division of Law Enforcement of the USFWS to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

f. The qualified biologist(s) will maintain a record of each observation of desert tortoise during the project. The information gathered will include the following: (1) location; (2) date and time of observation; (3) whether tortoise was handled; (4) general health and whether it voided its bladder; (5) location tortoise moved from and location moved to; and (6) any observed unique physical characteristics of each individual.

g. FHWA and a qualified biologist will prepare a report to be distributed to NPS, Reclamation, USFWS, and NDOW no later than 90 days following the completion of construction activity. The report will document the number and location of desert tortoises encountered, their disposition, effectiveness of mitigation measures, practicality of mitigation measures, recommendations for future mitigation measures that allow for better protection or more workable implementation, and an estimate of acreage disturbed.

Desert Bighorn Sheep. Fencing will be constructed and maintained to prevent desert bighorn sheep from entering the highway. Out-jumps will be constructed at strategic locations to provide an escape for any sheep accidentally trapped inside the fenced highway right-of-way. Roadside signing will be installed warning motorists of the possibility of encountering wildlife in the area. In addition, crossing structures will be incorporated into the highway design to allow bighorn movement through established movement corridors. With the mitigation features currently planned, the project could probably result in a net overall reduction of animals killed along or on the highway. Movements to water sources during summer could be disrupted during and immediately after construction by the presence of the highway. Alternate water sources will also be provided for mitigation.

A mitigation monitoring plan will be implemented in consultation with AGFD, NDOW, and NPS. The plan will assess effectiveness of the crossing structures, fencing, and alternate water sources. Adjustments will be made, if needed.

Peregrine Falcon. Biologists from AGFD and NPS will monitor peregrine falcons in the proposed project area 3 to 4 times per year at least 2 years before, during, and after 1 year of public use of the new Colorado River bridge. NDOW will coordinate their ongoing peregrine falcon surveys in the area with AGFD and NPS.

If breeding territories are found within 0.5 mile of construction activities, consultation will be reinitiated with USFWS to determine appropriate mitigation measures.

Bald Eagle. Biologists from AGFD, NPS, and Reclamation will monitor bald eagle use of the bridge crossing sites during two consecutive winters before construction, and any preferred hunting perch sites or night roosting sites will be identified. Measures will be taken to not affect any preferred hunting perch sites or night roosting sites for bald eagles. If bald eagles were to nest in the project vicinity, consultation with USFWS will be reinitiated.

Devil's Hole Pupfish. No construction below the waterline will occur in the Colorado River in Black Canyon. For construction of the Sugarloaf Mountain alignment, a catch net and temporary spill containment system will be constructed at the Colorado River crossing to catch falling debris and collect contaminants if spilled. For construction of bridge

abutments, loose rocks will be scaled prior to and during excavation work, and netting on the canyon slopes will be used during blasting to minimize rock fall.

An assessment of the potential effects of the blasting activities of the project will be completed prior to implementation. If the assessment identifies unavoidable impacts to the Devil's Hole pupfish, formal consultation with USFWS will be initiated, and appropriate conservation and mitigation measures will be included in the Biological Opinion.

Razorback Sucker. No construction below the waterline will occur in the Colorado River in Black Canyon. As for the Devil's Hole pupfish, measures will be taken to ensure that any falling debris from the cliffs will not affect water quality that could affect razorback suckers further downstream of the Hoover Dam or in Lake Mohave.

If the assessment identifies unavoidable impacts to the razorback sucker, formal consultation with USFWS will be initiated, and appropriate conservation and mitigation measures will be included in the Biological Opinion.

Bonytail Chub. There will be no construction below the waterline in the Colorado River in Black Canyon. Measures will be taken to ensure that any falling debris from the cliffs will not affect water quality that could affect the bonytail chub further downstream in Lake Mohave.

Mountain Lion. Mitigation measures for desert bighorn sheep will also mitigate effects to the mountain lion population.

Bicolored Penstemon. Preconstruction surveys of bicolored penstemon will be performed. Plants found within the construction right-of-way will be salvaged, as will topsoil possibly containing penstemon seeds. Any salvaged plants will be stockpiled and replanted within the constructed highway right-of-way.

Migratory Birds. No land clearing will occur during the avian breeding season. Actions will be taken to ensure that no migratory birds, their nests, or nest contents, will be harmed during construction.

Waters of the United States. Temporary impacts will be avoided or minimized by designating construction access, stockpile, and staging areas outside of waters of the United States and by designing effective rock debris restraints on steep slopes. In many locations, especially on the Gold Strike Canyon alignment, the proposed road is located on steep rocky slopes. Excavation of a road base will result in the need to move considerable amounts of rock debris. In the absence of effective barriers, this material will fall into the adjacent washes. This potential fill is included in the temporary impacts to waters of the United States.

Permanent impacts can be minimized on the Gold Strike Canyon alignment. This could be accomplished by placement of span bridges in place of road fill at many locations. Impacts may be further reduced by bridge design and bridge construction methods that minimize or avoid all fill in waters of the United States. Avoiding impacts to waters of the United States at bridge crossings will reduce permanent impacts on the Sugarloaf Mountain alignment from 0.11 to 0.07 acre and on the Gold Strike Canyon alignment from 0.67 to 0.38 acre. Placement of the Promontory Point west bridge pier (for the cable-stayed and suspension designs) in the waters of Lake Mead would require Section 10 and Section 404 U.S. Army Corps of Engineers and Section 9 U.S. Coast Guard permits for navigable water crossings and placement of bridge and fill in waters of the United States.

Permanent impacts can be further reduced by highway design and highway construction methods that will reduce the fill to less than 50 feet on either side of the centerline in the vicinity of waters of the United States.

3.3.3.2 Operational Mitigation

NDOT and ADOT will maintain wildlife underpasses and overpasses in their respective states. Alternate water sources provided for mitigation will be maintained by either NPS or Reclamation. Reclamation sewage evaporation ponds will be replaced as a wildlife watering source, or a new source will be provided if relocated ponds are fenced (with Sugarloaf Mountain Alternative).

3.4 Water Resources

3.4.1 Affected Environment

Annual precipitation in Las Vegas Valley averages 4.1 inches per year (National Oceanic and Atmospheric Administration, 1991). Precipitation rates in the proposed project area are similar.

Several natural drainages occur along the three build alternative alignments (Figure 3-3). Most are narrow (1- to 3-feet wide) washes that drain a local watershed of approximately 2 acres. However, two broader intermittent desert washes (from a few feet to more than 20 feet wide) drain watersheds of more than 50 acres in the proposed project area. One is a medium-sized, unnamed drainage that runs in a north-south direction west of U.S. 93 in Arizona, intersecting each of the build alternatives.

The other of the larger drainages (Gold Strike Canyon Wash) runs along the Gold Strike Canyon Alternative. At the lower end of the wash, before terminating at the Colorado River, are hot springs that produce year-round runoff into the river. The only water courses with perennial flows existing in the proposed project area are the Colorado River, Lake Mead, and the lower Gold Strike Canyon Wash (supplied by hot springs). The remainder of the washes are intermittent.

The River Mountains to the northwest, Lake Mead to the north, and Lake Mohave to the south flank the proposed project area. Lake Mead can store nearly 2 years of average Colorado River flow. When full, Lake Mead is 110 miles long with an 822-mile shoreline and a capacity of 26 million acre-feet. The figure that NPS uses most often is based on the average lake elevation of 1,200 feet, resulting in a shoreline 714 miles long. If the shoreline for Lake Mohave is also included, the length is approximately 953 miles long.

No known groundwater resources are located within the River Mountains or along the mountain flanks. Alluvial aquifers within Las Vegas Valley supply about 15 to 20 percent of the water to Las Vegas Valley. The River Mountains are not known to be a source of any significant recharge to these alluvial aquifers (Malmberg, 1965). In addition, the volcanic rocks composing the mountains are not considered suitable for the formation of useful aquifer systems (Plum, 1989). However, there may be fracture porosity within the rocks that could contain groundwater at elevations below the level of Lake Mead. No known water wells are located in the vicinity of the proposed project area.

Floodplains. The Federal Government created the National Flood Insurance Program (NFIP) in 1968. This program is an effort to reduce the financial losses incurred by private citizens and public entities from the devastating effects of flooding. The program is

administered by the Federal Insurance Administration (FIA), a division of the Federal Emergency Management Agency (FEMA).

Flood zones designated as "X" zones are minimal to moderate risk flood zones. Flood zones designated as "A" zones are one of two Special Flood Hazard Area (SFHA) zones that are subject to damage from rising water. FEMA maps obtained from Clark County, Nevada and Mohave County, Arizona for the project area indicate that, while the Colorado River itself is considered to be a Zone A flood potential, the surrounding land areas, by virtue of their elevations, are designated as Zone X.

3.4.2 Environmental Consequences

3.4.2.1 Construction Impacts

Runoff draining to and from the project during construction will impact water quality. New cut and fill slopes will erode by a combination of sheet, rill and concentrated flow. The eroded material will travel downslope and eventually enter the channel network characteristic of each alternative. Once in the channel, the sediment can travel downstream provided the channel characteristics and runoff volume are adequate to sustain material movement. At natural channel crossings, disturbed channel sections will erode creating point sources of sediment and potentially long-term disruption to channel stability.

Channel bypass systems will be constructed in areas where runoff is diverted around the work site. These systems will be temporary features, small in geometric cross section (i.e., 2-foot-deep v-channel with 2:1 slopes, at a minimum) and generally not constructed adequately to sustain long-term use. Their use will result in large volumes of soil being eroded from the channel and transported through the site. The volume removed and deposited will be proportional to the bypass channel length and slope.

Temporary access roads will be constructed, and occasionally sections will be washed away from storm runoff. Material from these roads will potentially make it to live water. In addition to washed out road sections, other segments might be weakened and fail during a lesser runoff event. In general, with sediment movement, the closer the eroded material is deposited to live water, the higher the probability that with time the sediment will actually enter it.

Equipment working along the construction site will also contribute to water quality impacts. Construction equipment will leak various petroleum compounds contaminating isolated areas of the work site. When these areas come in contact with runoff, the compound(s) will be mobilized and could potentially enter live water. Areas utilized for fueling equipment will also be prone to contamination from spills and can be transported when runoff is present. Other sources of construction-related contamination will result from materials such as concrete, concrete and asphalt coatings, and emulsions being delivered to the construction site. The equipment used for delivery of these products would be cleaned after the delivery. The waste material will be discharged within the construction corridor and will become mobilized during storm events.

The roadway profiles vary from less than 0.5 percent to slightly greater than 6 percent. For the Promontory Point and Sugarloaf Mountain Alternatives, approximately 80 to 90 percent of the alignment is less than 3 percent. For the Gold Strike Canyon Alternative, only about 29 percent of the alignment is less than 3 percent. Typically for disturbed areas, steeper ditch grades result in increased erosion.

Of the three alternatives, the Gold Strike Canyon alignment should have the greatest potential for impacting water quality from erosion during construction. Cut and fill slopes in the lower canyon sections will have the greatest impact on the Colorado River water quality due to the relatively short travel distance to the river. The alternative having the second greatest potential for impacting water quality is the Sugarloaf Mountain alignment followed closely by the Promontory Point alignment. These latter two alternatives are constructed on similar terrain. However, since the Sugarloaf Mountain Alternative has a slightly steeper overall slope, the erosion potential is greater.

Equipment impacts to water quality for each alternative will also differ. Due to the steeper slopes associated with the Gold Strike Canyon Alternative, spills and discharges from equipment will quickly travel downslope and have the potential for reaching live water sooner than the other two alternatives. However, during bridge construction, the potential for contamination directly to live water is greater for the Promontory Point alignment due to the increased time necessary to construct the longer bridge over live water. In addition, pier construction would require extensive dewatering operations and erosion control BMPs. This type of construction significantly increases the potential for accidents during construction and the unanticipated release of concrete or sediment into waters of the U.S.

3.4.2.2 Operational Impacts

Once the construction is completed and the roadways are functional, the various alignments will still impact water quality. Exposed cut and fill slopes will continue to erode until stabilized by vegetative or mechanical means. Discharge from culverts and roadway channels will cause erosion due to steep slopes and elevated velocities unless properly designed. Additional runoff generated from the road surface, if uncontained, will carry pollutants and trash offsite or deposit them directly in live water if originating from bridge surfaces. Chemical spills resulting from vehicle accidents are a possibility and, if uncontained, will impact water quality. Therefore, long-term impacts to water quality from operation of the bypass could exceed the actual construction impacts if not properly mitigated.

Since the roadway surface is impermeable, essentially all precipitation falling on it will travel from the surface as runoff to catch basins and then to nearby natural channels. This additional runoff is not expected to increase downstream flood flows in nearby channels since the roadway runoff will enter the channel system prior to the generation of the local or regional peak flow. The roadway runoff will increase the localized volume in the nearby channels, but this is not expected to pose any problems. The volume in most cases will be small when compared to that generated on a local or a regional basis. As a result, no impacts to flood flow or floodplains are anticipated from the alternatives.

Runoff generated from bridges that directly discharge to receiving waters or channels could alter localized water quality. Unlike roads, bridges typically do not accommodate vehicle parking except under emergency conditions such as vehicle breakdown. As such, the level of contamination resulting from pollutants is probably low to warrant treatment of the runoff. Normally the bulk of pollutants originating from roadway surfaces are removed from the road surface by the "first flush" or initial runoff generated during a storm.

The Gold Strike Canyon Alternative is anticipated to have the greatest impact to water quality during roadway operations. Due to the steep slopes associated with the road profile, sediment generation from the slopes, channels, and culvert outfalls will be higher than the other two alternatives, unless mitigation measures are implemented. The alternative having the next greatest impact would be the Sugarloaf Mountain Alternative,

due to its steeper overall slopes when compared to those of the Promontory Point Alternative.

When considering water quality impacts resulting from bridge-generated runoff, the Gold Strike Canyon Alternative poses the greatest impact due to the combined length of all the bridges along the alignment. The Sugarloaf Mountain Alternative would have the second greatest impact followed by the Promontory Point Alternative. However, when just considering the longest single Colorado River/Lake Mead crossing, Promontory Point is ranked first, then Sugarloaf Mountain followed by Gold Strike Canyon Alternative. This is based strictly on bridge length without implementing mitigation measures. In addition, an uncontained spill on the Promontory Point bridge over Lake Mead has the potential to contaminate or make unusable the water stored for future use.

Floodplains. Each of the three build alternatives will transversely encroach into an area designated as Zone A flood potential, as they cross the Colorado River. The degree of encroachment is somewhat higher for the Promontory Point Alternative since it crosses Lake Mead with a longer bridge upstream of Hoover Dam. The degree of encroachment of the build alternatives will be limited to bridge piers and abutments supporting the structures. These structural encroachments will not be of sufficient extent/volume to cause the existing water surface elevation to increase substantially. If these structural encroachments result in a cumulative rise in water surface elevation of less than 1 foot, the established standard of the NFIP, the level of flooding risk associated with the three build alignments would be considered low.

No Build Alternative. Although the No Build Alternative would avoid the potential short-term impacts to local water quality resulting from erosion and spills during construction activities, runoff from U.S. 93 across Hoover Dam presently impacts local water quality. This impact is primarily from road surface runoff which carries pollutants from the current heavy traffic usage of the highway. In addition, transportation of hazardous materials across the dam results in an increased potential for accidental spills that could significantly impact waters of Lake Mead and the Colorado River. Reclamation currently maintains a facility-specific emergency preparedness plan for Hoover Dam to deal with potential hazardous material transport accidents that might occur on the dam crest and approaches. The Hoover Dam Police standard operating procedures also contain provisions for responding to accidental hazardous material spills (personal communication, Jeff Weaver July 15, 1998). However, there is no on-site containment facility to handle hazardous material or waste spilled in a trucking accident on or near the dam crossing.

Under the No Build Alternative, the environmental benefits to local water resources from removing conventional traffic and hazardous material transporters from the dam to a new bridge, which incorporates an engineered runoff conveyance system, will not be realized.

3.4.3 Measures to Minimize Harm

Implementation of Best Management Practices (BMPs) along the project corridor will dramatically reduce water quality impacts to the Colorado River below Hoover Dam. Both construction and operational impacts are to be mitigated through the use of BMPs. During construction, it will be imperative to manage stormwater runoff above and below the project so that the net impact to receiving water is negligible. This will be achieved by routing upslope runoff around the construction site, minimizing exposure to disturbed slopes, and collecting and treating onsite runoff and discharging it so that the water quality entering the receiving waters is not impaired.

During system operation, channels conveying roadway-derived runoff will be designed to resist erosion. Cut-and-fill slopes will be stabilized using vegetative and/or mechanical means, and roadway-derived runoff will be captured and treated to remove suspended solids prior to discharging from the project area.

For both the construction and operation phase, the main concern will be to isolate runoff-rich suspended sediment in treatment basins. By ignoring this issue, the volume of runoff derived from this project, although small, could potentially impact receiving water quality to varying degrees. Immediately downstream of the project area, sediment-rich roadway runoff could mix with unimpaired runoff and degrade localized water quality. Further downstream, as additional runoff water is added, the impacts from the project area are reduced due to dilution. By the time the roadway runoff enters the Colorado River, water quality from the roadway would most likely be negligible. Based on the anticipated impacts to water quality immediately downstream of the roadway, water quality parameters, such as suspended solids, turbidity, color and total dissolved solids (TDS), will be elevated if not collected and treated. It is possible this runoff could exceed the threshold limits for suspended solids and turbidity. Collecting and treating this runoff prior to discharging to natural drainage channels will prevent impacts to localized water quality.

The standards of water quality below Hoover Dam that will be pertinent to this project are as follows:

Parameter	Water Quality Standards for Beneficial Uses
Temperature °C – maximum $\Delta T°$	Nov.-Apr.: $\leq$ 13°C May-June: $\leq$ 17°C July-Oct.: $\leq$ 23°C $\Delta T° \leq$ 2°C
pH Units	S.V.: 7.0 – 8.3 ΔpH: $\pm$ 0.5 Max.
Total Phosphates (as P) – mg/L	A-Avg.: $\leq$ 0.05 ---
Nitrogen Species (N) – mg/L	Nitrate S.V.: $\leq$ 10 Nitrate S.V.: $\leq$ .06 Ammonia S.V.: $\leq$ .02 (un-ionized)
Dissolved Oxygen – mg/L	S.V. Nov.-May: $\geq$ 6.0 June-Oct.: $\geq$ 5.0
Suspended Solids – mg/L	S.V.: $\leq$ 25
Turbidity – NTU	S.V.: $\leq$ 10
Color – PCU	Increase must not be more than 10 PCU above natural conditions
Total Dissolved Solids – mg/L	S.V.: $\leq$ 723
Alkalinity (as $CaCO_3$) – mg/L	Less than 25 percent change from natural conditions

Parameter	Water Quality Standards for Beneficial Uses
Fecal Coliform – No./100 mL	≤ 200/400°

3.4.3.1 Construction Mitigation

Depending on how each alternative is phased for construction will determine some of the mitigation measures. Assuming each phase of construction actively disturbs more than 5 acres, a National Pollutant Discharge Elimination System (NPDES) permit will be required. Through the terms and conditions written into the permit, both discharge limitations and water quality standards are primarily implemented and enforced. The NPDES permit must be consistent with discharge limitations and water quality standards established for the receiving waters.

The construction sites for all alternatives will have to be retrofitted with BMP improvements. These improvements reduce the potential of degrading offsite water quality or watercourses during the short construction period. Examples of some of the BMPs that will likely be common to all the alternatives are construction of silt barriers (silt fences or straw bale check dams) to trap sediment, not allowing it to flow to offsite channels. The contractor will be required to remove the trapped silt and debris to an offsite location before removing the barriers. Offsite flows will be routed around cut and fill slopes to prevent contamination of runoff. Bypass channels must be properly designed to convey anticipated flow volumes and velocities. Construction equipment must be cleaned on a regular basis to minimize potential runoff contamination from petroleum products. Sediment basins will be constructed to treat sediment-rich runoff before discharging it offsite to drainage channels. Construction equipment will be inspected frequently for leaks and repaired immediately when discovered. All equipment will be fueled and serviced at designated locations in order to minimize work site contamination. These fueling locations will be located away from nearby channels, swales, or other features that would quickly facilitate movement in the event of a spill. Upon completing the construction, all contaminated material (e.g., concrete wash water) will be removed and disposed of in accordance with local, regional, and federal regulations. Temporary sanitary waste facilities will be designed and developed in a manner that protects both surface and subsurface water resources.

For all the build alternatives, a catch net and temporary spill containment system will be constructed at the Colorado River or Lake Mead crossing to catch falling debris and collect contaminants if spilled. For construction of bridge abutments, loose rocks will be scaled prior to and during excavation work, and netting on the canyon slopes will be used during blasting to minimize rock fall.

As an additional mitigation measure for the preferred Sugarloaf Mountain Alternative, the sewer evaporation ponds will have to be relocated and allow for possible wildlife or fencing improvements.

For the Promontory Point Alternative, to further reduce the chance for water quality contamination, bridge construction across the lake should be on an accelerated schedule. Because this is the longest of the three alternative bridges actually crossing live water, it will require a greater length of time to construct and thereby increase the chance for contaminating the lake.

3.4.3.2 Operational Mitigation

Mitigation measures for all alternatives will include properly designed roadway channels that will resist erosion, construction of energy dissipating structures at all culverts whose discharge velocity will cause downstream erosion, and building sediment trapping basins strategically located to maximize sediment removal and still function as a chemical spill containment structure.

Cut and fill slopes will continue to erode unless stabilized using vegetative or mechanical means. Vegetation will slow surface runoff, help bind soils, reduce raindrop impact and break up flow patterns. Mechanical means include geotextiles such as matting, retaining walls, and rock slope protection. Matting and similar products prevent extensive contact between surface runoff and soil, keeping the soil intact. Retaining walls decrease cut and fill slopes which in turn reduce runoff velocities and erosion potential. Rock slope protection armors the slope, preventing soil movement.

Discharge in roadside channels and from culverts will erode, transporting sediments downstream. Slopes along roadside channels and at discharge points from culverts may be steep, promoting erosion. Therefore, both conveyance features will require some sort of protection in the form of channel lining, reduced slopes, or energy dissipating structures. Channel lining may be in the form of rock riprap, and energy dissipating structures will be designed elements that will break up and reduce discharge velocities.

Over time, the roadway surface will collect contaminants such as oil, grease, soil, and trash. When it rains, these contaminants will be mobilized and washed from the road surface to nearby natural and roadside channels. To lessen the impact these contaminants have on water quality, the runoff will be drained to settling basins, allowing the larger suspended material to settle. Dissolved contaminants would remain mobile and travel through the basins to the nearby drainage network. Besides capturing road pollutants, these basins will also serve to contain chemical spills resulting from vehicle accidents. Each basin will be designed to contain a certain rainfall runoff volume before allowing discharge. If an accident occurred, and provided the basins were dry at the time of the accident, the spill volume in most cases will be accommodated. These settling basins will require periodic cleaning. Any fences that may be incorporated into the basin design must be compatible with basin maintenance and function.

In addition, all bridges over live water will have the potential to collect the "first-flush" runoff volume from the bridge as well as the spill volume that might be generated from a semi-truck tanker spill. The bridge runoff unit volume is small and could potentially be captured and transferred to a basin located near the bridge abutment for treatment. Once the first-flush volume is captured, additional runoff volume will be discharged. In the event an accident on the bridge resulted in a chemical spill, this first flush system will normally have the capacity to collect the volume from a typical truck tanker. The roadway and bridge settling basins will be maintained by NDOT or ADOT, depending on their location.

At this preliminary stage of design, the location and extent of potential settling basins is uncertain. If the eventual design causes impacts beyond those cleared in this EIS, additional studies and National Environmental Policy Act (NEPA) documentation will be prepared for those areas.

3.5 Cultural Resources

3.5.1 Affected Environment

Cultural resources are defined as buildings, sites, districts, structures, and objects significant to history, architecture, archaeology, culture, or science. Significant cultural resources are those that are listed in or are eligible for listing in the National Register of Historic Places (NRHP). Listed resources or those resources determined eligible for NRHP listing are often referred to as "historic properties." The NRHP is the nation's inventory of historic properties, and NRHP documentation includes a recommendation about whether a property is significant at the local, State, or national level. The 1992 changes to the National Historic Preservation Act of 1966 as amended (NHPA) acknowledge that traditional cultural properties (TCPs) can be eligible for listing in the NRHP. TCPs are those historic properties important to American Indian tribes. Hoover Dam itself is a National Historic Landmark (NHL)—a property designated by the Secretary of the Interior as possessing national significance in one or more categories: American history, architecture, archaeology, engineering, and culture. NHLs are also listed on the NRHP.

The NHPA and the Archaeological Resources Protection Act of 1979 (ARPA) are two of the more important legislative mandates that require Federal agencies to identify cultural resources within their jurisdictions and consider the effects on those resources as a consequence of federal "undertakings." Undertakings are those projects planned and constructed by federal agencies and also include those projects assisted by federal agencies through funding, technical support, or administrative authorizations (licenses, permits, and rights-of-way).

The NHPA requires federal agencies to take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. Further, the federal agency is required to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on the undertaking. The ACHP has promulgated 36 CFR 800 as a set of regulations for federal agencies to follow in fulfilling the cultural resource consultation and compliance process. The regulations provide a step-by-step procedure for the entire compliance process, from initial identification of a resource, through its evaluation, and to final treatment measures (avoidance, data recovery, etc.) if required for historic properties.

While it is federal policy to avoid or minimize adverse effects to cultural resources when planning, constructing, and/or assisting federal projects, in some cases it is impossible to avoid disturbing or destroying some cultural resources if an authorized development is to be implemented. In such instances, it is federal policy to recover the information embodied in those resources through historical, archaeological, and ethnographical study before the project begins. Other federal policies that may be applicable to the consideration of cultural resources potentially affected by the project include EO 13007 and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).

Because the project is a federal undertaking, consultation with Indian Tribes is mandated by several policies, laws, and regulations including EO 13007, ARPA, NAGPRA, NHPA, and NEPA. Consultation is recognized as the most effective means of determining if TCPs are present within a project area.

All of the historic properties in the area of potential effects have been assessed in terms of their eligibility (or lack thereof) for listing in the NRHP. With the exception of the recently

discovered prehistoric archaeological sites documented during 1998 and 1999, additional historic sites relating to Hoover Dam, and the eligible TCP site, the NRHP eligibility status of all of the historic sites and features in the project area was determined through earlier consultations (1991 to 1993) between the former lead agency (Reclamation) and the Arizona and Nevada SHPOs.

Preliminary consultations between Reclamation and the ACHP were conducted in 1991 with the result that the ACHP found the Gold Strike Alternative to be the least likely to produce adverse effects on the Hoover Dam NHL. ACHP urged Reclamation to refine its analyses and provide the DEIS for their review. FHWA provided ACHP with the DEIS and has consulted with ACHP on the preferred alternative. The majority of the effect determinations discussed in this DEIS were made by the SHPOs during the 1991 to 1993 consultations with Reclamation.

After a 4-year hiatus and transfer of lead agency responsibility from Reclamation to FHWA, formal consultations with the two SHPOs were reinitiated in October 1997. These consultations continued through both the NEPA process and the Section 106 process. Prior to cessation of the project study in 1993, Reclamation had not yet initiated consultations with affected Indian tribes. FHWA started tribal consultations through implementation of an intensive program of field trips and elder interviews that were conducted in late May/early June 1998. Beginning in December 1999, FHWA formally requested the participation of interested Native American tribal representatives in a series of government-to-government consultation meetings to facilitate identification and treatment of traditional cultural properties for the Hoover Dam Bypass. NPS and Reclamation cultural resource staff assisted FHWA in identifying the appropriate tribal representatives to involve in the consultation process. Consultation meetings involving 12 Native American tribes, FHWA, NPS and Reclamation occurred during completion of the NEPA and Section 106 process in 2000, specifically on January 11, March 30, May 8, August 15 and 16, and November 15. These meetings will continue after approval of the Record of Decision, through design and construction of the Hoover Dam Bypass.

3.5.1.1 Surveys, Tribal Interviews, and Literature Reviews

Prior to mid-1993, Reclamation conducted cultural resources inventories as part of the preparation of the Hoover Dam Bypass DEIS (Queen 1992 and White 1993a,b). These surveys resulted in the identification and recordation of numerous historic features, several of which are associated with the construction of Hoover Dam. Except for a single rock feature, no prehistoric Native American sites were identified by Reclamation. Literature sources revealed 44 cultural features within the area, and 42 of the 44 features are associated with constructing, operating, and maintaining Hoover Dam. Thirty-three of the features are not considered individually eligible for listing in the NRHP; however, they may contribute to a potential historic district that focuses on constructing, operating, and maintaining Hoover Dam.

A large prehistoric archaeological site was discovered in November 1997. An archaeological survey of the three build alternatives was conducted in March 1998. Following FHWA standards, an Area of Potential Effects (APE) was established for the three build alternatives. The APE, defined as all ground surface 200 feet to each side of the staked centerline, was intensively surveyed by a team of archaeologists walking transects parallel to the centerline, spaced a maximum of 20 meters. When cultural materials were found, the location was flagged, and the archaeological sites were formally recorded. The survey resulted in the discovery and recordation of five prehistoric archaeological sites on the Arizona side (including the site found in 1997). FHWA, in consultation with the Arizona SHPO,

determined that these five sites are not eligible for the National Register (see further discussion of sites 14:21 and 14:22 below). The Arizona State Museum assigns site registration numbers for Mohave County, Arizona, and includes the partial descriptor "NV" in its registration numbers.

AZ:NV:DD:14:21 Sugarloaf Mountain (in the APE)	Gypsum Period (5000-2000 B.P.) or Late Prehistoric (750 B.P-Contact)
AZ:NV:DD:14:22 Sugarloaf Mountain (in the APE)	Unknown prehistoric time period
AZ:NV:DD:14:23 Promontory Point (in the APE)	Unknown prehistoric time period
AZ:NV:DD:14:24 Promontory Point (outside APE)	Unknown prehistoric time period
AZ:NV:DD:14:25 Promontory Point (in the APE)	Unknown prehistoric time period

The May-June 1998 site visits and field interviews with tribal elders, conducted for FHWA by the University of Arizona, resulted in completion of an ethnographic study report for the Hoover Dam Bypass Project in December 1998 (FHWA, October 2000a). That report included preliminary findings, summarized in the DEIS, indicating the presence of potentially significant traditional cultural properties in the vicinity of the bypass project.

After identification of Sugarloaf Mountain Alternative as the preferred alternative, following circulation of the DEIS in November 1998, NPS and Reclamation directed FHWA to conduct a detailed historic resources survey to update and expand the sites previously recorded by Reclamation, as well as additional intensive surface mapping and documentation of archaeological sites 14:21 and 14:22 located in Arizona. Both the historic and archaeological surveys were scoped to provide additional documentation to address National Register eligibility of sites in the APE of the preferred alternative. Those additional investigations, conducted during March and June 1999, resulted in completion of a supplemental archaeological resources survey report (FHWA, April 2000) and a historic resources survey report (FHWA, August 1999) for the Sugarloaf Mountain Alternative.

The 1999 archaeological resources survey report concluded that sites 14:21 and 14:22 were not eligible for the National Register, because after detailed surface inspection and mapping, it was determined the sites lacked information important in the prehistory of the areas. The historic resources survey report resulted in identification of seven additional National Register eligible historic properties relating to construction and operation of Hoover Dam. Those reports and the December 1998 ethnographic study (FHWA, October 2000a) were submitted by FHWA to the Arizona and Nevada SHPOs in August 1999 with a request for concurrence in determinations of National Register eligibility for the affected historic properties.

The Nevada and Arizona SHPOs commented back to FHWA, in September and October respectively, concurring in the determinations of National Register eligibility for most of the historic properties documented by FHWA. However, the Nevada SHPO requested that FHWA conduct an ethnohistoric study to provide documentary context for assessing the potential traditional cultural properties identified by the tribal elders during the 1998 field interviews, and that FHWA commence formal government-to-government consultation with

affected Native American tribes concerning the significance and National Register eligibility of the potential traditional cultural properties in the project area. The Arizona SHPO also requested further consideration of potential TCPs in the area, as well as additional information on archaeological sites 14:21 and 14:22, within a broader historic and ethnographic context, to more fully evaluate the potential National Register eligibility of these sites. (See Appendix C and Volume II for copies of all pertinent FHWA, SHPO, and Native American tribal correspondence relating to cultural resources.)

At the first meeting between the Native American tribal representatives and the federal agencies, held on January 11, 2000, the tribes requested that the 1998 ethnographic studies be expanded to other locations and include additional tribes and elders. As a result, the University of Arizona conducted additional site visits and interviews during May 2000. The resulting report (FHWA, October 2000a), coupled with the ethnohistoric assessment report (FHWA, October 2000b), provided documentation supporting a determination by FHWA and the SHPOs that the Gold Strike Canyon and Sugarloaf Mountain TCP is eligible for the National Register of Historic Places (FHWA, October 2000c). The National Register eligible TCP boundaries include archaeological site 14:21 (FHWA, April 2000), which Reclamation noted in an October 6, 2000, letter to FHWA supporting the TCP eligibility, "should be considered to contribute to the eligibility of the larger Gold Strike Canyon and Sugarloaf Mountain TCP" (see Appendix C, October 6, 2000, Reclamation letter).

3.5.1.2 Archaeological Context

The prehistory of the proposed project area covers the time period from about 12,000 years before present (B.P.) (B.P. being before 1950) to the time of initial European contact in A.D. 1600, and is divided into five periods: Lake Mohave (12,000 to 7000 B.P.), Pinto (7000 to 5000 B.P.), Gypsum (5000-2000 B.P.), Saratoga Springs (2000 to 800 B.P.), and Late Prehistoric (750 B.P.-Contact) (Ezzo et al., 1995).

Lake Mohave Period (12000 to 7000 B.P.). Evidence of Paleo-Indian occupation in the vicinity of the proposed project is lacking. Either the material remains were quickly covered over, or they were rapidly scattered about or washed away from their original location, effectively destroying the site. The Paleo-Indian culture gave rise to a series of more localized cultural manifestations known as the Archaic, represented in the proposed project area by the Pinto and Gypsum periods.

In general, the Archaic represents a period of hunting and gathering characterized by reduced mobility, more localized adaptations, and greater diversity of tool kits. Most recorded sites from this time period are surface finds.

Pinto Period (7000 to 5000 B.P.). The Pinto period is defined by the presence of the Pinto complex—an assemblage characterized by leaf-shaped knives, scrapers, and projectile points. Pinto settlement in the proposed project vicinity was centered around water sources, particularly drainages and remnant pluvial lakes. Settlement focused on valley floors, favoring lowland, well-watered habitats. Hunting continued to be an important dietary component, but milling implements appeared for the first time, indicating a greater reliance on, and orientation toward, plant food resources than during the preceding Lake Mohave period (Ezzo et al., 1995).

Gypsum Period (5000 to 2000 B.P.). The Gypsum period represents a continuation of the pre-agricultural Pinto foraging lifestyle. Gypsum sites evidence greater use of milling implements, resource diversification, and greater emphasis on plant and seed processing. Gypsum period assemblages are characterized by a variety of projectile points. Other tools

include leaf-shaped points, flake scrapers, choppers, hammerstones, rectangular-based knives, manos, mortars, and pestles.

The Gypsum period appears to have been a time of increased human activity in the proposed project area. Groups moved through a range of diverse ecological zones that included mountains, riverine habitats, and other lowland areas, to hunt, collect, and process seeds and wild plants (Ezzo et al., 1995). Compared to previous periods, there are a greater variety of site types: rockshelters and caves were utilized, and open-air sites included camps and specialized activity areas. Bighorn sheep became a significant food source, and small game, which was abundant in the riparian communities or well-watered areas, was also hunted (Ezzo et al., 1995).

Saratoga Springs Period (2000 to 800 B.P.). The Saratoga Springs period exemplifies the influence of the Anasazi in the proposed project area. It can be divided into four phases: Moapa phase (1650 to 1450 B.P.), Muddy River phase (1450 to 1250 B.P.), Lost City phase (1250 to 850 B.P.), and Mesa House phase (850 to 800 B.P.). The Moapa phase corresponds to the Basketmaker II period of the Colorado Plateau, a time when pithouse villages made their first appearance. The Moapa phase represents the beginning of the transition from a foraging to a sedentary, agricultural way of life in the northern Southwest (Ezzo et al., 1995).

The Muddy River phase corresponds to the Basketmaker III period on the Colorado Plateau and is characterized by the introduction of ceramics and the bow and arrow. Settlements consisted of small numbers of randomly arranged pithouses and food storage cists. The introduction of ceramics and the bow and arrow had significant effects on hunting and storage capabilities. This introduction reduced the use of food storage cists in caves for storing seeds and plant materials for extended periods of time; it also reduced the need for woven baskets for use in cooking, storage, and water transport (Ezzo, et al., 1995).

The Lost City phase corresponds to the Pueblo I and the early and middle stages of the Pueblo II period on the Colorado Plateau. There was a shift from subterranean or semi-subterranean structures to surface structures, generally with associated storage facilities.

The Mesa House phase corresponds to the late Pueblo II period on the Colorado Plateau and represents the final period of Anasazi settlement in the Las Vegas Valley and neighboring areas. The primary distinguishing characteristic of the Mesa House phase is the new types of decorated ceramics. Agriculture continued to be an important component of subsistence, but wild foods continued to be significant (Ezzo et al., 1995).

Ezzo et al. (1995) discuss the two recent models that attempt to explain Virgin Anasazi expansion and demise. Rafferty's model (Rafferty 1984, 1990a,b) relies on the concept of world-systems theory to buttress his argument that Anasazi expansion into the Las Vegas Valley was driven by population increase and the need to secure valuable resources for exchange into Chaco Canyon (the leaders of which were sending such goods to the heart of the Toltec empire in central Mexico). Lyneis's (1990, 1992a,b) model adheres closely to available data and recognizes the complexity of human systems and behavior to address the issue of Anasazi expansion and retreat.

Late Prehistoric Period (750 B.P.-Contact). Late prehistoric occupation in the project area is characterized by artifact assemblages that include Owens Valley Brownware ceramics, a variety of projectile points, large triangular knives, incised stones, steatite beads, slate pendants, shell beads, unshaped manos and metates, and mortars and pestles. These artifacts describe the basic lifestyle of a foraging people who may have practiced horticulture on a small scale and lived in small, mobile groups that exploited well-watered and upland

environments. These assemblages provide good evidence for the abandonment of the region by the Anasazi and the arrival of the Southern Paiute (Ezzo et al., 1995). Ezzo et al. (1995) also reviewed the complex issues surrounding the nature and timing of the entry of the Paiutes (or their direct ancestors) into the region—either as early as several thousand years ago or as recently as a thousand or fewer years ago.

Southern Paiute sites tend to consist of surface artifact scatters often associated with hearths or arrangements of fire-cracked rock. Caves and rock shelters were preferred locations for occupation, and petroglyphs occasionally occur on rock shelter walls or on standing boulders—an attribute of the Patayan tradition (Ezzo et al., 1995). According to Ezzo et al. (1995) the Patayan influence in the region at this time is more significant than in any previous period; the pattern of interaction between Patayan and Anasazi and Patayan and Paiute becomes a common occurrence after A.D. 1000 in the Arizona Strip and adjacent areas to the west. The Patayan subsistence and settlement is similar to that of the Southern Paiute – mobility and a mixed subsistence base in a wide range of ecological zones including floodplains, valleys, and uplands. Fragile-pattern sites, primarily an aspect of the Patayan cultural tradition, occur in the region as well. These sites are created by the deliberate or incidental removal of desert pavement from the surfaces of benches, piedmonts, or relict river terraces to create intaglios, earth figures, or geoglyphs in linear, abstract, zoomorphic, and anthropomorphic shapes. Another feature common to Patayan sites along the lower Colorado River are rocks deliberately shaped into a number of patterns (circles and lines). Rock rings (circles) may have functioned as hearths, sleeping areas, or windbreaks, while linear alignments probably functioned as directional markers that pointed travelers toward a particular locality.

Late prehistoric activity in the area represents a time of rather dispersed, small mobile groups occupying habitats and landforms that were previously utilized by the Virgin Anasazi. Subsistence was maintained through a combination of farming the floodplains of the Virgin and Muddy Rivers and probably the larger washes, and exploiting a wide range of ecological zones for wild plant and animal resources (Ezzo et al., 1995).

Historic Period (Contact-Hoover Dam Construction). The earliest Euro-American exploration of the Colorado River dates from the mid-1500s. The Colorado River was discovered and explored in 1540 by the Alarcon, Diaz, and Cardenas expeditions. In 1604-05, Ornate led another Spanish expedition to the mouth of the Little Colorado River, then followed the river to the Gulf of California. Throughout the 1700s, the Spanish conducted several expeditions into the area including explorations by Father Sedelmeyer (1744), Father Garces (1771 and 1775-76), Father Anza (1774), and Father Escalante (1776).

Trappers began to explore the area in the mid-1800s. In 1826, James Puttie became the first white to ascend the Colorado River from its mouth to the Rocky Mountains and in the same year, Jedediah Smith also explored the Colorado River, beginning at its confluence with the Virgin River to the area around Needles, California. From 1846 to 1860, War Department survey parties explored and mapped the Lower Colorado River. In 1857-58, Lt. J.C. Ives completed the first detailed exploration of the Colorado River as he traveled by steamboat from the mouth of the river to a point in the vicinity of Las Vegas Wash. When the Civil War ended, survey and exploration resumed in the Colorado River basin.

Regulation of the Colorado River demanded federal involvement because the river had navigable status (the government had jurisdiction over its control and use) and the river was international (actions affecting water supply required agreement with Mexico). In addition, the Colorado flowed through several states with different and sometimes contradictory

water needs and interests. To reach agreement on the disposition of water rights to the Colorado River, the states of Colorado, California, Nevada, Arizona, Utah, Wyoming, and New Mexico formed the League of the Southwest in 1919. The league urged the federal government to help develop the water resources of the Colorado River basin. In 1921, Congress authorized the states to form a compact to achieve agreement on equitable water distribution. Not all states agreed to the terms, however, and the compact was never ratified.

The states did not reconcile their differences until Congress enacted the Boulder Canyon Project Act in 1928. Six of the seven states had to ratify the compact in order for the Act to take effect; it was ratified in 1929 with only Arizona abstaining. The compact provided for equitable water distribution and ensured Mexico's rights to use the waters of the Colorado River system. It also acknowledged that domestic, agricultural, and hydropower uses should take precedence over navigation.

The Boulder Canyon Project Act authorized construction of a 20,000,000 acre-foot capacity reservoir and dam in Boulder Canyon and a high-line canal from Laguna Dam to the Imperial Valley. By 1920, all alternative potential dam sites had been eliminated except for those in Boulder Canyon and Black Canyon, near Las Vegas. Site D in lower Black Canyon was eventually selected as the dam site. Designs for a dam had been developed during the 1920s, and final designs for a massive arch-gravity dam were approved by the Colorado River Board on November 19, 1932.

The design called for the dam to have a base thickness of 660 feet, a crest width of 45 feet, and a crest length of 1,282 feet. The dam would create the largest reservoir in the world at that time, approximately 115 miles long, with a maximum depth of 590 feet, covering 227 square miles, with a capacity of 32,000,000 acre-feet. In 1931, a railroad was constructed from Boulder City to the Hoover Dam construction site for moving materials and equipment. Construction began in November 1932, and the first concrete was poured in June 1933. By February 1935, enough of the dam was completed to begin controlling the flow of the Colorado River and creating the reservoir. Secretary of the Interior Harold Ickes officially accepted the dam and power plant as complete in March 1936, almost 2 years ahead of schedule. President Franklin Roosevelt dedicated the dam on September 30, 1935, and the reservoir was named Lake Mead in February 1936 in honor of Dr. Elwood Mead, former Commissioner of Reclamation.

3.5.1.3 Traditional Cultural Properties

The University of Arizona (U of A) conducted ethnographic investigations in 1998 and 2000 to support the preparation of the EIS. Since TCPs may be eligible for NRHP listing in accordance with recent amendments to the NHPA, U of A was scoped to conduct a program of detailed field interviews with tribal representatives ("elders") to assist FHWA determine the presence/absence of TCPs and to facilitate future project consultations between FHWA and the various Indian tribal governments (see Sections 3.5.1 and 3.5.1.1).

The major finding of the ethnographic investigation is that the overall project area lies within a National Register-eligible TCP. FHWA recommended the site as an eligible TCP, and the SHPOs, Reclamation, and NPS concurred. This property encompasses a geographic area that includes Gold Strike Canyon on the Nevada side and Sugarloaf Mountain on the Arizona side. Among many statements by the elders, the participating tribal representatives believe:

- Sugarloaf Mountain and the Gold Strike Hot Springs are on "The Salt Song Pathway."

- Amongst the Mohaves, Sugarloaf Mountain is linked to the Origin Mountain, Avikwa'ame.
- Gold Strike Canyon Hot Springs and Sugarloaf Mountain are connected to Gypsum Cave and the Creator.
- Sugarloaf Mountain is marked by healing stones used for doctoring.
- Ceremonial clearings on Sugarloaf Mountain were used for vision quests and dancing.
- Gold Strike Canyon and Sugarloaf Mountain are near a traditional turquoise mine.
- A petroglyph on top of Sugarloaf Mountain is a universal symbol and a trail marker.
- The Gold Strike Canyon Hot Springs are sacred, used for healing and purification.

3.5.2 Environmental Consequences

3.5.2.1 Historical

Eighteen historic sites or features previously identified by Reclamation (Queen, 1992, and White, 1993a, b) would be affected or potentially affected by the three alternatives: Hoover Dam – 26-CK-3916, the Kingman Switchyard – AZ:DD:14:1, Waste Tailings (AZ) – AZ:NV:DD:14:15, Old Construction Road and Test Borings (AZ) - AZ:NV:DD:14:16, World War II Bunker (AZ) - AZ:NV:DD:14:18, the Wooden Ladders (NV) – 26-CK-4734, the Cantilevered Walkway – 26-CK-4742, the Tunnel – 26-CK-4748, Tailings (NV) – 26-CK-4750, the Old Government Railroad grade (Reclamation lands) – 26-CK-4751, Building Foundations (NV) – 26-CK-4752, the Diversion Channel – 26-CK-4753, a Retaining Wall – 26-CK-4754, a Trash Scatter – 26-CK-4763, some elements of the Electrical Power Transmission Switchyard (the Nevada State Switchyard, the M.W.D. Switchyard, and the Southern California Edison Switchyard) – 26-CK-4765, the Scenic Overlook (NV) – 26-CK-4766, Transmission Towers and Lines (NV) – 26-CK-5180, and an Old Construction Road (AZ) – AZF:2:87.

Seven additional historic and cultural properties identified by FHWA after circulation of the DEIS would be affected or potentially affected by the proposed project: the Hoover Dam Transmission Towers in Arizona - AZ:NV:DD:14:29, Old Arizona U.S. Highway 93 Segment in APE - AZ:NV:DD:14:30, Sugarloaf Mountain Survey Station - AZ:NV:DD:14:31, Stone Gates and Lower Portal Access Road (NV) - 26-CK-5789, U.S. 93 Switchback Segment in Nevada - 26-CK-5790, the Arizona-Nevada Switchyard (NV) - 26-CK-5792, and the Gold Strike Canyon and Sugarloaf Mountain TCP. (See FHWA, August 1999, for historic properties, and Section 3.5.1.3 along with FHWA, 2000a, and FHWA, October 2000b, for detailed documentation on the TCP; also see Appendix C, August 27, 1999, and October 12, 2000, FHWA Determination of Eligibility letters to SHPOs.)

Promontory Point Alternative. In June 2000, FHWA applied the criteria of adverse effect and determined in consultation with the Nevada and Arizona SHPOs that the Promontory Point Alternative would have an adverse effect on the Hoover Dam National Historic Landmark because the bypass project would introduce visual elements that diminish the integrity of the property's significant historic features and setting, although it would not cause any physical damage to the dam complex. An adverse effect is found when a project may alter, directly or indirectly, the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Section 110(f) of the

NHPA requires that the Agency Official, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to any NHL that may be directly and adversely affected by an undertaking (36 CFR 800.10); however, FHWA and NPS have determined that the historic views of the dam would be adversely affected and cannot be mitigated. The Promontory Point Alternative would enhance protection of the physical features of the dam by removing trucks from the dam and thereby eliminating the potential for hazardous material spills and large vehicle collisions with dam facilities.

It was also determined, based on previous findings by Reclamation (Queen, 1992, and White, 1993) and recent investigations by FHWA (FHWA, August 1999), that the Promontory Point Alternative would have an adverse effect on the following additional historic properties eligible for the National Register for their association with the construction and operation of Hoover Dam or as contributing elements to the NHL (see above): Old Arizona U.S. Highway 93 Segment in APE, Old Government Railroad Grade (NV), Building Foundations (near Nevada bridge abutment), the Diversion Channel and Retaining Wall (NV), the Nevada State Transmission Switchyard (NV), and the historic Transmission Towers and Lines in Nevada (see Appendix C, June 6, 2000, FHWA Determination of Eligibility and Effect letters to SHPOs). The Promontory Point Alternative would also have an adverse effect on the Gold Strike Canyon and Sugarloaf Mountain TCP (FHWA, October 2000a).

The Old Government Railroad grade (Reclamation lands) would be partially affected by the Promontory Point Alternative. The diversion channel and retaining wall are not individually eligible for listing in the NRHP, but are eligible as contributing elements to a potential Hoover Dam historic district under NRHP, criterion "C." Both may suffer possible direct impact as a result of Promontory Point construction.

The Nevada State electric power transmission switchyard is not individually eligible, but is eligible as a contributing element to a potential district under NRHP criterion "C." The Promontory Point construction could produce both direct and indirect impacts, and partial demolition may be required.

Sugarloaf Mountain Alternative (Preferred Alternative). In June 2000, FHWA applied the criteria of adverse effect and determined, in consultation with the Nevada and Arizona SHPOs, that the Sugarloaf Mountain Alternative would have an adverse effect on the Hoover Dam NHL because the bypass project would introduce visual elements that diminish the integrity of the property's significant historic features and setting, although it would not cause any physical damage to the dam complex. However, FHWA and NPS determined that the preferred alternative would not detract from the historic views of the dam as would the Promontory Point Alternative. The Sugarloaf Mountain Alternative would enhance protection of the physical features of the dam by removing trucks from the dam and thereby eliminating the potential for hazardous material spills and large vehicle collisions with dam facilities.

It was also determined, based on previous findings by Reclamation (Queen, 1992, and White, 1993) and recent investigations by FHWA (August 1999), that the Sugarloaf Mountain Alternative would have an adverse effect on the following additional historic properties eligible for the National Register for their association with the construction and operation of Hoover Dam or as contributing elements to the NHL (see above): Kingman Switchyard (AZ), Transmission Towers and Lines in Arizona, Old Arizona U.S. Highway 93 Segment in APE, Old Government Railroad Grade (NV), Transmission Towers and Lines in Nevada, Stone Gates and Lower Portal Access Road (NV), U.S. 93 Switchback Segment (NV), and the Arizona-Nevada Switchyard (NV) (see Appendix C, June 6, 2000, FHWA Determination of

Eligibility and Effect letters to SHPOs); however, the Kingman Switchyard and the U.S. 93 Switchback Segment would not be physically damaged, but only indirectly affected by a change in the setting. The Sugarloaf Mountain Alternative would also have an adverse effect on the Gold Strike Canyon and Sugarloaf Mountain TCP (FHWA, October 2000a).

The Kingman Switchyard is not individually eligible, but it is eligible as a contributing element to a potential district. Construction could produce indirect effects on its visual and historic setting. The Old Government Railroad grade (Reclamation lands) would be partially affected by construction. Construction could produce both direct and indirect impacts on the Arizona-Nevada Switchyard, and modification or demolition may be required.

Gold Strike Canyon Alternative. In 1991, during early consultation on the bypass project, Reclamation along with NPS and the Nevada and Arizona SHPOs reviewed the effects of the Gold Strike Canyon Alternative and concluded that it would have "no adverse effect" on the Hoover Dam National Historic Landmark because a bridge at this location "competes the least with the Landmark" (see Appendix C, October 2, 1991, Reclamation meeting notes). The Gold Strike Canyon Alternative would not cause any physical damage to the dam complex and would enhance protection of the physical features of the dam by removing trucks from the dam, thereby eliminating the potential for hazardous material spills and large vehicle collisions with dam facilities.

It was also determined, based on previous findings by Reclamation (Queen, 1992, and White, 1993) and recent investigations by FHWA (FHWA, August 1999), that the Gold Strike Canyon Alternative would have an adverse effect on the following historic properties eligible for the National Register for their association with the construction and operation of Hoover Dam or as contributing elements to the NHL (see above): Arizona Waste Tailings, Old Construction Road and Test Borings (AZ), Old Arizona U.S. Highway 93 segment in APE, Wooden Ladders (NV), and the Waste Tailings in Nevada (see Appendix C, June 6, 2000, FHWA Determination of Eligibility and Effect letters to SHPOs). The effects on the Tunnel (NV) and Cantilevered Walkway (NV) properties were undetermined by Reclamation. The Gold Strike Canyon Alternative would also have an adverse effect on the Gold Strike Canyon and Sugarloaf Mountain TCP (FHWA, October 2000a).

The waste tailings, cantilevered walkway, tunnel, and the Nevada tailings are not individually eligible, but are eligible as contributing elements to a potential district. The Nevada tailings would suffer direct impact from Gold Strike Canyon construction, while the walkway could suffer partial or direct impact. The tunnel could provide construction access to the Gold Strike Canyon worksite if it were enlarged to accommodate heavy equipment. The Arizona tailings could also suffer partial impact from Gold Strike Canyon construction.

3.5.2.2 Archaeological

Five prehistoric archaeological sites were recorded during investigation of the proposed project alternatives. None of these sites were found to be eligible for the National Register. Four of the five sites are within the APE (ASM NV:DD:14:21, -22, -23, and -25) while one appears to be outside the APE (ASM NV:DD:14:24). All four sites within the APE would likely be impacted, while the site outside the APE might be impacted without fencing.

Promontory Point Alternative. Two prehistoric archaeological sites were recorded within the APE of the Promontory Point Alternative (ASM NV:DD:14:23 and -25), and one site was recorded just outside the APE (ASM NV:DD:14:24). These three sites were found to be ineligible for NRHP listing.

Sugarloaf Mountain Alternative (Preferred Alternative). Two prehistoric archaeological sites lie within the APE of the Sugarloaf Mountain Alternative. Although not individually eligible, one site is a contributor to the eligible TCP (ASM NV:DD:14:21); the other is not (ASM NV:DD:14:22).

Gold Strike Canyon Alternative. No archaeological sites were detected in those portions of the Gold Strike Canyon Alternative APE that were surveyed in March 1998.

3.5.2.3 Traditional Cultural Properties

As a result of government-to-government consultation and as indicated above, the ethnographic study (FHWA, October 2000a) indicates that an NRHP-eligible TCP is present in the project area, and construction of any of the three build alternatives would adversely affect this property.

3.5.2.4 Construction Impacts

Promontory Point Alternative. Construction of the Promontory Point Alternative would have an adverse effect on the historic visual setting of Hoover Dam. FHWA and NPS determined that the adverse effect on the historic views of the dam could not be mitigated. Segments of the Old Government Railroad grade within Reclamation jurisdiction would be adversely affected; however, NPS is in the process of developing an agreement with NDOT to convert this historic railroad grade to a bicycle/pedestrian trail (see Section 3.8, Recreation Resources). A part of the diversion channel and a small segment of the retaining wall would be destroyed by construction. The northernmost electrical power transmission switchyard would be partially or totally destroyed, and transmission towers in Nevada would be relocated. The Old Arizona U.S. Highway 93 segment would be directly impacted.

The two ineligible prehistoric archaeological sites within the APE would likely be destroyed during construction.

The Promontory Point Alternative would also directly impact approximately 14 acres from the northeastern portion of the Gold Strike Canyon and Sugarloaf Mountain TCP on the Arizona side.

Sugarloaf Mountain Alternative (Preferred Alternative). Construction of the Sugarloaf Mountain Alternative would have an adverse effect on the historic visual setting of Hoover Dam; however, this effect can be mitigated. Several of the historic transmission towers and lines in Arizona and Nevada will require relocation for construction of the bypass roadway and bridge. A portion of the abandoned Arizona U.S. 93 segment in the APE will be covered by construction of a bridge over Kingman Wash. The bypass may directly impact the stone gates, but would not affect the lower portal access road near the Reclamation warehouse on the Nevada side. A segment of the Old Government Railroad grade within Reclamation jurisdiction will be directly affected (see Section 3.8, Recreation Resources). The Arizona-Nevada Switchyard may be modified or fully demolished.

Two individually ineligible prehistoric archaeological sites are located in the APE. One site would be partially destroyed during construction, and the other site would be completely destroyed during construction (see Section 3.5.2.2).

The Sugarloaf Mountain Alternative would also directly impact approximately 22 acres from the northern portion of the Gold Strike Canyon and Sugarloaf Mountain TCP on the Arizona side. The preferred alternative alignment traverses along the base of Sugarloaf Mountain, approximately 700 feet north and 200 feet below the mountain top. The area where the

bypass crosses the TCP is already disturbed by transmission lines and towers, a switchyard and other power facilities, maintenance roads, and sewer evaporation ponds.

Gold Strike Canyon Alternative. Construction of the Gold Strike Canyon Alternative would have no adverse effect on the historic visual setting of Hoover Dam. The historic waste tailings on the Arizona side would be partially destroyed by project construction. The Old Arizona U.S. 93 highway segment would be directly impacted. The cantilevered walkway and tailings on the Nevada side would be partially destroyed. The tunnel could be substantially altered if it is enlarged to accommodate access by large, heavy equipment needed for construction.

The Gold Strike Canyon Alternative would also directly impact approximately 51 acres from the entire length of the Gold Strike Canyon and Sugarloaf Mountain TCP. Of the three build alternatives, the Gold Strike Canyon alignment would have the most substantial impact on the TCP, physically damaging large, presently undisturbed portions of most of Gold Strike Canyon on the Nevada side and the southern flank of Sugarloaf Mountain on the Arizona side.

All Alternatives. The ethnographic study indicates that the project area lies within a TCP. Thus, all three build alternatives impact the TCP. According to the tribal representatives (FHWA, October 2000a), specific impacts might include:

- Tremendous amounts of ground disturbance (especially at Gold Strike Canyon).
- Intrusion and interference with ceremonies, songs, or trail systems.
- Scaring away rams and damaging artifacts and archaeological sites during construction and project operation.
- Construction and project operation would destroy the whole site, the scenery, and the culture related to it. The bridge could destroy artifacts and aesthetic setting.
- Any kind of construction would damage Indian sacred land/country.
- Dynamiting rock and bulldozing may injure workers and tourists (construction killed a Pahrump Paiute Hoover Dam project worker in 1935).
- Construction would trample ruins and deplete the herds of mountain sheep.
- Construction would damage mountain sheep trails to water. Undiscovered rock writings might be destroyed.
- There will be more pollution and public access, more vandalism and destruction.
- Known and unknown cultural resources would be destroyed.
- There would be a lot of damage, especially on Sugarloaf Mountain.
- Construction would hurt the rocks.

3.5.2.5 Operational Impacts

Promontory Point Alternative. Construction of the Promontory Point Alternative would have an adverse effect on the historic visual setting of Hoover Dam, which would continue if the Promontory Point Alternative were constructed. Because segments of the Old Government Railroad grade within Reclamation jurisdiction would be destroyed, there would be no

operational impacts to this feature. Similarly, those portions of the diversion tunnel and retaining wall that would be destroyed by construction would likely not experience further impact resulting from project operation. The northernmost electric power transmission switchyard, which would be partially or totally destroyed, would not likely experience further impact from project operations. Operation of the Promontory Point Alternative would affect the historic setting of the World War II Bunker in Arizona and the old building foundations (near the bridge abutment) and remaining transmission towers in Nevada.

Since construction would probably destroy one prehistoric archaeological site and may likely destroy another, the potential effects of project operation would be moot. If one of the sites escapes destruction or damage from road construction, it could still be subject to operational impacts from the new roadway. Without fencing, destructive impacts during operation could take the form of off-road-vehicle use adjacent to the roadway, or illegal collection of artifacts facilitated by easy road access. None of these archaeological sites are eligible for the NRHP.

Sugarloaf Mountain Alternative (Preferred Alternative). Construction of the Sugarloaf Mountain Alternative would have an adverse effect on the historic visual setting of Hoover Dam; however, this impact can be reduced by implementation of mitigation measures in the PA. The anticipated visual impacts expected to affect the Kingman Switchyard and the Sugarloaf Mountain Survey Station can be mitigated. The Arizona-Nevada Switchyard, if not demolished, would be visually impacted from project operations. The U.S. 93 switchback segment in Nevada and the remaining historic transmission towers also would be visually impacted from project operations.

Operation of this alternative could produce impacts to a prehistoric archaeological site in addition to its partial destruction resulting from construction. Without planned fencing, destructive impacts during operation could take the form of off-road-vehicle use adjacent to the roadway or illegal collection of artifacts facilitated by easy road access to the site if there is no access control fencing. This site is a contributing element of the TCP.

Gold Strike Canyon Alternative. Construction of the Gold Strike Canyon Alternative would have no adverse effect on the historic visual setting of Hoover Dam. Project operation would also have no adverse effect on the historic visual setting of Hoover Dam. The waste tailings on the Arizona site that would be partially destroyed by project construction, and the cantilevered walkway and tailings on the Nevada side that would also be partially destroyed, would not likely experience any further impact resulting from project operation. The tunnel, which might be substantially altered if it is enlarged to accommodate access by large, heavy equipment needed for construction, would not likely experience further impact from project operations. Because no archaeological sites were identified in or adjacent to this alternative, no operational impacts are expected.

All Alternatives. Operational impacts to the TCP would include traffic noise, exhaust emissions, and a change in the visual setting.

No Build Alternative. If the Hoover Dam Bypass Project is not built, there will be no effect on known/recorded historic properties. The known/recorded prehistoric archaeological sites and historic archaeological features associated with the construction of the Old Boulder City Water System and Hoover Dam are located well away from pedestrian or vehicle tourist traffic. Hence, continued operation of the existing highway bridge (over the dam) and existing highway approaches should have no effect on these resources. However, under No Build, the traffic congestion on the historic two-lane crest roadway and approaches will

worsen, further degrade the historic setting, and increase the potential for traffic collisions with dam appurtenances.

The presence of Hoover Dam and operation of the existing highway bridge and approaches have diminished several traditional cultural values that the Indian Tribes ascribe to the overall project vicinity. If the project is not built, there would be no further effects to the TCP than those that presently exist. However, failure to build the project may result in great harm to Native American cultural values if an accidental spill (off the dam) of hazardous materials pollutes the Colorado River.

3.5.3 Measures to Minimize Harm

For the NRHP eligible historic and cultural features affected by the project, formal consultations with Nevada and Arizona SHPOs and the federal land-managing agencies (NPS and Reclamation) were completed for the preferred alternative for determination of specific measures to minimize harm to these cultural resource sites.

A PA that commits FHWA to implement specific activities and mitigation measures to resolve the adverse effects on historic properties from the preferred alternative was developed in consultation among the ACHP, FHWA, Nevada and Arizona SHPOs, NPS, Reclamation, WAPA, NDOT, ADOT, and interested Native American tribal governments. The PA stipulates, in part, that FHWA will establish a Design Advisory Panel (DAP) to review bridge design concepts and corridorwide design elements, develop Corridor Design Criteria for aesthetic consistency of major structural, roadway and earthwork elements, mitigate adverse effects on historic resources according to the Secretary of Interior Standards, and mitigate adverse effects on the TCP based on specific measures identified in consultation with the Native American tribes who are invited signatories to the PA. The DAP consists of members from FHWA, NDOT, ADOT, the Nevada and Arizona SHPOs, the ACHP, the NHL Coordinator, NPS, Reclamation, WAPA, and consulting Native American tribes, as well as an independent architectural historian and a registered landscape architect. The PA includes a clause listing highway and power facilities maintenance and operations exemptions for activities by Reclamation, WAPA, NPS, ADOT, and NDOT within the TCP boundaries.

The PA incorporates a Treatment Plan for avoidance, minimization, and mitigation of adverse effects to historic and cultural properties. The specific mitigation measures in the Treatment Plan for historic resources include documenting the Hoover Dam National Historic Landmark viewshed and related historic features in accordance with the Historic American Engineering Record (HAER) standards, determined in consultation with the NPS/HAER. Mitigation measures currently identified for the TCP have resulted from the ongoing government-to-government consultation meetings between FHWA, NPS, Reclamation, and the Native American tribes. The mitigation measures recommended by the tribes to date and incorporated in the PA include providing funding to the tribes for continuing consultation through design and construction, providing access for the tribes to the TCP, developing a statement of work for conducting future studies of cultural landscapes in the surrounding area, and providing Native American cultural interpretive exhibits in the vicinity of Hoover Dam.

3.5.3.1 Construction Mitigation

Promontory Point Alternative. In June 2000, FHWA applied the criteria of adverse effect and determined in consultation with the Nevada and Arizona SHPOs that the Promontory Point Alternative would have an adverse effect on the Hoover Dam NHL because the bypass

project would introduce visual elements that diminish the integrity of the property's significant historic features and setting. Furthermore, FHWA and the NPS have determined that construction of a bridge at the Promontory Point crossing would adversely affect visitors' "first impression" historic views of the dam. These views occur as motorists approach the dam on existing U.S. 93 from both Nevada and Arizona. The dominance of the Promontory Point bridge would significantly detract from the historic views of the dam and could not be mitigated. Measures to minimize harm would be required for segments of the Old Government Railroad grade within Reclamation jurisdiction. Furthermore, because the railroad is under conversion to a bicycle/pedestrian trail by NPS, it must be protected as a recreation resource (see Section 3.8). Measures may be required for a portion of the diversion tunnel and a small segment of the retaining wall because these features are eligible as contributing elements to a potential historic district. Because the electric power transmission switchyard is eligible as a contributing element to a potential historic district, measures to minimize harm would likely be required. Mitigation would also be required for the transmission towers in Nevada, the Old Arizona U.S. 93 highway segment, and the TCP. Consultation with the Nevada and Arizona SHPOs would be required to determine the nature and magnitude of the measures.

Mitigation for construction impacts to prehistoric archaeological sites NV:DD:14:23, NV:DD:14:24, and NV:DD:14:25 would not be required because these sites were found ineligible for the National Register. However, construction in these areas may require an archaeological and Native American monitor, and in any cases of unanticipated discovery, the finds would have to be secured and protected until appropriate actions could be implemented.

Sugarloaf Mountain Alternative (Preferred Alternative). In June 2000, FHWA applied the criteria of adverse effect and determined in consultation with the Nevada and Arizona SHPOs that the Sugarloaf Mountain Alternative would have an adverse effect on the Hoover Dam NHL because the bypass project would introduce visual elements that diminish the integrity of the property's significant historic features and setting. However, in contrast to the Promontory Point Alternative, FHWA and NPS determined the preferred alternative bridge would not detract from the "first impression" historic views as visitors approach the dam from the Arizona and Nevada approaches. The Design Advisory Panel established in the PA will provide input on bridge design concepts, addressing structure type, materials, and colors to minimize the visual impact.

The PA/Treatment Plan for the Sugarloaf Mountain Alternative includes other specific measures to minimize harm to historic and cultural properties that will be directly impacted during construction. For all adversely affected historic and cultural properties, the PA identifies and requires an appropriate level of documentation for each site prior to construction. The specific level of documentation for all properties, including HAER recordation, will be determined in consultation with NPS/HAER authorities. HAER recordation may include large format photography of affected features; measured drawings where appropriate; reproduction of original design drawings, construction specifications, and historic photographs; photography of the property setting; and a historical context.

In Arizona, the properties to be mitigated before they are impacted by construction consist of historic transmission towers and lines to be removed and the Old Arizona U.S. 93 highway segment. In Nevada, the properties to be mitigated consist of the Old Government Railroad grade, historic transmission lines and towers, and the stone gate structure. Since NPS is converting the railroad grade to a bicycle/pedestrian trial, those critical segments will be protected as a recreation resource through close coordination between FHWA and NPS (see

Section 3.8). If the Arizona-Nevada Switchyard cannot be avoided by engineering design, it too will be documented prior to any modification or demolition.

Mitigation for construction impacts to prehistoric archaeological sites NV:DD:14:21 and NV:DD:14:22 will not be required because these sites were found ineligible for the National Register; although, site NV:DD:14:21 was found to be a contributing element of the TCP. However, construction in these areas may require an archaeological and Native American monitor, and in any cases of unanticipated discovery, the finds would have to be secured and protected until appropriate actions could be implemented.

The PA/Treatment Plan for the preferred alternative incorporates measures to minimize harm to the Gold Strike Canyon and Sugarloaf Mountain TCP. The Native American tribal representatives, through a representative on the Design Advisory Panel, will have input to the Corridor Design Criteria for the bypass roadway and bridge. Native American tribal representatives may monitor construction of the roadway facility through the TCP area and the related lithic scatter (NV:DD:14:21) located on the eastern flank of Sugarloaf Mountain. Other mitigation measures that have been requested by the tribal representatives during the government-to-government project consultation meetings will be elaborated and refined by FHWA, the federal land managing agencies, and consulting tribes under the PA. The specific measures that have been recommended by the tribes and included in the PA for consideration by FHWA and the federal land managing agencies are to:

- Consummate a Memorandum of Understanding regarding the continued government-to-government consultation between FHWA and the tribes
- Provide funds as available for ongoing tribal consultation
- Involve the tribes in the design aspects of the new bridge and roadway
- Continue the consultation with the tribes throughout the design and construction process
- Protect the confidentiality of sensitive cultural information provided to the federal agencies by tribal representatives
- Provide access for the tribes to traditional cultural places in the project area
- Develop a statement of work for conducting future cultural landscape studies for the larger area encompassing the Gold Strike Canyon and Sugarloaf Mountain TCP
- Provide Native American cultural interpretive exhibits, developed in consultation with tribal representatives
- Develop a separate treatment plan for any inadvertent discoveries of human remains during any project-related activity

Gold Strike Canyon Alternative. In 1991, Reclamation, NPS, and the SHPOs concluded that construction of the Gold Strike Alternative would have no adverse effect on the historic visual setting of Hoover Dam, suggesting that measures to minimize harm would not be required. Because the waste tailings on the Arizona site (NV:DD:14:15) are eligible for NRHP listing as contributing elements to a potential historic district, measures to minimize harm could be required. The same situation would apply to the cantilevered walkway (26-CK-4742) and tailings on the Nevada side (26-CK-4750). The tunnel (26-CK-4748), if substantially altered to accommodate passage of large construction equipment, might also be subject to measures because it is also eligible for NRHP listing as a contributing element to a

potential historic district. The TCP would be substantially impacted, and it is uncertain if any mitigation would be acceptable to the tribes.

No prehistoric archaeological sites were detected in those portions of the Gold Strike Canyon Alternative surveyed in March 1998 or examined by Reclamation's archaeological staff in 1991 to 1992. Because no archeological sites were identified along this alternative, no specific mitigation measures would be required; however, construction may require an archaeological and Native American monitor, and in any cases of unanticipated discovery, the finds would have to be secured and protected until appropriate actions could be implemented.

3.5.3.2 Operational Mitigation

Promontory Point Alternative. As noted above, construction of the Promontory Point Alternative would result in adverse effects on the historic visual setting of Hoover Dam. These visual impacts are considered by FHWA and NPS to be unmitigable. Therefore, no available measures exist to minimize harm during project operation.

The portion of the Old Government Railroad grade directly impacted by the Promontory Point Alternative would be mitigated according to the measures defined in the PA for the preferred alternative. Given the substantial impact to the railroad grade by the Promontory Point alignment, conversion of the grade as a bicycle/pedestrian trail by NPS may not be practicable under this alternative (see Section 3.8).

Measures to minimize harm may be required during construction for the portion of the diversion tunnel and small segment of the retaining wall because these features are eligible as contributing elements to a potential historic district. Once constructed, it is unlikely that harm minimization measures would be required for these two features during project operation.

Operation of the Promontory Point Alternative would affect the historic setting of the old building foundations (near the bridge abutment) and the remaining transmission towers in Nevada. Mitigation measures likely would be required. Because the electric power transmission switchyard is also eligible as a contributing element to a potential historic district, measures to minimize harm would likely be required during construction; but once constructed, such measures are not likely to be required during project operation. Consultation with the Nevada SHPO would be required to determine the nature and magnitude of the measures.

The historic setting of the World War II Bunker on the Arizona side would be affected by the operation of the bypass passing below it on this alignment. Consultation with the Arizona SHPO would be required to determine the nature of any mitigation measures needed to resolve this impact.

Site AZ:NV:DD:14:23, found ineligible for the NRHP, would probably be destroyed by construction; therefore, operational impacts would be irrelevant. Sites AZ:NV:DD:14:24 and -25 are also not eligible for NRHP listing, and mitigation would not be required.

Sugarloaf Mountain Alternative (Preferred Alternative). As noted above, construction of the Sugarloaf Mountain Alternative would produce adverse effects to the historic visual setting of Hoover Dam. Operation of the Sugarloaf Mountain Alternative will change the long-term visual setting of the historic landmark, as well as the Kingman Switchyard and the Sugarloaf Mountain Survey Station in Nevada, the U.S. 93 Switchback in Arizona, and the remaining historic transmission towers and lines in both states.

Input by the Design Advisory Panel on bridge design concepts, structure type and materials, and in developing corridorwide design criteria will mitigate the total project effects on the NHL and other proximate historic properties, as stipulated in the PA. The panel will consist of representatives from FHWA, ACHP, the National Historic Landmark Coordinator, NPS, Reclamation, WAPA, the signatory Native American tribes, the Nevada and Arizona SHPOs, NDOT, ADOT, an independent architectural historian, and an independent registered landscape architect. Design enhancements from this panel will minimize both the short-term construction impact as well as the long-term operation impact of the new highway bypass on the historic landscape.

Construction impacts may require mitigation of AZ:NV:DD:14:21 as a contributing element of the TCP. Site AZ:NV:DD:14:22 is not eligible, and mitigation would not be required. Operational impacts on the TCP will be minimized through measures applied from the PA.

Gold Strike Canyon Alternative. As noted above, construction of the Gold Strike Canyon Alternative would have no adverse effect to the historic visual setting of Hoover Dam, suggesting that measures to minimize harm would not be required, either during construction or operation. Because the waste tailings on the Arizona site are eligible for NRHP listing as a contributing element to a potential historic district, measures to minimize harm during construction could be required. Once implemented, however, it is unlikely that further measures to minimize harm would be required during operation. The same situation would apply to the cantilevered walkway and tailings on the Nevada side. The tunnel, if substantially altered to accommodate passage of large construction equipment, might also be subject to measures because it too is eligible for NRHP listing as a contributing element to a potential historic district. Once implemented, however, it is unlikely that further measures to minimize harm to the tunnel would be required.

No archaeological sites were identified in this alternative; therefore, no impacts are expected and no mitigation required.

All Alternatives. Operation of any of the build alternatives would diminish the integrity of the visual and audible setting of the Gold Strike Canyon and Sugarloaf Mountain TCP on a long-term basis. The mitigation measures and treatment approach incorporated in the PA and described in Section 3.5.3.1 for the preferred alternative will be further refined and possibly expanded during continued consultations between FHWA, the land managing agencies, and the tribal representatives, with the goal of minimizing the intrusion of the highway bypass on future Native American uses of the TCP.

No Build Alternative. No mitigation measures would be required to reduce harm to prehistoric and historic archaeological sites and features if the project is not built.

Indian tribes that participated in this investigation suggested several measures that would reduce adverse effects to their TCP and its associated cultural values if the project is built. Some of these measures could be implemented in a no build scenario to mitigate the existing harmful effects of the existing conditions on these cultural values (e.g., a monument to Indian peoples, educate Indians and non-Indians that Hoover Dam is where Indian ancestors lived, close the hot springs and open them only to the Indians, set aside an area(s) for Indian use, and include Indian tribes in comanagement of lands in the project area).

3.6 Land Use

3.6.1 Affected Environment

This section discusses existing land uses in the vicinity of the three build alternatives. Three types of federal land are in the proposed project area: LMNRA, administered by the NPS; Hoover Dam Reservation (HDR), administered by Reclamation; and the Hoover Dam National Historic Landmark (HDNHL), also administered by Reclamation (see Figure 2-3). Current land uses are described below. A Section 4(f) evaluation pertaining to federally protected parklands and historic sites was prepared and is included as Chapter 6. The proposed project area is entirely on federal lands located within Clark County and Mohave County. For comparative purposes, brief descriptions of applicable land use policies are given below.

The Promontory Point and Sugarloaf Mountain Alternatives would traverse LMNRA, HDR, and HDNHL lands; the Gold Strike Canyon Alternative would traverse only LMNRA and HDR lands. The portions of the three alternatives on the Nevada side of the Colorado River are in Clark County, and the portions on the Arizona side of the Colorado River are in Mohave County.

3.6.1.1 Existing Land Uses in the Project Area and Vicinity

To characterize existing land uses along the three build alternative alignments and in the vicinity, on-the-ground and drive-by area surveys were performed March 9 and 10, 1998. Outside the proposed project area, immediately west of the western terminus of the three build alternatives is the Hacienda Hotel (formerly called the Gold Strike Inn at the time of the survey). Outside the proposed project area, immediately east of the eastern terminus of the three build alternatives is undeveloped open space. Immediately north and south are lands dedicated to open space and recreational uses. To the north is Lake Mead; to the south is the Colorado River. Hoover Dam separates the two water features. Most of the proposed project area is undeveloped open space, portions of which are used for recreational purposes.

Existing land uses along the Promontory Point Alternative and in its vicinity include undeveloped recreational land (36 acres minimum, Mohave County General Plan) and electric transmission and distribution facilities and other facilities associated with Hoover Dam.

Existing land uses along the Sugarloaf Mountain Alternative and in its vicinity include undeveloped recreational land, a water tank, sewage evaporation ponds, and electric transmission facilities associated with Hoover Dam. About 400 feet downstream of this alternative is a rafting concessionaire's put-in on the Colorado River. Access to this put-in is provided by Reclamation's restricted access Lower Portal Road. Reclamation operates a warehouse associated with the dam operations approximately midway between the western terminus and Hoover Dam.

Existing land uses along the Gold Strike Canyon Alternative and in its vicinity include undeveloped recreational land and an undesignated trail used to hike through Gold Strike Canyon down to the river. Near the mouth of the canyon are the drainages of geothermal seeps and hot springs, some of which have human-made blockages to form ponds of warm water. These ponds are used for recreational purposes.

Farmlands. As previously noted, most land within the vicinity of the proposed project is undeveloped, with a large portion dedicated to recreational uses. Agricultural land uses typically are not excluded from these areas.

As a result of a substantial decrease in the amount of open farmland, Congress passed the Farmland Protection Policy Act (PL 97-98; 7 U.S.C. 4201 et seq.). The purpose of the Act is to minimize the unnecessary and irreversible conversion of farmland to nonagricultural uses by federal programs/actions. The Act further requires that federal programs/actions be administered in a manner that will be compatible with state and local government and private programs and policies to protect farmland. The Act specifies three categories of farmlands:

- Prime farmland—land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion (7 U.S.C. 4201[c][1][A]).
- Unique farmland—land other than prime farmland that is used for the production of specific high-value food and fiber crops such as citrus, tree nuts, olives, cranberries, fruits, and vegetables (7 U.S.C. 4201[c][1][B]).
- Additional farmland of statewide or local importance—land identified by state or local agencies for agricultural use, but not of national significance (7 U.S.C. 4201[c][1][C]).

No present agricultural land uses that fall within these farmland categories have been identified within the project vicinity.

3.6.1.2 Land Use Planning

The Clark County General Plan, Mohave County General Plan, the LMNRA General Management Plan (GMP), Reclamation's Hoover Dam Reservation, and the National Historic Landmark are the development guides in the proposed project area. Although the land use plans for Clark and Mohave Counties have no legal authority over management of federal lands, federal agencies strive to achieve conformance with adjoining land use plans.

Clark County General Plan. The proposed project area within Nevada is located within Clark County. The Clark County General Plan lists several general planning goals applicable to the proposed project. These goals are provided below.

- Goal 1: To promote public health, safety, and welfare
- Goal 2: To promote efficient use of public services
- Goal 3: To promote development compatible with the natural environment

Mohave County General Plan. The proposed project area within Arizona is located within Mohave County. The Mohave County General Plan lists several major planning concepts that define its vision for year 2010. Among these are three concepts applicable to the project: promote beneficial economic growth, development, and renewal; protect the environment; and preserve and enhance historic, cultural, open space, and recreational lands and structures.

Transportation is addressed as part of the General Plan's Public Infrastructure Element. The County recognizes the relationship between land uses and transportation facilities. In addition, the County acknowledges the importance of compatibility of the County's roadway system with city, state, and federal roads. General Plan transportation policies

apply to streets within the County's jurisdiction, namely arterial roads and collectors within the County's street system. No specific General Plan transportation policies apply to the proposed project area; however, the following three goals generally apply to the proposed project area:

- Goal 51: To plan, construct, and maintain an efficient transportation system that is adequate to meet the mobility needs of County residents and businesses
- Goal 52: To promote compatibility between roadway improvements, land use patterns, and natural features
- Goal 53: To minimize the impacts of automobile travel on the County's air quality, natural environment, and developed communities (Freilich, Leitner & Carlisle, 1995)

Lake Mead National Recreation Area General Management Plan. The LMNRA GMP, prepared by the NPS, provides a management strategy for the two reservoirs (Lake Mead and Lake Mohave) and surrounding lands within the National Recreation Area (NRA). The NRA contains 1,482,476 acres of federal land and 28,212 acres of nonfederal land (see Figure 6-1).

The NPS management strategy focuses on accommodating increasing visitor use at the NRA while protecting the area's most outstanding natural and cultural values. The NPS seeks to provide a quality visitor experience in a manner that will ensure visitor safety and will protect the area's significant resources. Due to increasing demands on the park's waters, shoreline resources, and facilities, a Lake Management Plan is in preparation. This plan will supplement the GMP in the areas of recreational carrying capacity and shoreline recreation facilities.

Hoover Dam Reservation. The Hoover Dam Reservation (Reservation) delineates lands managed by Reclamation for security purposes and for operating and maintaining Hoover Dam, its buildings and structures, electric transmission lines, towers, switchyards, and spoil disposal sites. No specific management plan has been prepared for guiding development within the Reservation; however, public access to certain areas within the Reservation is restricted, and portions of the area are fenced. As such, Reservation lands do not fall under federal parkland protective provisions (see Chapter 6). Controlled access to the Colorado River about 1 mile west of Hoover Dam is provided by a locked gate at the Lower Portal Road and U.S. 93 intersection. Access is allowed to a rafting concessionaire, a tour group operator, and individuals having permits issued by Reclamation.

Hoover Dam National Historic Landmark. Hoover Dam is a designated National Historic Landmark and is listed in the National Register of Historic Places. It is under the jurisdiction of Reclamation. National Historic Landmarks identify, designate, recognize, and protect buildings, structures, sites, and objects of national significance. The NPS, in cooperation with other government agencies, professionals, and independent organizations, administers the landmark program. Once a site is designated a National Historic Landmark, the owner maintains all rights and privileges of ownership. However, the designation requires that federal transportation projects affecting a landmark take steps to minimize harm to the affected property, under Section 4(f) of the Department of Transportation Act. The dam also falls under the protective provisions of Section 106 of the National Historic Preservation Act.

3.6.2 Environmental Consequences

3.6.2.1 Construction Impacts

Consequences associated with development of the project alternatives, including the preferred alternative, are based on the compatibility of the alternatives with both existing land uses and applicable planning documents governing the use of project lands. Changes in land use and patterns resulting from the three build alternatives evaluated are generally consistent with federal and local land use plans. Impacts from the three build alternatives are separated into those associated with construction, and those resulting from operation of the alternatives.

Potential effects on land use are associated with project construction rather than operation because once the right-of-way easement has been granted and construction begins, no further changes to land use patterns are expected. Existing land uses surrounding the proposed project area would not be precluded during the construction period. Access to most existing land uses would be maintained; the exception is the trail in Gold Strike Canyon, which would be closed to public access during construction of the Gold Strike Canyon Alternative.

The primary land use change associated with the build alternatives is the development of currently undeveloped recreational land for a four-lane highway in the proposed project area. Table 3-18 shows the total acreage that would be developed in each jurisdiction.

Table 3-18
Acreage to be Developed for Each Build Alternative[a]

Jurisdiction	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon
Lake Mead National Recreation Area	94.5	95.9	97.1
National Historic Landmark Boundary	40.6	25.7	0.0
Hoover Dam Reservation	73.9	70.7	81.2
Total Acreage	209.0	192.3	178.3

[a]Includes areas of all potential project components.

3.6.2.2 Operational Impacts

Existing land uses surrounding the proposed project area would not be affected following project completion. The change from recreational land to highway would constitute a small change when compared to the expansive amount of open space area in the surrounding region. Access to existing land uses would be maintained during project operation. No operational impacts on air quality were identified with the build alternatives; however, the Gold Strike Canyon Alternative would have an unmitigable noise impact on recreational land uses.

3.6.2.3 No Build Alternative

Because the No Build Alternative would result in no construction, no land use changes would occur. However, there would be negative effects on visitor usage as congestion increases on the dam.

3.6.3 Measures to Minimize Harm

Noise, visual, and access impacts on recreational land use with construction and operation of the Gold Strike Canyon Alternative could not be mitigated (see Section 3.8.3.2). No other adverse impacts on land use from construction or operation were identified; therefore, no mitigation is warranted.

3.7 Visual Resources

3.7.1 Affected Environment

3.7.1.1 Visual Environment

Landscape Description. The proposed project area is within the LMNRA, which retains an undisturbed character throughout much of its area, but also includes some developed facilities. The desert in the proposed project area is at elevations ranging from about 650 feet to about 2,000 feet. Soils in the proposed project area are pink, red, and brownish-gray. Landforms are mountains, valleys, and beaches, and include the deeply incised Black Canyon, Gold Strike Canyon, and Sugarloaf Mountain. Landcover in the proposed project area includes Lake Mead, the Colorado River, low-lying and sparse desert vegetation, rock formations, and human-made development such as Hoover Dam facilities, electric transmission towers and lines, access roads, and U.S. 93.

Visual Character. Primary forms in the proposed project area are Lake Mead, Hoover Dam, Colorado River, and Black Canyon. Hoover Dam, viewed either from U.S. 93 or from the air, is a large mass. Views from the dam, lake, river, or canyon also show the area's variety of forms. Aerial views and views from the river and dam all exhibit strong lines. For example, Hoover Dam provides both horizontal and vertical lines in the landscape. Electric transmission towers and lines provide angled, vertical, and horizontal lines. U.S. 93 introduces a horizontal line across the landscape. The walls of Black Canyon exhibit vertical lines, and viewed from the air, the river exhibits a meandering line.

Color variety in the proposed project area is evidenced by the Canyon's pinkish-brown rock formations and soils; lightness is introduced by the concrete of the dam structure; and brightness is provided by the sun's reflection off the dam, lake, and river. Additional color is added by the blues and greens of the lake and river. Area texture includes rock formations, topography, water surfaces, and low-lying vegetation.

Outside of Lake Mead, Hoover Dam is the most dominant human-made feature within the proposed project area. Its position in the canyon relative to overlooks, viewpoints, and the visitor center clearly make it the visual focus. Its size makes it an impressive structure, and its placement within the deep canyon makes it compatible with the area. Visual diversity is provided by the mixture of natural and human-made environment such as the variety of forms; straight and curved lines; lightness, darkness, and color variety; and textural variety offered by ground surface relief and vegetation. The area's landscape forms, lines, color combinations, and textures all contribute to visual continuity.

Visual Quality. Three criteria were used to evaluate the proposed project area's visual quality: vividness, intactness, and unity. Determining vividness of the proposed project area includes assessing the area's landforms, landcover, and human-made development. The proposed project area's vividness rating is high. The area's landforms (steep canyon walls and mountains) contribute to the memorable view. Water bodies (both lake and river)

provide a vivid landscape because of their color, reflection of sunlight, motion, and shoreline. Human-made development in the area contributes to the view's vividness by its contrast with the natural landscape (the dam and its facilities, angled design of electric transmission line towers, parking lots, and roads).

Intactness of the proposed project area is demonstrated by the integrity of the features. Human-made features add to the area's complexity and visual variety. The area appears very ordered; a view of the dam from downstream exhibits symmetry and strong lines.

Landscape unity is achieved by the mixture of natural elements and human-made alterations. Compatibility exists between the natural landscape (canyon, lake, and river) and the human-made facilities (dam, electric transmission lines, visitor center, parking lots, concessions, and road).

The NPS considers many natural features within the LMNRA to be outstanding. Uniqueness, critical habitat protection, and aesthetic and recreational value are criteria used by the NPS to consider natural features outstanding. Features include warm springs, unique geologic formations and plant communities, scenic vistas, desert bighorn lambing grounds, and coves popular for their sandy beaches or scenic beauty.

Black Canyon is the only site near the proposed project area afforded special protection by the NPS because of its geologic and scenic values, numerous hot and warm springs, and winter habitat for bald eagles. The NPS-protected area begins about 1 mile south of the Gold Strike Canyon Alternative and extends south for about 9 miles. In addition to protecting the integrity of the natural feature, the NPS indicates that the views provided by this feature must also be considered. Therefore, the NPS indicates that if development around Black Canyon is made visible from U.S. 93 on the Arizona side of Hoover Dam, the canyon's scenic integrity would be compromised. In addition, the NPS recognizes that the view corridor from the Colorado River through Black Canyon is an outstanding view that should be protected (NPS, 1986).

National Scenic Byways possess outstanding qualities that exemplify a region's characteristics. No National Scenic Byways are in Nevada or Arizona near the proposed project area. U.S. 93 is a Nevada Scenic Byway; however, it is not designated as such in or near the proposed project area. No Arizona Scenic Byways are in or near the proposed project area.

No rivers in Nevada or Arizona near the proposed project area are designated pursuant to the *Wild and Scenic Rivers Act*.

3.7.1.2 Viewer Characteristics

Viewer Groups, Exposure, and Sensitivity. For all three build alternatives, viewer groups can be classified as one of two types:

- Recreationists visiting the Hoover Dam area (including Hoover Dam itself, Lake Mead, Colorado River, and Black Canyon)
- Drivers and passengers traveling in vehicles through the Hoover Dam area

Recreationists are considered a sensitive viewer group because their viewing of the dam, the lake, the river, and the canyon is expected to last up to several hours. Recreationists generally value, and are more aware of, the aesthetic quality of their surroundings than commuters or people at work, because their focus is usually on their surroundings while

they are relaxing; or the recreational activity they are engaging in, which is usually enhanced by their surroundings. Because Hoover Dam, a National Historic Landmark visited by more than 1 million tourists annually, is so well known both nationally and internationally, and provides spectacular photograph opportunities, recreationists visiting the Hoover Dam area are considered particularly sensitive to the surrounding views.

Drivers and passengers traveling over Hoover Dam (through traffic) are considered a less sensitive viewer group than recreationists because of their relatively short view time while traveling across the dam, the obstructed views offered from within vehicles, and because their focus is to negotiate a vehicle in traffic congestion and reach a final destination. Scenic driving for pleasure is a valid recreational activity, and the sensitivity of such viewers should not be ignored. However, because of the short view time, the driver distraction occurring from traveling in heavy traffic, and the obstructed views within vehicles while crossing the dam, these travelers are considered less sensitive viewers than recreationists.

Recreationists' Existing Views. Recreational boaters on Lake Mead experience unobstructed views of Black Canyon and Hoover Dam from up to 1.2 miles upstream. Recreationists on Lake Mead or its shores do not have views of the downstream side of the dam, Black Canyon downstream of the dam, or the Colorado River.

Recreationists visiting Lakeview Point Overlook in Nevada have a view of Lake Mead. Viewer groups at the Arizona Lookout and parking areas have a view of the dam and lake. Recreationists on the dam crest looking upstream have an unobstructed view of Lake Mead and Black Canyon for 1.2 miles. Looking downstream from the dam crest, recreationists have an unobstructed view of the Colorado River and Black Canyon for 0.5 mile.

Recreationists on the Colorado River at the rafting and canoeing put-ins about 0.5 mile downstream of Hoover Dam have an unobstructed view of the dam and Black Canyon when looking upstream. From the put-ins looking downstream, recreationists have unobstructed views of the Colorado River and Black Canyon for about 0.6 mile.

Recreationists hiking the Gold Strike Canyon trail have limited views. Because Gold Strike Canyon is narrow, winding, and steeply sloped, views of Hoover Dam from the trail are precluded. From the trail, views of the Colorado River and Black Canyon are completely obstructed until the last 0.1 mile of the trail.

Recreationists at the hot springs in Gold Strike Canyon have views of the Colorado River and Black Canyon from the pool closest to the river; views of the river and the canyon from the other pools are obstructed. Views of Hoover Dam (upstream) from the hot springs are completely obstructed.

Drivers' and Passengers' Existing Views. Drivers and passengers traveling over existing U.S. 93 and Hoover Dam have limited views. At a speed of 10 mph, a vehicle crosses the dam in 1.5 minutes, which is considered a short view time. In addition, from passenger vehicles traveling east, Lake Mead and the Colorado River cannot be seen at all, and views of Black Canyon are limited. Views from passenger vehicles traveling west are obstructed in a similar manner. The viewshed from within higher vehicles, such as commercial trucks, is greater than from passenger vehicles, but is still of short duration and is partially obstructed by the vehicle itself.

3.7.2 Environmental Consequences

3.7.2.1 Construction Impacts

Impacts on visual resources during construction that are common to all three build alternatives include the following:

- Dust would be emitted from earthmoving activities, construction vehicles and equipment, construction worker vehicles, materials delivery vehicles, and from areas within the construction zone that have been disturbed or where excavated material is stockpiled. Fugitive dust, if emitted in sufficient quantities, and if adverse weather conditions persist, could impair or degrade existing views (either from the ground or from the air).

- Depending on their values, interests, and preconceived expectations, for some recreationists viewing the area (either from the ground or from the air) the presence of construction equipment and its associated activities would detract from the views currently experienced. For other recreationists, the presence of equipment and highway/bridge construction would be interesting and would add visual variety to the landscape, creating additional photographic opportunities.

- Hoover Dam is currently lit at night and provides interesting nighttime views. For some recreationists, the additional light that would be emitted during nighttime construction (if it occurs) would detract from the nighttime views experienced during the dam visit. Depending on their values and expectations, for other recreationists, the additional light and associated construction activities would add visual interest to the setting. This issue would be of less concern to recreationists if the Gold Strike Canyon Alternative were constructed, because that alternative is not visible from Hoover Dam. However, the canyon downstream might appear brighter during nighttime construction if that alternative were selected.

Promontory Point Alternative. Construction of the Promontory Point Alternative would last approximately 5 years. During construction of this alternative, the view of Lake Mead from Hoover Dam (regardless of bridge design) would be altered from its existing, primarily undisturbed, state to one exhibiting a highly disturbed character. Construction vehicles, equipment, and personnel would alter the slopes on both sides of the lake. The waste disposal area would not be visible from the dam, river, or lake, but would be seen from U.S. 93 in Arizona.

Changes to the visual environment in the area of this alternative would be noticeable to visitors to the dam, the lake (when near the dam), and from the air. As discussed previously, changes to the landscape are expected to be offensive to some viewers and interesting to others. The impact on visual resources from construction activities would not be permanent, but because of the length of the construction period, they are not short-term. Other existing views, such as from the rafting put-ins on the Colorado River and the hiking trail and hot springs, would not be affected.

Sugarloaf Mountain Alternative (Preferred Alternative). Construction of the preferred Sugarloaf Mountain Alternative is expected to last approximately 5 years. During construction of this alternative, the view of Black Canyon from Hoover Dam and Lake Mead would be affected. Although the view area is already largely disturbed, construction vehicles, equipment, and personnel would alter the slopes on both sides of the canyon.

Changes to the visual environment in the area of this alternative would also be noticeable from the dam, the river (when near the dam), and from the air. Construction vehicles, equipment, and personnel would alter the canyon slopes on both sides of the river, and the emerging bridge structure would become a dominant visual element. As discussed previously, changes to the landscape are expected to be offensive to some viewers and interesting to others. The impact on visual resources from construction activities would not be considered permanent, but because of the length of the construction period, they are not considered short-term. Other existing views, such as from the hiking trail and hot springs, would not be affected.

Gold Strike Canyon Alternative. Construction of the Gold Strike Canyon Alternative would last approximately 5 to 6 years. During construction of this alternative, views from the lake or dam toward the Gold Strike Canyon Alternative (regardless of bridge design) would not be affected because that alternative cannot be seen from the lake or dam.

Changes to the visual environment in the area of this alternative would be noticeable from the river and the air. Construction vehicles, equipment, and personnel would alter the canyon slopes on both sides of the river. One waste disposal area would be visible from the trail, and another disposal area would be visible from U.S. 93 in Arizona. No waste disposal areas would be visible from the dam, lake, or river. In addition, areas for cut and fill and materials laydown would be visible from the put-in area on the Colorado River. As discussed previously, changes to the landscape are expected to be offensive to some viewers, and interesting to others. The impact on visual resources from construction activities would not be considered permanent, but because of the length of the construction period, they are not considered short-term.

Much of the Gold Strike Canyon Alternative would either parallel or cross the canyon hiking trail. Use of the trail would be precluded during construction of this alternative; therefore, existing views from the hiking trail would be eliminated. Because the trail would be closed to the public, access to the hot springs would only be available from the river. The view from the hot springs looking directly north toward the Gold Strike Canyon Alternative would be obstructed by topography and, therefore, would not be affected. The view from the hot springs looking to the northwest would be affected by construction equipment and activities.

No Build Alternative. Because the No Build Alternative would result in no construction, no construction-related impacts on existing visual resources are expected at Hoover Dam, Lake Mead, the Colorado River, Black Canyon, or the Gold Strike Canyon hiking trail and hot springs. In addition, no construction-related impacts on aerial views would occur.

3.7.2.2 Operational Impacts

Visible structural features of the three build alternatives have been assessed and compared with the area's pattern elements and character, and its vividness, intactness, and unity to determine the compatibility of the proposed features with the existing landscape.

Figure 3-4 shows the four viewpoints selected for visual simulations. To show what is currently visible from four viewpoints in the proposed project area, photographs were taken at each location. These photographs serve as existing condition views and provide the basis for comparing various bridge designs and alternatives being considered. Alternative bridge designs have been superimposed onto the photographs in visual simulations. The following viewpoints were selected:

- From aboard the Desert Princess on Lake Mead looking toward Hoover Dam (Figures 3-5, 3-6, and 3-10)
- From the Arizona Overlook toward Lake Mead (Figures 3-7 and 3-8)
- From atop Hoover Dam on the Arizona side looking downstream (Figures 3-9 and 3-10)
- From the rafting put-in on the Colorado River about 0.5 mile downstream of Hoover Dam looking south (Figures 3-11 and 3-12)

Figure 3-4 shows the locations of each of the four viewpoints and the alignments of the three build alternatives. As shown in Figure 3-4, the direction of each view is toward one of the three alternatives. The viewpoints chosen are popular photograph opportunity locations. Viewpoints 1 through 3 were selected because they represent views that recreationists would experience while visiting the Hoover Dam area. Many locations exist at the dam, lake, and scenic lookouts where photographs could be taken, and many views from each location could be generated. The location and direction of each photograph taken are considered representative of the views provided while at the Hoover Dam area.

Viewpoint 4 was chosen to show the view seen by the 18,500 recreationists who put-in annually to raft or canoe the Colorado River. Because the Gold Strike Canyon Alternative is not visible from Hoover Dam but is visible from the put-in location, the river put-in provides the best view of that alternative by recreationists. Although a view looking upstream toward Hoover Dam could also have been provided from Viewpoint 4 (which would have shown the Sugarloaf Mountain Alternative), it was determined that the Sugarloaf Mountain Alternative could be adequately assessed from Viewpoint 3, a location visited by more tourists than Viewpoint 4.

Impacts Common to All Build Alternatives. Adding a bridge and its associated facilities to the landscape in the Hoover Dam area would alter the landscape. Regardless of the alternative implemented, these facilities would be visible from at least one viewpoint. For some viewers, these features would add visual variety and interest to the landscape. For other viewers, the addition of such features would detract and possibly even degrade the landscape. If the proposed project is implemented, regardless of the alternative selected, a new view of the surrounding landscape from the bridge and its roadway approaches would be created. The view on the bridge would be limited to features seen from moving vehicles traveling about 60 mph; bicyclists, pedestrians, and stopped vehicles would not be allowed on the new bridge.

However, as discussed in Volume II, in anticipation of great public desire for views of Hoover Dam from the new bridge on the Sugarloaf Mountain alignment, FHWA will study the technical feasibility of a separate viewing facility associated with the bridge. Further details of such a facility cannot be determined until design of the bridge and approaches is advanced beyond the current level. Details of how people would be conveyed to the viewing facility and evaluation of environmental impacts would be addressed in a separate NEPA document, written for the specific purpose and need of providing views of Hoover Dam from or in the vicinity of the new bridge, if the construction scope of the viewing facility exceeds the anticipated impacts addressed in this EIS.

Promontory Point Alternative. Views of the Promontory Point Alternative would be unobstructed from locations on Lake Mead up to 1.2 miles upstream of the dam. The new bridge would be visible from Hoover Dam and by aerial sightseers, thus changing the landscape setting of Lake Mead from the dam and the air. For some viewers, this change

would detract from the lake's view. This viewer group expects the views to be unchanged from existing conditions, or expects the changes to be unnoticeable or unobtrusive. For others, the bridge design would add variety to the lake view. This viewer group would notice the visual change, but would not be offended by the change to the view.

A bridge at the Promontory Point crossing would adversely affect visitors' "first impression" historic views of the dam. These views occur as motorists approach the dam on existing U.S. 93 from both Nevada and Arizona. The dominance of the Promontory Point bridge would significantly detract from the historic views of the dam and could not be mitigated. In contrast, the Sugarloaf Mountain bridge would not detract from the historic views as visitors approach the dam from the Arizona and Nevada approaches. (See Figures 3-7 and 3-8 for views from the Arizona Overlook.)

Steel Truss Rib Through Arch Bridge from Viewpoint 1. Figures 3-5 and 3-6 show Hoover Dam from aboard the Desert Princess on Lake Mead (Viewpoint 1). The top photograph in Figure 3-5 shows the existing view from the boat toward Hoover Dam. The top photograph in Figure 3-6 simulates what a steel truss rib through arch bridge crossing Lake Mead would look like from aboard the Desert Princess. This bridge design would add a large form, contrasting lines, unobtrusive color, and texture changes (from the appearance of lattice steelwork on the arch) to the view.

From this viewpoint, the Hoover Dam facilities and electric transmission line towers are subordinate features and do not detract from the existing view. The position, size, and shape of the steel truss rib through arch bridge make it a feature that would dominate the view from the boat. This bridge design would add to visual diversity by intermixing horizontal, vertical, and curved lines to a predominantly undisturbed view of the landscape. Although adding diversity, the bridge would not add visual interest to the landscape. In addition, it would interrupt the visual continuity of the mountains in the background because of the presence of the arch and vertical bridge lines near the center of the photograph.

The visual quality shown in Figure 3-5 would be affected by this bridge design. Vividness would be compromised by the introduction of the bridge structure. In addition, the landscape intactness and unity would be affected by the size and prominence of the form, contrasting lines, and textural differences between the proposed bridge and the existing landscape.

Hoover Dam and Lake Mead would be visible to motorists traveling over the new bridge; however, the view would be partially obstructed by the safety barrier that would be installed on both sides of the bridge. Because stopped vehicles, bicyclists, and pedestrians would be precluded from the new bridge, and vehicle speeds across the bridge would be 60 mph, the new bridge would not provide the benefits of extended viewing opportunities of Lake Mead and Hoover Dam.

Concrete Cable-Stayed Bridge from Viewpoint 1. Also shown in Figure 3-6 from aboard the Desert Princess on Lake Mead (Viewpoint 1) is a simulation (lower photograph) of how a concrete cable-stayed bridge crossing Lake Mead would look from this viewpoint. This bridge design would add a large form that exhibits little texture; contrasting diagonal, vertical, and horizontal lines; and a color contrast from the concrete towers.

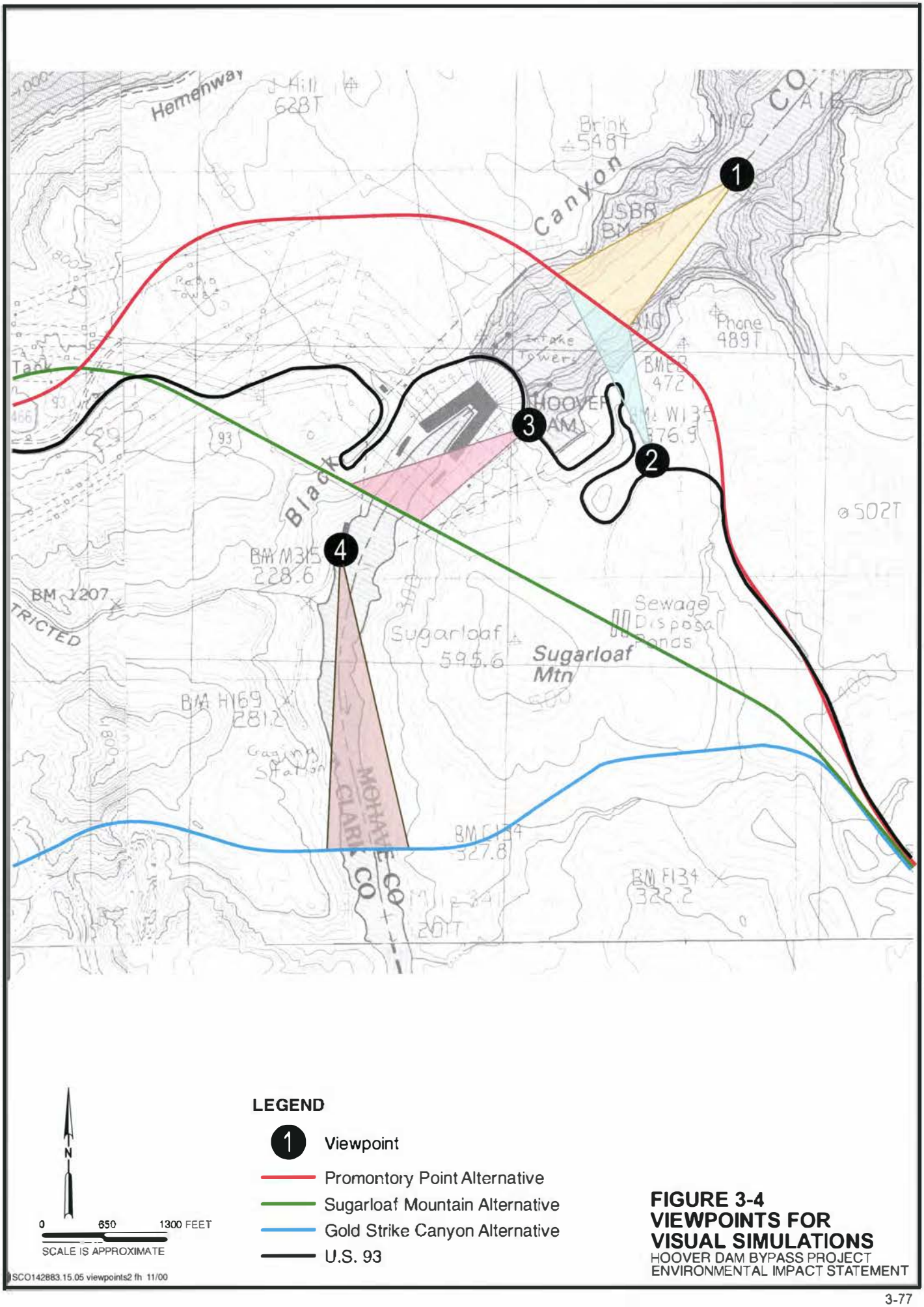

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FIGURE 3-4
VIEWPOINTS FOR VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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Existing conditions view from the Desert Princess on Lake Mead (Viewpoint 1)

View of suspension bridge from the Desert Princess on Lake Mead
(Viewpoint 1)

FIGURE 3-5
PROMONTORY POINT ALTERNATIVE
VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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View of steel truss rib through arch bridge from the Desert Princess on Lake Mead
(Viewpoint 1)

View of concrete cable-stayed bridge from the Desert Princess on Lake Mead
(Viewpoint 1)

FIGURE 3-6
PROMONTORY POINT ALTERNATIVE
VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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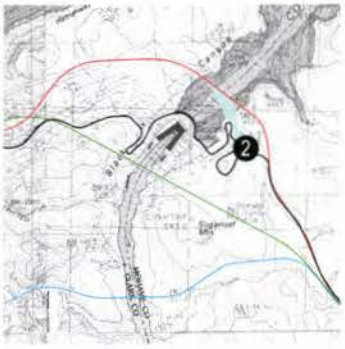
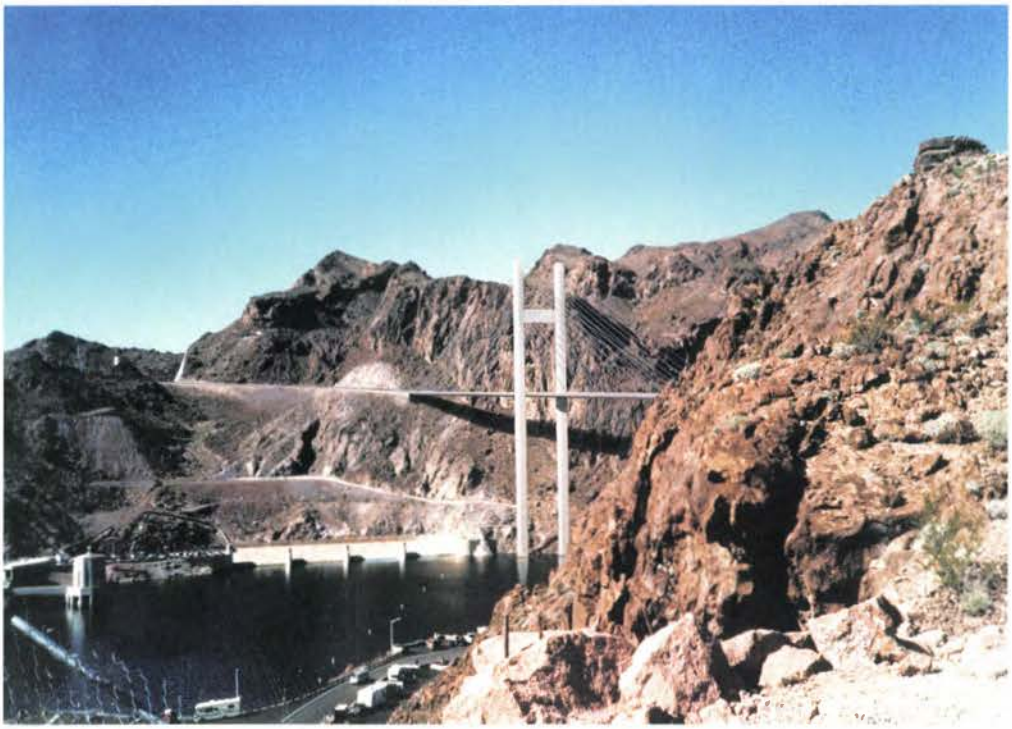


Existing conditions view from the Arizona Overlook (Viewpoint 2)



View of cable-stayed bridge from the Arizona Overlook (Viewpoint 2)

FIGURE 3-7
PROMONTORY POINT ALTERNATIVE VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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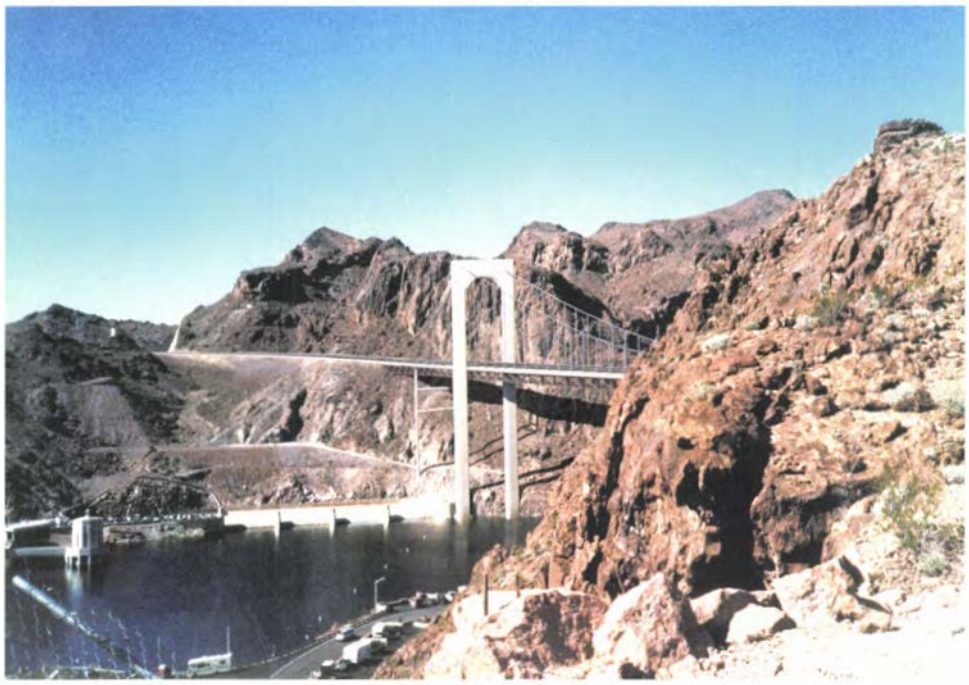
View of steel truss rib through arch bridge from the Arizona Overlook (Viewpoint 2)



View of suspension bridge from the Arizona Overlook (Viewpoint 2)

FIGURE 3-8
PROMONTORY POINT ALTERNATIVE VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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Existing conditions view looking south from Hoover Dam (Viewpoint 3)

View looking south of concrete cable-stayed bridge from Hoover Dam (Viewpoint 3)

FIGURE 3-9
SUGARLOAF MOUNTAIN ALTERNATIVE VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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View looking south of concrete or steel deck arch bridge from Hoover Dam (Viewpoint 3)

View looking south of concrete or steel deck arch bridge from Lake Mead (Viewpoint 1)

FIGURE 3-10
SUGARLOAF MOUNTAIN ALTERNATIVE VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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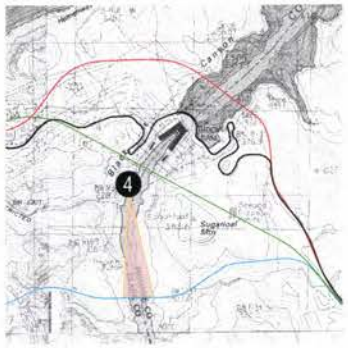

Existing conditions view from the rafting put-in south of Hoover Dam (Viewpoint 4)

View of steel deck arch bridge from the rafting put-in south of Hoover Dam (Viewpoint 4)

FIGURE 3-11
GOLD STRIKE CANYON ALTERNATIVE VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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View of concrete deck arch bridge from the rafting put-in south of Hoover Dam
(Viewpoint 4)

FIGURE 3-12
GOLD STRIKE CANYON ALTERNATIVE
VISUAL SIMULATIONS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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From this viewpoint, the position, size, and presence of the concrete towers make the bridge a dominant feature within the photograph. Their presence is the most obvious structural feature that would affect the view of the landscape. This bridge design is less dominant than the steel truss rib through arch design discussed above. This bridge design would add little diversity to the view because the diagonal cables, although visible, are not prominent. The cables, therefore, would not detract from the view, but would maintain the view's continuity by minimizing obstructions to the existing view of the mountains in the background. Impacts on the visual quality of the view shown in Figure 3-5 would not be adverse because of this bridge design. As shown in the simulation, the vividness (memorability of the existing landscape components) would remain, and the landscape view would remain intact. The unity (visual harmony between landscape elements) would be affected by the structure's size and prominence, its contrasting lines, and textural differences; however, this impact is not considered adverse.

Hoover Dam and Lake Mead would be visible to motorists traveling over the new bridge; however, the view would be partially obstructed by the safety barrier on both sides of the bridge. Because stopped vehicles, bicyclists, and pedestrians would be precluded from the new bridge, the bridge would not provide the benefits of extended viewing opportunities of Hoover Dam and Lake Mead.

Suspension Bridge from Viewpoint 1. Figure 3-5 also shows the simulated view of a suspension bridge crossing Lake Mead from aboard the Desert Princess on Lake Mead (Viewpoint 1, bottom photograph). This bridge design would add a large form that exhibits little texture, contrasting vertical and horizontal lines, and a color contrast from the concrete towers.

From this viewpoint, the position, size, and presence of the concrete towers result in the bridge being a dominant feature. Their presence is the most obvious structural feature that would affect the view of the landscape. Similar to the concrete cable-stayed bridge, this design is less dominant than the steel truss rib through arch design. This design would add little diversity to the view. The cables would not detract from the view, but maintain the view's continuity by minimizing obstructions to the existing mountain view.

The visual quality of the view shown in Figure 3-5 would not be greatly affected by this bridge design. As shown in the simulation, the vividness (memorability of the existing landscape components) would remain, and the landscape view would remain intact. The unity (visual harmony between landscape elements) would be marginally affected by the size and prominence, contrasting lines, and textural differences of the structure.

Hoover Dam and Lake Mead would be visible to motorists traveling over the new bridge; however, the view would be partially obstructed by the safety barrier on both sides of the bridge. Because stopped vehicles, bicyclists, and pedestrians would be precluded from the new bridge, the bridge would not provide the benefits of extended viewing opportunities of Hoover Dam and Lake Mead.

Steel Truss Rib Through Arch Bridge from Viewpoint 2. Figure 3-7 shows a view from the Arizona Overlook (Viewpoint 2) looking across Lake Mead. The top photograph in that figure shows the existing view from the overlook. The top photograph in Figure 3-8 is a simulation showing what a steel truss rib through arch bridge would look like from this viewpoint. This bridge design would add a large form that exhibits texture (from the steel latticework on the arch), and contrasting lines.

From this viewpoint, the bridge is not a dominant feature that detracts from the existing view. Although the arch is a prominent feature, the presence of the hillside in the right foreground of the photo eliminates part of the arch. This bridge design would add to the visual diversity of the view by intermixing horizontal, vertical, and curved lines to a view that mixes natural and human-made elements. Because this view of the steel truss rib through arch design would not significantly affect the backdrop of the mountains in the background, it would not interrupt the visual continuity of the view.

Therefore, the visual quality of the view shown in Figure 3-7 would not be adversely affected by this bridge design.

Concrete Cable-Stayed Bridge from Viewpoint 2. Also shown in Figure 3-7, from the Arizona Overlook (Viewpoint 2) is a simulation (bottom photograph) showing what a concrete cable-stayed bridge would look like from this viewpoint. This bridge design would add a large form that exhibits little texture; strong diagonal, horizontal, and vertical lines; and a color contrast from the concrete towers.

From this viewpoint, this bridge design is not a dominant feature that detracts from the existing view. Although the bridge concrete towers are prominent features because of the hillside in the right foreground, the other tower and remainder of the span are not visible from this viewpoint. In addition, the cables are essentially "lost" against the background. Similar to the suspension bridge design, this bridge design would add little diversity to the view because the diagonal cables are not prominent. They would not detract from the view, but would maintain the view's continuity.

Therefore, the visual quality of the view shown in Viewpoint 2 (Figure 3-7) would not be greatly affected by this bridge design.

Suspension Bridge from Viewpoint 2. Figures 3-7 and 3-8 are the view from the Arizona Overlook (Viewpoint 2) looking across Lake Mead. The top photograph in Figure 3-7 shows the existing view from the overlook. The lower photograph in Figure 3-8 shows how a suspension bridge across Lake Mead would look from this viewpoint. This bridge design would add a large form that exhibits little texture, strong horizontal and vertical lines, and a color contrast from the concrete towers.

From this viewpoint, the bridge is not a dominant feature that detracts from the existing view. Although the bridge's concrete towers are prominent features, because of the hillside in the right foreground the other tower and remainder of the span are not visible from this viewpoint. This bridge design would add little diversity to the view because the vertical cables, although noticeable, would not detract from the view at the overlook, thus maintaining the view's continuity. The height of the tower (below the mountain slope in the background) would also aid in maintaining the view's continuity. Therefore, this bridge design would not adversely affect Viewpoint 2 visual resources.

Sugarloaf Mountain Alternative (Preferred Alternative). Views of the Sugarloaf Mountain Alternative would be unobstructed from Hoover Dam and from the rafting put-in 0.5 mile downstream of the dam. In addition, the new bridge would be visible by aerial sightseers, thus changing the aerial view of the dam and canyon. For some aerial viewers, this change would detract from the lake view. This viewer group expects views to be unchanged from existing conditions, or expects changes to be unnoticeable or unobtrusive. For others, the bridge design would add variety to the lake view. This viewer group would notice the visual change, but would not be offended by the change to the view.

As mentioned above, in anticipation of public demand for views of Hoover Dam from the new bridge on this alignment, FHWA will study the technical feasibility of a separate viewing facility associated with the bridge. Further details of such a facility cannot be determined until design of the bridge and approaches is advanced beyond the current level.

Consideration of the following specific bridge designs for Sugarloaf Mountain and the other build alternatives in this EIS is not intended to preclude other feasible structures. A Design Advisory Panel, established as part of a Programmatic Agreement for this project under requirements of the National Historic Preservation Act, will provide input on bridge design concepts, structure type, and materials (see Section 3.5).

Concrete Cable-Stayed Bridge. Figures 3-9 and 3-10 are a view of Black Canyon looking downstream from the eastern side of Hoover Dam (Viewpoint 3). As shown in the top photograph in Figure 3-9, the view is dominated by human-made development such as the electric transmission line towers in the foreground, and to a lesser degree, U.S. 93 and the vehicles on the right side of the photograph. The bottom photograph simulates how a concrete cable-stayed bridge crossing Black Canyon would look when standing atop the dam. This bridge design would drastically alter the view by adding a large form, a variety of lines, contrasting color, and little texture.

From this viewpoint, the bridge towers, bridge deck, and diagonal lines dominate the view. The bridge design would add to the visual diversity of the landscape because of the contrasting lines and colors; however, it would not add to the visual interest of the view. The presence of the bridge would interrupt the visual continuity of the view of the one mountain in the middleground (center of photograph) and the mountains in the background.

The visual quality of the view shown in Figure 3-9 would be only slightly affected by this bridge design, due to the presence of the transmission towers in the foreground. The vividness of the view would be slightly degraded by the presence and closeness of the bridge structure. In addition, the intactness and unity of the view would be affected by the size and prominence of the bridge form; the vertical, horizontal, and diagonal lines; and the textural differences between the proposed bridge and the existing landscape.

Hoover Dam and Lake Mead would not be visible to passenger cars traveling over the new bridge. Stopped vehicles, bicyclists, and pedestrians would be precluded on the new bridge roadway; however, FHWA will study the feasibility of a separate viewing facility associated with the bridge.

Concrete or Steel Deck Arch Bridge. Figure 3-10 simulates how a concrete or steel deck arch bridge crossing Black Canyon would look. This bridge design would add a large form that exhibits little texture; vertical, horizontal, and curve lines; and color difference (with a concrete arch).

From this viewpoint, the position, size, and strong horizontal line created by the bridge deck makes the bridge a dominant feature within the photograph and detracts from the view. Visual diversity of the view would not be notably improved or degraded, except with the contrasting color of the concrete arch. The visual continuity of the mountain in the middleground (center of photograph) and the mountains in the background would be decreased. The height of the bridge deck (along the top of the mountain in the middleground) also affects the view adversely.

The visual quality shown in Figure 3-9 would be only slightly affected by this bridge design, due to the presence of the transmission towers in the foreground. The visual impact is considered less than that discussed for the concrete cable-stayed bridge design, and the concrete arch would have greater visual impact than steel due to the greater mass. Similar to the concrete cable-stayed bridge, the vividness of the view would be slightly degraded by the presence and closeness of the bridge structure. In addition, the view's intactness and unity would be affected by the size and prominence of the bridge form; the vertical and horizontal lines; and the textural differences between the proposed bridge and the existing landscape.

Hoover Dam and Lake Mead would not be visible to passenger cars traveling over the new bridge. Stopped vehicles, bicyclists, and pedestrians would be precluded on the new bridge roadway; however, FHWA will study the feasibility of a separate viewing facility associated with the bridge.

The Sugarloaf Mountain Alternative would impact the views of Black Canyon from the dam crest and Lake Mead. However, the Sugarloaf Mountain Alternative could be blended into the landscape more readily than the Promontory Point Alternative. This is because (1) the Sugarloaf Mountain alternative deck structure would form a fairly contiguous horizontal line with the canyon rim, (2) the structure would not significantly protrude above the horizon line when viewed from the dam crest, and (3) the structure would not protrude above the horizon line when viewed from Lake Mead. Conversely, the Promontory Point Alternative would be obtrusive and protrude above the strong horizontal component of Lake Mead regardless of bridge type.

Gold Strike Canyon Alternative. Views of the Gold Strike Canyon Alternative would be completely obstructed from Hoover Dam, the Arizona Overlook, and Lake Mead. The new bridge would be visible from the rafting put-in 0.5 mile downstream of Hoover Dam and by aerial sightseers. The bridge at this location would also change the landscape setting of Gold Strike Canyon as seen from the hiking trail and hot springs. For some viewers at the river launch and those seeing the area by air, this change would detract from the view. For other viewers, the bridge design would add variety to the view. It should be noted that the view of the bridge from rafts floating down river from the rafting launch would increase as the rafters float toward the bridge. Once downstream of the bridge, views of the bridge would again decrease. Views by recreationists using the hiking trail or hot springs would be adversely affected by this alternative, regardless of the bridge design selected.

Steel Deck Arch Bridge. Figures 3-11 and 3-12 show a view of Black Canyon looking downstream from the rafting put-in located 0.5 mile south of Hoover Dam. The top photograph in Figure 3-11 is the existing view from the put-in. The bottom photograph simulates how a steel deck arch bridge would look from the put-in. This bridge design would add a large form; contrasting horizontal, vertical, and curved lines; unobtrusive color; and texture changes to the view.

From this viewpoint, the existing landscape appears largely undisturbed. The only noticeable human-made feature is the retaining wall in the upper right corner of the photograph. The position, size, and shape of the bridge structure make it a feature that would dominate the view from a raft. The structure would add to the visual diversity of the view. The bridge structure would not interrupt the visual continuity of the mountains in the background, and it would not affect the view of the slopes in the middleground.

The visual quality shown in Figure 3-11 would be affected by this bridge design; although, of the two bridge designs being considered for this alternative, it is the less obtrusive design. The vividness of the landscape components would not be adversely affected by the bridge structure; however, the view's intactness and unity would be slightly compromised by the size and prominence of the form and contrasting lines.

Concrete Deck Arch Bridge. Figure 3-12 simulates how a concrete deck arch bridge would look. Similar to that discussed for the steel deck arch bridge, this bridge design would add a large form; contrasting horizontal, vertical, and curved lines; unobtrusive color, and texture changes to the view. As the simulation shows, these effects would be more pronounced with this bridge design than that for the steel deck arch bridge.

This design would have the same effect on the visual dominance, diversity, and continuity of the view as was described for the steel deck arch bridge. In addition, this bridge design would affect the view's vividness, intactness, and unity in the same manner; however, these effects would be more pronounced with this bridge design.

This bridge design would affect the quality of the view shown in Figure 3-11 in the same manner as that described for the steel deck arch bridge. Because the concrete forms on this bridge are larger than the steel shown in the steel deck arch bridge, the visual impact from this bridge design is greater than that for the steel deck arch bridge.

No Build Alternative. Implementing the No Build Alternative would result in no additional roadway or bridge being constructed, and would therefore result in no physical changes to the existing roadway and Hoover Dam crossing. No change to the views currently experienced by recreationists visiting the Hoover Dam area (including the dam, Lake Mead, Colorado River, Black Canyon, and Gold Strike Canyon hiking trail and hot springs) is expected. Aerial views would also be unaffected by this alternative.

As traffic levels continue to increase, vehicle speeds on the dam are expected to decrease, resulting in longer views for through-traffic drivers and passengers. Although the view duration would be increased for this viewer group, the quality of the view would remain obstructed (either by vehicle height or by the vehicle itself). In addition, as noted previously, the focus of this viewer group is not its surroundings but primarily its concentration on negotiating through traffic, avoiding pedestrians, and reaching its final destination. Therefore, this is not considered a benefit to this viewer group.

3.7.3 Measures to Minimize Harm

Visual simulations were created to illustrate the impacts to visual resources from each of the three build alternatives. Figure 3-4 shows the viewpoints for the visual simulations. Figures 3-5 through 3-12 are visual simulations for each alternative.

3.7.3.1 Construction Mitigation

Regardless of the alternative selected, certain views during the construction period would be altered by the presence of construction vehicles, equipment, personnel, and emerging new highway facilities. This impact is expected to be considered adverse by some viewers and is an unavoidable consequence of project construction.

The following mitigation measure will be implemented to reduce impacts on visual resources: implement a public information program that could include an Internet web site, and provide data sheets to Hoover Dam visitors. Information to be provided includes a

description of the proposed project, the purpose and need, a construction schedule, and an explanation of what viewers are seeing and what can be expected to be seen in the future. A visual simulation will be included so that the viewer can see what the constructed project will look like when complete. Providing project information may alleviate viewers' concerns about construction-related view obstruction by explaining that the project is intended to improve traffic continuity and visitor safety.

3.7.3.2 Operational Mitigation

Regardless of the alternative selected, the proposed bridge would alter the view, either from Hoover Dam, Lake Mead, the river rafting put-ins, or the Gold Strike Canyon hiking trail and hot springs. For all the alternatives, the rock cuts adjacent to the proposed bridge will be engineered to minimize impacts on visual resources. This could include special blasting techniques to avoid pre-split shear rock faces. Resulting ledges will be topsoiled and revegetated to the extent possible. Rock slopes and slope protection in the vicinity of the bridge will be stained with a desert varnish to reduce the visual impact from the proposed construction adjacent to the bridge.

Promontory Point Alternative. Impacts on visual resources from the steel truss rib through arch bridge could be lessened by coloring the steel to blend with the surrounding environment.

To reduce impacts on visual resources from the concrete cable-stayed bridge and the suspension bridge, the concrete should be tinted to blend with the surrounding environment, which would reduce the visibility of the towers.

Sugarloaf Mountain Alternative (Preferred Alternative). Impacts on visual resources from the concrete cable-stayed bridge, if selected, will be reduced by tinting the concrete with a nonglare color that blends with the surrounding environment. However, the closeness of the bridge to the dam would still result in the bridge dominating the downstream view from the dam.

Although the computer simulation is conceptual in Figure 3-10, impacts on visual resources from the concrete or steel deck arch bridge could be lessened by setting the bridge deck elevation so that the mountain in the center of the photograph would be more prominent. However, this may not be feasible from an engineering design, earthwork, or economic standpoint. If not, the view will remain affected, but is not considered adverse because of the visual intrusion of the transmission line towers in the foreground. If either a concrete or steel arch bridge design is selected, the impact may be lessened by coloring the structure to blend with the surrounding environment.

Gold Strike Canyon Alternative. Impacts on visual resources from either the concrete deck arch bridge or the steel deck arch bridge would be reduced by coloring the concrete or steel so that the bridge blends more effectively with the surrounding environment. This measure would reduce the visual impact perceived by the hikers, hot spring users, rafters, and other river users near the proposed alignment.

3.8 Recreation Resources

3.8.1 Affected Environment

Hoover Dam, about 1,244 feet long and 726 feet tall, is situated in Black Canyon and is one of the most spectacular structures in the world. It is an NHL and a popular tourist attraction in

southern Nevada and northern Arizona. Reclamation operates a visitor center at the dam, offers daily guided tours, provides parking for 851 personal vehicles and 22 buses (a multistory parking garage and an outdoor parking lot are adjacent to and on the dam), and has several scenic overlooks providing photograph opportunities (personal communication with Dan Jensen/Reclamation, 1998). Photography is a very popular activity at the dam because of the dam's historic significance and its massive size. In addition, souvenir shops and restrooms are available.

Three food and beverage concessionaires were located at the dam until a fire destroyed the one located at the Arizona Lookout. Plans to relocate the two remaining concessions (one in Nevada and the other in Arizona) to the lower level of the multistory parking garage are nearly complete. The third concession at the Arizona Lookout has been rebuilt. The existing concession building on the Nevada side of the dam may be converted into a museum and is currently under study. The existing Arizona-side concession trailer will be removed from the site early in 2001 (personal communication with Dan Jensen/Reclamation, 2000).

About 33.2 million visitors have toured Hoover Dam since 1937. There were about 1.03 million visitors in 1997 and an average of 2,823 persons daily in 1997 (personal communication with Kris Mills/Reclamation, 1998). Public access to the downstream side of the dam and Colorado River for 0.5 mile is precluded for safety reasons. The area is fenced in certain locations, and warning signs are posted. This area is accessible only to dam personnel and those having Reclamation permits.

The LMNRA had 9.7 million visitors in 1997 (personal communication with Bill Burke/NPS, 1998). Six developed recreation areas are on Lake Mead, with day-use areas, boating facilities, campgrounds, and lodging. In addition, Lake Mead Cruises operates a boat tour aboard the Desert Princess, a paddlewheel boat with a capacity of several hundred people. Sightseeing is the most popular activity; other activities include fishing, boating, houseboating, parasailing, scuba diving, jet skiing, swimming, canoeing, kayaking, hiking, and nature study.

The developed recreation area on Lake Mead nearest to the proposed project is Boulder Beach, located on the western arm of Lake Mead. Boulder Beach can be accessed from U.S. 93/95 in Henderson via Lake Mead Drive and from Nevada SR 166 (Lakeshore Drive). Facilities at Boulder Beach include a marina, camping areas, picnic areas, a swimming beach, lodging, two launch ramps, store and restaurant, boat gasoline station, restrooms, and parking areas (personal communication with Bill Burke/NPS, 1998).

The Hacienda Hotel, located on U.S. 93 about 3 miles west of Hoover Dam, provides gaming, lodging, and eating facilities. About 0.5 mile downstream from Hoover Dam, a rafting concessionaire (Black Canyon Raft Tours) operates a dock with a fleet of 11 rafts that accommodate from 18 to 42 people each and are used to float customers down the Colorado River. About 18,500 customers floated the river in 1997. The rafting concession operates from February 1 to November 30, and by special arrangement in December and January (personal communication with Ron Opfer/Black Canyon Raft Tours, 1998). It has a permit to use Reclamation's restricted access road (the Lower Portal Road) from U.S. 93 down to the river (personal communication with Dan Jensen/Reclamation, 1998).

Reclamation also issues permits to individuals to launch canoes at a put-in about 20 yards downstream of the rafting put-in. Groups of up to 15 people are escorted twice daily from Reclamation's warehouse to the river put-in via Lower Portal Road. Demand for this service exceeds capacity; the service usually requires advance reservations. In 1997, 7,212 individual

permits were issued for this service (personal communication with Dan Jensen/Reclamation, 1998).

In addition, in February 1998 a tour group was issued an annual permit by Reclamation to escort groups from Las Vegas to tour Hoover Dam and provide access to Lower Portal Road to photograph the dam from the helicopter pad and canoe put-in. To date, the average number of users has been 10 per week (personal communication with Dan Jensen/Reclamation, 1998).

A 2.5-mile-long trail is used by visitors to hike through Gold Strike Canyon to the Colorado River and hot springs. The Gold Strike Canyon trail is not an official NPS-designated trail. The trail is used for nature study, photography, technical rock climbing, and accessing the hot springs. An estimated 1,000 hikers use the trail and hot springs annually, mostly in the cooler months (personal communication with Jim Holland/NPS, 1998). To accommodate the needs of hot springs users, the NPS provides a portable toilet at the canyon mouth.

Historic railroad grades and tunnels near Hoover Dam are currently used for hiking and mountain biking. The NPS, in partnership with Reclamation, the City of Boulder City, and the Southwest Gas Trailhikers, have developed a proposal to convert these existing railroad grades to a hiking/bicycle trail under the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The historic railroad grades were constructed in 1931 for moving materials and equipment to the Hoover Dam construction site. The planned trail will extend from Boulder City to Hoover Dam, a distance of 8 miles, and will serve as an extension of the Hemenway Wash Trail that was constructed by Boulder City. The development of this trail is being supported financially with matching funds from the City of Boulder City and the Southwest Gas Trailhikers.

Commercial airplane and helicopter sightseeing flights originating in Las Vegas and nearby small airports and helipads also are available to recreationists wanting aerial views of Hoover Dam, Lake Mead, and the Colorado River.

3.8.2 Environmental Consequences

3.8.2.1 Construction Impacts

Impacts during construction of the proposed project common to all three build alternatives include the following:

- Dust would be emitted from earthmoving activities, construction vehicles and equipment, construction worker vehicles, material delivery vehicles, and from areas within the construction zone that have been disturbed or where excavated material is stockpiled. The magnitude of the impact on recreationists visiting Hoover Dam, Lake Mead, the Colorado River, and Gold Strike Canyon hot springs and hiking trail would vary by alternative.

- Noise would be emitted during all construction phases. Noise sources include construction vehicles and equipment, construction worker vehicles, and materials delivery vehicles. Noise levels associated with construction activities are typically 88 dBA to 92 dBA at a distance of 50 feet, which would be a noticeable change from ambient noise levels. The magnitude of the impact on recreationists visiting Hoover Dam, Lake Mead, Colorado River, hot springs, and the hiking trail would vary by alternative.

- Effects on water-dependent recreation activities would occur from construction work at Lake Mead near Hoover Dam and at the Colorado River rafting and canoeing put-ins because of the temporary impacts on access and water quality (this would apply only to the Promontory Point and Sugarloaf Mountain Alternatives).

- Effects on access to Hoover Dam, Lake Mead, the Colorado River, and the hiking trail in Gold Strike Canyon would occur because of proposed project construction activities. Roadway access and the access to Hoover Dam from Lake Mead may be restricted at times during construction to ensure the public's safety. The canyon trail would be closed during construction if the Gold Strike Canyon Alternative were selected.

- Effects of the presence of construction equipment would occur. For some recreationists, the presence of construction equipment and its associated activities would detract from the recreational experience. For others, the presence of equipment and construction activities would be interesting, creating additional photographic opportunities.

- Increased light emitted from the construction area would occur if nighttime construction is conducted. Hoover Dam is currently lit at night and provides interesting nighttime views for tourists. For some recreationists, the additional light that would be emitted during nighttime construction, if it occurs, would detract from the nighttime views experienced during the dam visit. Again, depending on their values and expectations, for other recreationists the additional light and associated construction activities would add interest to the setting. This issue would be less of a concern to recreationists if the Gold Strike Canyon Alternative were constructed because that alternative is not visible from Hoover Dam. However, the canyon downstream might appear brighter during nighttime construction, if that alternative were selected.

Impacts specific to the three build alternatives and the No Build Alternative are described below.

Promontory Point Alternative. Construction of the Promontory Point Alternative would last approximately 5 years. During construction of this alternative, an area of Lake Mead upstream of Hoover Dam would be designated as a construction safety zone. This designation would limit public use of that area of the lake for recreational activities by eliminating access to Hoover Dam on its upstream side (from Lake Mead). Access restrictions and periods of closure would be coordinated with NPS and the lake tour operators (e.g., the Desert Princess tour concessionaire). No other effects on activities at Lake Mead would be expected.

Existing recreational activities at Hoover Dam, the Colorado River, Gold Strike Canyon hiking trail and hot springs, and the Hacienda Hotel would not be affected by construction of this alternative. In addition, the ground and aerial tour groups would not be affected.

In areas where blasting, earthmoving, other construction activities, and spoil disposal areas are located, construction safety zones would also be established. These zones would preclude using the area for hiking or other dispersed recreational activities currently occurring along the alignment.

Sugarloaf Mountain Alternative (Preferred Alternative). Construction of the preferred Sugarloaf Mountain Alternative is expected to last approximately 5 years. Certain areas along the Colorado River and along U.S. 93 would be designated as construction safety zones. These designations would preclude public use of those areas for recreational activities. The rafting concession and the canoeing put-in should be able to continue to operate with minor

interruptions in service by coordinating launching to avoid conflicts with construction activities. Access to the river put-in and helipad by ground tours may be interrupted by construction activities; coordination should occur to avoid conflicts with such activities.

Existing recreational activities at Lake Mead, Hoover Dam, Gold Strike Canyon hiking trail and hot springs, and the Hacienda Hotel would not be affected by construction of the proposed project. In addition, ground and aerial tour groups would not be affected by construction of this alternative.

In areas where blasting, earthmoving, other construction activities, and spoil disposal areas are located, construction safety zones would be established. These zones would preclude using the area for hiking or other dispersed recreational activities currently occurring along the proposed alternative.

Gold Strike Canyon Alternative. Construction of the Gold Strike Canyon Alternative would last approximately 5 to 6 years. Certain areas along the Colorado River and U.S. 93 would be designated as construction safety zones. These designations would preclude public use of those areas for recreational activities. The Gold Strike Canyon hiking trail would be closed during construction. The rafting concession and the canoeing put-in should be able to continue to operate with minor interruptions in service by coordinating launching and passage through the construction zone to avoid conflicts with construction activities.

Existing recreational activities at Lake Mead, Hoover Dam, and the Hacienda Hotel would not be affected by construction of this alternative. In addition, aerial tour groups would not be affected.

In areas where blasting, earthmoving, other construction activities, and spoil disposal areas are located, construction safety zones would be established. These zones would preclude using the area for hiking or other dispersed recreational activities currently occurring along the proposed alternative.

No Build Alternative. Because the No Build Alternative would result in the proposed project not being constructed, no construction-related impacts on existing recreational activities are expected at Hoover Dam, Lake Mead, Colorado River put-ins, Gold Strike Canyon hiking trail and hot springs, Hacienda Hotel, and ground or aerial tours.

3.8.2.2 Operational Impacts

Impacts during the operational phase of the proposed project common to all three build alternatives include the following:

- The new bridge, regardless of the alternative chosen, would likely become a tourist attraction because of its association with and proximity to Hoover Dam, its design, and the setting in which it would be located. This would result in recreationists in the area making it a travel destination. This is considered a benefit to recreationists desiring the experience.

- For some recreationists, the presence of the new bridge would detract from the recreational experience offered at Hoover Dam by changing the view from the dam. For other recreationists, the presence of the new bridge would add to the variety of the view from the dam, which they would consider to be interesting, thus creating additional photographic opportunities. (The view from the dam would change with either the Promontory Point Alternative or Sugarloaf Mountain Alternative.)

- Because traffic congestion would be alleviated at Hoover Dam, CO and VOC daily emissions are expected to be reduced by approximately 50 percent and 80 percent, respectively. Pedestrian safety would also be improved. This is considered a benefit to recreationists atop the dam.

Impacts specific to the three build alternatives and the No Build Alternative are described below.

Promontory Point Alternative. The new bridge would be visible from Hoover Dam and from aerial sightseeing recreationists, thus changing the recreational setting of Lake Mead from the dam and the air. For some recreationists, this change would detract from the lake view. For other recreationists, the bridge design would add variety to the lake view. The presence of the new bridge would not preclude recreational opportunities currently offered at Hoover Dam and by aerial sightseeing.

The bridge would also be visible to recreationists on Lake Mead (those in motorized and nonmotorized water craft, anglers, and swimmers) and along adjacent shores (e.g., hikers and picnickers) in the dam vicinity. Similar to that discussed for views from Hoover Dam and the air, the quality of the recreational experience of some recreationists on and around Lake Mead would be degraded, and the experience of other recreationists would be enhanced by the presence of the new bridge. The new bridge would not preclude recreational opportunities currently offered by Lake Mead and its shores. No significant changes to existing noise levels are expected.

Because traffic would be diverted from atop Hoover Dam to the new bridge, traffic congestion would be reduced, thereby reducing the potential for vehicle collisions with pedestrian tourists on the dam. The reduction in traffic would also reduce the amount of truck traffic noise and volume of air pollutants emitted from vehicles on the dam. These three improvements are considered benefits to recreationists visiting Hoover Dam.

Hoover Dam may also be visible to motorists traveling over the new bridge and approaches; however, the safety barrier and the high elevation of the proposed bridge (relative to the dam) will minimize viewing opportunities. Because stopped vehicles, bicyclists, and pedestrians would be precluded from the new bridge, additional opportunities to photograph Hoover Dam would not be provided.

Implementation of the Promontory Point Alternative, on its current alignment, would impact the planned railroad grade hiking/bicycle trail. Because the alignments for both the Promontory Point Alternative and the railroad grade trail are preliminary and have not been finalized, there would be an opportunity for NPS and FHWA to work collaboratively to develop a compatible design for the two facilities. This collaboration in the design of these two transportation facilities would ensure the railroad grade trail would not be adversely affected by subsequent development of the U.S. 93/Hoover Dam Bypass.

Implementation of the Promontory Point Alternative would not affect other recreational activities at the Colorado River, the Gold Strike Canyon hiking trail and hot springs, or the Hacienda Hotel.

Sugarloaf Mountain Alternative (Preferred Alternative). The new bridge would be visible from Hoover Dam and from aerial sightseeing tours, thus changing the recreational setting of the Colorado River immediately downstream of the dam from both the dam and the air. For some recreationists, this change would degrade the river view. For other recreationists, the bridge design would add variety to the river view. The presence of the new bridge would

not preclude the recreational opportunities currently offered by Hoover Dam and aerial sightseeing.

The bridge would be visible to recreationists on the Colorado River at the rafting and canoeing put-in locations, located about 0.5 mile downstream of Hoover Dam. The quality of the recreational experience of some recreationists on the Colorado River would be degraded, and the experience of other recreationists would be enhanced by the presence of the new bridge. The new bridge would not preclude recreational opportunities currently offered at the rafting and canoeing put-ins or at the hot springs and hiking trail. As rafters and canoeists float downstream away from the proposed bridge, the view of the bridge would diminish, until approximately 0.4 mile downstream from the put-in, at which point the bridge would not be visible. No significant changes from existing noise levels are expected.

Because traffic would be diverted from atop Hoover Dam to the new bridge, traffic congestion would be reduced, thereby reducing the potential for vehicle collisions with pedestrian tourists on the dam. The reduction in traffic would also reduce the amount of truck traffic noise and volume of air pollutants emitted from vehicles on the dam. These three improvements (pedestrian safety, noise, and air quality) are considered benefits to recreationists visiting Hoover Dam.

Hoover Dam may also be visible to motorists traveling over the new bridge and approaches; however, the safety barrier and the high elevation of the proposed bridge (relative to the dam) will minimize viewing opportunities. Stopped vehicles, bicyclists, and pedestrians would be precluded on the new bridge roadway; however, FHWA will study the feasibility of a separate viewing facility associated with the bridge.

Implementation of the Sugarloaf Mountain Alternative, on its current alignment, would impact the planned railroad grade hiking/bicycle trail. Because the alignments for both the Sugarloaf Mountain Alternative and the railroad grade trail are preliminary and have not been finalized, there is an opportunity for NPS and FHWA to work collaboratively to develop a compatible design for the two facilities. Since Sugarloaf Mountain is the preferred alternative, this design collaboration would ensure the railroad grade trail would not be adversely affected by the U.S. 93/Hoover Dam Bypass.

Implementation of the Sugarloaf Mountain Alternative would not affect other recreational activities at Lake Mead, the Gold Strike Canyon hiking trail and hot springs, and the Hacienda Hotel.

Gold Strike Canyon Alternative. The new bridge would not be visible from Hoover Dam or by the ground tours; therefore, those activities would not be affected. It would be visible to aerial sightseeing recreationists, thus changing the recreational setting of Black Canyon and the Colorado River in the vicinity of the construction zone from the air. For some recreationists, this change would degrade the river view. For other recreationists, the bridge design would add variety to the river view. The presence of the new bridge would not preclude aerial sightseeing opportunities.

The location where the bridge would cross the river would be visible to recreationists at the rafting and canoeing put-in locations, located about 0.5 mile downstream of Hoover Dam. It would be visible to recreationists using the hot springs and hiking trail. For some recreationists, the quality of the recreational experience in Black Canyon, on the Colorado River, and at the hiking trail and hot springs would be degraded. The presence of the new

bridge would not preclude recreational opportunities currently offered at the rafting and canoeing put-ins or at the hot springs and hiking trail. After put-in, rafters and canoeists would float downstream toward the proposed bridge, resulting in the bridge becoming increasingly large. Once downstream of the bridge, it would remain visible for approximately 0.8 mile.

The addition of vehicle traffic to the currently undeveloped Gold Strike Canyon would increase existing ambient noise levels by 26 dBA. With construction of noise barriers on the roadway, noise levels along the canyon trail would still represent a substantial increase over existing levels, which would be an adverse impact. This increase in noise levels and the bridges and highway in the canyon would affect the quality of the recreational experience of users of the hiking trail in that area (see Chapter 6, Section 4(f) Evaluation).

Because traffic would be diverted from atop Hoover Dam to the new bridge, traffic congestion on the dam would be reduced, thereby reducing the potential for vehicle collisions with pedestrian tourists on the dam. The reduction in traffic would also reduce the amount of truck traffic noise and volume of air pollutants emitted from vehicles on the dam. These three improvements are considered benefits to recreationists visiting Hoover Dam.

Implementation of the Gold Strike Canyon Alternative would not affect recreational activities at Lake Mead and the Hacienda Hotel.

No Build Alternative. Implementation of the No Build Alternative would result in no additional roadway or bridge being constructed, and would result in no physical changes to the existing roadway and Hoover Dam crossing. Traffic levels on U.S. 93 are projected to continue to increase, and the number of recreationists visiting Hoover Dam, Lake Mead, and the Colorado River and its environs is also expected to continue to increase. The continued increase in vehicles along U.S. 93 near Hoover Dam and atop the dam is expected to further increase traffic congestion.

Increased traffic would result in increased travel times for both through-vehicles and vehicles whose final destination is the dam, and would also result in additional noise and vehicle fumes on the roadway and atop the dam. Increased travel times may affect the enjoyment of the travelers' recreational experience, and the visit to Hoover Dam would likely be degraded by associated additional noise and vehicle fumes.

Additional traffic would increase the potential for vehicle and pedestrian collisions on the dam, resulting in an increased public safety hazard. Continuing to allow commercial trucks to cross the dam, in combination with the expected increased traffic levels, would also increase the public safety hazard. The increase in recreationists visiting the dam would compound this public safety hazard. This increased hazard potential would adversely affect the recreational experience at the dam.

Implementation of the No Build Alternative would not adversely affect Lake Mead recreational activities. However, if traffic congestion increases to intolerable levels to motorists, they may elect to drive to their destination using an alternate route, even if it is longer. Motorists who chose an alternate route would forego the recreational opportunities offered at Hoover Dam, the Colorado River, the Gold Strike Canyon hiking trail and hot springs, and the Hacienda Hotel.

3.8.3 Measures to Minimize Harm

3.8.3.1 Construction Mitigation

Regardless of the alternative selected, certain areas would be designated for construction activities, which would preclude using those areas for dispersed recreational activities. In most cases, this impact on recreational activities is not considered adverse. Designated construction safety zones and construction areas would have signs posted, and public access to those areas would be precluded, thus reducing the potential for recreationists to be injured in the construction zone or by construction activities. The hiking trail in Gold Strike Canyon would be closed during construction of the Gold Strike Canyon Alternative, which would be an adverse impact on the recreationists using this area.

Promontory Point Alternative. The following mitigation measures should be implemented:

- Construction activities should be coordinated with Lake Mead Cruises to avoid conflicts.
- The construction zone within Lake Mead should be marked with buoys, or other devices, to preclude access by private and commercial boats.

Sugarloaf Mountain Alternative (Preferred Alternative). Raft and canoe launchings at the put-ins on the Colorado River will be scheduled to avoid conflicts between construction activities and put-ins.

Gold Strike Canyon Alternative. The following mitigation measures should be implemented:

- Raft and canoe launchings at the put-ins on the Colorado River, and floating through the construction zone, should be scheduled to avoid conflicts between construction activities and river floating.
- A net or other device should be used to prevent construction materials or equipment from falling from the bridge into the river.
- The loss of trail access from U.S. 93 to the hot springs during the construction period is considered unmitigable.

3.8.3.2 Operational Mitigation

Recreational activities at Hoover Dam, Lake Mead, and the Colorado River would not be precluded by implementation of any of the three build alternatives. Selection of the Sugarloaf Mountain Alternative would alter the view from Hoover Dam and the river put-ins.

Promontory Point Alternative. No additional mitigation for this alternative is required or recommended.

Sugarloaf Mountain Alternative (Preferred Alternative). Based on recommendations of the DAP to reduce visibility of the bridge from recreational viewpoints, the bridge could be painted or tinted with nonglare colors that blend with the surrounding environment. No additional mitigation for this alternative is required or recommended.

In anticipation of public demand for views of Hoover Dam from the new bridge on this alignment, FHWA will study the technical feasibility of a separate viewing platform associated with the bridge. Further details of such a facility cannot be determined until design of the bridge and approaches is advanced beyond the current level.

Gold Strike Canyon Alternative. Noise levels resulting from operation of this alternative were calculated to be 65 dBA-L_{eq} at the top of the hiking trail, compared against an existing noise level of 39 dBA in the canyon. The federal/state noise criterion or standard to be achieved is 67 dBA-L_{eq}. It would be possible to reduce the noise levels by constructing noise barriers located at the outside edge of the roadway adjacent to the trail (shown on Figure 3-1). A 6 dBA-L_{eq} reduction could be achieved, resulting in a noise level of 59 dBA. Although the barriers would reduce the noise level below the federal/state criterion, the resulting noise level still represents a substantial increase over existing conditions. Reduced access for hikers and aesthetic impacts from the elevated roadway in the canyon also cannot be mitigated.

3.9 Socioeconomics

3.9.1 Affected Environment

This section describes the population, employment, and income levels in Clark County and Boulder City, Nevada and Mohave County, Arizona. Boulder City is the nearest town to the proposed project area and is, therefore, the focus of the discussion. This section also discusses social conditions, environmental justice, and transportation and circulation.

3.9.1.1 Population

The Hoover Dam area is located within Clark County, Nevada, and Mohave County, Arizona. Clark County, in southern Nevada, covers 7,911 square miles and has a countywide population density of 125 people per square mile. The 1996 population was 992,593, an increase of 34 percent over 1990. The Las Vegas and Henderson population of 560,359 represents approximately 48 percent of Clark County's total population.

Mohave County, in western Arizona, covers 13,312 square miles with a countywide population density of 9 people per square mile. Between 1990 and 1996, population increased by 30 percent, to 121,602.

Boulder City is situated along the eastern border of Clark County, about 24 miles southeast of Las Vegas and 6 miles southwest of Hoover Dam. Boulder City's population has grown more slowly than the rest of the county because of its controlled growth ordinance. Current population is approximately 14,500.

3.9.1.2 Employment

Tourism is a primary economic force in Clark County. Boulder City offers a full range of services to the increasing numbers of tourists, with motels, restaurants, and an airport. Although gambling is not permitted within the city, Hacienda Hotel (located on U.S. 93 between Boulder City and Hoover Dam), a major employer in the area, offers gaming and other entertainment. Federal and local government agencies are the most significant employers in the local labor force. In addition to tourism and government, a light industrial area in the city provides commercial and manufacturing jobs to the local economy.

Construction, trade, finance, real estate, and services provide the majority of employment in Mohave County. Employment opportunities at Hoover Dam consist of federal jobs and privately operated food and gift concessionaires.

In 1989, average personal per capita income in Boulder City was $17,231; Clark County was $15,109; and the State of Nevada was $15,214. The national personal per capita income was $14,420.

3.9.1.3 Social Conditions

The proposed project is located entirely on federal land about 6 miles northeast of the nearest residential area in Boulder City. Boulder City is the only city in Nevada where gambling is prohibited. The city has also instituted a controlled growth policy to prevent rapid development and to preserve the utility systems and social infrastructure. Boulder City offers a quiet, small town atmosphere.

3.9.1.4 Environmental Justice

Environmental justice refers to social inequity in bearing the burdens of adverse environmental impacts. Certain U.S. socioeconomic groups, including ethnic minorities, the elderly, rural residents, and others, have historically experienced a disproportionate share of adverse effects from locally undesirable land uses such as toxic waste dumps, landfills, and freeway projects.

Consistent with Title VI of the 1964 *Civil Rights Act* and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, dated February 11, 1994, all proposed projects and decisions must ensure that minority and low-income populations are not disproportionately adversely affected by transportation programs or projects.

The FHWA policy toward environmental justice is to address whether any social group is disproportionately impacted by a proposed project, and to identify possible mitigation measures to avoid or minimize adverse social impacts. Specifically, the FHWA intends that no person in the U.S. shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.

Table 3-19 presents 1990 census data for Las Vegas, Henderson, and Boulder City, Nevada; and for Kingman, Arizona.

Table 3-19
1990 Census Data by Locality Near the Proposed Project Area

Las Vegas	Henderson	Boulder City	Kingman
Total Population			
258,295	64,942	12,567	12,722
Race (Percent)			
White: 78.4	White: 91.5	White: 97	White: 94.5
Black: 11.5	Black: 2.7	Black: 0.4	Black: 0.1
AI[a]: 0.9	AI: 1.0	AI: 1.0	AI: 1.3
A[b]: 3.6	A: 2.1	A: 1.2	A: 1.5
Other[c]: 5.6	Other: 2.7	Other: 0.4	Other: 2.6

Table 3-19
1990 Census Data by Locality Near the Proposed Project Area

Las Vegas	Henderson	Boulder City	Kingman
Total Households			
99,954	23,353	5,116	4,961
Race (Percent)			
White: 82	White: 92.7	White: 98	White: 95
Black: 10.1	Black: 2.7	Black: 0	Black: 0.2
AI: 0.9	AI: 1.0	AI: 1.0	AI: 1.1
A: 2.8	A: 1.4	A: 0.7	A: 1.2
Other: 4.2	Other: 2.2	Other: 0.3	Other: 2.5
Households by Age Group			
<25: 5,904	<25: 1,288	<25: 104	<25: 210
25-34: 24,401	25-34: 6,019	25-34: 616	25-34: 849
35-44: 22,469	35-44: 6,059	35-44: 874	35-44: 967
45-54: 16,431	45-54: 3,846	45-54: 880	45-54: 800
55-64: 13,510	55-64: 2,876	55-64: 888	55-64: 772
65-74: 11,903	65-74: 2,422	65-74: 1,092	65-74: 807
Households (all races) Age 55 and Over and Percentage Below the Poverty Level			
30,749	6,141	2,642	2,135
(52 Percent)	(46 Percent)	(45 Percent)	(65 Percent)
Households Age 55 and Over Below the Poverty Level[d] by Race[e] (Percent)			
White: 50.5	White: 45.7	White: 23.5	White: 64.3
Black: 63.8	Black: 48.4	Black: 0	Black: 100
AI: 65.1	AI: 24.5	AI: 12.8	AI: 41.1
A: 60.1	A: 32.4	A: 21.4	A: 100
Other: 51.4	Other: 71.7	Other: 0	Other: 100
Families Above the Poverty Level in 1989 by Race (Percent)			
White: 76.3	White: 88.2	White: 93.5	White: 89.2
Black: 7.9	Black: 2.1	Black: 0	Black: 0.2
AI: 0.9	AI: 0.8	AI: 1.3	AI: 1.4
A: 2.8	A: 1.3	A: 0.4	A: 1.2
Other: 4.0	Other: 2.5	Other: 0.3	Other: 2.5
Families Below the Poverty Level in 1989 by Race (Percent)			
White: 4.6	White: 4.4	White: 4.5	White: 5.2
Black: 2.4	Black: 0.4	Black: 0	Black: 0
AI: 0.1	AI: 0.1	AI: 0	AI: 0
A: 0.2	A: 0.1	A: 0	A: 0.2
Other: 0.8	Other: 0.1	Other: 0	Other: 0.1
Per Capita Income by Race in 1989 ($)			
White: 16,121	White: 16,951	White: 17,254	White: 12,370
Black: 9,252	Black: 11,691	Black: 1,096	Black: 10,400
AI: 12,140	AI: 11,008	AI: 13,788	AI: 10,480
A: 12,465	A: 10,846	A: 26,219	A: 37,571
Other: 8,436	Other: 9,773	Other: 9,712	Other: 12,523

Table 3-19
1990 Census Data by Locality Near the Proposed Project Area

	Las Vegas	Henderson	Boulder City	Kingman

[a] AI—American Indian, Eskimo, or Aleut

[b] A—Asian or Pacific Islander

[c] Other—Other Race

[d] FHWA defines low income as a median household income of less than $15,150 for a family of four. Numbers presented in this table are conservative because they include the household income category of $15,000 to $24,999 to ensure including those households with household income between $15,000 and $15,150.

[e] These numbers show, for example, that 50.5 percent of all white households age 55 and over are below the poverty level in Las Vegas, Nevada.

Source: 1990 U.S. Census Data

3.9.1.5 Transportation and Circulation

U.S. 93 is a north-to-south trending highway with the southern terminus at Wickenburg, Arizona (northwest of Phoenix). U.S. 93 intersects I-15 in Las Vegas and heads north near the eastern boundary of Nevada, bisects Idaho, and continues north through western Montana to the Canadian border. This route is used by traffic from Tucson and Phoenix, Arizona; to Las Vegas and Reno, Nevada; and Salt Lake City, Utah. Usage has increased since NAFTA implementation. The U.S. 93 corridor, in combination with other highways, creates a continuous north-to-south corridor between Canada and Mexico, through the United States from Calgary, Canada, to Nogales, Mexico (Figure 1-1). These highways, consisting mostly of four-lane divided facilities with structural sections capable of supporting heavy vehicles, provide north-to-south linkages from the international border with Mexico via I-19 from Nogales to Tucson, and I-10 from Tucson to Phoenix, in Arizona; and I-15 in Nevada, Utah, Idaho, and Montana to the Canadian border. U.S. 93 provides a north-to-south link between I-10 near Phoenix to I-15 in the Las Vegas metropolitan area. Much of U.S. 93 is a two-lane undivided highway.

Currently, the Nogales border crossing handles more than 250,000 truck crossings annually and is the primary point of entry for produce shipped by truck into the U.S. from Mexico (ADOT, 1993). The U.S. 93 corridor has been recommended by ADOT to become Arizona's link in the international trade route proposed by NAFTA.

ADOT plans to improve U.S. 93 to a four-lane divided facility from Wickenburg to north of Kingman, Arizona in the next several years. In Nevada, U.S. 93 is four lanes from Las Vegas to Boulder City. After implementing ADOT improvements, the only section of U.S. 93 that will remain two lanes (between Phoenix and Las Vegas) will be the 19-mile segment that includes Hoover Dam. Although most of the corridor would generally consist of a high-speed divided facility, the Hoover Dam segment creates a traffic bottleneck between Nevada and Arizona, potentially interfering with interstate and international commerce.

Hoover Dam is the only Colorado River crossing near Las Vegas. The next closest crossings are at Davis Dam, 67 miles downstream, or at Laughlin, 70 miles downstream. Because shorter travel times and distances reduce accident exposure and transit costs, the shorter Hoover Dam crossing is preferred by the commercial trucking industry for travel in the Las Vegas to Phoenix corridor.

Other routes that cross the Colorado River are U.S. 95 and SR 163 in Nevada to Arizona SR 68 (see Figure 2-1), which would add 23 miles to the trip from Kingman to Las Vegas.

Another route from Kingman to Las Vegas, I-40 to Needles, California, and then north on U.S. 95 to Las Vegas, adds 70 miles to the trip (see Table 2-1).

As the shortest route, U.S. 93 across Hoover Dam would offer a time savings for through traffic between Arizona and Nevada if the existing bottleneck is eliminated at the dam. Traffic flow is generally at speeds near posted limits except at roadway approaches to Hoover Dam. Average speeds recorded on the approaches to the dam and across the dam crest were as low as 8 mph (*Traffic Study: Colorado River Bridge*, Reclamation, December 1991).

The Hoover Dam section of U.S. 93 has reached capacity during peak periods and cannot provide additional capacity with the current roadway alignment. In 1991, average travel speeds for the 2 miles of roadway on either side of Hoover Dam were 8 to 18 mph. Table 3-20 presents 1997 AADT and LOS at Hoover Dam (see Traffic Analysis - Appendix A).

Table 3-20
Average Annual Daily Traffic and Level of Service at Hoover Dam

Measurement	1997
AADT	11,500
LOS	F

The LOS compares projected traffic with the theoretical capacity of a roadway segment. LOS is designated A to F, with A representing unconstrained and free-flowing traffic, and F representing unstable flow with near gridlock conditions. As shown in Table 3-20, traffic congestion at Hoover Dam is nearing gridlock.

Bicyclists and Pedestrians. Bicycles currently have access to and across Hoover Dam on U.S. 93. There are no bicycle lanes on U.S. 93, nor is the highway a designated bicycle route. The NPS and NDOT are in the process of developing a bicycle/pedestrian trail from Boulder City to Hoover Dam on the Railroad Grade just north of U.S. 93 (see Section 3.8, Recreation Resources).

3.9.2 Environmental Consequences

3.9.2.1 Build Alternatives

Population. No change in regional (Clark and Mohave counties) population is expected from implementation of any of the build alternatives. Recent trends in population growth are not expected to be altered. Because Boulder City has a growth ordinance, population increases within the city are expected to continue at the same rate as in the past 10 years.

Employment. Construction of any of the build alternatives would create both direct and indirect employment opportunities in the region. Direct employment would be provided for project construction workers. Indirect employment would be provided for those in construction material manufacturing and delivery, project goods and services, and project operation and maintenance.

The number of direct and indirect jobs that would be created during the construction period is based on the relationship between construction costs and the multipliers for construction employment. It is expected that Las Vegas, Henderson, Boulder City, and Kingman would provide the labor pool. During the construction period, between 2,900 to 3,440 new jobs would be created in the region.

The Hacienda Hotel, located about 3 miles west of Hoover Dam, employs about 450 people, many of whom live in Boulder City. Implementation of the build alternatives is not expected to affect the number of employees at this establishment.

Income. Few permanent jobs would be created by construction of any of the build alternatives; therefore, the personal per capita income is not expected to change in Clark or Mohave counties.

In both Arizona and Nevada, minor adverse impacts may occur to the dam concessionaires as a result of through-traffic reduction over the dam. However, these impacts would be offset by the expected continued increase in dam visitors. Reduced traffic congestion on the dam would make it a more desirable attraction to visit. The rafting concession would continue operation with only minor interruptions by coordinating its scheduled raft launching to avoid conflicts with construction activities; therefore, it is not expected to be adversely affected. Access restrictions to Hoover Dam from Lake Mead would be coordinated with lake tour operators.

Impacts to the local economy would be most notable during the construction period. Based on the cost range for the alternatives, for every dollar spent in bridge construction and highway approaches, $1.75 would be generated in the regional economy. An estimated range of economic activity from construction expenditures would be from $233 to $257 million.

During operation of the proposed project, traffic would continue to pass through Boulder City as it currently does. Therefore, changes in spending within the city (and resultant economic impacts) are expected to be negligible when compared to existing levels.

Social Conditions. Because the proposed project's western terminus is located about 4 miles east of the Boulder City limits, the city's existing social infrastructure (including schools, recreational areas, churches, businesses, and emergency services) is not expected to be adversely affected. In fact, the reduction in traffic congestion and potential safety hazards at and near the dam are likely to reduce the demand upon Boulder City emergency response personnel. In addition, no businesses or households would need to be relocated, and Boulder City's community cohesion and property values would not be affected.

If the proposed project is implemented, perceived social impacts, such as noise, pollution, and associated decreases in quality of life, would occur in Boulder City at the current same rate. Therefore, no impact on the city's social conditions is expected from any of the build alternatives.

Environmental Justice. E.O. 12898 requires identification and avoidance of disproportionately high and adverse human health or environmental effects on minority and low-income populations.

Because the area where the build alternatives would be constructed and operated is currently unpopulated, no minority or low-income groups live in that area. Therefore, disproportionately high and adverse human health or environmental effects on minority and low-income groups are not anticipated.

Transportation and Circulation. U.S. 93 traffic forecasts were completed using historic traffic data obtained from ADOT and NDOT and applying expected annual traffic growth rates of between 4 and 5 percent for 1997. The AADT volumes and associated LOS at Hoover Dam for years 2017 and 2027 under the No Build Alternative are presented in Table 3-21.

Table 3-21
Forecasted Average Annual Daily Traffic and Level of Service at Hoover Dam Under No Build Alternative

	Year	
Measurement	**2017**	**2027**
AADT	21,100	26,000
LOS	F	F

Source: Appendix A, Traffic Analysis

The LOS at Hoover Dam is expected to improve from F to E with implementation of any of the build alternatives. The primary reason the LOS would not improve more than level E is the mountainous terrain, steep grades, and sharp curves. Speeds are expected to be low; however, the roadway capacity would be well above the anticipated demand, and traffic delays on the dam are not expected.

If any of the build alternatives are implemented, the AADT and associated LOS in year 2017 for the new bridge crossing are 16,400 and A, respectively. In year 2027, the AADT and LOS would be 19,900 and B, respectively.

Bicyclists and Pedestrians. Bicycles and pedestrians would be restricted from crossing the new Hoover Dam bypass bridge if any of the proposed build alternatives are constructed. The bicycle through route and dam access would be via existing U.S. 93, but some portions would be impacted by the new highway and would need to be reconstructed. The dam crossing would stay open to automobile traffic and bicyclists visiting the historic landmark. The Nevada and Arizona connections of the old highway/dam crossing to the new U.S. 93 bypass roadway would be designed to provide ingress/egress for bicycles. Detailed traffic analysis would be completed during final design to determine whether at-grade crossings or interchanges are required to accommodate the expected volumes of vehicles exiting to or returning from the dam crossing.

3.9.2.2 No Build Alternative

Implementation of the No Build Alternative would result in no change to existing population trends and growth in Clark and Mohave counties. In addition, this alternative would result in the creation of no direct or indirect jobs (and, therefore, no change to the local economy), and no change to the existing personal per capita income level in the region.

Similar to that for the build alternatives, no impacts to the existing social infrastructure of Boulder City (including schools, recreational areas, churches, and businesses) are expected. However, the expected increase in traffic congestion and associated potential safety hazards at and near the dam may affect the demand upon Boulder City emergency response personnel during emergencies. No businesses or households would need to be relocated, and Boulder City's community cohesion and property values would not be affected by this alternative.

If the No Build Alternative is implemented, perceived social impacts (such as noise, pollution, and associated decreases in quality of life) would occur in Boulder City at the current rate. Because the No Build Alternative would result in no project being constructed, no adverse effects on minority or low-income populations are expected.

With implementation of the No Build Alternative, LOS is expected to remain F at Hoover Dam. The AADT and associated LOS in year 2017 at the dam if the No Build Alternative is implemented are 21,100 and F, respectively. In year 2027, the AADT and LOS would be 26,000 and F, respectively. Although LOS at the dam would continue to be F when compared to existing conditions, the increase in AADT (83.5 and 126 percent in years 2017 and 2027, respectively) would result in significant transportation and circulation impacts on U.S. 93 at and near the dam (see Table 3-21).

3.9.3 Measures to Minimize Harm

Because no adverse impacts on population, employment, income, social conditions, minority or low-income populations, or transportation and circulation are expected as a result of implementing any of the build alternatives, no mitigation is required.

3.10 Hazardous Materials

3.10.1 Affected Environment

Sites with known or suspected hazardous waste that may be affected by the proposed project were evaluated to assess environmental concerns at each site. These sites are known or suspected to be contaminated with hazardous wastes because of historical use, storage, or release of hazardous materials at the site. This evaluation is based on Level I Contaminant Surveys that were conducted for the Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon Alternatives in May 1992 (Reclamation, May 1992a, b, c), a Resource Conservation and Recovery Act of 1976 (RCRA) Compliance Evaluation Inspection report from March 1996, and a subsequent survey in May 1998. General locations of these sites are shown in Figure 3-13.

3.10.1.1 Promontory Point Alternative

Seven potential hazardous waste sites exist on or adjacent to the Promontory Point Alternative corridor: the Reclamation warehouse storage yard; two staging areas used by contractors during construction of the new visitor center; two disposal areas used during construction of the new visitor center and during rehabilitation of U.S. 93 in the vicinity of the dam; a dump pile; and an abandoned switchyard. Because the Promontory Point and Sugarloaf Mountain Alternatives both impact the Reclamation warehouse storage yard, environmental concerns for this site would be the same as those discussed below, under the preferred alternative.

Contractor Staging and Disposal Areas. At the time of the survey, Reclamation was building the new visitors' facility at Hoover Dam. The prime contractor constructed two staging areas for this work at Stations 120+00 and 125+00. The two disposal areas consisted primarily of excavated rock, soil, and milled pavement; however, some old pipe, rebar, scrap metal, and other construction debris were evident. One of the disposal areas had been flattened and used for equipment storage. A large storage tank and several 55-gallon containers of motor oil and antifreeze were also stored at one staging area on or near the alignment centerline at Station 125+00.

These areas are of concern because chemicals, including motor oil, antifreeze, and diesel fuel, were used and stored at these sites. Several noticeable oil stains were observed on the ground (Reclamation, 1992a). If it is determined that chemicals were released to the soil,

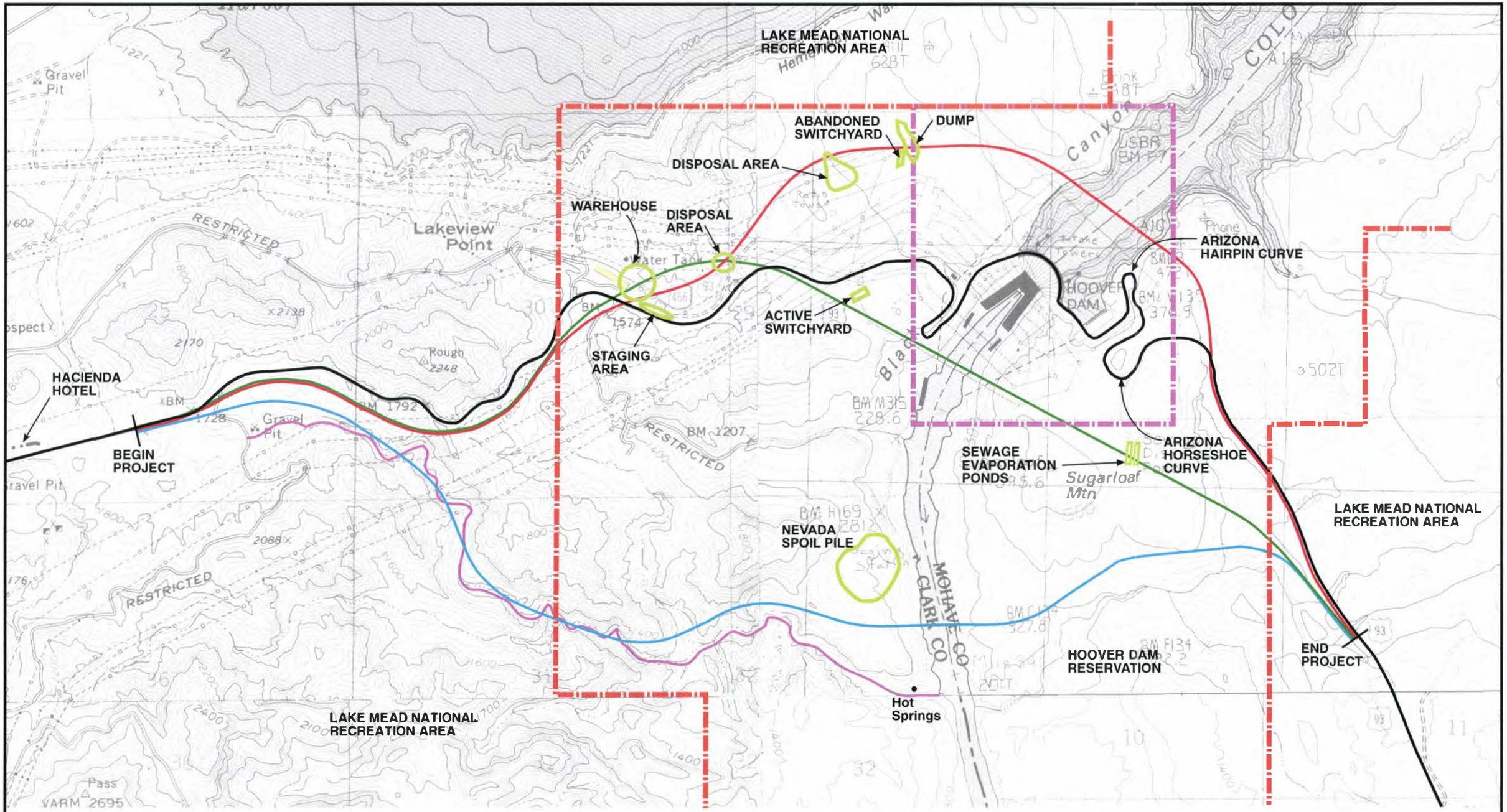

FIGURE 3-13
POTENTIAL HAZARDOUS WASTE SITES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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contaminated soil may be encountered during construction activities. Site cleanup was the responsibility of the contractor after completion of the project.

Dump Pile. An original dump pile used during construction of Hoover Dam is located along the Promontory Point Alternative alignment (Reclamation, May 1992a), approximately 400 feet left of centerline at Station 151+00. The area has the appearance of an industrial waste site due to the scattered metal shavings, numerous rusted 5-gallon and 55-gallon containers, concrete blocks, scrap metal, and sheet metal. Some ground discoloration was observed. Because the dump pile is located upgradient from the proposed alignment, a potential pathway for contamination exists from the dump to the subject alignment through surface runoff or a subsurface plume of contamination.

Abandoned Switchyard. There were several substantial oil stains noticed at each of the switchyards north of U.S. 93 in the immediate vicinity of the Promontory Point alignment. The switchyard near the centerline at Station 151+50 is currently out of service. A transformer had a yellow tag on it to indicate it contained PCBs. Additional environmental concerns at this site include oil stains on the ground. If the oil is the result of a transformer leak, the oil could potentially contain PCBs.

PCBs are a subset of the synthetic organic chemicals known as chlorinated hydrocarbons. Between 1926 and 1977, PCB-containing products were manufactured for use in applications such as electrical transformers, where stable, fire-resistant, heat-transfer properties were demanded. The most extensive use of PCBs occurred in dielectric fluids. Such fluids typically have the following characteristics: a heavy oil appearance, high boiling point, high chemical stability, high flash point, low electrical conductivity, and low water solubility. PCBs are known to cause chronic reproductive effects, gastric disorders, and skin lesions in laboratory animals. In addition, the U.S. EPA suspects that PCBs are probable human carcinogens.

During the 1970s, in an effort to minimize the potential for adverse health effects caused by PCBs and other substances, Congress passed the Toxic Substances Control Act (TSCA), which strictly regulates all aspects of PCB use. TSCA prohibits the manufacture, processing, and distributing in commerce of PCBs, except as exempted by the EPA. TSCA also prescribes that the use, marking, and disposal of PCBs be strictly regulated by EPA. Regulations issued pursuant to TSCA require generator identification numbers and the manifesting of PCB wastes. Also, some state RCRA programs, particularly in the area of disposal, place additional restrictions on the handling of PCBs.

In July 1992, the Tennessee Valley Authority (TVA), under a Western Area Power Administration (WAPA) contract (Contract No. DE-A165-91 WA 09429), conducted a preliminary environmental assessment of the potential for PCB contamination of this and other Nevada Power Company switchyards at this location. The report of this assessment, which included sampling and analysis of transformer oils, noted that approximately 6,600 gallons of oil containing PCBs were present onsite in seven circuit breakers, ranging in capacity from 600 to 2,200 gallons. Blue PCB labels on these circuit breakers indicated that PCBs were present in the oil at concentrations under 50 ppm. An exception was one circuit breaker bushing that had a yellow label, indicating PCB concentrations greater than 50 ppm. The Hazardous Material Coordinator for Hoover Dam has indicated that these units have not been drained, and that jurisdiction and responsibility for proper closure of the transformers/circuit breakers would lie with WAPA (personal communication, Jeff Weaver, 1998).

The TVA preliminary assessment also noted that one minor spill involving PCB-containing oil occurred in 1990 at this location. The spill was remediated under the supervision of the Phoenix office of WAPA. The assessment further evaluated the potential for PCBs at this location to migrate into the environment. It was determined that the greatest threat to the environment would come from storm-induced drainage through the site's lower switchyards and culverts to the river. The potential hazards to the public and worker exposures via the soil and air pathways was judged to be minimal (personal communication, Jeff Weaver, 1998).

3.10.1.2 Sugarloaf Mountain Alternative (Preferred Alternative)

Six potential hazardous waste sites exist on or adjacent to the Sugarloaf Mountain Alternative corridor: the Reclamation warehouse storage yard; two staging areas used by contractors during construction of the new visitor center; one disposal area used during construction of the new visitor center and during rehabilitation of U.S. 93 in the vicinity of the dam; an active switchyard; and sewage evaporation ponds. Because the Sugarloaf Mountain and Promontory Point Alternatives both impact the two contractor staging areas, and one of the contractor disposal areas, environmental concerns are the same as those discussed previously. The following sections address environmental concerns regarding the Reclamation warehouse storage yard, the active switchyard, and the sewage evaporation ponds.

Reclamation Warehouse Storage Yard. The Sugarloaf Mountain Alternative would pass through the Reclamation warehouse storage yard at Station 107+00. Environmental concerns at this site include past and present chemical use and storage, stained soils, and drains and other pathways for potential contamination. A partial list of known chemical and hazardous waste include paint, PCBs, solvents, used oil, asbestos, and solvent rags. A small oil stain was noticed in the outside parking area of the warehouse.

Another concern at this site is potential residual petroleum hydrocarbons in soil resulting from two leaking underground fuel storage tanks that were removed in 1991. The underground storage tanks (USTs) were used for refueling maintenance vehicles and consisted of a 500-gallon diesel fuel tank and a 3,000-gallon gasoline tank. An estimated 500 gallons of unleaded fuel were released to the soil. The site was subsequently remediated in accordance with Nevada Division of Environmental Protection regulations and to the satisfaction of the Clark County Health District.

A 1996 inspection report states that the majority of hazardous waste currently generated onsite is paint waste. Samples taken of sandblast residue were analyzed, and results show that one sample contained 6 ppm lead, and all others passed toxicity characteristic leaching procedure (TCLP) tests. The drum of material from which the "hot" sample was collected was disposed of as hazardous waste. At the time that the samples were taken, staff recommended that sandblast residues generated in the future be collected as they are generated. The inspection concluded with no violations being observed at the warehouse and storage yard facilities.

Arizona and Nevada Switchyard. This active switchyard is located downgradient of the Sugarloaf Mountain Alternative near Station 139+00. The 1992 Level I Survey and Contaminant Survey Checklist stated that there were several substantial oil stains noticed on the ground at this site; however, WAPA staff have stated that the circuit breakers no longer use oil containing PCBs.

Sewage Evaporation Ponds. Two sewage evaporation ponds are located along the alignment near the centerline at Station 183+00. These ponds receive sewage from the visitor center. No evidence exists to suggest that industrial wastewater has been discharged to the ponds. During 1992 and on other occasions, bighorn sheep have been observed grazing alongside and drinking from the ponds, which removes most concern of contamination other than the normal sewage that would be found at this type of facility. The two sewage evaporation ponds will need to be excavated, closed, and relocated if the Sugarloaf Mountain Alternative is implemented.

3.10.1.3 Gold Strike Canyon Alternative

One hazardous waste site, a spoil pile located in Nevada near the Colorado River, would be impacted by the Gold Strike Canyon Alternative. The spoil pile is littered with metal shavings, numerous 5-gallon and 55-gallon containers, concrete pillars, scrap metal, wood timbers, and roofing material (that may contain asbestos). The spoil site is used as a practice range for the police personnel working at the dam. Surface soils at this waste site could potentially be contaminated from historical chemical releases. Because the spoil site is located downgradient of this proposed alignment, roadway runoff could potentially carry and spread surface soil contamination further downgradient of the waste site.

3.10.2 Environmental Consequences

Discussion of potential impacts from hazardous material haul-vehicle accidents is provided in the Water Resources section (Section 3.4).

3.10.2.1 Promontory Point Alternative

Because the Promontory Point and Sugarloaf Mountain Alternatives both impact the Reclamation warehouse storage yard, measures to address environmental concerns at this site would be the same as those discussed below under the Preferred alternative.

Contractor Staging and Disposal Areas. According to the Level I Contaminant Survey (Reclamation, May 1992a), contractors were responsible for cleaning staging areas. However, there is still the potential for encountering hazardous materials at the contractor staging and disposal areas. If this material is discovered during construction, the contractor would comply with the provisions of the Hazardous Materials Management Plan. During construction operations, some of the material in the two disposal areas may be excavated and either recompacted or moved to another location. Prior to excavation, additional sampling and testing would be required to confirm that no hazardous materials were disposed of at these sites.

If hazardous materials are discovered during surveys or construction, FHWA or its contractor would become a hazardous waste generator. A generator identification number would need to be obtained in order to transport hazardous materials, identify the hazardous material, and disclose the haul route to a specific treatment and/or disposal facility. The contractor must also comply with all requirements of the RCRA, associated state hazardous waste disposal requirements, and all of the provisions of the OSHA regulations regarding health and safety of workers and the handling of hazardous waste.

Dump Pile. To determine whether contamination from the dump pile has affected the alternative alignment, soil sampling should be conducted. Subsurface soil samples will determine whether a plume of subsurface contamination has migrated from the dump pile to

the alternative alignment. In addition, surface soil samples should be conducted to determine whether surface runoff has carried contaminants to the alternative roadway site.

As described above for the Contractor Staging and Disposal Areas, the contractor would comply with the provisions of the Hazardous Materials Management Plan if hazardous materials were discovered during construction. Additionally, the contractor would be required to comply with all requirements of the RCRA and associated state hazardous waste disposal requirements, and all of the provisions of the OSHA regulations regarding health and safety of workers and the handling of hazardous waste.

A generator identification number would also need to be obtained for the removal of any hazardous materials from the dump pile, if any should be found. And, as described above, FHWA or its contractor would need to disclose the haul route to a specific treatment and/or disposal facility.

Abandoned Switchyard. To address environmental concerns at this site, surface soil samples should be conducted before construction begins to determine whether oil or PCBs are present. Construction workers could be exposed to hazardous materials if any PCB-contaminated soil were present during construction or excavation in the project area.

If PCB-contaminated soils are unearthed or removed from the site, FHWA or its contractor may become a hazardous waste generator. A generator identification number would need to be obtained, as discussed above. The contractor would also be required to comply with RCRA, associated state hazardous waste disposal requirements, and OSHA regulations.

3.10.2.2 Sugarloaf Mountain Alternative (Preferred Alternative)

Because the Sugarloaf Mountain and Promontory Point Alternatives both impact the two contractor staging areas and one of the contractor disposal areas, measures to address environmental concerns at these sites are the same as those discussed above. The following sections describe measures to address environmental concerns at the Reclamation warehouse storage yard, the active switchyard, and the sewage evaporation ponds.

Reclamation Warehouse Storage Yard. Contaminated soil may be encountered during excavation and construction activities, and contaminated soils may pose health and safety risks to construction workers. If encountered, this soil would require special handling, storage, and disposal procedures according to the type and extent of contamination. If this material is discovered during construction, rather than prior to, the contractor would comply with the provisions of the Hazardous Materials Management Plan. In either case, the contractor would be required to comply with all requirements of the RCRA and associated state hazardous waste disposal requirements, and all of the provisions of the OSHA regulations regarding health and safety of workers and the handling of hazardous waste.

Further studies and soil sampling would be required to determine the type and extent of contamination because there is no existing information regarding the potential hazardous waste sites. After these studies are complete, FHWA, in consultation with the appropriate regulatory agencies, would determine which soils can be handled as hazardous waste and which soils would be handled as nonhazardous. When this information is available, methods for treating the contamination onsite would be determined, and procedures for handling and disposing of the waste would be resolved.

If it is determined that chemicals used and stored at the warehouse were released to the environment, or that residual petroleum hydrocarbons are present, FHWA or its contractor would become a hazardous waste generator upon extraction of the contaminated soil. The

contractor would then need to obtain a generator identification number in order to transport hazardous materials, identify the hazardous material, and disclose the haul route to a specific treatment and/or disposal facility.

Arizona and Nevada Switchyard. The presence of soil staining at the switchyard indicates the possibility of PCB-contaminated soil. Because PCB-contaminated soil requires special cleanup and disposal procedures and may pose health and safety risks to construction workers, soil samples would be taken in areas where oil stains are observed or leaks suspected. If PCB-contaminated soils are unearthed or removed from the site, FHWA or its contractor would become a hazardous waste generator. A generator identification number would need to be obtained, as discussed above. The contractor would also be required to comply with RCRA, associated state hazardous waste disposal requirements, and OSHA regulations.

Sewage Evaporation Ponds. The proposed Sugarloaf Mountain Alternative centerline would bisect the sewage evaporation ponds. While it is expected that no industrial wastewater has been discharged to the ponds, this would be verified through sludge and soil sampling. In either case, the two sewage evaporation ponds would need to be excavated, closed, and relocated if the Sugarloaf Mountain Alternative is implemented.

If industrial wastewater were discovered in the pond, contaminated sludge or soils could impact worker health and safety, as well as soil and sludge storage and disposal procedures. The removal of these contaminated sludge or soils would result in FHWA or its contractor becoming a hazardous waste generator. A generator identification number would need to be obtained, as discussed above. The contractor would also be required to comply with RCRA, associated state hazardous waste disposal requirements, and OSHA regulations.

3.10.2.3 Gold Strike Canyon Alternative

Because the Nevada Spoil Pile is located downgradient of the proposed alternative, roadway runoff could potentially affect this waste site. Roadway runoff should be controlled through barriers or diverted to prevent future runoff from spreading potential surface soil contamination downgradient of the waste site.

3.10.2.4 No Build Alternative

Should the No Build Alternative be selected, hazardous materials sites described above would not be affected. No further testing or remediation would occur.

3.10.3 Measures to Minimize Harm

3.10.3.1 Promontory Point Alternative

Because the Promontory Point and Sugarloaf Mountain Alternatives both impact the Reclamation warehouse storage yard, measures to address environmental concerns at this site would be the same as those discussed below under the Preferred alternative.

Potential Contractor Staging and Disposal Areas. Documentation reviews and personnel interviews would be conducted to determine whether releases have occurred, the extent of contamination, and how the contamination was addressed. An assessment would be conducted at the site to ensure that cleanup was conducted properly. Soil sampling would be conducted if evidence (e.g., discolored soil, odors, stressed vegetation) suggests that contamination may still be present.

Dump Pile. If recommended sampling shows that contamination has migrated to the proposed project location, excavation or remediation of affected soils may be required, depending on contaminant types and concentrations. At a minimum, soil should be monitored during excavation activities to segregate suspected contaminated soils. Roadway runoff should be controlled by barrier use or by being diverted to prevent future runoff from impacting the roadway site.

Abandoned Switchyard. If soil samples indicate that hazardous materials are present in the area, affected soil should be removed and disposed of in accordance with applicable environmental regulations. PCB-contaminated soil requires special cleanup and disposal procedures and may pose health and safety risks to construction workers.

Any PCBs remaining in the transformers at the abandoned switchyard would require proper disposal prior to demolition or dismantling. In addition, per EPA Region IX PCB Spill Cleanup Policy, any PCB-contaminated soil would need to be remediated to background levels (i.e., detection limits), where practicably attainable, for any PCB spill from a source greater than 50 ppm PCBs. In certain cases, EPA Region IX would consider alternative cleanup levels. Cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 allows deviation from the Regional Policy when the reason for deviation is included in the Record of Decision (ROD).

3.10.3.2 Sugarloaf Mountain Alternative (Preferred Alternative)

Because the Sugarloaf Mountain and Promontory Point Alternatives both impact the two contractor staging areas and one of the contractor disposal areas, measures to address environmental concerns at these sites are the same as those discussed above. The following sections describe measures to address environmental concerns at the Reclamation warehouse storage yard, the active switchyard, and the sewage evaporation ponds.

Reclamation Warehouse Storage Yard. To address environmental concerns at this site, chemical usage, storage, and releases would be investigated and documented. Interviews of onsite personnel and internal record reviews would be performed to determine locations and quantities of hazardous materials used and released in the storage yard. This information would then be used to implement an investigation of soils that would be affected by roadway construction. Soil samples would be taken in areas where discoloration, odors, or known releases have occurred or are suspected. Soil would be monitored during excavation activities to segregate contaminated soils.

Records documenting underground fuel tank removal would be reviewed to determine the vertical and horizontal extent of contamination, location and quantity of contaminated soil excavated, whether in situ remediation was implemented, and the cleanup standard attained. This review would help determine whether residual petroleum hydrocarbons are likely to be encountered during excavation and construction, and at what concentrations. Soil in the tank area would be monitored during excavation to segregate contaminated soils.

Since contaminants could become airborne during removal, additional control measures would be taken to ensure that airborne toxics concentration levels do not exceed any state or federal standards.

Arizona and Nevada Switchyard. Surface soil sampling would be conducted in areas where oil stains are located in order to confirm the presence of PCB-contaminated soil. If PCB-contaminated soil is discovered in the switchyard and the site is affected by construction of the bypass, affected soil would be removed and disposed of in accordance

with applicable environmental regulations. Alternately, if contaminated soils remain in place, roadway runoff will be controlled by barrier use or by being diverted to prevent future runoff from spreading the contamination downgradient of the yard. Per EPA Region IX, PCB Spill Cleanup Policy, any PCB-contaminated soil would need to be remediated to background levels (i.e., detection limits), where practicably attainable, for any PCB spill from a source greater than 50 ppm PCBs. In certain cases, the EPA, Region IX, would consider alternative cleanup levels. Cleanup under the CERCLA of 1980 allows deviation from the Regional Policy when the reason for deviation is included in the ROD.

Sewage Evaporation Ponds. Soil and sludge sampling would be conducted to confirm that industrial wastewater has not been discharged to the ponds. If it were discovered that industrial wastewater had been discharged there, contaminated sludge or soils would need to be removed in order to protect workers' safety during construction of the proposed project. Removal would require special safety and handling procedures and would require compliance with all applicable state and federal regulations.

The ADEQ will be contacted before pond excavation during construction of the proposed project to determine whether specific closure or material handling and disposal requirements apply.

3.10.3.3 Gold Strike Canyon Alternative

Roadway runoff from the Nevada Spoil Pile should be controlled through barriers or diverted to prevent future runoff from spreading potential surface soil contamination downgradient of the waste site.

3.10.3.4 No Build Alternative

Should the No Build Alternative be selected, no mitigation is warranted because there would be no effect.

3.11 Construction Activities and Impacts

This section presents activities and associated impacts that would occur during construction of the build alternatives.

3.11.1 Construction Activities

Project construction activities would include the following:

- Earthwork (including clearing, grading, grubbing, embankment construction, batch plant accommodation, fill, and erosion control activities)
- Removal or relocation of existing facilities
- Roadway approach construction (both Nevada and Arizona)
- Structure construction (bridges, tunnels, ramps, and walls)
- Roadway surfacing and barriers
- Existing traffic maintenance during construction
- Dust abatement
- Wildlife fencing, security fencing, and gates

- Cross-drainage culverts
- Signing and lighting
- Pavement marking and paint striping
- Landscaping and seeding
- Abandoned roadway obliteration

3.11.2 Construction Impacts

Construction impacts are short-term and temporary, and cease when a project is operational. Project construction impacts include effects on local air quality and ambient noise levels; increased erosion; potential fuels or chemical spills; potential transportation and circulation impacts; effects on vegetation, wildlife habitat, recreation, and cultural resources; disturbance of special-status species; and effects on the area's visual resources. These impacts are discussed in more detail in this chapter.

Four separate construction contracts are expected for the proposed project: the Nevada approach, the Arizona approach, the bridge, and completion activities. Table 3-22 shows estimated construction times for the Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon Alternatives. It is anticipated that Nevada and Arizona highway approach construction would occur concurrently.

Bridge construction would not begin until significant portions of the approach highways are completed. Paving would not begin until the bridge and both highway approaches are completed.

Completion activities include paving the roadway and bridge, installing barriers and signs, and finishing the tie-ins to the existing highway. Table 3-22 shows that these activities are anticipated to require about 4 months, regardless of the alternative selected.

Table 3-22
Estimated Construction Period for Build Alternatives

Contract	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon
Nevada Approach	28 months	34 months	42 months
Arizona Approach	15 months	23 months	30 months
Bridge	38 months	36 months	33 months
Completion Activities	4 months	4 months	4 months
Total Construction Time	4 years, 9 months	4 years, 7 months	5 years, 3 months

Source: Reclamation. *Colorado River Bridge—Hoover Dam, Arizona-Nevada. Phase B—Corridor Studies.* August 1992.

3.11.2.1 Promontory Point Alternative

This alternative would be located just south of existing U.S. 93 until it reaches the Reclamation warehouse. Depending on the final design details, the new bypass roadway will probably cross U.S. 93 at one location on a grade-separated structure and traverse the Reclamation property east of the warehouse. Existing U.S. 93 would continue to provide access to Hoover Dam, Lakeview Point, and the Reclamation warehouse (see Figure 2-4).

Project construction would not affect traffic operations on the existing highway, except at the beginning of the alternative where the two roads cross near the warehouse.

On the Nevada approach, it appears that a balance between cut and fill quantities can be attained, and a waste disposal area would not be required. On the Arizona approach, one waste disposal area would be required.

An electric transmission tower on the Nevada approach would need to be relocated. Relocation of any one transmission tower may require additional work on adjoining towers of that particular line. An abandoned WAPA switchyard would need to be removed.

No major detours, closures, or traffic delays are expected during construction of the highway approaches. The existing highway could remain open with little interference except during the tie-in activity at the beginning and end of the project. Completion of the access road in Arizona is required before the existing highway could be closed to the public. Hauling across the existing Arizona highway would be necessary. Some delays could occur during blasting operations associated with excavation above the existing highway.

3.11.2.2 Sugarloaf Mountain Alternative (Preferred Alternative)

The preferred Sugarloaf Mountain Alternative follows the same corridor as the Promontory Point Alternative except at the Reclamation warehouse area, where the alternative turns to the southeast. Depending on the final design details, the new bypass roadway will probably cross U.S. 93 at two locations on grade-separated structures and traverse the Reclamation property east of the warehouse. Existing U.S. 93 would continue to provide access to Hoover Dam, Lakeview Point, and the Reclamation warehouse (see Figure 2-4).

On the Nevada approach, it appears that a balance between cut and fill quantities can be attained, and a waste disposal area will not be required. Hauling material for embankments would be required. On the Arizona approach, all material excavated from Sugarloaf Mountain would be expected to be used to build roadway embankments and no disposal would be required.

The sewage evaporation ponds on the Arizona side would be removed, and new ponds would be constructed downhill to the east of the existing ponds. The highway may affect the Reclamation warehouse storage yards.

No major detours, closures, or traffic delays are expected to occur during highway approach construction. The existing highway would remain open with little interference except during the tie-in activity at the beginning and end of the project. Hauling across the existing highway in two locations would be necessary. Construction of the Nevada access road would accommodate existing highway traffic during construction.

Transmission Towers and Lines. Construction of the preferred alternative would require removal and modification of existing electrical transmission components and construction of new electrical transmission components. The final configuration of electrical towers, transmission lines, and facilities would be determined during final design. FHWA would work with WAPA during final design to select the most beneficial solution considering all project elements and factors (e.g., operation and maintenance characteristics for both electrical transmission and transportation, historic and visual impacts, and construction considerations and costs). Any necessary modifications to the existing system would be performed under the direct oversight of WAPA.

Seven preliminary Colorado River crossing electrical transmission reconfiguration options have been developed by WAPA in coordination with FHWA (see Figures 3-14A through 3-14G).

All options require removal of existing spans (up to 10) and towers (up to 4) and construction of new spans (up to 7). Most options would require construction of new towers (up to 4) and modification of existing towers (up to 2) and spans (1). All options require removal of one or two existing Colorado River spans before bridge construction. One option requires construction of a new Colorado River span. Three of the options would require removal of the existing Arizona-Nevada Switchyard and replacing a single-phase circuit with a double-phase circuit to the Mead Substation.

Regardless of the final electrical transmission configuration chosen at the Colorado River crossing, the preferred alternative would require removal and construction of one tower, modification of two existing towers, and removal and construction of two spans in the vicinity of the bridge/tunnel on the Nevada side (see Figure 2-8).

Meetings with WAPA engineers confirmed that minimal additional right-of-way would be needed to implement any of the options. Therefore, indirect impacts outside of the project limits covered in this EIS would be minimal or nonexistent. FHWA would work with the two SHPOs to mitigate any adverse effects related to removal of historic transmission towers and facilities.

Construction Staging Areas. The preferred alternative is located generally south of the existing road corridor so that construction can be accomplished without interfering with traffic. Because the majority of the construction work would be done with no traffic to maintain, most of the necessary contractor staging could be done within the proposed right-of-way. For additional contractor staging, Reclamation has identified five areas that are available (Figure 3-15). These areas have been previously disturbed and are presently used for maintenance and contractor staging. No new staging areas would be required to construct the preferred alternative.

Material Sources. The design of the preferred alternative would be advanced during final engineering so that the earthwork quantities (cuts and fills) would be balanced. Borrow material would not be required. A waste area for excess rock would not be required.

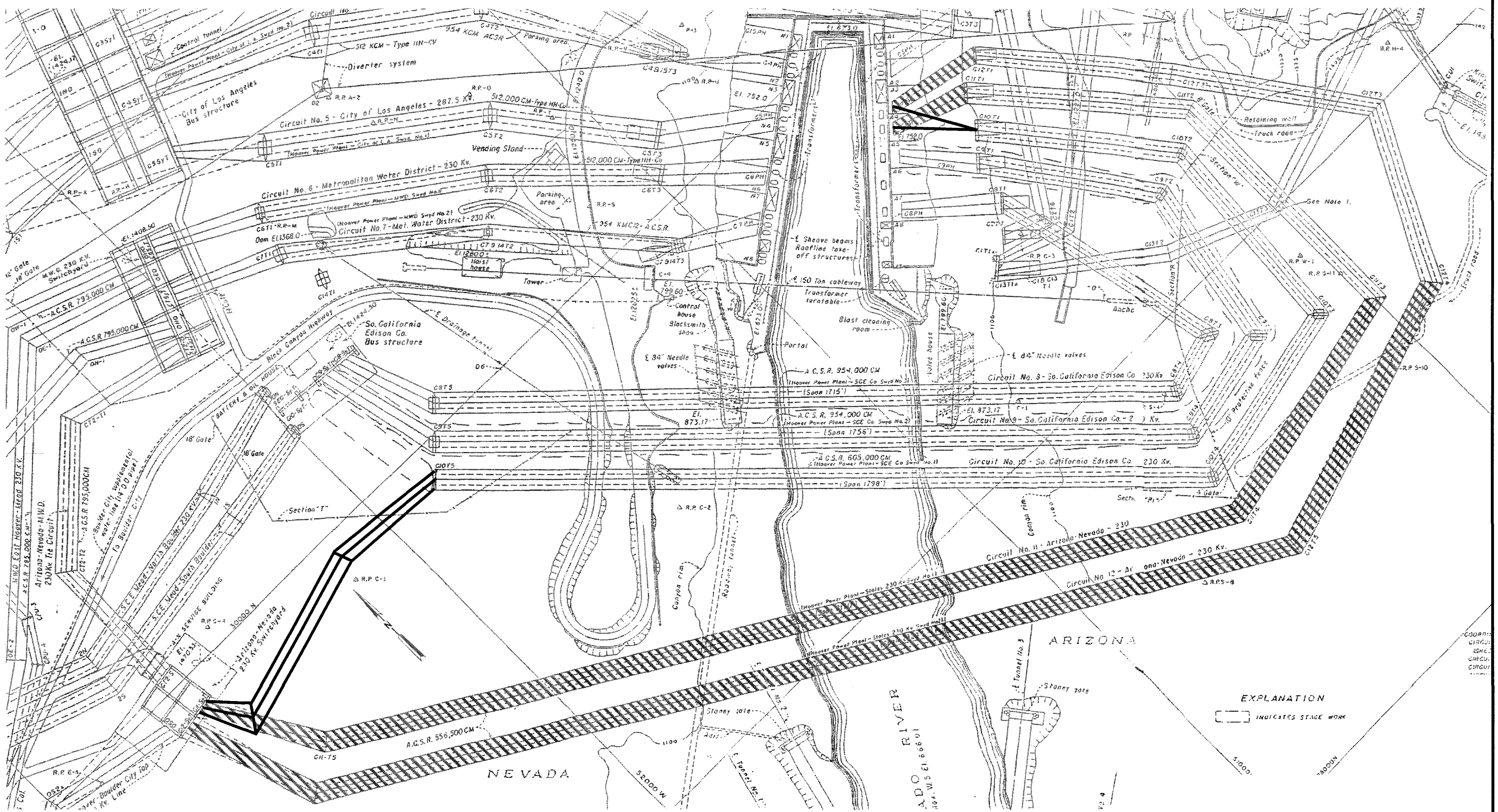
FHWA would not identify material sources for the production of aggregates. It is anticipated that the native rock within the right-of-way may be adequate to produce some or all of the aggregate needed for the project. Other aggregates may come from readily available commercial sources in the Boulder City and Las Vegas vicinity.

3.11.2.3 Gold Strike Canyon Alternative

This alternative would begin about 1,000 feet east of the Hacienda Hotel. The alternative would turn to follow Gold Strike Canyon toward the Colorado River.

Three waste disposal areas would be required on the Nevada approach to accommodate excess waste material. One waste disposal area on the Arizona approach would be required.

No significant relocation of existing features has been identified for this alternative. The alternative would cross under several existing transmission lines; no existing transmission towers would be affected. Two existing wood pole electric lines (one in Nevada and one in Arizona) cross the alternative, and some minor pole relocation may be necessary.



LEGEND

Relocated Transmission Lines

Removed Transmission Lines

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FIGURE 3-14A
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #1
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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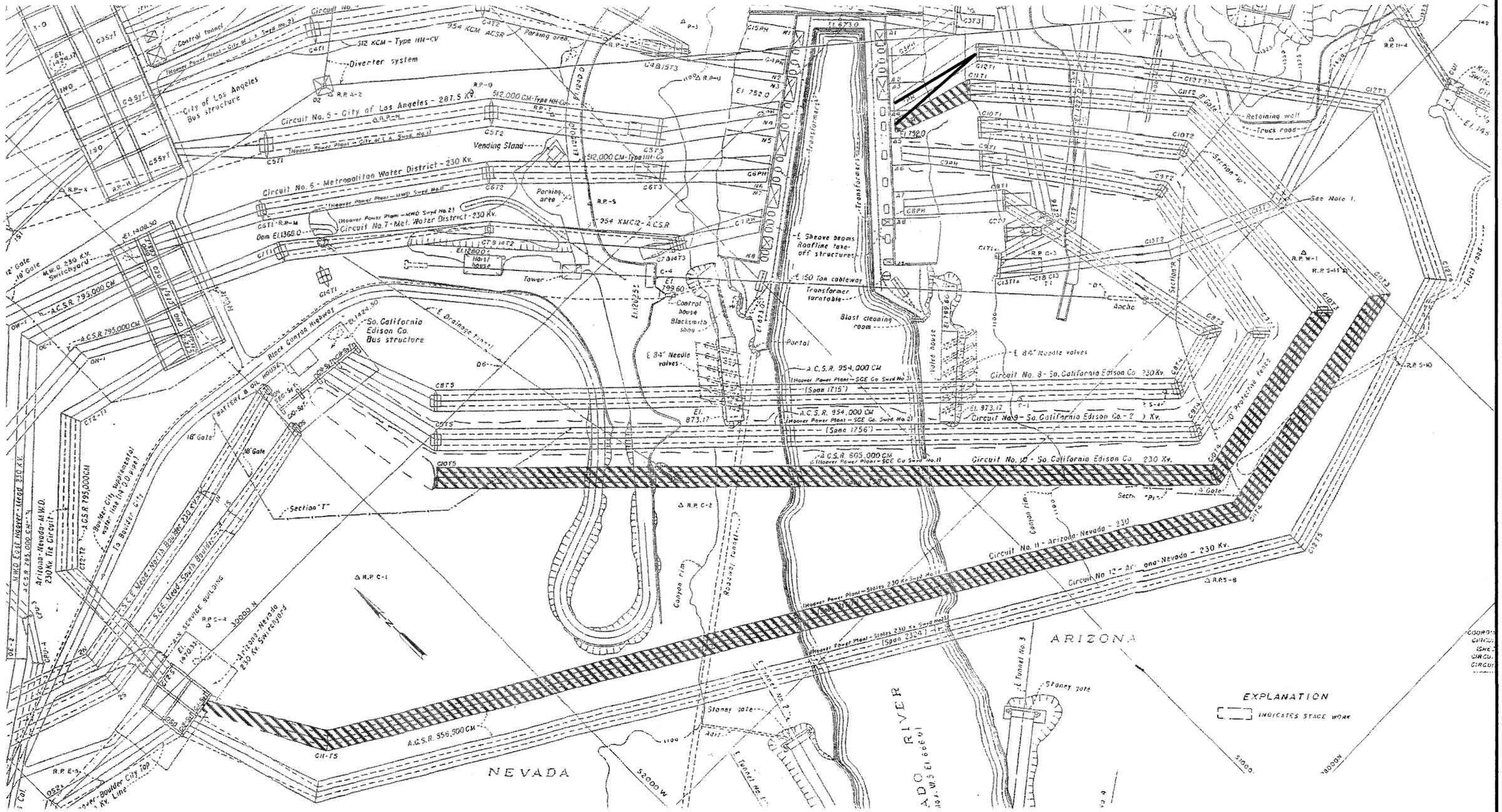

LEGEND

- Relocated Transmission Lines
- Removed Transmission Lines

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FIGURE 3-14B
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #2
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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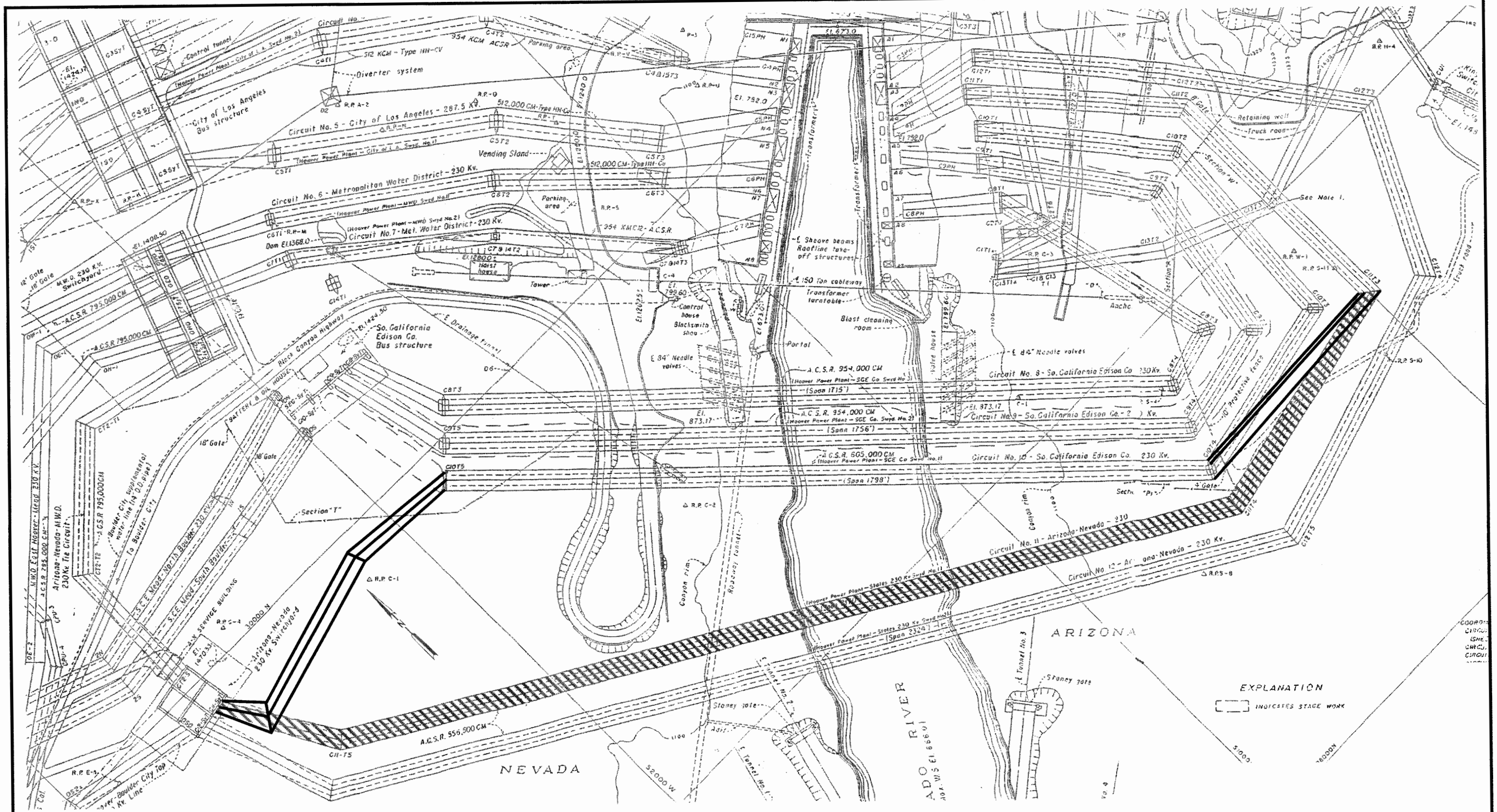

FIGURE 3-14C
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #3
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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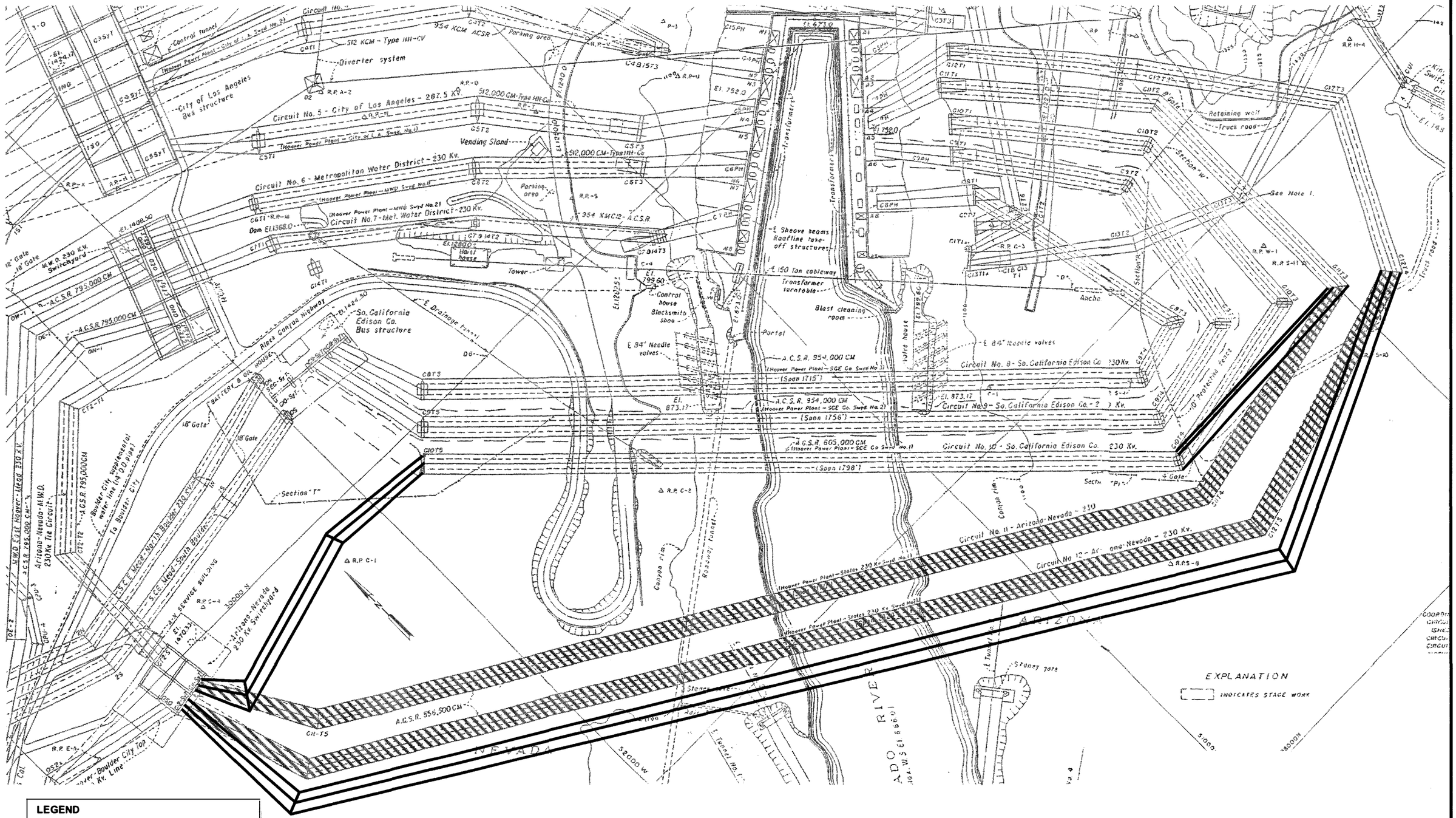

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FIGURE 3-14D
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #4
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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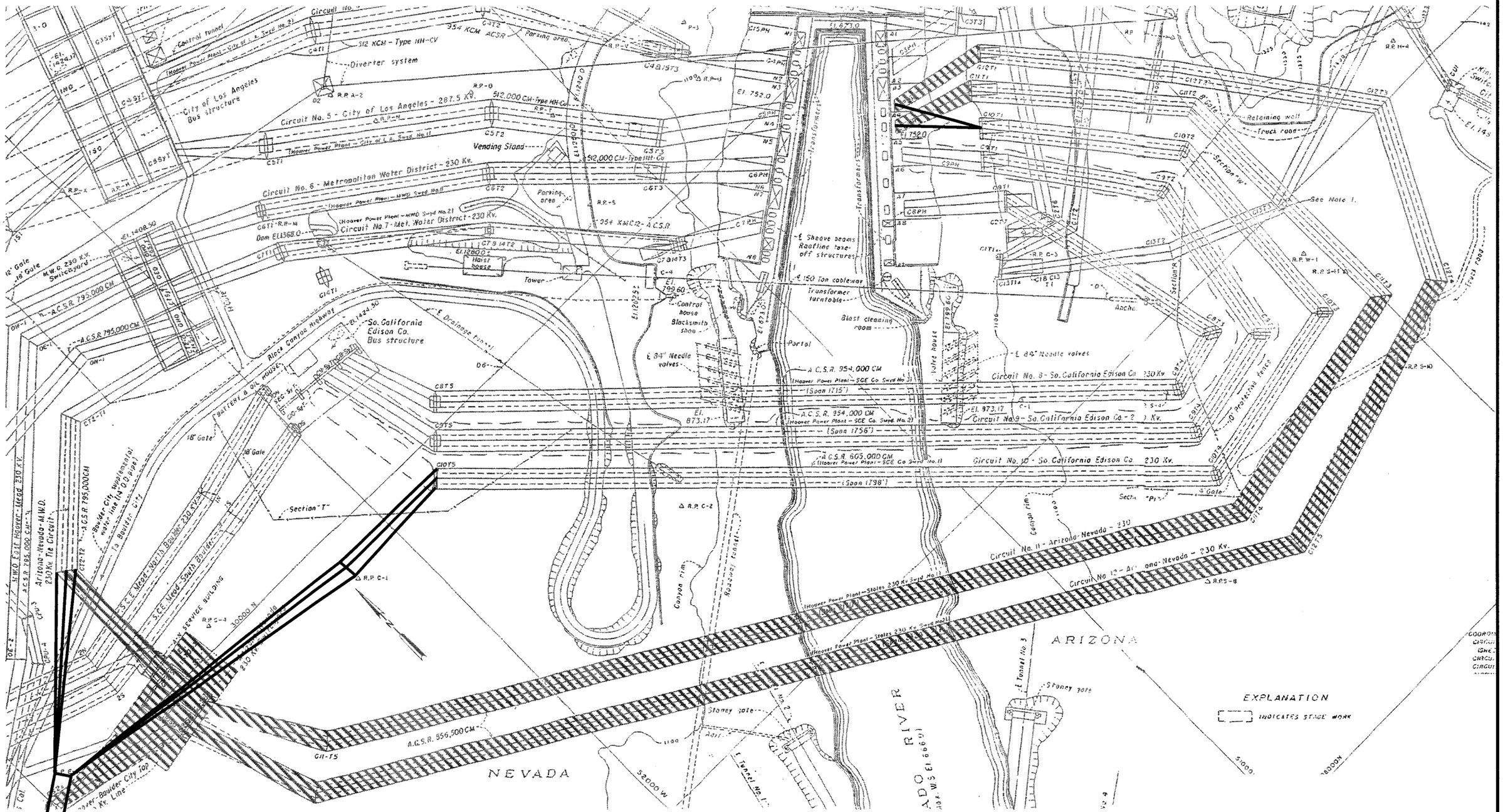

FIGURE 3-14E
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #5
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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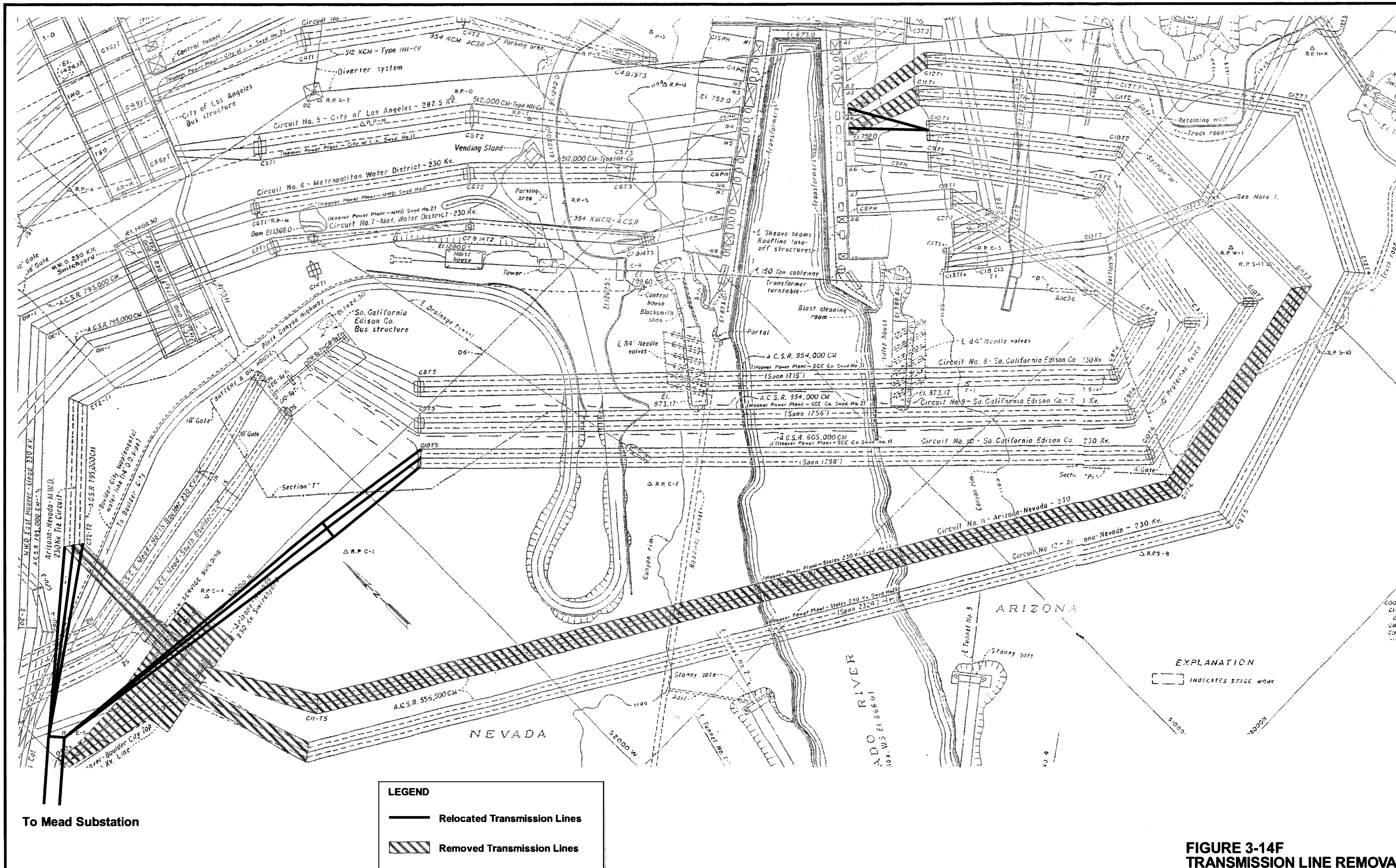

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FIGURE 3-14F
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #5A
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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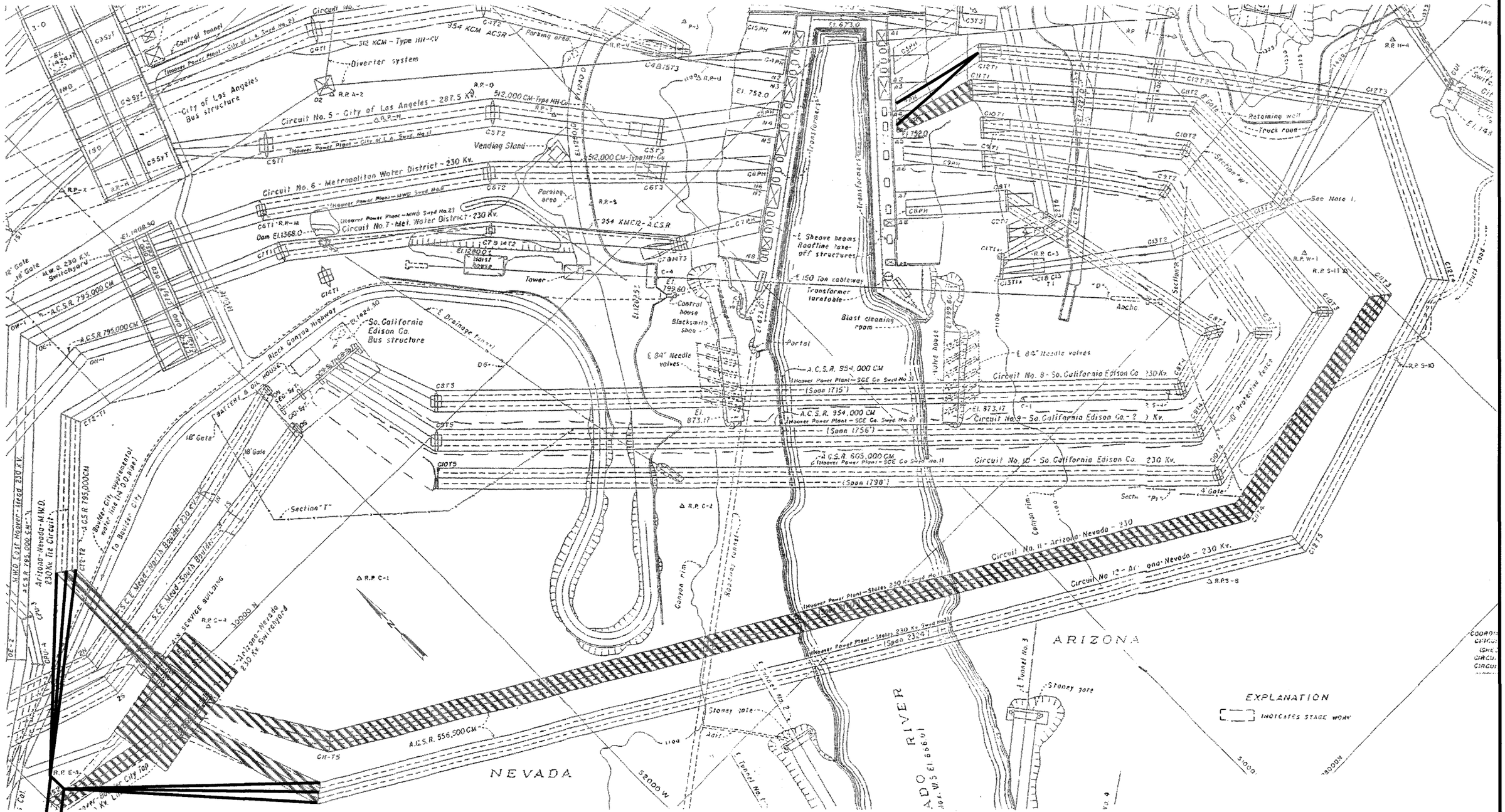

LEGEND

- Relocated Transmission Lines
- Removed Transmission Lines

FIGURE 3-14G
TRANSMISSION LINE REMOVAL AND RELOCATION OPTION #6
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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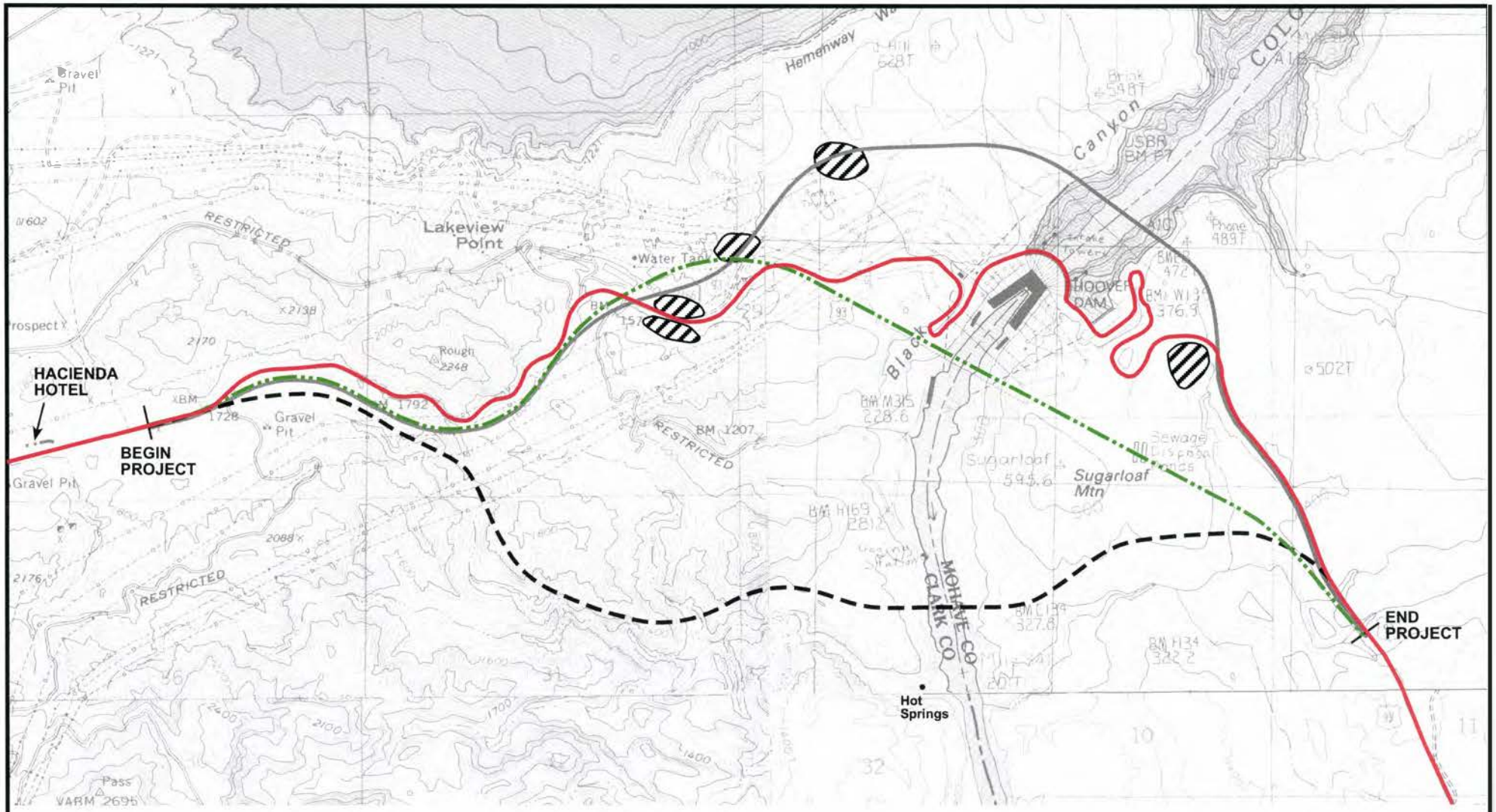

FIGURE 3-15
POTENTIAL CONSTRUCTION STAGING AREAS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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No major detours, closures, or traffic delays are expected during construction of the highway approaches. The existing highway could remain open with little interference except during the tie-in activity at the beginning and end of the project. Some improvements to the existing Reclamation access road, including enlarging the old haul road tunnel, would be required. All other Nevada construction access would be along the alternative from the beginning of U.S. 93. The Gold Strike Canyon hiking trail would be closed during construction, as the canyon bottom would be graded and used as an access road. On the Arizona approach, construction access would be primarily along the alternative from U.S. 93 back toward the river.

3.12 Energy

3.12.1 Construction Energy Usage

This section discusses the energy used to construct and operate the proposed project. Construction and operation of the three build alternatives would require similar fuel commitments. The No Build Alternative would not require fuel for construction.

The energy consumed to construct the proposed project can be estimated by making assumptions about the following variables:

- Construction cost of the alternative
- Construction duration of the alternative
- Number of construction workers traveling to and from the construction site
- Number of trucks and pieces of equipment used
- Efficiency of trucks and equipment (e.g., mpg)
- Length of time trucks and equipment would be used

For this analysis, the energy consumed would be the fuel used for project trucks, construction equipment, and workers' personal vehicles. Based on construction cost and duration, the estimated number is 70 full-time-equivalent workers throughout the construction duration of each of the build alternatives.

For the Promontory Point Alternative, fuel usage over the 4-year, 9-month construction period is estimated at 500,000 to 800,000 gallons, or 400 to 640 gallons per day.

For the Sugarloaf Mountain Alternative, fuel usage over the 4-year, 7-month construction period is estimated at 520,000 to 835,000 gallons, or 430 to 690 gallons per day.

For the Gold Strike Canyon Alternative, fuel usage over the 5-year, 3-month construction period is estimated at 560,000 to 900,000 gallons, or 400 to 650 gallons per day.

3.12.2 Operation Energy Usage

Primary energy usage during operation of the proposed highway and bridge would be fuel for vehicles traveling over the roadway and structure. Because roadway and bridge inspection and maintenance would require regular, but infrequent, trips to the area, energy usage for this phase would be lower than for the construction phase, and is not considered significant.

Post-construction operational energy requirements are expected to be less per vehicle for the three build alternatives than for the No Build Alternative because the existing traffic congestion on U.S. 93 near Hoover Dam and atop the dam is expected to worsen as traffic

volumes increase. This condition would result in increasingly lower fuel efficiency of vehicles traveling across Hoover Dam.

3.13 Local Short-Term Uses Versus Long-Term Productivity

This section discusses the proposed project's short-term impacts on resource use, and maintenance and enhancement of long-term productivity. Construction and operation of any of the three build alternatives would result in similar short- and long-term impacts and benefits. The following sections discuss these impacts and benefits.

3.13.1 Short-Term Uses of Man's Environment

Short-term project costs include the commitment of substantial financial and material resources. Short-term uses of man's environment include project impacts considered significant and temporary, including construction effects on local air quality; ambient noise levels; increased erosion; potential fuel or chemical spills; potential transportation and circulation impacts; effects on vegetation, wildlife habitat, recreation, and cultural resources; disturbance of special-status species; and effects on the area's visual resources. These impacts are mitigated to less than significant levels with the preferred alternative.

Project construction impacts are discussed in more detail earlier in this chapter. A benefit during the construction phase would be the creation of construction-related employment.

3.13.2 Long-Term Effects of the Proposed Project

Dedication for the proposed project would preclude opportunities for alternate land uses. Long-term effects of the proposed project include changes in landforms, visual quality, recreational opportunities, and localized hydrology; an increase in localized ambient noise levels; reduction of open space; and a loss of vegetation and wildlife habitat.

Long-term benefits would include increased public safety at Hoover Dam resulting from traffic reduction and commercial truck elimination, and improved travel speeds on U.S. 93 resulting in time savings for personal vehicles and commercial trucking. An additional benefit is U.S. 93 would become part of the international trade route proposed by NAFTA.

U.S. 93 on the Arizona and Nevada approaches to Hoover Dam currently operates at LOS E. The LOS at the dam is currently F. If the No Build Alternative is implemented, both approaches and Hoover Dam will be at LOS F by year 2017. Constructing and operating the proposed project would result in LOS E at Hoover Dam, LOS B at the Nevada approach in year 2017 and C for year 2027, and LOS A at the Arizona approach in year 2017 and B for year 2027.

3.13.3 Conclusion

The proposed transportation improvements would meet long-term needs identified in the Nevada and Arizona state transportation plans. These plans consider present and future traffic requirements based on existing and future intended land use patterns. The local short-term project construction impacts, after mitigation is implemented, are acceptable in view of the maintenance and enhancement of long-term productivity that would be provided for the local area; for Nevada, Arizona, and Utah; and for international trade pursuant to NAFTA. In addition, long-term benefits provided by the proposed bridge and roadway alternative are anticipated to outweigh the long-term impacts of operating the facility.

3.14 Irreversible and Irretrievable Commitment of Resources

This section discusses the proposed project's irreversible and irretrievable commitment of resources. Implementation of any of the build alternatives would require a commitment of natural, physical, human, and fiscal resources. Construction and operation of any of the three build alternatives would require a similar commitment of these resources. This discussion focuses on the following issues:

- The project's use of nonrenewable resources during the construction and operation. Included in this discussion are fossil fuels, highway construction materials, electricity, water, and labor.
- The changes expected to occur as a result of the proposed project. These changes include the commitment of land for the proposed project, physical changes in the environment, effects on human populations, and fiscal changes.

3.14.1 Use of Nonrenewable Resources

As discussed in Section 3.12, construction of the proposed project would require the use of fossil fuels for construction vehicles and equipment and construction worker vehicles. Relatively minor amounts of electricity may also be used at construction trailers or by portable generators during project construction. In addition, operation of the proposed project would require the use of fossil fuels by vehicles traveling along the constructed alternative.

Both labor and highway construction materials, such as concrete, sand, aggregate, and steel, would be expended during construction. Labor and natural resources would also be used in the fabrication of construction materials. These materials generally are not retrievable. The use of these materials and labor during project construction would not have an adverse effect on the continued availability of these resources. Operation of the proposed project would result in greater fuel efficiency of vehicles traveling on the newly constructed alternative when compared to those vehicles traveling at slower speeds on the existing highway across Hoover Dam.

3.14.2 Expected Changes as a Result of the Proposed Project

Nevada and Arizona have committed land for use as a transportation corridor along U.S. 93. The new Nevada and Arizona approaches would require the commitment of additional land to construct and implement the proposed project. This additional commitment of land would result in the loss of public parkland and recreation areas, vegetation and wildlife habitat and foraging areas, and it would affect special-status species and wildlife dispersion opportunities.

Land used for the proposed project is considered an irreversible commitment during the period land is used for the highway facility. If, in the future, a greater need arises for use of the land, or if the highway facility is no longer needed, the land could be converted to another use. However, it is not likely that once the proposed project is constructed such a conversion would ever be necessary or desirable.

As discussed in Section 3.7, Visual Resources, alteration of the landscape where the proposed project is constructed would be considered an irreversible environmental change. Although the proposed bridge and new highway could be removed and the land converted to another

use in the future, it is neither likely that such conversion would occur, nor is it likely that the landscape would return to its pre-project condition.

Construction of the proposed project would generate jobs for the approximately 4- to 5-year construction period. During construction, labor would be needed to build the proposed bridge and roadway and to fabricate construction materials. Long-term maintenance of the proposed project would also generate jobs.

Construction of the proposed project would require a substantial one-time expenditure of federal and possibly state funds, which are not considered retrievable. Long-term facility maintenance costs are also not retrievable. A slight decrease in the amount of expenditures at the two concession stands on the dam may result from fewer vehicles traveling across the dam after the new roadway and bridge are constructed. No change in expenditures in Phoenix or Kingman, Arizona, or Las Vegas, Boulder City, or Henderson, Nevada, are expected from implementation of the proposed project. No change in highway taxes are expected from the proposed project.

3.14.3 Conclusion

Tourists, residents, and the commercial trucking industry of Clark County, Mohave County, and throughout Nevada, Arizona, and Utah would benefit by the proposed improvements to the transportation system. These benefits consist of increased public safety at Hoover Dam by reducing the amount of traffic on the dam and eliminating commercial trucks from it; and improved travel speeds on U.S. 93, resulting in a time savings and reduction in transit costs for commercial trucks and a time savings for personal vehicles traveling between Phoenix and Las Vegas. In addition, roadway improvements would allow the U.S. 93 corridor to be part of the international trade route proposed by NAFTA. These benefits are anticipated to outweigh the commitment of the above-listed natural and fiscal resources.

CHAPTER 4

Unavoidable Adverse Impacts

4.1 Introduction

Some impacts to specific resources were evaluated for each build alternative and the No Build Alternative, while others were evaluated regionally. Where data were available for each alternative and effects differed, individual alternative analyses were performed.

Constructing and operating any build alternative would irreversibly and irretrievably commit environmental resources to the project. An irreversible commitment is the permanent loss of the resource.

4.2 Air

After implementing construction mitigation measures, no further adverse impacts were identified. As a result of implementing one of the build alternatives, a beneficial impact would occur because air quality is expected to improve in the proposed project area during operations. Because of increased traffic, air quality in the Hoover Dam vicinity would worsen if the No Build Alternative were selected (see Section 3.1).

4.3 Noise

Even with mitigation measures, the Gold Strike Canyon Alternative would still exceed standards at the upper end of the canyon on the hiking trail. Noise is higher for the No Build Alternative than for any of the build alternatives at the dam crossing (see Section 3.2).

4.4 Biological Resources

Implementing any build alternative could result in the loss of 122 to 143 acres of wildlife habitat (see Table 3-13), including associated vegetation and either the displacement of, or direct loss of, associated wildlife. Partial recovery of some of these losses may be attained through the mitigation measures described in Chapter 3, Measures to Minimize Harm. Implementation of the build alternatives will result in 0.66 to 2.77 acres of temporary fill and 0.11 to 0.67 acres of permanent fill in waters of the United States (see Table 3-16, Section 3.3).

4.5 Water Resources

For the build alternatives, constructing the roadway will increase both short-term and long-term sediment yield over existing conditions. Removing existing vegetative and rock cover will disturb existing conditions, increasing the short-term sediment yield and impacting local and, to a lesser extent, regional water quality. Using BMPs and other measures discussed in Chapter 3 will reduce this impact.

For the three build alternatives, no adverse unavoidable long-term impacts would occur following implementation of BMPs and design/construction of hazardous material spill containment elements (see Section 3.4).

4.6 Cultural Resources

4.6.1 Promontory Point Impacts

Adverse effects on the Hoover Dam National Historic Landmark (NHL) would occur from visual elements of the project that would diminish the integrity of the historic features and setting. Furthermore, FHWA and the NPS determined that construction of the new bridge would adversely affect visitors' historic views of the dam from U.S. 93 in both Nevada and Arizona, and this could not be mitigated. Based on the preliminary design, the Promontory Point Alternative also would have an adverse effect on the following additional historic properties eligible for the National Register for their association with the construction and operation of Hoover Dam or as contributing elements to the NHL: NV:DD:14:30, 26-CK-4751, 26-CK-4752, 26-CK-4753, 26-CK-4754, 26-CK-4765, and 26-CK-5180 (see Section 3.5).

Unavoidable adverse impacts would occur to prehistoric archaeological site NV:DD:14:23 and probably to site NV:DD:14:25. These impacts would occur during construction for the former and operations for the latter. These sites were found to be ineligible for the National Register.

The Promontory Point Alternative also would have an adverse effect on the Gold Strike Canyon and Sugarloaf Mountain TCP.

4.6.2 Sugarloaf Mountain Impacts (Preferred Alternative)

Adverse effects on the NHL would occur from visual elements of the project that would diminish the integrity of the historic features and setting. However, FHWA and the Nevada and Arizona SHPOs determined these effects can be mitigated. Based on the preliminary design, the Sugarloaf Mountain Alternative also would have an adverse effect on the following additional historic properties eligible for the National Register for their association with the construction and operation of Hoover Dam or as contributing elements to the NHL: NV:DD:14:1, NV:DD:14:29, NV:DD:14:30, 26-CK-4751, 26-CK-5180, 26-CK-5789, 26-CK-5790, and 26-CK-5792. Of these, sites NV:DD:14:1 and 26-CK-5790 would not be physically damaged but only indirectly affected by a change in the setting.

Unavoidable adverse impacts would occur to prehistoric archaeological sites NV:DD:14:21 and NV:DD:14:22 from construction of this alternative. These sites were found to be ineligible for the National Register; however, 14:21 is a contributing element of the TCP.

The Sugarloaf Mountain Alternative would also have an adverse effect on the Gold Strike Canyon and Sugarloaf Mountain TCP; however, the alignment traverses the TCP in an area of extensive disturbance. The Nevada and Arizona SHPOs, the Advisory Council on Historic Preservation, and participating Native American tribes have signed a Programmatic Agreement including measures and processes for minimizing harm to the TCP from the preferred alternative.

4.6.3 Gold Strike Canyon Impacts

Based on the preliminary design, the Gold Strike Canyon Alternative would have an adverse effect on the following historic properties eligible for the National Register for their association with the construction and operation of Hoover Dam or as contributing elements to the NHL: NV:DD:14:15, NV:DD:14:16, NV:DD:14:30, 26-CK-4743, and 26-CK-4750.

Since no archaeological sites were identified along this alternative, no unavoidable adverse impacts are expected.

The Gold Strike Canyon Alternative also would have an adverse effect on the Gold Strike Canyon and Sugarloaf Mountain TCP. Based on the severity of this impact, it may be unmitigable.

4.7 Land Use

No unavoidable adverse impacts are identified for any of the three build alternatives. If the No Build Alternative is selected, changes in land use would not occur (see Section 3.6).

4.8 Visual Resources

The proposed bridge (regardless of the alternative implemented) would alter the view, both during construction and operation, from Hoover Dam, Lake Mead, the river put-ins, or the hiking trail and hot springs. For the Promontory Point Alternative, the impact on visual resources is considered unmitigable. Some viewers may consider the bridge to add variety to the view.

FHWA and the NPS determined that construction of a bridge at the Promontory Point crossing would adversely affect visitors' "first impression" historic views of the dam. These views occur as motorists approach the dam on existing U.S. 93 from both Nevada and Arizona. The dominance of the Promontory Point bridge would significantly detract from the historic views of the dam and could not be mitigated. In contrast, the Sugarloaf Mountain bridge would not detract from the historic views as visitors approach the dam from the Arizona and Nevada approaches because it is not visible due to the existing roadway alignment, which presents a direct view of the dam and Lake Mead (see Section 3.7).

4.9 Recreation

Regardless of the alternative selected, construction activities would affect recreation activities that occur in designated construction safety zones or construction areas. In addition, the hiking trail in Gold Strike Canyon would be closed to public access during construction of the Gold Strike Canyon Alternative. This effect is considered an unavoidable adverse impact but is necessary to protect the public's safety.

The proposed bridge (if either the Promontory Point or Sugarloaf Mountain Alternative is implemented) would alter the view, either from Hoover Dam, Lake Mead, or the river put-ins. Implementation of the Gold Strike Canyon Alternative would alter the view from the hiking trail and the hot springs. This impact is considered unavoidable but is not necessarily adverse. Some recreationists are expected to consider the bridge as adding variety to the views.

Unavoidable adverse noise impacts to recreation on the hiking trail are anticipated if the Gold Strike Canyon Alternative is implemented (see Section 3.8).

4.10 Socioeconomics

No unavoidable adverse impacts on population, employment, income, social conditions, minority or low-income populations are expected from any of the build alternatives or from the No Build Alternative.

Implementation of any of the build alternatives would have a beneficial impact on transportation and circulation that would not occur if the No Build Alternative were selected (see Section 3.9).

4.11 Hazardous Materials

No unavoidable adverse impacts would occur from implementing any of the build alternatives or from the No Build Alternative (see Section 3.10).

CHAPTER 5

Cumulative Impacts

Note: The following chapter has been substantially revised based on comments received on the DEIS from EPA (see Volume II).

5.1 Introduction

This section addresses potential cumulative impacts to the environment that could be associated with the implementation of the proposed U.S. 93 Hoover Dam Bypass Project in concert with one or more other past, present, or reasonably foreseeable future actions or projects. Specifically, this section is prepared in accordance with the requirements of NEPA and guidance from the Council on Environmental Quality (CEQ), Considering Cumulative Effects Under the National Environmental Policy Act. The CEQ regulations define a "cumulative impact" for purposes of NEPA as follows:

> Cumulative impact is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR §1508.7).

This cumulative impacts section gives emphasis to the actions or projects that are likely to cause the most significant cumulative impacts (i.e., projects that would occur relatively close to the project site). For other transportation projects in the region, this cumulative impacts section focuses primarily on the potential impacts of reasonably foreseeable future actions. The impacts of past and present actions are also discussed, but in less detail and in a more qualitative manner.

5.2 Cumulative Impacts Analysis

5.2.1 Other Actions/Projects Included in the Cumulative Impacts Analysis

The following criteria were considered in identifying those past, present, or reasonably foreseeable projects that could result in cumulative impacts:

- Projects that have an application for construction and/or operation pending before an agency with permit authority
- Projects that are listed on the Arizona Transportation Improvement Program (STIP) or the Nevada STIP
- Projects that have the potential to generate environmental impacts that, when addressed collectively with the proposed project, could result in cumulative impacts to the environment
- Projects that are of a similar character, could affect similar environmental resources, or are located in geographic proximity to the proposed project

5.2.2 Scope of the Cumulative Impacts Analysis

The geographic area addressed in this analysis varies according to the nature and characteristics of each environmental resource. Two geographic areas are defined to categorize this analysis. A description of each follows:

1. The first area is the vicinity of the proposed project and includes the area within the NHL boundary, portions of the HDR boundary, and portions of the LMNRA (see Figure 2-3).

2. A second area encompasses a substantial portion of the surrounding desert region, a geographic area generally corresponding to the Las Vegas and Henderson urban area in Clark County, Nevada, and Mohave County, Arizona. This geographic area is used to include a broader range of other projects and environmental resources well beyond the immediate vicinity of the proposed project.

5.2.3 Timing and Duration of Other Actions/Projects

For each of the projects addressed in this analysis, the time period in which it would be implemented, including construction and operational phasing, is defined. Information on the timing and duration for the other projects was obtained from applicant proposals, when available. When this information was not available and could not otherwise be obtained through reasonable efforts (e.g., direct contact with applicants), professional judgement was used to estimate a reasonable time frame to complete the regulatory review and permit issuance processes needed for implementation of the other projects.

5.2.4 Future Time Horizon of the Proposed Project

A horizon has been selected to discuss potential cumulative impacts of the Hoover Dam Bypass and other past, present, and reasonably foreseeable projects. The time horizon for the Sugarloaf Mountain Alternative, the preferred alternative, is 7 years, the approximate time to complete design and construction.

5.2.5 Cumulative Projects Data and Information

Each of the projects addressed in this cumulative effects analysis is supported by different levels of information, depending upon the current status of the particular project. For future projects, this information ranges from a simple project description, identifying its goals and objectives, to a comprehensive environmental review performed in accordance with NEPA or other state or local environmental regulations. For past projects, relevant agencies or departments were interviewed about documents that might discuss the history of the project, including past project impacts.

This analysis uses the level of information available at the time this EIS document was prepared to describe these other projects and their respective potential impacts on the environment. If sufficient data or information on specific aspects of the proposed project were not available to complete an analysis comparable to the evaluation of other projects, and reasonable efforts to obtain that information were unsuccessful (as in the case of the U.S. 95 widening in Nevada), professional judgement was used to estimate the potential impacts.

5.2.6 Reasonable Forecast Analysis

In accordance with the CEQ guidance, this analysis assesses future cumulative effects for projects that can be reasonably forecast. This includes those projects that are currently funded or for which other NEPA analysis is being prepared, and those that are being considered but have not reached a funding or environmental document stage.

5.3 Methods Used for Identifying Other Past, Present, and Reasonably Foreseeable Actions/Projects

Several methods were used to identify other past, present, and reasonably foreseeable projects that could, in concert with the proposed Hoover Dam Bypass, contribute to cumulative impacts on the environment. For projects occurring on lands administered by federal agencies, the agency with primary land management authority identified projects that could potentially contribute to cumulative environmental effects. These agencies include the following:

- ADEQ
- ADOT
- AGFD
- FHWA
- Los Angeles Department of Water and Power
- NPS
- Nevada Department of Conservation and Natural Resources
- NDOT
- WAPA
- Reclamation
- USFWS

Surveying other land management authorities within the southeast Nevada/western Arizona region identified other projects. These surveys consisted of informal inquiries designed to acquire existing available environmental documentation and project descriptions. Concerning other projects located on private properties in the vicinity of the proposed bypass, the Clark and Mohave County Planning Departments determined that there are no applications or proposals for specific plans.

5.4 List of Past, Present, and Reasonably Foreseeable Actions/Projects and Respective Environmental Impacts

The actions or projects that could result in changes to the local environment (and result in cumulative impacts when combined with the proposed project) would include any actions proposed by NPS and Reclamation, and highway projects proposed by NDOT, ADOT, or local jurisdictions such as Clark and Mohave counties.

NPS and Reclamation administer the land in the immediate vicinity of Hoover Dam. No new actions or projects are proposed within the project area by these two agencies; therefore, no environmental impacts (such as biological, cultural, air quality, noise, recreation, visual, or aesthetic) would result and, consequently, the proposed project would not contribute to significant cumulative impacts. Similarly, no projects are proposed by

Clark and Mohave counties in the immediate project vicinity that would contribute to cumulative environmental impacts with the proposed project.

ADOT and NDOT each have two reasonably foreseeable future projects. NDOT plans to begin improvements (widening the two-lane segments to four-lane, median divided) to U.S. 95 from the California/Nevada state line to the U.S. 93 intersection west of Boulder City. Further, NDOT is currently preparing an environmental document for U.S. 93 improvements from the western terminus of the Hoover Dam Bypass project to U.S. 93 about 1 mile north of Railroad Pass Casino, west of Boulder City. ADOT is currently constructing improvements on Arizona SR 68 from MP 1.2 to MP 14.5. Further, ADOT plans to begin a preliminary study for improvements to U.S. 93 from the LMNRA eastern boundary to the eastern terminus of the Hoover Dam Bypass project.

5.4.1 Past Actions/Projects Near and Within the Project Vicinity

In its natural state, the Colorado River flowed unimpeded some 1,700 miles with a vertical elevation drop of more than 14,000 feet from its beginnings in the southern Rocky Mountains and eastern Great Basin to its terminus at the Gulf of California. The lower portion of the river from the Grand Canyon downstream was typically low gradient and flowed through a rather broad alluvial valley with relatively few confined reaches. At its mouth was an alluvial delta containing vast marshes, riparian forests, and backwaters. Such habitats were present along the entire reach of the lower river. The riparian belt extended away from the river for up to several miles, where the water table was relatively shallow.

Seasonal flooding resulted in the creation of several distinct communities of plants and animals. High water occurred around June, with low flows occurring during the winter months. Riparian communities were in a constant state of succession as the river, on a seasonal basis, was constantly depositing new sediment, shifting its channel, and creating and destroying habitat. Floodplain communities developed in areas prone to extended periods of inundation, and the aquatic community evolved consisting of a main channel with separate or connected oxbows and backwaters.

The overall ecosystem of the lower Colorado River today is quite different from that which existed prior to modern day use and development. During historic times, the area surrounding the Hoover Dam was used for a wide variety of purposes. Past activities in the project area and vicinity included cattle grazing, hunting, and mining for turquoise, gold, and silver. Mining occurred in the late 1800s and early 1900s in several areas within about 5 miles of Hoover Dam. Turquoise mining occurred near the location of the Hacienda Hotel; gold and silver mining occurred in locations on the Arizona side of the dam. Cattle grazing and hunting historically occurred in the project vicinity, but were not allowed near Hoover Dam (personal communication, Bill Burke, NPS, 1998).

The project area and vicinity currently consist of a mixture of land uses and facilities. Current uses and facilities include the dam and related hydroelectric facilities, a utility corridor (transmission towers and lines), a transportation corridor (U.S. 93 and access roads to the dam, lake, and river), and developed recreation facilities (visitors' center and parking garage at the dam, boating facilities, rafting and canoeing facilities, hiking trails, hot springs, and scenic lookouts).

These past and present activities, in addition to future planned projects, have and will continue to have a variety of impacts on the environment in the vicinity of Hoover Dam. These projects are described below in chronological order from past to future.

5.4.1.1 Construction of Hoover Dam

In 1928, Congress passed the Boulder Canyon Project Act authorizing construction of Hoover Dam. (Hoover Dam has also been called Boulder Dam; Congress made the name Hoover Dam permanent in 1947 after Herbert Hoover, the 31st President of the United States, who strongly supported construction of a high concrete dam on the Colorado River.) Construction of Hoover Dam began in 1931, and the last concrete was poured in 1935 – exactly 2 years, 1 month, and 28 days ahead of schedule. Hoover Dam's reservoir, Lake Mead, is America's largest man-made reservoir and can store 28.5 million acre-feet (9.2 trillion gallons) of water, or nearly 2 years of the river's average annual flow. (An acre-foot of water could cover a football field to a depth of 1 foot.)

Direct Impacts of Dam Construction

In order to construct Hoover Dam, engineers first drove a diversion tunnel through the wall of the river canyon from a point upstream of the dam site to a point downstream. They then lined the tunnel with concrete and built inlet and outlet sections to minimize flow turbulence. Cofferdams (watertight structures that allow exposure of the riverbed) were placed across the river above and below the dam site to divert the water into the tunnel and prevent it from backing up into the dam site. During construction of Hoover Dam, the Colorado River was diverted into four 56-foot-diameter tunnels averaging more than 4,000 feet in length. These tunnels were drilled and blasted out of the rock walls on either side of the river. Tunneling activity reached its peak in January 1932, with as much as 16,000 cubic yards of rock being hauled away every day by the truck fleet. The construction of the cofferdams required the removal of nearly 213,000 cubic yards of river silt from the bed of the Colorado River, which was replaced by sand and gravel and covered with concrete.

These activities completely altered streamside communities in the construction zone. The river could no longer supply water to flora and fauna along the natural stream course, and organisms that move with the stream flow had no natural bank habitat to supply them with nutrition and cover. After they diverted the river, work crews cleared the vegetation from the dam construction and reservoir areas. Thus, riparian habitat was directly destroyed. Dam construction required excavation of foundation and abutment areas for the dam. First workers dredged the area and removed all earth, sand, gravel, and loose rock, directly destroying riparian vegetation. Digging in the river bottom may have lowered the water table and made water inaccessible to established vegetation root systems. Additional rock was drilled, blasted, excavated, loaded, and removed so that the dam could be constructed on solid bedrock.

Facilities, such as roads, buildings, minor utility pipelines, surfaced areas for parking, and storage areas, were developed to facilitate construction. For the Hoover Dam construction, power lines were also strung across the Mojave Desert from San Bernardino and Victorville, California, to a substation on a rocky promontory near the canyon rim to provide power for all machines and illuminate the entire dam site, including tunnels.

As part of the necessary infrastructure for the construction of the dam, the Boulder Canyon Project Federal Reservation was created. This 144-square-mile area in the Eldorado Valley included the dam site, the lower portion of the future reservoir, the site of Boulder City, and

vast stretches of open territory around the town. This area was under federal control and, unlike the surrounding jurisdictions, gambling, the sale of liquor, and other practices deemed injurious to the workers and the orderly progress of work were strictly prohibited. The town, named Boulder City, included eight 172-man dormitories, one 53-man office dormitory, more than 600 family cottages, a mess hall and recreation hall, an office building, company store, laundry, and a 20-bed hospital. Sewer and water lines were laid out and hooked up, and nearly 20 miles of streets were paved. Reclamation spent well over a million dollars constructing the administration building, government residences, and landscaping for streets and parks. Privately financed structures housing various independent businesses sprung up along Nevada Highway, the main street in town. The key to this transformation of the Eldorado Valley was a network of elaborate, expensive pumps and pipes that carried water from the Colorado River out of Black Canyon to the town (Stevens, 1988).

After the construction of Hoover Dam was completed, a large portion of Boulder City was razed, as required by the government contract. This included hundreds of cottages, half a dozen dormitories, the mess hall, the recreation hall, and many other structures. The southern half of the city was returned to a state closely resembling its predam condition. Two dormitories were set aside to house Civilian Conservation Corps workers working on the Boulder Dam National Recreation Area, and a number of cottages were resold and hauled offsite for other uses. However, the landscaping remained and some of the original buildings are still standing, including the hospital, Grace Community Church, the Boulder Dam Hotel, and a number of enlarged and renovated cottages (Stevens, 1988).

On February 29, 1936, Hoover Dam and its powerhouse were accepted as complete. In addition to the direct, adverse, environmental effects of the dam's construction, there were immediate beneficial effects, which included water and power for the Los Angeles metropolitan area and water and flood protection for the fertile agricultural lands of Southern California and Arizona.

In general, the development of Hoover Dam and its associated facilities involved construction activities that likely resulted in temporary localized impacts on air quality, ambient noise levels, water quality, recreation resources, and aesthetic and visual resources. Impacts on local air quality would have likely occurred from construction equipment and vehicles traveling on dirt roads and during earth-moving activities. The impacts from increases in ambient noise levels would have resulted from the construction equipment, vehicles, and personnel constructing the various projects. Impacts to local water quality and riparian ecosystems could be expected to have occurred where construction activities, including scaling of the cliffs in Black Canyon, were conducted near Lake Mead, the Colorado River, or any of the washes or other water bodies in the project vicinity. The impacts to aesthetic resources would have occurred from the presence of the construction vehicles, equipment, and personnel, the dust and noise generated, and the change to the landscape that resulted. All of these impacts are construction related, specific to the projects' locations, and once the projects were completed, the impacts ceased and natural systems (air, water, vegetation, and wildlife) adapted and stabilized. Furthermore, prior to development of the dam, there were no permanent human receptors or habitations sensitive to noise, air, and aesthetic impacts – only construction workers and visitors to the construction site.

Long-term impacts to cultural resources occurred during project construction because of both the disturbance to the cultural resource sites and the imposition of new facilities

changing the setting and accessibility of cultural resource sites. Consultations with Native Americans for the DEIS provided numerous comments from tribal informants that construction of the dam and impounding of the waters of Lake Mead had a serious adverse effect on the traditional cultural landscape.

Substantial long-term visual effects on the environment occurred. After project construction was completed and the construction vehicles and equipment were removed, the change to the landscape from the dam and Lake Mead was dramatic and profound, and it was unlikely to revert to its preproject conditions.

The development of Hoover Dam and its associated facilities also contributed in a beneficial manner to the local and regional economy, local recreation resources, transportation and circulation in the area, and public utilities across the southwestern United States. This project, constructed during the Great Depression, employed a large number of previously unemployed workers. This work and the paycheck it provided enabled employees and their families to move from the tents and shacks north of Las Vegas to Boulder City, and to forego the soup kitchens in Las Vegas. Beneficial economic effects were realized regionally during construction from the purchase of materials, goods, and services in the local area and region. Construction personnel working on these projects contributed to secondary spending by their individual purchases of goods and services. Additionally, some workers made a large impact to the economy of Las Vegas by gambling away the majority of their paychecks during their days off.

Benefits to recreationists occurred by the development of additional recreation facilities and opportunities in the area. Benefits to commuters, tourists, commercial truck traffic, and local and regional consumers accrued by the development of the local roadway and interstate highway system in the area and the creation of HDNHL, a major tourist attraction. The development of U.S. 93 provides a more direct route between Las Vegas and Kingman, improving interstate commerce and numerous recreation facilities and other types of establishments.

Loss of Riparian Vegetation. Filling the reservoir and operation of the dam severely impacts vegetation, both in the immediate area around the dam and downstream. When the reservoir fills, riparian habitat becomes inundated, directly destroying the submerged vegetation. Many of the plant species that are not submerged in the initial filling area are unable to tolerate the subsequent water-level fluctuations typical in reservoirs and die off, reducing habitat for wildlife. Terrestrial habitat shrinks in acreage as a direct result of inundation. The land-water interface in the project area increases, resulting in shifts in flora and fauna as the ecology changes from that of a river to that of a lake-like impoundment.

Because sediment is entrapped in the reservoir upstream of a dam, the downstream system receives essentially clear, "sediment-hungry" water. The clear water derives its equilibrium load by entraining bed sediments and eroding riverbanks. These actions decrease the floodplain width and, therefore, decrease the area available for establishment of riparian habitat.

If the normal pattern of seasonal flooding is altered as a result of dam operation, long-established patterns of soil fertility relationships will change as well. For example, riparian vegetation that depends on spring deposition of silt for seedling establishment will not be generated. Floodplain lakes, marshes, swamps, and ponds may not receive annual or seasonal replenishment of water and nutrients. Use of a dam for hydroelectric

generation can produce fluctuations downstream that shift conditions from those of a large stream to those of a small headwater in a short period of time.

Effect of Dams on Terrestrial Life. Many birds use the shores and banks of streams and rivers for nesting. Although reservoirs can increase the area of land suitable for nests, dam operation often causes unexpected fluctuations in water levels that wash away eggs or inundate nest sites.

Other birds use riparian trees for nesting, roosting, and hunting. Reservoirs often make open-water habitat out of streamside forests, killing the trees. The effect is beneficial for snag-loving birds, so long as the dead trees are left standing, but it is detrimental for birds that use living trees during their various life stages.

Reptiles and amphibians commonly lay their eggs on stream banks or in river shallows. Reservoir fluctuations prematurely end their development, as the eggs are either inundated or desiccated beyond their tolerance.

The development of Hoover Dam facilities resulted in long-term changes to biological resources. Impacts to biological resources typically occurred during the construction phase of a project, but they are considered long-term because of their effects on local habitats and species. Although the dam was constructed prior to the Endangered Species Act, substantial impacts likely occurred to both common and sensitive native plant and animal species.

Effects of Dams on Aquatic Life. Faunal remains in archaeological sites show that Colorado River fishes were caught and eaten by Indians, as well as early canyon explorers. Studies completed during the late 1930s, during and after the construction of Hoover Dam, noted faunal declines when compared to earlier studies. A 1944 survey of the lower Colorado River was the first to provide insight on both native and introduced fishes downstream from the new Hoover and Parker dams. Reductions in native species were attributed to environmental changes associated with damming (Hunt and Huser, 1988).

Impacts have resulted from changes to wetland vegetation along the river. Streamside vegetation is essential in maintaining the aquatic ecosystems that support fisheries. Roots of riparian plants stabilize banks, prevent erosion, and occasionally create overhanging banks that serve as cover for fish. Streamside trees and herbs decrease the amount of sediment passing into the water and keep water temperatures cool enough to support cold-water fisheries. Sedimentation blocks fish gill filaments and results in fish death by anoxemia and carbon dioxide retention. Sedimentation also decreases the oxygen supply to fish eggs, resulting in their death, and alters the habitat of the aquatic invertebrates that form the prey base for many fish.

Riparian vegetation also serves as a source of large organic debris, which distributes sediments in a stream and creates pool and riffle habitat for aquatic organisms. Organic debris is an important source of nutrition for aquatic ecosystems.

Alien fish also attracted early attention in research studies and surveys. Lake Mead changed the Colorado River in ways that enhanced lentic-adapted (i.e., adapted to living in still waters such as lakes, ponds, or swamps), non-native species, and reservoir sport fisheries became important regional resources. A remarkable array of both native and non-native species were used as bait, and bait and forage fishes escaped or were intentionally stocked to join and feed expanding game fish populations. Many alien fish

could not adapt to the environment or competition for resources and disappeared, but others became well established. The original fauna of 30 or so native species in the Colorado basin has increased to 80 or more, including species from as far away as Europe, Asia, and Africa. Few things seem to help native fish survive the presence of alien species, aside from strong evidence that flooding in canyons displaces non-native fish, while native species are unaffected. In fact, native fish are often enhanced by flood removal of predators and competitors. However, the effect is temporary, since alien fish from populations protected in reservoirs and ponds upstream soon reinvade the canyons (Hunt and Huser, 1988).

Establishment of Salt Cedar. Historically, the lower Colorado River ecosystem was a mosaic of different native vegetation communities comprised mainly of Fremont cottonwood, Goodding willow, honey mesquite, screwbean mesquite, quailbush, and arrowweed, as well as many other plant species. This ecosystem was extremely important to many wildlife species, especially neotropical migratory bird species. However, native plant communities began to change soon after the completion of Hoover Dam. The elimination of annual spring floods produced an environment more suitable for the establishment of salt cedar, an exotic plant introduced during the mid-1800s, than for the regeneration of many native species.

While many native species are very susceptible to elimination by fire, salt cedar thrives on it. Salt cedar drops its needles each year during the winter, producing a thick carpet of highly flammable duff within a short amount of time. Once a fire begins, it spreads rapidly through the salt cedar. After burning, salt cedar sprouts new shoots from roots, while many native species do not. Salt cedar also produces seed throughout almost the entire year, so it is ready to take advantage of any disturbance that occurs, including fire. Through these two mechanisms, salt cedar is able to outcompete native plants and has become the dominant plant species along many riparian areas in the Southwest, including the lower Colorado River. Many areas have become pure stands of salt cedar after wildfires have swept through. Unfortunately, salt cedar has limited value as wildlife habitat. Additionally, as the predominance of salt cedar increases along the Colorado River, so does the frequency of wildfires, thereby spreading salt cedar even more.

Potential Cumulative Impacts

The construction of Hoover Dam has resulted in long-term impacts to the immediate vicinity and surrounding region. The U.S. 93 Hoover Dam Bypass Project will have localized, long-term impacts to terrestrial wildlife, desert washes, and aesthetics of Black Canyon; therefore, the bypass will contribute to cumulative impacts in the project area. These impacts are discussed in more detail in Section 5.5.2.

May and June 1998 site visits and field interviews with Native American tribal elders, conducted for FHWA by the University of Arizona, resulted in completion of an ethnographic study report for the Hoover Dam Bypass project in December 1998. That report included preliminary findings, summarized in the DEIS, indicating the presence of potentially significant traditional cultural properties in the vicinity of the bypass project. Additional site visits and interviews were conducted during May 2000. The resulting report (FHWA, October 2000a), provided documentation supporting a determination by FHWA and the SHPOs that the Gold Strike Canyon and Sugarloaf Mountain TCP is eligible for the National Register of Historic Places. In the interviews with the tribal elders, there was a clear feeling expressed that the construction of Hoover Dam had a substantial adverse impact on traditional cultural values, including: inundating the Colorado River from which

traditional songs and power were derived; flooding Native American village sites, a salt trail, and salt mines; destroying ancient fishing places; bringing pollution, public access, and vandalism to traditional lands; impacting the land with numerous power transmission towers; and overdeveloping the area for recreation. The Hoover Dam Bypass will have an adverse effect on the TCP and is discussed in Section 5.5.1.

5.4.1.2 Hoover Dam Visitor Center and Parking Facilities

The new visitor center and parking garage was opened at Hoover Dam in 1997. The Finding of No Significant Impact (FONSI) for the Visitor Center and Parking Facilities (September 20, 1979) concluded that there would be slight social and economic impacts. Reclamation, in consultation with the Nevada and Arizona SHPOs, determined that the project would have an adverse effect on the HDNHL. That effect was addressed through design review stipulations in an MOA signed by the federal ACHP on April 9, 1991.

Impacts on wildlife and vegetation were determined to be extremely small, almost nonexistent, and only temporary in nature because they would cease at the end of construction. Impacts to natural vegetation and archaeological sites that may have been present in the project area were minimized or avoided because they were destroyed or covered with concrete when the dam was initially constructed. The remaining natural vegetation is located on the canyon walls, and very little of the project occurred in that area.

The project was found to have beneficial effects by improving safety, relieving congestion, and providing a more efficient means of operation, particularly of the visitor services. Visitors would no longer have to wait for long periods in extreme heat and would be able to take the tour in a much more enjoyable and efficient manner. The project was determined to be in harmony with the designs, aesthetics, and the operation of the dam, and would provide for a continuity of design and purpose. The project features were designed so that they would blend with the existing dam and facilities.

Potential Cumulative Impacts

According to the FONSI, construction did not result in impacts that were more than minimal. As a result, this project, in combination with the proposed Hoover Dam Bypass, would not result in any cumulative impacts.

5.4.2 Present Actions/Projects Near and Within the Project Vicinity

This section focuses on federal, state, and local agency management plans and programs affecting the environmental resources in the project area. Detailed references for these plans and programs can be found in EIS Chapter 9.

5.4.2.1 Lake Mead General Management Plan

NPS's Lake Mead General Management Plan, approved in 1986 for a 25-year or longer period, follows a strategy that centers on accommodating increasing visitor use while protecting the area's most outstanding natural and cultural resources. It also addresses visitor use and flash flood safety problems that face most developed areas.

Solving existing crowding/congestion problems and accommodating projected increases in visitation would require expansion and improvement of existing developed areas, circulation improvements, improvement of existing shoreline access points, and establishment of new developed areas. The Management Plan establishes maximum levels

of development that could accommodate increasing use in the future, while not exceeding reasonable capacity limits. These are maximum levels, not goals; development within the maximum levels would occur only when demand and economic feasibility justify the expansion (NPS, 1986).

The Management Plan has resulted in and will continue to result in the following primary impacts during the 25-year projected life of the plan:

- Improvements in water quality in beach areas
- Destruction of or severe damage to soils, causing minor disruptions in drainage patterns that would temporarily increase erosion potential
- Seismic exploration for oil and gas leases would have the potential to cause adverse impacts to bighorn sheep herds, although proposed mitigation measures and the assumption that activity would remain sporadic, as in the past, reduces these impacts to a less than significant level

Potential Cumulative Impacts

Management Plan impacts, when considered in conjunction with those from the Hoover Dam Bypass Project, may result in cumulative impacts to the bighorn sheep population. The plan will result in beneficial impacts to water quality, so the bypass would not contribute to cumulative water quality impacts. Similarly, the Hoover Dam Bypass Project is not expected to impact soils, so cumulative soil impacts are not expected. Cumulative impacts to the bighorn sheep population are discussed in more detail in Section 5.5.2.

5.4.2.2 Reclamation Endangered Species Conservation

As part of Reclamation's ongoing operations and maintenance activities, the agency has an ongoing program of endangered species conservation. These programs are defined in the Description and Assessment of Operations, Maintenance, and Sensitive Species of the Lower Colorado River (Reclamation, 1996). The activities range from very specific to broad multispecies conservation programs, and they occur within the immediate Hoover Dam Bypass Project area as well as in the surrounding region. Reclamation's endangered species conservation activities include the following programs.

Endangered Razorback Sucker and Bonytail Conservation. Reclamation has an active program for the conservation and recovery of endangered razorback suckers and bonytail. These activities are part of the current routine operation of the Lower Colorado River system. As part of the Lower Colorado River Multi-Species Conservation Program (MSCP) interim conservation effort, federal and state biologists met in July 1995 to prioritize and quantify recovery and conservation program needs for endangered fish and other species during the 1995 to 2005 period. The following programs represent some of the ways this is currently being achieved.

- **Native Fish Work Group.** The purpose of this program is to replace the aging population of adult razorback suckers resident to Lake Mohave with immature fish spawned by wild populations to maintain the population's genetic diversity and viability.
- **Willow Beach National Fish Hatchery.** Reclamation has been working with the USFWS at the Willow Beach National Fish Hatchery to retrofit portions of a cold water fish hatchery facility to rear native warm-water fishes. Heating systems have been designed and installed for the hatch house for initial rearing of eggs and larvae. Since the

initiation of this program, approximately 8,000 young razorback suckers have been reared for stocking into rearing ponds at Lake Havasu (Reclamation, 1996).

- **HAVFISH Project.** Reclamation is an active partner of the multi-agency, Lake Havasu Fishery Improvement Project, HAVFISH. One of the objectives of this program is to release 25,000 razorback suckers and 25,000 bonytail into Lake Havasu over the next 10 years.

- **Boulder City Golf Course Native Fish Rearing Project.** Reclamation and NDOW signed an interagency agreement with the City of Boulder City to use the ponds at the Boulder City Golf Course for rearing native fish. During 1994, the first lake on the course was drained, and a new liner and aeration system were installed. Approximately 1,400 juvenile razorback suckers were stocked in the ponds, and over 400 of these were stocked into Lake Havasu in 1995. This program has since expanded with the development of three more ponds on the golf course.

- **Hualapai Native Fish Rearing Facility.** Reclamation is providing technical and financial support to the Hualapai Tribe in northern Arizona for the development of a native fish rearing facility. This facility may raise razorback suckers, bonytail, humpback chubs, and other native fishes for reintroduction into the Colorado River and its tributaries within the Grand Canyon and on tribal lands.

Native Riparian Plant Restoration. Reclamation is maintaining and expanding the cooperative native riparian plant restoration programs initiated along the Lower Colorado River. These partnership activities include the establishment of native plant nurseries, demonstration plantings, enhancement projects, and research. Reclamation has committed at least $100,000 per year for 5 years, beginning in 1996, for native riparian plant restoration.

Three-Finger Lake Project. In 1993, Reclamation and USFWS began a cooperative project to restore Three-Finger Lake, which is located on the California side of the lower Colorado River within the Cibola Division, south of Blythe. Approximately 120 acres of channels and shallow backwater areas, plus one 20-acre native fish rearing pond, were dredged. This project included the construction of the water intake system, protective levees and bankline structures, and the planting of native riparian vegetation.

Boulder City Wetland Project. The primary objective of the Boulder City Wetland Project is to demonstrate using reclaimed municipal wastewater to restore habitat for threatened and endangered species, and species of concern. Secondary objectives include public education and research on improving water quality and restoring habitat for sensitive species. The wetland receives Colorado River water blended with treated wastewater from Boulder City's wastewater treatment plant. The blended wastewater flows through a wetland system consisting of a stream containing shallow marshes and pools, then through four deep-water ponds. The stream and ponds contain a variety of native wetland plants and are bordered by native riparian plantings. Water from this wetland is used to irrigate turf at an adjacent Veterans Cemetery.

Lower Imperial Division Wetland Enhancement. This proposed cost-share project will restore and maintain streamflow of sufficient quality and quantity to enhance and assist in recovering and protecting riparian/wetland and aquatic fish and wildlife habitat. The proposed project extends from Imperial Dam upstream to Martinez Lake and encompasses a 9.5-mile reach of the lower Colorado River, including about 3,000 acres of riparian habitat

and wetlands and 22 backwater lakes. The area is used extensively by waterfowl, neotropical birds, sport fish, amphibians, mammals, songbirds, and other wildlife. Project objectives for the California and Arizona sides of the river include: restore the historical California channel, creating habitat for the endangered Yuma clapper rail and razorback sucker and for other species of concern; restore inflow and outflow to approximately 20 isolated backwater lakes adjacent to the river that have been partially or totally plugged by silt and vegetation; protect existing riparian stands of native cottonwood, willow, and mesquite; and restore and enhance wetlands.

Las Vegas Wash Wetland Restoration. Reclamation and NPS have entered into an agreement to construct two new wetlands totaling approximately 20 acres on the lower end of the Las Vegas Wash near its discharge to Lake Mead. These two multipurpose wetlands are designed to enhance marsh and riparian habitat within the eroded channel of the wash and also to provide for the polishing of perennial effluent flows. The purpose of this effort is to enhance habitat for the benefit of aquatic and riparian-dependent species.

MSCP Development. The Lower Colorado River MSCP is a cooperative federal/lower basin states/tribal/ private effort to conserve Endangered Species Act-listed and sensitive species dependent on the river. This program has the goal of benefitting more than 100 federal-, or state-listed, candidate and sensitive species and their habitats, ranging from aquatic, wetland and riparian, to upland.

As part of the development of this MSCP, Reclamation is generating a BA and requested formal Section 7 consultation on its present discretional routine operations and maintenance. Reclamation has discretion in the following areas:

- Managing target elevations of Lake Mohave, Lake Havasu, and Senator Wash Reservoir
- Making determinations of surplus, normal, and shortage conditions
- Implementing Endangered Species Act Section 7 endangered species conservation measures, such as cooperative efforts to preserve the endangered razorback sucker and bonytail populations in Lake Mohave and elsewhere on the Lower Colorado River
- Making management decisions on actions that affect recreation, the natural environment, and private development (along with the activities), limited by the fact that such decisions do not result in a new or additional consumptive use of Colorado River water or violate other mandates as specified in the "Law of the River"

Potential Cumulative Impacts

The Endangered Species Conversation Program has been designed to result in a beneficial impact to the region's biological resources. These plans are resulting in the recovery of native fish populations in the Lower Colorado River, enhancement and restoration of wetlands, restoration of native riparian plant habitat, and the conservation of federal- and state-listed threatened endangered species and species of concern. As a result, the beneficial project impacts of the Species Conservation Program, when considered in conjunction with the project impacts of the Hoover Dam Bypass Project, do not contribute to cumulative impacts.

5.4.2.3 Clark County Desert Conservation Program

The desert tortoise was emergency listed as endangered in 1989 and was later changed to threatened status in 1990. Historically, when development occurred that required the taking of a special-status species, a Habitat Conservation Plan was necessary in order to obtain an incidental take permit. Because of the length of time between species listings and completion of Habitat Conservation Plans, and because of the rapid growth and development occurring in the Las Vegas Valley CCDCP, the program was to provide a mechanism to allow development to occur on tortoise habitat within Clark County in exchange for the conservation of publicly owned desert tortoise habitat outside the urban area. The intent was to achieve a balance between economic stability and long-term environmental preservation.

The program called for the preparation of a Short-Term Habitat Conservation Plan in 1990 and a Long-Term Desert Conservation Plan, which became effective in 1995. In 1995, USFWS approved the Long-Term Plan and granted a 30-year incidental take permit to Clark County. The plan is based on the funding of certain measures identified in the USFWS Recovery Plan for the Desert Tortoise. The source of funding is a $550-per-acre mitigation fee on development. The permit area includes all private land within Clark County and all land that becomes private through any means.

Potential Cumulative Impacts

The proposed project would be constructed on federal lands and is not directly affected by the CCDCP. However, implementation of the preferred alternative would result in a loss of 120 acres of marginal habitat and, as indicated in Section 3.3.3 of the EIS, mitigation would be implemented to minimize impacts on the desert tortoise. Mitigation will include contributing project funds to the desert tortoise habitat conservation program, conducting preconstruction surveys, relocation of affected tortoises, and construction worker education regarding tortoises. With implementation of this mitigation, development of the proposed project would not contribute to cumulative impacts on the desert tortoise, nor would it conflict with the goals and objectives of the CCDCP.

5.4.3 Reasonably Foreseeable Future Projects

This section focuses on the reasonably foreseeable actions that are proposed or are in the planning stage that would occur near the project area. The actions evaluated are roadway improvement programs proposed for Nevada and Arizona. Provided below is a brief description of each of these highway projects and their anticipated short-term and long-term adverse impacts on the environment.

5.4.3.1 Boulder City/U.S. 93 Corridor Study

NDOT is conducting a Boulder City/U.S. 93 Corridor Study, the primary objectives of which are:

- Resolving traffic problems in the vicinity of Boulder City
- Extending freeway status to the U.S. 93/U.S. 95 interchange
- Improving operations at the junction of U.S. 93/U.S. 95
- Creating a safer transportation corridor
- Accommodating future transportation demand
- Improving system linkage on U.S. 93 and maintaining route continuity

In November 1999, NDOT began an environmental study of the segment of U.S. 93 between the Wagonwheel Interchange and the Hacienda Hotel. This project is in the environmental study stage, and no project alternatives or alignments have been selected; however, if there is a project as an outcome of the study, construction could begin as early as 2005. The eastern terminus of the project is coincident with the western terminus of the U.S. 93 Hoover Dam Bypass alignment. However, the Boulder City Corridor and the Hoover Dam Bypass are separate projects with independent utility, conceived to meet separate needs; each could be constructed without the other, and each would still fulfill its own objectives.

Traffic analysis conducted for the Hoover Dam Bypass indicates that, if constructed on the proposed timeline, the new bridge crossing does not generate additional traffic west of the dam. This is because there is not currently a noteworthy volume of traffic utilizing an alternate route.

If, however, the Hoover Dam Bypass were not constructed until 2027, the project would result in a 24 percent increase in traffic west of the dam and in Boulder City. This is because the gridlock at the dam would be so severe that a substantial percentage of traffic would seek an alternate route simply due to the extensive delays at the dam. Thus, if construction of the bypass occurs in 2027, vehicles using an alternate route would return to the bypass, resulting an increase in traffic of approximately 24 percent (see Appendix B).

Potential Cumulative Impacts

Depending on the timing of project development, construction activities associated with the Boulder City/U.S. 93 Corridor project could overlap with those of the Hoover Dam Bypass Project, resulting in temporary localized air quality, traffic, noise, visual, or water quality impacts.

Depending on site-specific conditions, a southerly bypass alternative around Boulder City would likely have long-term adverse impacts on desert tortoise and bighorn sheep, which are species also impacted by the dam bypass. The Boulder City/U.S. 93 Corridor bypass alternative would also have potential cultural resource and visual impacts on the undeveloped desert landscape to the north, south, and east of the city. However, the extent or location of potential environmental impacts and required mitigation measures are unknown at this time. Identification of impacts and potential mitigation measures will not be possible until project alternatives have been fully analyzed for the Boulder City/U.S. 93 Corridor. Despite this lack of early engineering information, the potential for cumulative impacts does exist for biological, cultural, Section 4(f), and visual resources. These are discussed in more detail in Section 5.5.2.

5.4.3.2 U.S. 93 Widening in Arizona

The ASTIP (December 1994) has identified the Phoenix to Nevada U.S. 93 corridor as one of the top priority corridors within Arizona. ADOT is programming and constructing various improvements along U.S. 93 in Arizona, from south of Wickenburg to Hoover Dam. Improvements will be phased consistent with funding levels and highway safety and capacity priorities. Ultimately, U.S. 93 will be widened to a continuous four-lane divided highway from Wickenburg to Hoover Dam.

ADOT will widen U.S. 93 to 4 lanes south from the new Hoover Dam Bypass interchange to the improved four-lane divided section 13 miles to the south at the LMNRA boundary. This segment of roadway is the final link between I-40 near Kingman and the Arizona terminus of the Hoover Dam Bypass Project. This widening could be done either

concurrently with construction of the Hoover Dam Bypass or soon after its completion. However, if the dam bypass is not constructed, the U.S. 93 widening will still proceed when ADOT determines traffic congestion in this restricted capacity two-lane section reaches unacceptable levels. If this widening is not completed, the 13-mile segment will create a regional traffic bottleneck between the proposed four-lane Hoover Dam Bypass and I-40, as well as south of I-40 to Phoenix (once the widening of U.S. 93 between Wickenburg and Kingman occurs).

Potential Cumulative Impacts

This work may occur either concurrently with or soon after construction of the Hoover Dam Bypass Project, potentially resulting in cumulative short-term impacts on air quality, traffic, noise, visual, and water quality. In addition, long-term impacts to biological, cultural, and parkland resources may occur, depending on site-specific conditions. However, the impacts could be reduced by reuse of some of the old highway alignment, which is already disturbed (see Section 5.5.2.2); there are several sections where this is a possibility. Nonetheless, the ADOT U.S. 93 widening project has the potential for cumulative impacts to biological, cultural, and Section 4(f) resources. These impacts are discussed in more detail in Section 5.5.2.

5.4.3.3 U.S. 95 Widening in Nevada

NDOT has a project listed in the long-range element of the Transportation System Projects list to widen the two-lane segment of U.S. 95 from the California/Nevada state line west of Laughlin to U.S. 93 west of Boulder City. This segment of U.S. 95 will be widened to a four-lane divided highway based on funding availability and traffic demand. Improvements to U.S. 95 will be a three-stage project. The first third to be designed and bid will be from Searchlight to a point approximately 18 miles north; $18 million is funded and construction is targeted for fall 2001. The second third of the highway to be improved would be the southern 20-mile section; the anticipated cost is about $19 million, and it would be constructed about 1 year later if funding is available. The final stage is the northern third of U.S. 95; it is approximately 18 miles long, would cost about $18 million, and would be constructed as soon as funding became available.

Potential Cumulative Impacts

This program of improvements to U.S. 95 is in the very early planning stages, and few details about the project or potential environmental impacts are currently available from NDOT. Since the project is being funded and designed in three stages starting far south of Hoover Dam, there is no potential for cumulative short-term impacts from construction because the final stage will not likely be built until after completion of the Hoover Dam Bypass. Furthermore, no cumulative traffic operational impacts are foreseen because the highway users are different; most of the traffic on U.S. 95 is traveling to and from Las Vegas with no intention or need to go through Boulder City and/or Hoover Dam. Long-term impacts to biological and cultural resources may occur, depending on site-specific conditions; however, impacts will be very small because all of the work will be within previously disturbed right-of-way. Therefore, the NDOT U.S. 95 widening project has the potential for cumulative impacts to biological and cultural resources, but no engineering or environmental details are available at this time. NDOT is currently preparing an Environmental Assessment (EA) for the entire route (about 60 miles).

5.4.3.4 SR 68, Bullhead City - East, Widening in Arizona

From its junction with SR 95 in Bullhead City, Arizona, 14.6 miles of SR 68 is being widened (from MP 1.2 to MP 14.5) so that the roadway will have four travel lanes all the way to its terminus at U.S. 93. SR 68 is currently a four-lane roadway from MP 14.5 to U.S. 93, and it provides the only east-west roadway linking U.S. 93 near Kingman with Laughlin, Nevada, across the Colorado River from Bullhead City. ADOT traffic studies determined that a minimum of two eastbound and two westbound travel lanes were required to provide adequate operational characteristics and driver safety. This project is currently under construction. An environmental assessment (EA) was completed for this project in June 1999 (ADOT, 1999).

Potential Cumulative Impacts

Construction on this project was started in September 2000 and is scheduled to be completed in the fall 2001. Approximately 127 acres will be disturbed by project construction. The Draft and Final EAs for this project evaluate the potential for cumulative impacts to biological, Section 4(f), and visual resources. These impacts are discussed in more detail in Section 5.5.2.

5.5 Cumulative Environmental Impacts

Certain impacts associated with the proposed U.S. 93 Hoover Dam Bypass Project could arise which, in conjunction with impacts attributable to other projects (either in the immediate vicinity or with similar characteristics), could have the potential to result in collectively adverse effects to the environment that are of greater significance than those generated individually by the proposed project. Cumulative impacts could include those effects considered to be less than significant individually, but which could become significant when evaluated in relation to impacts from other projects.

5.5.1 Potential Cumulative Impacts

This section describes the cumulative impacts to environmental resources that could potentially arise with implementation of the proposed Hoover Dam Bypass Project in association with the other projects and programs described in this chapter. This discussion is presented by environmental resource areas. Because NPS, Reclamation, or Clark or Mohave counties do not propose development in or near the project area, no impacts on the environment would be expected, and the proposed project would not contribute to cumulative impacts. Therefore, the cumulative effect analysis focuses on the major roadway improvements that are planned to occur in the immediate vicinity of the proposed project and could result in environmental impacts that, when combined with those of the proposed project, have the potential to result in cumulative impacts.

5.5.1.1 Biological Resources

On June 3, 1999, USFWS issued its Biological Opinion for the Hoover Dam Bypass Project. This document represents the opinion of USFWS on the potential effects of the proposed bypass project on federally listed species under the Endangered Species Act of 1973. The Biological Opinion concluded that the project will not likely affect the following endangered species: bald eagle, American peregrine falcon, razorback sucker, southwestern willow flycatcher, bonytail chub, and Devil's Hole pupfish. For the Mojave desert tortoise, a federally listed threatened species, USFWS found that the project is not likely to

jeopardize its continued existence or adversely impact designated critical habitat. USFWS stipulated "reasonable and prudent" measures to minimize project effects on the desert tortoise, including payment of $46,960 to Clark County for offsite mitigation for the loss of 80 acres of desert tortoise habitat. This EIS also concluded that the Hoover Dam Bypass preferred alternative will impact 20 acres of known habitat of desert bighorn sheep, which is a USFWS species of concern, as well as a State of Nevada protected and State of Arizona threatened species.

There is insufficient environmental and engineering information available for the future U.S. 93 and U.S. 95 highway improvement projects to identify potential cumulative impacts on endangered, threatened, or protected species also affected by the Hoover Dam Bypass. However, since these two future projects will primarily involve widening of existing highways, it is assumed that additional adverse impacts can usually be avoided with environmentally sensitive design, including continued use of protected game crossing structures, right-of-way fencing to minimize animal mortality, and other measures, including roadside signing for wildlife areas. Lands immediately adjacent to major highways are generally low-value biological habitats because of their highly disturbed nature. Hence, no cumulative biological impacts are anticipated from these future projects.

In contrast, the Boulder City/U.S. 93 Corridor alternatives have the potential for cumulative impacts on biological resources also impacted by the Hoover Dam Bypass. A new highway around Boulder City would fragment the existing habitat and essentially isolate most biota now occupying the area between the existing U.S. 93 corridor and any bypass route. As a result of any new highway, human development of the affected area may be accelerated, eventually causing its entire loss as wildlife habitat. The worst-case alternative for biological resources would be a southern bypass similar to that defined in NDOT's 1994 U.S. 93 Colorado River Crossing Corridor Study. The primary difference between the potential project alternatives is the greater habitat loss associated with the approximately 14-mile southern corridor. Considerably more impact to the desert tortoise can be anticipated with a southern alternative, because this corridor cuts through almost continuous tortoise habitat from the point it departs the U.S. 93/U.S. 95 interchange to the point at which it exits the Eldorado Valley and enters the Eldorado Mountains east of Boulder City. The new alignment alternatives for the Boulder City/U.S. 93 Corridor project also have the potential to impact local populations of desert bighorn sheep, which range throughout the River Mountains, often entering the lower slopes and even occasionally crossing U.S. 93. Therefore, although NDOT has not completed environmental and engineering studies for the Boulder City/U.S. 93 Corridor, it is likely that a bypass alternative on new (undisturbed) alignment will impact two special-status wildlife species also impacted by the Hoover Dam Bypass – the desert tortoise and desert bighorn sheep – and thus collectively cause a cumulative impact on these resources. The cumulative acreage of impacted habitats will not be known until NDOT completes preliminary design for the Boulder City/U.S. 93 Corridor.

The SR 68 project has the potential for cumulative impacts to desert bighorn sheep. This project traverses important desert bighorn sheep habitat in the Black Mountains of northwestern Arizona. This habitat was already fragmented by the existing highway, which has effectively split the population for 40 or more years. The construction of two wildlife crossings designed and situated primarily for use by bighorn sheep is part of the proposed mitigation for the project. If successful (i.e., desert bighorn sheep use the crossings), this project could result in a net beneficial impact to desert bighorn sheep.

However, this roadway improvement would result in a disturbance of approximately 90 acres of desert bighorn sheep habitat. Therefore, the Hoover Dam Bypass and the SR 68 widening projects would cumulatively impact 110 acres of bighorn sheep habitat; however, both projects include game crossings to minimize the effect on sheep movement.

USFWS considered cumulative effects in their June 1999 Biological Opinion for the Hoover Dam Bypass and concluded that future federal actions unrelated to the proposed project will require separate consultation pursuant to Section 7 of the Endangered Species Act. Since the majority of the land surrounding the proposed project is administered by Reclamation, NPS, or BLM, any action on those lands will be subject to consultation under Section 7. USFWS further concluded that actions on private lands within Clark County are expected to increase as the human population increases. The rapid growth of the human population, as well as tourism, has resulted in loss and degradation of desert tortoise habitat and loss of individual tortoises. These impacts are expected to continue according to USFWS. However, the CCDCP and associated incidental take permit addresses take of desert tortoises and destruction of their habitat from future development projects on nonfederal lands within Clark County. USFWS anticipates that measures in the CCDCP will continue to mitigate and minimize such effects.

5.5.1.2 Archaeological/Historical (Section 106) Resources

The U.S. 93 Hoover Dam Bypass will not impact significant prehistoric archaeological resources. However, it will have an adverse effect on the HDNHL, some contributing features, and the Gold Strike Canyon and Sugarloaf Mountain Traditional Cultural Property (TCP) within the area of potential effects of the preferred alternative.

Considering the nearby foreseeable future highway projects described in Section 5.4.3, on the Nevada side there are no recorded prehistoric sites of known significance within the potential alignments for development of the U.S. 93 Boulder City Corridor. The only reported prehistoric sites are isolated lithic flake scatters, ceramics, and milling stone stations located on the broad alluvial fan east of the Boulder City Airport. However, larger prehistoric archaeological sites, such as rockshelters, campsites, and rock alignments are situated in the River Mountains north of Boulder City, and the Eldorado Mountains to the east contain similar prehistoric resources including prehistoric turquoise mines. Historic sites in the Boulder City area include the Sullivan Turquoise Mines near Hacienda Hotel and in Hemenway Valley; potential remains from the Alunite Mining District and Boulder Annex Townsite near Railroad Pass; historic power transmission lines emanating from the Hoover Dam generating stations to locations in California, Arizona, and Nevada; a Union Pacific Railroad Line from Boulder City to the dam for which berms, bridges, and other features can still be found; and the Boulder City National Register Historic District, which could be affected by improvements to existing U.S. 93 through town. Considering the adverse effect of the preferred alternative on HDNHL and related features, there is a potential for consequential cumulative impacts on this resource due to the possibility of impacts from a Boulder City Corridor alternative on the power transmission lines emanating from the dam, which were found eligible for the National Register as contributing elements to the HDNHL. Furthermore, a Boulder City/ U.S. 93 Corridor Alternative could have a cumulative impact on the Goldstrike Canyon and Sugarloaf Mountain TCP, which is adversely affected by the Hoover Dam Bypass and is located approximately 0.75 mile east of the Hacienda Hotel and south of existing U.S. 93. However, the exact nature and limits of any significant cultural resources potentially affected by the Boulder City Corridor will not be known until detailed studies are completed by NDOT.

On the Arizona side, the abandoned former roadway of U.S. 93 was evaluated within the area of potential effects of the Hoover Dam Bypass. It was found eligible for the National Register for its association with the construction of Hoover Dam. The roadway recorded here is a fill or grade extending from the current highway on the north and running southward roughly parallel to the current highway route. The surface retains some gravel and small pieces of asphalt. This fill-and-cut segment is a portion of the original route of U.S. 93, as it was built in the late 1930s. The contract for construction of Hoover Dam included provisions for completing approaches to the dam for the highway to Las Vegas, Nevada, and a road to Kingman, Arizona. The approaches to Hoover Dam on both sides of the canyon were widened in 1957, and it is possible the recorded segment was abandoned at that time. However, there is certainly the potential for other historic resources, as well as prehistoric archaeological sites along the U.S. 93 corridor in Arizona that might be impacted by widening the highway, especially if it were done on a new alignment. More specific information on potential cultural resources that could be affected by the widening of U.S. 93 in Arizona will not be available until environmental studies are completed for this project, but no National Register resources are presently known that may be affected and that would result in a cumulative impact when considered collectively with the dam bypass effects.

5.5.1.3 Section 4(f) Resources

The preferred alternative for the Hoover Dam Bypass permanently uses approximately 92 acres of Section 4(f) lands from the LMNRA, the HDNHL, and the National Register eligible TCP. It was determined that there are no feasible and prudent alternatives to the use of Section 4(f) land and that the proposed action includes all possible planning to minimize harm to the Section 4(f) lands resulting from their use.

NDOT's Boulder City/U.S. 93 Corridor Study alternatives may impact land within the LMNRA located northeast of Boulder City, between the eastern limit of the project and the recreation area boundary. Using an assumed general highway right-of-way section of 300 feet, as was done for the U.S. 93 Hoover Dam Bypass, the Boulder City Corridor could result in permanent use of over 50 acres of Section 4(f) land from the LMNRA if a southern bypass alternative were selected. Other potential alternative corridors have not been studied fully by NDOT, and the extent of their potential Section 4(f) impact cannot be estimated at this time.

Widening of the 13-mile two-lane segment of U.S. 93 in Arizona, from the future Hoover Dam Bypass interchange to the boundary of the LMNRA, would use Section 4(f) recreation land administered by NPS. In some areas, ADOT has 400 feet of existing highway right-of-way; however, at this predesign stage it is unknown what portions of the widening would be on LMNRA or ADOT land. If ADOT did the widening on the existing alignment of U.S. 93, it is estimated that an additional 50 feet of right-of-way would be required. Assuming all the new highway right-of-way would be on LMNRA land, this ADOT project could result in the permanent use of approximately 80 acres of Section 4(f) land.

Based on the location of existing U.S. 93 through the LMNRA, there is no feasible and prudent alternative to the use of Section 4(f)-protected land for either the proposed Boulder City/U.S. 93 Corridor or the U.S. 93 widening in Arizona. Thus, these two reasonably foreseeable future projects in the immediate vicinity of the Hoover Dam Bypass would have the potential to generate Section 4(f) impacts that, when addressed collectively with the proposed project, could result in a considerable cumulative impact to public recreation and

historic lands. Impacts to Section 4(f) resources from improvements to SR 68 through the LMNRA were evaluated for the project and appended to the Final EA (ADOT, 1999). The evaluation concluded that expanding the roadway through the LMNRA will not substantially impair the activities, features, or attributes of the Section 4(f) resource, either by direct impacts (land takings for easements) from MP 1.6 to MP 2.0 or by constructive use/proximity impacts from MP 1.23 to MP 1.6. The total area of LMNRA required is 1.92 acres.

The four highway projects together could permanently use approximately 224 acres of land from the LMNRA, the HDNHL, and TCP. However, this potential cumulative impact to Section 4(f) land from the four highway projects would still be substantially less than five of the alternative alignments considered for the Hoover Dam Bypass: Willow Beach North, Willow Beach South, Nelson, Cottonwood, and Temple Bar (see Table 2-1).

5.5.1.4 Visual Resources

The preferred Sugarloaf Mountain alignment for the Hoover Dam Bypass will be located approximately 1,500 feet downstream from Hoover Dam and about 254 feet higher than the crest of the dam (see Figure 2-9). This new bridge crossing over Black Canyon will be in full view from the dam (see Figure 3-10). Consequently, it was found to have an adverse effect on the historic landmark owing to the introduction of visual elements that diminish the integrity of the property's significant historic features (36 CFR 800.5). This EIS determined that other visual effects of the Hoover Dam Bypass on the surrounding environment could be mitigated (see Section 3.7).

NDOT's planned Boulder City and U.S. 95 highway improvements and ADOT's planned U.S. 93 widening will likely have both short-term and long-term visual impacts on the surrounding desert environment. However, the planned U.S. 93 and U.S. 95 improvements will be all within existing highway corridors, which have been a part of the desert landscape for many decades and, therefore, may not have adverse visual impacts. Of these three foreseeable future projects, only the Boulder City Corridor alternatives have the potential for substantial visual impacts on presently undeveloped desert landscape, which is located in the Eldorado Valley to the south and the Colorado River and Eldorado Mountains to the north and east. As discussed under Archaeological and Historic Resources (Section 5.5.2.2), the Boulder City Corridor southern bypass alternative could contribute to a cumulative impact on historic features related to Hoover Dam (i.e., the power transmission lines). However, even if a southern bypass were the selected alternative, these transmission lines are not part of the historic viewshed of Hoover Dam; therefore, it does not appear that development of the Boulder City Corridor would contribute to a cumulative visual impact on the HDNHL.

Improvements underway on SR 68 will result in some long-term impacts to visual resources. These impacts result from the loss of some rock spires and other visual features, increased rock cuts, and a change in the overall character in some areas of the project. However, due to its location, SR 68 will have no cumulative impacts to HDNHL visual resources.

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CHAPTER 6

Section 4(f) Evaluation

Introduction

6.1 Purpose of Section 4(f) Evaluation

Section 4(f) of the U.S. Department of Transportation Act of 1966, codified in Federal law at 49 U.S.C. § 303, declares that, "it is the policy of the United States government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation land, wildlife and waterfowl refuges, and historic sites." Section 4(f) specifies that, "the Secretary [of Transportation] may approve a transportation program or project... requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site), only if—

1. There is no feasible and prudent alternative to using that land; and
2. The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use."

The use of Section 4(f) resources occurs when: (1) land from a Section 4(f) site is permanently acquired for a transportation project, (2) when there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose, or (3) when the proximity impacts of the transportation project on the Section 4(f) site, without acquisition of land, are so great that the purposes for which the Section 4(f) site exists are substantially impaired. The latter type of use is also known as a "constructive use." Constructive use occurs when the transportation project does not incorporate land from a Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Constructive use has been determined to occur under the following cases (23 CFR 771.135[p]):

- The projected noise level increase attributable to the project substantially interferes with the use and enjoyment of a noise-sensitive facility of a resource protected by Section 4(f).
- The proximity of the proposed project substantially impairs aesthetic features or attributes of a resource protected by Section 4(f), where such features or attributes are considered important contributing elements to the value of the resource.
- The project results in a restriction on access which substantially diminishes the utility of a significant publicly owned park, recreation area, or historic site.
- The ecological intrusion of the project substantially diminishes the value of wildlife habitat in a wildlife or waterfowl refuge adjacent to the project or substantially interferes with the access to a wildlife or waterfowl refuge, when such access is necessary for established wildlife migration or critical life cycle processes.

Section 4(f) is applicable to historic sites and archaeological resources when the resource is included on, or eligible for, the NRHP (23 CFR 771.135[e]). Section 4(f) does not apply to

archaeological sites where it is determined after consultation with the SHPO and the ACHP that the resource is important chiefly because of what can be learned by data recovery and has minimal value for preservation in place. Constructive use is defined as not occurring when compliance with the requirements of Section 106 of the NHPA (16 U.S.C. § 470) and related regulations for proximity impacts of a proposed project on an NRHP site results in a finding of "no effect" or "no adverse effect" (36 CFR 800.5).

Section 4(f) further requires consultation with the Department of the Interior (DOI), and as appropriate, the involved offices of the Departments of Agriculture and Housing and Urban Development in developing transportation projects and programs which use lands protected by Section 4(f).

Because the Hoover Dam Bypass Project would use Section 4(f) lands, this evaluation identifies significant Section 4(f) resources in the project area, describes the nature and extent of the use of these significant properties, evaluates alternatives that would avoid the use of Section 4(f) resources, and describes measures to minimize harm to the affected resources.

6.2 Proposed Project

6.2.1 Introduction

U.S. 93 is a primary highway that traverses the western part of the nation from Montana to Arizona. U.S. 93 functions as a principal arterial highway providing a north-south transportation corridor and is an integral part of the State and national highway systems. In addition to the interstate commerce that uses this route, vacationers from throughout the country use U.S. 93 in their travels between Phoenix, Arizona, and Las Vegas, Nevada, and points beyond.

The present route of U.S. 93 uses the crest of Hoover Dam as a bridge to cross the Colorado River. The proposed project would remove trucks and through-vehicular traffic from the crest of Hoover Dam by rerouting U.S. 93 to a new bridge crossing and associated approach highways. This new route would reduce or eliminate the steep grades, sharp curves, narrow highway width, substandard shoulders, poor sight distances, and low travel speeds of the existing route.

6.2.2 Purpose and Need

A complete discussion of the purpose and need for the project is provided in Chapter 1 of this EIS and is incorporated herein by reference.

The purpose of the project is to reduce or eliminate through traffic over Hoover Dam to:

- Minimize the potential for pedestrian-vehicle accidents on the dam crest and on the Nevada and Arizona approaches to the dam
- Remove a major bottleneck to interstate and international commerce and travel in the west by reducing traffic congestion and accidents in this segment on the major commercial route between Phoenix and Las Vegas
- Replace an inadequate federally owned highway river crossing with a new crossing that meets current roadway design criteria, and improves through-vehicle and truck traffic capacity on U.S. 93 at the dam

- Reduce travel time in the dam vicinity
- Protect Hoover Dam employees, visitors, equipment, power generation capabilities, and Colorado River waters while enhancing visitors' experiences at Hoover Dam by:
  - Safeguarding dam and power plant facilities and the waters of Lake Mead and the Colorado River from hazardous spills or explosions
  - Protecting the dam and power plant facilities from interruptions in electricity and water delivery
  - Providing improved conditions for operating and maintaining Hoover Dam facilities

6.2.3 Project Alternatives Using Section 4(f) Lands

A complete discussion of the project alternatives is provided in Chapter 2 and is incorporated herein by reference. A listing of these alternatives and the Section 4(f) acreage used is provided below (see Section 2.2 for details).

Alternatives Using Section 4(f) Lands

- Promontory Point (74 acres)
- Sugarloaf Mountain (92 acres)
- Gold Strike Canyon (128 acres)

Alternatives Using Section 4(f) Lands, Considered but Eliminated (see Figure 2-1)

- Boulder City North (145 acres)
- Boulder City South (165 acres)
- Boulder City South Option (135 acres)
- Willow Beach North (405 acres)
- Willow Beach South (575 acres)
- Nelson (491 acres)
- Cottonwood (436 acres)
- Temple Bar (818 acres)
- Laughlin-Bullhead City (36 acres)
- Modifications to Hoover Dam
  - Option for widening Hoover Dam
  - Option for elevated highway on Hoover Dam

6.2.3.1 Promontory Point Alternative

The Promontory Point Alternative would cross Lake Mead about 1,000 feet upstream of Hoover Dam and would require construction of approximately 2.7 miles of approach road in Nevada, a 2,200-foot bridge over Lake Mead, and 0.8 mile of approach road in Arizona. The three bridge types that are considered in the EIS for this alternative are a steel truss rib through-arch bridge, a concrete cable-stayed bridge, and a steel suspension bridge. However, presentation of specific bridge designs in this EIS is not intended to preclude other feasible structures. The Promontory Alternative would include six wildlife underpasses, one highway bridge, and one tunnel. Fencing would be placed along both sides of the highway corridor to guide wildlife to the crossing structures.

6.2.3.2 Sugarloaf Mountain Alternative (Preferred Alternative)

The Sugarloaf Mountain Alternative would cross the Colorado River about 1,500 feet downstream of Hoover Dam and would require constructing approximately 2.2 miles of highway approach in Nevada, a 1,900-foot bridge, and approximately 1.1 miles of highway approach in Arizona. Bridge types considered in the EIS for this alternative are a concrete or steel deck arch bridge and a concrete cable-stayed bridge; however, presentation of specific bridge designs in this EIS is not intended to preclude other feasible structures. A Design Advisory Panel will provide input on bridge design concepts, structure type, and materials (see Section 3.5). The Sugarloaf Mountain Alternative would include four wildlife underpasses, three wildlife overpasses, two highway bridges (which also serve as wildlife crossings), and a tunnel. Fencing would be placed along both sides of the highway corridor to guide wildlife to the crossing structures.

6.2.3.3 Gold Strike Canyon Alternative

The Gold Strike Canyon Alternative would cross the Colorado River about 1 mile downstream of Hoover Dam and would require construction of approximately 2.2 miles of approach road in Nevada, a 1,700-foot bridge, and 1.1 miles of approach road in Arizona. The bridge types considered in the EIS for this alternative are a concrete deck arch bridge and a steel deck arch bridge; however, presentation of specific bridge designs in this EIS is not intended to preclude other feasible structures. The Gold Strike Canyon Alternative would include two wildlife underpasses, one wildlife overpass, ten highway bridges, and one tunnel. Noise barriers could be constructed on the outside shoulder along the roadway facing the trail through Gold Strike Canyon to reduce noise impacts on the hiking trail. Fencing would be placed along both sides of the highway corridor to guide wildlife to the crossing structures.

6.2.4 Other Alternatives Considered, But Eliminated

Following completion of the Phase A Study (Reclamation, October 1991; see Chapter 1 for more details), the PMT[1] agreed (Memorandum, January 1991) that all alternatives except for Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon be eliminated from further consideration. After analyzing the alternatives under specific screening criteria (Section 2.3), all were eliminated from further consideration except for the three alignments closest to Hoover Dam: Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon. The other alternatives were eliminated for reasons described below:

1. Some alternative routes did not meet the project purpose and need because they would not substantially eliminate roadway deficiencies and reduce traffic congestion on U.S. 93 at Hoover Dam and dam approaches, eliminate through traffic from the dam, enhance public safety, or protect Hoover Dam and its visitors. Alternatives were also dropped from further consideration if they substantially increased travel time and did not provide system continuity to enhance travel within the U.S. 93 corridor. The

[1]The PMT is currently an interagency team composed of the Federal Highway Administration - Central Federal Lands Highway Division, National Park Service, the Arizona and Nevada Divisions of the Federal Highway Administration, the Arizona and Nevada Departments of Transportation, and the Bureau of Reclamation. The PMT was established in 1989 to oversee project planning, environmental studies, design development, and project funding. The PMT representatives from these agencies have participated in reviews of the proposed project area, environmental studies, preliminary engineering, and the DEIS throughout the planning process.

Laughlin-Bullhead City Alternative was eliminated because motorists would avoid driving 23 additional miles by continuing to use the Hoover Dam crossing. Therefore, meeting the objectives of enhanced safety, improved level of service, and reduced congestion on U.S. 93 at the dam would not be achieved.

2. Except for U.S. 95/I-40, all of the build alternatives would affect Section 4(f) lands; however, some routes have considerably more impact than others. The Temple Bar Alternative and all the highway alternatives south of Gold Strike Canyon except the Laughlin-Bullhead City and U.S. 95/I-40 Alternatives would affect much more Section 4(f) land than the three alternatives near Hoover Dam. Based on the requirement to minimize harm to Section 4(f) property, these southerly alternatives were eliminated from further consideration.

3. Routes nearest Hoover Dam would pass through lands already extensively disturbed by human-made features. Conversely, the Willow Beach, Nelson, Cottonwood, Boulder City, and Temple Bar Alternatives were eliminated because those routes would pass through areas of extensive pristine habitat.

4. Alternatives were eliminated from consideration because their impacts on known peregrine falcon breeding areas, bighorn sheep habitat and movement corridors, desert tortoise habitat, and other wildlife were more severe than the three alternatives near the dam.

5. The cost of constructing the alternative routes generally increases as the length of the route and the distance from the dam increases. The higher costs of the Hoover Dam/Boulder City Bypass ($317 million) and Willow Beach South ($409 million) routes were added justification for their elimination from further consideration (NDOT, 1994).

6. The Laughlin-Bullhead City Alternative would result in additional total 20-year costs of approximately $1.4 billion over the alternatives studied in detail, due to the increased length of the alternative (see Appendix B).

7. Alternatives that require keeping the existing highway open to through traffic to provide visitor access to the dam were dropped from further consideration if they also required operating and maintaining extensive lengths of duplicate highway. Alternative routes not close to Hoover Dam (Willow Beach, Nelson, Cottonwood, and Temple Bar) were eliminated for this reason.

(See Chapters 1 and 2 for additional information about these routes.)

6.2.4.1 Modifications to Hoover Dam

This alternative was examined with two options for modifications to existing U.S. 93 on the crest of Hoover Dam:

- **Option for Widening Hoover Dam.** This option would widen the dam crest and connect it to the existing highway near each abutment, which would result in more traffic lanes through the dam area with no significant improvement in traffic flow. Tourist traffic would not be separated from the through traffic, and traffic interference with dam maintenance operations would still occur. Constructing new highway approaches to fit a widened dam crest would require large amounts of earthwork and complex approach structures.

- **Option for Elevated Highway on Hoover Dam.** This option was examined to attempt to attain the desired highway design criteria by adding an elevated crossing structure (which would be supported by some portion of Hoover Dam). It would require entirely new and straighter highway approaches. Extremely deep and lengthy excavations, or possibly tunnels, would be necessary to connect such a structure to the existing highway.

Both options of this alternative were eliminated because:

1. The approach roads to the dam have sharp switchback curves with radii less than 100 feet and grades as steep as 7 percent. Because of these existing restrictive conditions, the design criteria for a four-lane highway with a maximum 6 percent grade and a minimum curve radius of 1,500 feet could not be met by making reasonable improvements to the existing highway.
2. It would result in significant adverse impacts to the historical significance of the site—the integrity and setting of the dam and its status as an NHL.
3. It would cause interference with the Hoover Dam Visitor Center and further complicate conditions for separation of traffic, vehicle-turning movements, and parking maneuvers.
4. It does not solve the problems of safety to the public, does not protect the power and water supplies, and does not improve the situation of interference with operations and maintenance of the dam facilities.
5. No practical way exists to make these modifications without major impacts to the historic appearance of the dam and disruption to traffic during construction.

6.3 Section 4(f) Properties

Because of the unique situation of Section 4(f) lands within the LMNRA being continuous from 40 miles north, where the LMNRA meets the Grand Canyon National Recreation Area, to 60 miles south of the existing corridor, it is not possible to avoid these lands and still maintain the service that existing U.S. 93 provides for this area of the West (Figure 6-1).

There are three primary Section 4(f) properties involved with the proposed action—the LMNRA, the HDNHL, and a traditional cultural property (TCP) determined eligible for the National Register of Historic Places. LMNRA encompasses approximately 1,482,476 acres of federal land and 28,212 acres of nonfederal land and is managed by the NPS. The HDNHL encompasses approximately 330 acres of federal land that is managed by Reclamation as a part of the Hoover Dam Reservation Area (HDRA). The HDRA was reserved specifically for reclamation and power generation purposes and for the protection and security of the dam power plant and associated facilities. Areas within the HDRA, and not within the HDNHL or TCP, are not considered 4(f) property.

The LMNRA was established October 8, 1964, by Public Law 88-639, for "the general purpose of public recreation, benefit, and use, and in a manner that will preserve, develop, and enhance...the recreation potential and in a manner that will preserve the scenic, historic, scientific, and other important features of the area."

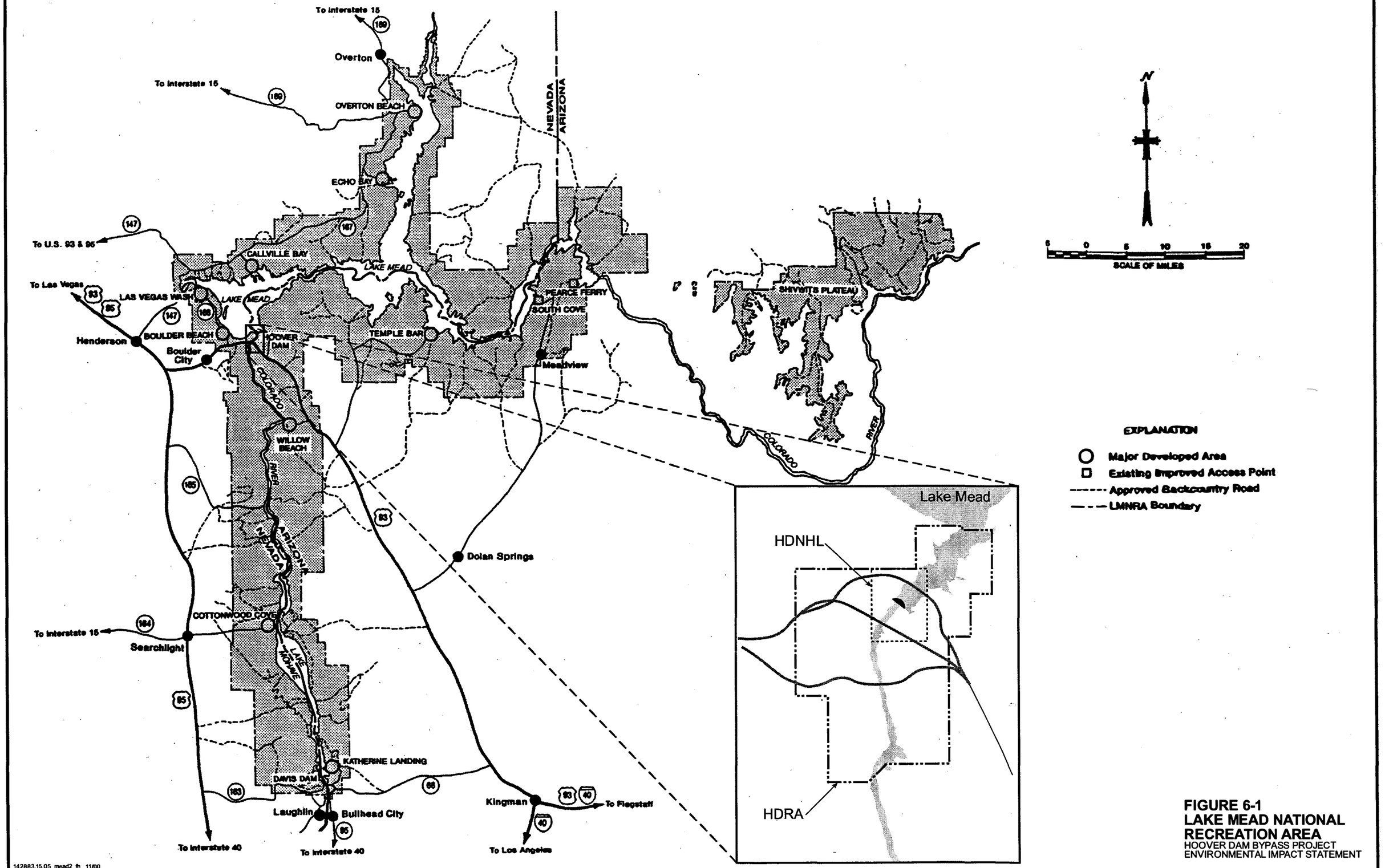

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FIGURE 6-1
LAKE MEAD NATIONAL RECREATION AREA
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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The LMNRA and the HDNHL include a wide variety of scenic and recreational resources. Most of the LMNRA is arid desert. Rugged mountains, expansive alluvial fans, and dry washes dominate the landscape. The LMNRA encompasses two reservoirs formed by the Colorado River: (1) Lake Mead, 110 miles long and formed by Hoover Dam, has 162,677 acres of water surface and more than 822 miles of shoreline; and (2) Lake Mohave, 67 miles long and formed by Davis Dam, has 28,800 acres of water surface and more than 254 miles of shoreline (Figure 6-1).

This ruggedly scenic area is famous for Hoover Dam, Lake Mead, the Colorado River, recreational activities, and wildlife. Attributes identified by the NPS that contribute to the overall quality and management of the LMNRA include aesthetics, cultural, historic, recreational, noise, air, and existing natural or biological resources. Potential impacts to these attributes by the proposed project are summarized in Chapter 3.

The recreational activities available in the LMNRA include sightseeing, hiking, camping, picnicking, backpacking, fishing, hunting, boating, river rafting, and bicycling. In 1997, there were 9.7 million visitors to the LMNRA. More than 1 million visitors toured Hoover Dam in 1997. The LMNRA and Hoover Dam are popular tourist destination areas, both nationally and internationally.

6.4 Impacts on the Section 4(f) Properties

As defined in the introduction, the use of a Section 4(f) resource occurs either when land from a Section 4(f) site is permanently acquired for a transportation project, when temporary occupancy has adverse effects, or when the proximity impacts of the project on the Section 4(f) site are so great that the purposes for which the Section 4(f) site exists are substantially impaired. Table 6-1 presents a simplified summary of Section 4(f) impacts that each alternative would have if implemented. The Hoover Dam Bypass project alternatives would impact three primary Section 4(f) properties: the LMNRA, which is a federal public park and recreation land, the HDNHL, which is listed in the National Register, and a National Register-eligible TCP. No wildlife or waterfowl refuges are located in the vicinity of the proposed project. No National Register-eligible archaeological sites have been identified within the project's area of potential effects (APE); however, one archaeological site within the APE was found to be a contributing element of the TCP. Acreage impacts on Section 4(f) lands are shown graphically in Figure 6-2.

As discussed in the introduction, constructive use is defined as not occurring when compliance with the requirements of Section 106 of the NHPA (16 U.S.C. § 470) and related regulations for proximity impacts of a proposed project on an NRHP site results in a finding of "no effect" or "no adverse effect" (36 CFR 800.5). However, pursuant to the ACHP regulations implementing Section 106, an undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to: (1) physical destruction of or damage to all or part of the property; (2) change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance; and (3) introduction of visual, audible, or atmospheric elements that diminish the integrity of the property's significant historic features (36 CFR800.5 [a]).

6.4.1 Promontory Point Alternative

The Section 4(f) properties and/or resource values were identified and assessed for potential impact by the Promontory Point Alternative. The following summarizes the results of that effort. (A more detailed description of these analyses and conclusions can be found in Chapter 3.)

6.4.1.1 Park Land and Recreation

The Promontory Point Alternative would permanently use a total of 74 acres of Section 4(f) land (39.2 acres within the LMNRA, 20.3 acres within the NHL, and 14.3 acres within the TCP; see Figure 6-2). A major regulatory agency concern and potential worst-case impact on recreational lands is the threat of a major hazardous materials spill on the new bridge, which could impact thousands of acres of lake waters and shoreline within the LMNRA. This alternative would not directly impact any recreational facility or resource located within Section 4(f) land. During construction, the noise of construction and presence of heavy equipment would temporarily lower the aesthetic experience for some visitors at the dam and in the area; however, others would find the construction operation interesting. Following construction and the subsequent diversion of traffic off the dam to the new bridge, truck-derived noise and exhaust fumes would be removed from the dam, thereby improving conditions for dam visitors. The long-term effect of this alternative will be to improve the recreationists' access to Hoover Dam by reducing traffic congestion and to make U.S. 93 a safer transportation facility. The new bridge could also become a recreational attraction in itself because of its proximity to Hoover Dam.

6.4.1.2 Cultural and Historic Resources

Implementation of the Promontory Point Alternative would affect a total of nine historic and cultural resource sites subject to protection under Section 4(f). These consist of Hoover Dam (listed as an NHL and in the NRHP), a concrete diversion channel (a contributing element to the NHL), a concrete retaining wall (a contributing element to the NHL), a power transmission switchyard (a contributing element to the NHL), transmission towers in Nevada, the Old Government Railroad grade, building foundations (near Nevada bridge abutment), U.S. 93 segment in Arizona (a contributing element to the NHL), and the TCP. The alternative crosses Lake Mead approximately 1,000 feet upstream from the dam and takes 20.3 acres of right-of-way from the northern portion of the 330-acre NHL property. This constitutes a permanent use of a portion of the historic property under Section 4(f). The alternative also uses 14.3 acres of land from the TCP.

FHWA and the NPS have determined that construction of a bridge at the Promontory Point crossing would adversely affect visitors' "first impression" historic views of the dam. These views occur as motorists approach the dam on existing U.S. 93 from both Nevada and Arizona. The dominance of the Promontory Point bridge would significantly detract from the historic views of the dam, because the bridge would conflict with Hoover Dam at the visitors' first opportunity to view it, a condition that could not be mitigated. In addition, preliminary Reclamation consultation with the SHPOs in the early 1990s indicated that the Promontory Point bridge alternative would be too close and would compete with the dam.

Table 6-1
Section 4(f) Impacts of the Hoover Dam Bypass Project

Resource	Promontory Point	Sugarloaf Mountain	Gold Strike Canyon	No Build[a]
Cultural Resources				
Hoover Dam (NHL)	Adverse effect to historic visual setting (nonmitigable)[b]	Adverse effect to historic visual setting (mitigable)[b]	No adverse effect to historic visual setting	(See footnote[c])
Dam-related historic features eligible for National Register[d]	Adverse effect on seven features	Adverse effect on eight features[e]	Adverse effect on five features	No change
TCP eligible for National Register	Adverse effect	Adverse effect	Adverse effect (nonmitigable)	
Noise[f]	No impact	No impact	Substantial increase in noise (>15 dBA) in upper canyon	Impacts to Hoover Dam location due to increased traffic
Recreation	Slight impact to boaters on Lake Mead. Positive impact to visitors at Hoover Dam	Positive impact to visitors at Hoover Dam	Impacts on Gold Strike Canyon Trail hikers due to loss of access. Positive impact to visitors at Hoover Dam	No change
Aesthetics	Impact to historic view of Hoover Dam and Black Canyon	Impact to existing view of Black Canyon	Impact to existing views of Black Canyon and Gold Strike Canyon	No change
Section 4(f) Land	Would take 20.3 acres of NHL land, 39.2 acres of LMNRA land, and 14.3 acres of TCP for 74 total acres	Would take 12.4 acres of NHL land, 57.1 acres of LMNRA land, and 22.3 acres of TCP for 92 total acres	Would take 0 acre of NHL land, 76.6 acres of LMNRA land, and 51 acres of TCP for 128 total acres	No change

[a] No action is defined by the Council of Environmental Quality as either, "no change from current management practices" or "the proposed activity would not take place." The No Build Alternative provides data for comparison purposes.

[b] FHWA and NPS determined the Promontory Point bridge would adversely affect the historic views of Hoover Dam while the Sugarloaf Mountain bridge would not, and that this impact cannot be mitigated.

[c] The No Build Alternative could result in potential structural damage from accidents and hazardous spills and in continued modification of the dam and its setting to improve traffic safety and access. Without long-range cultural resources planning, this alternative eventually may result in effects to the historic values from which the dam derives its significance.

[d] See Section 3.5 for specific details on impacts to cultural resources in the project area.

[e] FHWA conducted a supplemental historic resources survey of the preferred alternative and located six additional historic features associated with the NHL; two of the eight adversely affected features only have the setting impacted.

[f] See Table 3-6 for specific details.

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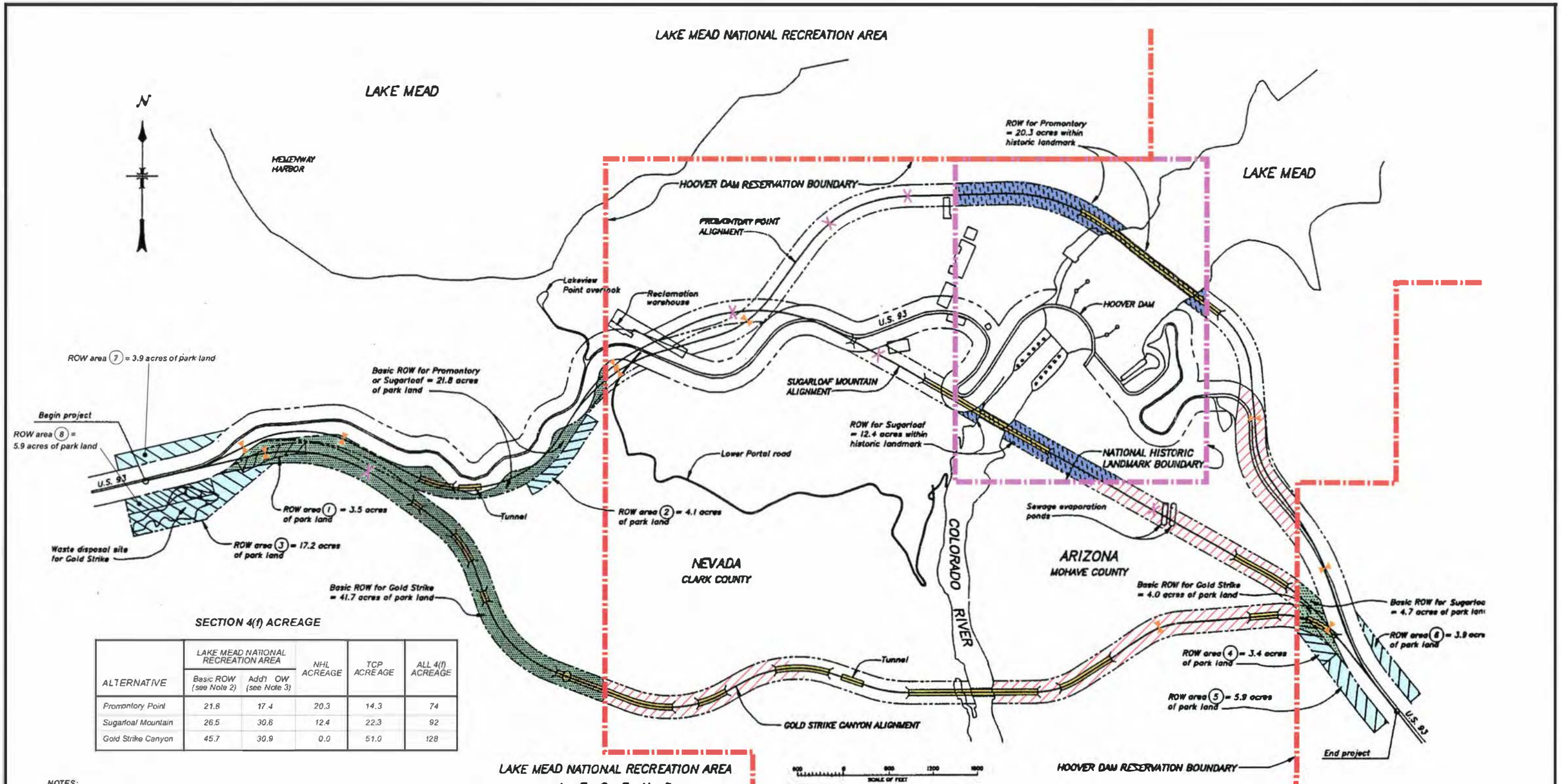

LAKE MEAD NATIONAL RECREATION AREA
L E G E N D

- Bridge
- Wildlife underpass
- Wildlife overpass
- Basic ROW in LMNRA
- Add'l ROW in LMNRA
- ROW in National Historic Landmark
- ROW in TCP within Hoover Dam Reservation Boundary

SECTION 4(f) ACREAGE

ALTERNATIVE	LAKE MEAD NATIONAL RECREATION AREA		NHL ACREAGE	TCP ACREAGE	ALL 4(f) ACREAGE
	Basic ROW (see Note 2)	Add'l ROW (see Note 3)			
Promontory Point	21.8	17.4	20.3	14.3	74
Sugarloaf Mountain	26.5	30.6	12.4	22.3	92
Gold Strike Canyon	45.7	30.9	0.0	51.0	128

NOTES:

1. A 400 ft. right-of-way (ROW) for existing Hwy. 93, 200 ft. each side of centerline already exists through the project area.
2. A basic 300 ft ROW is needed for each alternative, except at the Colorado River bridge sites where only the width of the bridge plus maintenance clearance (107 ft total) is needed over the water.
3. Additional area is needed outside of the basic ROW for constructing large roadway fills and intersections, and for waste disposal as listed below:

   Promontory Point
   Add ROW area (1) and (2) for large fills = 7.6 acres
   Add ROW area (7) and (8) for intersection = 9.8 acres
   Total additional ROW = 17.4 acres

   Sugarloaf Mountain
   Add ROW area (1), (2), and (4) for large fills = 11.0 acres
   Add ROW area (5) and (6) for intersection = 9.8 acres
   Add ROW area (7) and (8) for intersection = 9.8 acres
   Total additional ROW = 30.6 acres

   Gold Strike Canyon
   Add ROW area (3) for intersection and waste disposal site = 17.2 acres
   Add ROW area (5) and (6) for intersection = 9.8 acres
   Add ROW area (7) for intersection = 3.9 acres
   Total additional ROW = 30.9 acres
4. Boundaries of TCP are not shown for Native Americans' confidentiality purposes

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FIGURE 6-2
SECTION 4(f)
PUBLIC RECREATION LANDS
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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As with the other two build alternatives, this alternative would enhance protection of the physical features of Hoover Dam by removing trucks from the dam, thereby eliminating the potential for hazardous material spills and large-vehicle collisions with dam facilities.

6.4.1.3 Noise

Five receptor sites were selected in human-use areas to determine current and predicted noise impacts for this project: the Lakeview Point Overlook, the Nevada Intake Tower at the dam, a raft launch concession below the dam, the hot springs located at the mouth of Gold Strike Canyon, and a point along the Gold Strike Canyon Trail (Figure 3-1).

The closest receptor sites for Promontory Point Alternative are the Lakeview Point Overlook (receptor R1/M1) and the Nevada Intake Tower (receptor R3/M3). Lakeview Point Overlook would experience a future predicted noise level of 56 dBA; noise sources consist primarily of U.S. 93. The Nevada Intake Tower is predicted to have a future noise level of 74 dBA from traffic on U.S. 93 and the new bridge. The existing noise level at R1/M1 is 50 dBA (from U.S. 93), and at R3/M3 it is 73 dBA (also from U.S. 93). The new bridge would be located approximately 1,000 feet upstream of the dam. Most recreational activity in this area is associated with Hoover Dam visitation. As with Sugarloaf Mountain Alternative, most of the proposed alignment for Promontory Point falls within 2,000 feet of existing U.S. 93. Hence, constructing the Promontory Point Alternative would not result in significant increases in noise.

6.4.1.4 Aesthetics

Views of the Promontory Point Alternative would be unobstructed from locations on Lake Mead up to 1.2 miles upstream of the dam. The new bridge would be visible from Hoover Dam (which receives over 1 million visitors per year) and by aerial sightseers, thus changing the landscape setting of Lake Mead from the dam and the air. As discussed in Chapter 3, the visual quality of the view looking toward the dam from a boat on the lake would be most affected by the steel truss rib through arch bridge design on this alignment. The vividness (memorability of the existing landscape components) would be compromised by the introduction of the bridge structure. In addition, the intactness of the landscape and the unity (visual harmony between landscape elements) would be affected by the size and prominence of the form, contrasting lines, and textural differences between the proposed bridge and the existing landscape.

Views of Lake Mead from the dam crest, of the dam crest itself, and of Black Canyon from Lake Mead would be dominated by the Promontory Point bridge. The adverse visual effect could not be mitigated due to the obtrusive nature of the bridge and the protrusion of the structure, regardless of type, above the horizon.

6.4.1.5 Access

The Promontory Point Alternative would improve access to the HDNHL interpretive facilities by diverting all but visitor traffic off the existing, highly congested, two-lane dam crossing and approaches and onto a new four-lane U.S. 93 bridge located approximately 1,000 feet upstream from the dam.

6.4.2 Sugarloaf Mountain Alternative (Preferred Alternative)

The Section 4(f) properties and/or resource values were identified and assessed for potential impact by the Sugarloaf Mountain Alternative. The following summarizes the results of that effort. (A more detailed description of these analyses and conclusions can be found in Chapter 3.)

6.4.2.1 Park Land and Recreation

As stated previously, the Sugarloaf Mountain Alternative would permanently use 92 acres of Section 4(f) land (57.1 acres within the LMNRA, 12.4 acres within the HDNHL, and 22.3 acres within the TCP) (Figure 6-2). Much of this alternative traverses or is adjacent to areas of existing disturbance (e.g., power lines and related facilities). The Sugarloaf Mountain Alternative would not directly impact any recreational facility or resource located within Section 4(f) land. During construction, the noise of construction and presence of heavy equipment would temporarily lower the aesthetic experience for some visitors at the dam and in the area; however, others would find the construction operation interesting. Undesignated trail-use regulations within the LMNRA might need to be adjusted to accommodate construction activities, but these inconveniences would be minor and relatively short term. Following construction and the subsequent diversion of traffic off the dam to the new bridge, truck-derived noise and exhaust fumes would be removed from the dam, thereby improving conditions for dam visitors. The long-term effects of this alternative would be to improve the recreationists' access to Hoover Dam by reducing traffic congestion and to make U.S. 93 a safer transportation facility. The new bridge could also become a recreational attraction in itself because of its proximity to Hoover Dam.

In summary, the Sugarloaf Mountain Alternative would not significantly change the remaining portions of Section 4(f) lands in relation to noise or recreation qualities (see Chapter 3 for details). Construction activities would disrupt traffic flow and have some adverse effects on noise, visual, and aesthetics qualities, but these effects would be relatively short term. These activities would be closely monitored by and coordinated with Reclamation and NPS to minimize adverse impacts and activities.

6.4.2.2 Cultural and Historic Resources

Implementation of the Sugarloaf Mountain Alternative would affect 10 historic and cultural sites. These resources are the HDNHL, a power transmission switchyard (a contributing element to the NHL), the Old Government Railroad grade, transmission towers in Nevada, stone gates, U.S. 93 switchback (a contributing element to the NHL), Kingman Switchyard in Arizona, transmission towers in Arizona, the Old U.S. 93 segment in Arizona (a contributing element to the NHL), and the TCP. The alternative crosses the Colorado River gorge 1,500 feet downstream from the dam and takes approximately 12.4 acres of right-of-way from the 330-acre NHL property in its southwest corner. This constitutes a permanent use of a portion of the historic property under Section 4(f). The alternative also uses 22.3 acres of land from the TCP.

The Sugarloaf Mountain bridge would not detract from the "first impression" historic views as visitors see the dam from the Arizona and Nevada approaches because it is not visible due to the existing roadway alignment that presents a direct view of the dam and Lake Mead. The Sugarloaf Mountain Alternative would enhance protection of the physical features of Hoover Dam by eliminating the potential for hazardous material spills and large-vehicle collisions with dam facilities.

Archaeological site NV:DD:14:21 contains a cobble deposit with associated lithic reduction debris located on the lower slope of Sugarloaf Mountain. It is located within and contributes to the National Register eligibility of the larger TCP, and would be impacted by the bypass construction. Specifically, the site contains "doctor rocks" identified by tribal elders as used for healing and other ceremonial purposes.

Impacts to the Gold Strike Canyon and Sugarloaf Mountain TCP include land disturbance and changes in viewshed and noise. However, the land traversed by this alternative and viewsheds from prominent TCP locations have been significantly altered by construction of the dam and associated facilities. Furthermore, the Native American tribal elders interviewed in the ethnographic study stated that the integrity of the Sugarloaf TCP has not been diminished by the superficial impacts of traffic, construction of the treatment pond, or the presence of power lines.

6.4.2.3 Noise

The closest noise receptor site to the Sugarloaf Mountain Alternative is the raft launch site (receptor R2/M2), where the noise generated by traffic on the new bridge would be 57 decibels. The Nevada Intake Tower (R3/M3), which is about 2,030 feet from the proposed Sugarloaf bridge, would experience a predicted future noise level of about 74 decibels; noise sources consist of the new bridge, the existing dam crossing, and the Visitor's Center. Although this exceeds the federal noise abatement criterion, it represents a noise level decrease of approximately 3 dBA from the future no build predicted level of 77 dBA and an increase above the existing noise level of only 1 dBA. The existing noise level at R2/M2 is 52 dBA (from sound of river), and at R3/M3 it is 73 dBA (from existing traffic on U.S. 93). The future reduction is due to traffic being diverted to the new crossing (approximately 1,500 feet downstream from the dam).

The predicted 56 dBA noise level at the Lakeview Point Overlook (R1/M1) would be the same as the Promontory Point Alternative, given that these bypass alternatives are on essentially the same alignment near the overlook. Most of the proposed Sugarloaf Mountain Alternative falls within 2,000 feet of the existing U.S. 93 alignment; therefore, no significant increases in noise pollution would result along the entire length of the proposed highway.

6.4.2.4 Aesthetics

Views of the Sugarloaf Mountain Alternative would be unobstructed from Hoover Dam, except for the transmission towers and rock outcroppings in the foreground, and from the raft launch site 0.5 mile downstream of the dam. In addition, the new bridge would be visible by aerial sightseers, thus changing the aerial view of the dam and canyon. As discussed in Chapter 3, the visual quality of the view looking downstream from the eastern side of Hoover Dam would be most affected by the concrete cable-stayed bridge design. The vividness (memorability of the existing landscape components) of the view would be degraded by the presence and closeness of the bridge structure. In addition, the intactness and unity (visual harmony between landscape elements) of the view would be affected by the size and prominence of the bridge form; the vertical, horizontal, and diagonal lines; and the textural differences between the proposed bridge and the existing landscape.

The Sugarloaf Mountain bridge would be visible looking toward Black Canyon from Lake Mead and from the dam crest. However, certain bridge types would tend to blend into the surroundings due to continuity between the horizontal deck and canyon rim elements and the fact that elements of the bridge would not significantly protrude above the horizon line.

(See Figure 3-10.) Other bridge types whose towers and cable supports rise above the horizon line include elements that are similar in appearance to the existing power lines and transmission structures. Final bridge type will be based on input from a Design Advisory Panel, formed by the Programmatic Agreement, to mitigate adverse historic and visual impacts in concert with other major project factors.

6.4.2.5 Access

The Sugarloaf Mountain Alternative would improve access to the HDNHL interpretive facilities by diverting all but visitor traffic off the existing, highly congested, two-lane dam crossing and approaches and onto a new four-lane U.S. 93 bridge located 1,500 feet downstream from the dam.

6.4.3 Gold Strike Canyon Alternative

The Section 4(f) properties and/or resource values were identified and assessed for potential impact by the Gold Strike Canyon Alternative. The following summarizes the results of this effort. (A more detailed description of these analyses and conclusions can be found in Chapter 3.)

6.4.3.1 Park Land and Recreation

The Gold Strike Canyon Alternative would permanently use a total of 128 acres of Section 4(f) recreation land (76.6 acres within the LMNRA and 51 acres within the TCP) (Figure 6-2). This alternative would result in negative impacts to Gold Strike Canyon hikers. Although the Gold Strike Canyon trail is not an official NPS-designated trail, numerous hikers use it as a trail leading to the hot springs located at the lower end of Gold Strike Canyon. The trail would be closed during the 5- to 6-year construction period. The proposed highway for this alternative would pass over the trail at several locations, and traffic from the new highway would create new noise pollution along nearly the whole length of the trail. (See the following discussion of noise, aesthetics, and access impacts on the Gold Strike Canyon Trail.)

Within Gold Strike Canyon , the roadway would be constructed primarily on elevated structures where it would overlay and cross the popular Gold Strike Canyon Trail from near the trailhead located just south of U.S. 93 (approximately 0.5 mile south of the Lakeview Point turnoff) to within about 0.5 mile of the river, a total distance of approximately 1 mile. The length of the trail from the trailhead to the HDRA Boundary, approximately 0.75 mile along the proposed highway, is within the LMNRA and is under Section 4(f) protection. The HDRA is excluded from the LMNRA for the protection and security of the dam powerplant and associated facilities.

Following construction and the subsequent diversion of traffic off the dam to the new bridge, truck-derived noise and exhaust fumes would be removed from the dam, thereby improving conditions for dam visitors. The long-term effect of this alternative will be to improve the recreationists' access to Hoover Dam by reducing traffic congestion and to make U.S. 93 a safer transportation facility.

6.4.3.2 Cultural and Historic Resources

Implementation of the Gold Strike Canyon Alternative would only indirectly affect Hoover Dam through a slight change to the visual historic setting. Opinions of the Nevada and Arizona SHPOs and the NPS were that construction of a bridge at the Gold Strike crossing

location would have no adverse effect on the historic visual setting of the landmark.[2] The Gold Strike Canyon Alternative would also affect six other historic and cultural sites. These resources are the wooden ladders site (a contributing element to the NHL), Nevada waste tailings (a contributing element to the NHL), Arizona waste tailings (a contributing element to the NHL), construction road and test borings (contributing elements to the NHL), the Old U.S. 93 segment in Arizona (a contributing element to the NHL), and the TCP. As with the other two alternatives, the Gold Strike Canyon Alternative would enhance protection of the physical features of Hoover Dam by removing trucks from the dam, thereby eliminating the potential for hazardous material spills and large vehicle collisions with dam facilities.

6.4.3.3 Noise

The Gold Strike Canyon Alternative is the farthest from existing traffic-generated noise pollution associated with U.S. 93. Implementing this alternative would result in a permanent increase of approximately 26 dBA at the Gold Strike Canyon Trail site from traffic on the new U.S. 93 alignment, for a total of 65 dBA (the present ambient noise level is approximately 39 dBA). This would be below the 67-dBA federal noise abatement criterion; however, it would constitute a substantial increase (more than 15 dBA) under NDOT and ADOT noise abatement policies. Therefore, the projected noise level increase attributable to the project would substantially impair the use and enjoyment of the Gold Strike Canyon Trail by hikers. With mitigation (see below), the projected noise level increase can be reduced to 20 dBA above existing conditions, for a total of 59 dBA.

There is no predicted increase in the existing ambient noise level of 60 dBA at the Gold Strike Canyon Hot Springs from this alternative realignment of U.S. 93. Existing noise levels at the hot springs are caused from the sound of rushing water around the hot springs. The hot springs site would be shielded from future traffic-associated noise from the Gold Strike Canyon Alternative by intervening cliffs. Due to the serene and quiet nature of the previously undisturbed area, mitigation must be considered in those areas that would be affected by excessive noise levels (increases greater than 15 dBA above the existing ambient levels). Noise level decreases of approximately 3 dBA are predicted at both the Nevada Intake Tower and at Lakeview Point (from predicted future no-build levels of 77 dBA and 54 dBA, respectively) due to traffic being diverted to the new crossing location approximately 1 mile downstream.

6.4.3.4 Aesthetics

Views of the Gold Strike Canyon Alternative would be completely obstructed from Hoover Dam, the Arizona Overlook, and Lake Mead. The new bridge would be visible from the raft put-in 0.5 mile downstream of Hoover Dam and by aerial sightseers. As discussed in Chapter 3, the new Colorado River bridge would substantially change the landscape setting of Gold Strike Canyon as seen from the hiking trail and hot springs. From the view of Black Canyon looking downstream from the raft launch location, the concrete deck arch bridge design would have the most pronounced visual affect. Because the concrete forms on this bridge are larger than in the steel deck arch bridge, the visual impact from this bridge design is greater than for the steel deck arch bridge. With either bridge design, the vividness of the landscape components would not be adversely affected by the bridge

[2]The Advisory Council on Historic Preservation concurred with these preliminary opinions in a December 11, 1991 letter stating, "We agree that the construction of the bridge at Gold Strike Canyon appears to be the alternative which is least likely to have an adverse effect on the Hoover Dam National Historic Landmark."

structure; however, the intactness and unity of the view would be compromised by the size and prominence of the form and contrasting lines.

The Gold Strike Canyon Trail is used by visitors to hike down through the canyon to the river and the hot springs. Because of the heavy use of the hot springs area, the NPS has provided a portable toilet and trash receptacles at the mouth of the canyon.

At several locations in the canyon the highway alignment would cross over or lay directly above the canyon bottom and hiking trail. Construction of primarily highway bridges and retaining walls is required in lieu of fills through Gold Strike Canyon because fill slopes would interfere with drainage flows and drastically alter the canyon bottom for hiking. Views by recreationists using the hiking trail or hot springs would be adversely affected by this alternative, regardless of the bridge design that is selected.

6.4.3.5 Access

The Gold Strike Canyon Alternative would improve access to the HDNHL interpretive facilities by diverting all but visitor traffic off the existing, highly congested, two-lane dam crossing and approaches and onto a new four-lane U.S. 93 bridge located about 1 mile downstream from Hoover Dam.

During the construction period for this alternative (5 to 6 years), the Gold Strike Canyon trail would be closed from U.S. 93. Recreation activities within this area would be prohibited. Consequently, hiking access along this popular public parkland trail through Gold Strike Canyon to the river and hot spring pools would be blocked for years during construction of this highway alternative. Furthermore, the natural views and rugged appeal of this pristine canyon setting would be permanently replaced with concrete columns and overhead bridges crisscrossing the canyon trail for most of its length. This condition would substantially diminish the utility of this natural trail access to the river.

6.5 Avoidance Alternatives

Because of the unique situation of Section 4(f) lands being continuous from 40 miles north to 60 miles south of the existing corridor, it is not possible to avoid these lands and still maintain the service that existing U.S. 93 provides for this area of the Southwest (Figure 6-1). Consequently, there are no reasonable alternative routes that meet the project purpose and need, and avoid the use of Section 4(f) lands. The following avoidance alternatives are fully described and compared in Chapter 2.

A total of four alternatives would avoid the use of Section 4(f) lands:

- No Build Alternative
- Restricting motorized traffic from crossing Hoover Dam
  - Option for restricting truck traffic only
  - Option for restricting all traffic
- Traffic Systems Management
- U.S. Highway 95/I-40

6.5.1 No Build Alternative

The No Build Alternative would consist of no action being taken. No bypass of Hoover Dam would be developed, no change in the current highway configuration would occur, and no other structural or nonstructural improvements would be developed on U.S. 93 near Hoover Dam. Existing hairpin curves, inadequate sight distance, narrow dam crest roadway, and steep grades on U.S. 93 in the vicinity of Hoover Dam would remain unchanged. No direct construction costs would result from this alternative.

However, an increase in operations and maintenance costs is foreseeable because of the increased traffic and congestion on and near the dam. The public would also incur added costs because of more frequent traffic delays and accidents.

The No Build Alternative would not meet the purpose and need of the project as it would not remove a major bottleneck to regional commerce by increasing the capacity of U.S. 93 near the dam to improve through-vehicle and truck traffic, nor would it substantially reduce traffic congestion and accidents at the dam and approaches. It would not minimize out-of- direction travel during periods of significant delays at the dam crossing or reduce vehicle hours of travel and improve travel speeds. It may increase the potential for a catastrophic spill of hazardous materials with increasing automobile and truck traffic volumes on the dam and approaches. The risks to innocent bystanders, property damage to the dam and its facilities, contamination of the waters of Lake Mead or the Colorado River, and interruption of the power and water supply for people in the Southwest would remain or increase.

This alternative would not minimize impacts on recreation resources and tourists. It would not reduce the potential for pedestrian-vehicular accidents on the crest of the dam and on the Nevada and Arizona approaches to the dam. The increased traffic volumes, ranging from a forecasted 21,100 AADT in 2017 to 26,000 AADT in 2027 on Hoover Dam under no build versus 4,700 AADT in 2017 to 6,100 AADT in 2027 under the bypass alternatives, traveling at slower speeds would contribute to decreased air quality in the vicinity of Hoover Dam (see Traffic Analysis, Appendix A). There would also be increased congestion for tourists at Hoover Dam and parts of the LMNRA.

6.5.2 Restricting Motorized Traffic from Crossing Hoover Dam

The possibility of restricting traffic from using Hoover Dam to cross the Colorado River was examined with two options:

- Restricting truck traffic (through restriction on specific classifications of vehicles), which results in diversion to alternate routes, but leaves Hoover Dam open to automobile traffic; and
- Restricting all traffic, which results in diversion of all traffic to alternate routes and thus closes Hoover Dam to all motorized vehicles.

At the present time, Hoover Dam is the only Colorado River crossing in the general vicinity of Las Vegas, Nevada. The closest alternate crossings are at Lee's Ferry, 250 miles upstream of Hoover Dam; and at Davis Dam or Laughlin Bridge, 67 and 70 miles downstream, respectively. As a result, the river crossing on Hoover Dam is very important to both the commercial trucking industry and other travelers on U.S. 93.

In 1997, the AADT on Hoover Dam was 11,500 vehicles (13,200 vehicles on the Nevada side). Excluding commercial busses, approximately 18 percent of these daily vehicles were commercial trucks. Closure of the dam to traffic would likely result in a diversion of these vehicles to State Route (SR) 163 and U.S. 95 in Nevada and SR 68 in Arizona (the Laughlin-Bullhead City Alternative). These routes would add 23 miles to the trip from Kingman, Arizona, to Las Vegas, Nevada. Another possible route from Kingman to Las Vegas would be Interstate 40 (I-40) to Needles, California, and then north on U.S. 95 to Las Vegas. However, vehicles using these routes would travel 50 more miles than if they used SR 163 in Nevada as the alternate route. In either instance, U.S. 95 south of Las Vegas would experience a dramatic increase in traffic.

This alternative (with two options) for traffic restriction was eliminated because:

1. It does not fulfill the designated functional requirements of U.S. 93 as a principal arterial highway.
2. It would eliminate a major segment of a primary north-south U.S. highway.
3. The traffic congestion and safety considerations would merely be shifted from Hoover Dam to other locations.
4. Major sections of the alternate routes were not designed and built to sustain the heavy loads and volume of vehicles that would be diverted from Hoover Dam, resulting in a shortened life for those highways.
5. In addition to the extra travel distance, alternative transportation routes have greater elevation changes, resulting in both increased travel time and operating cost for commercial carriers and the general traveling public (see Appendix B).

6.5.3 Traffic Systems Management

A Traffic Systems Management (TSM) Study was completed in January 1992 to determine whether or not a low cost solution exists for the current and projected traffic congestion, pedestrians, and vehicle safety problems at the present crossing. Typically, TSM addresses signing and signalization, turn lanes and traffic channelization, vehicle turn-outs, vehicular access and parking controls, and pedestrian channelization and barriers.

The TSM Study concluded that some minor improvements in traffic flow could result from low cost changes in operational conditions; specifically: (1) existing crosswalks should be widened and supplemental signing added to better concentrate pedestrian crossings, which would minimize accident potential and improve overall traffic flow on the dam crest; and (2) the immediate approaches to Hoover Dam should be signed to indicate the location of visitor parking lots, which was done with construction of the Visitor's Center. The study concluded this would alleviate some of the traffic congestion that results from visitor confusion regarding parking lot locations.

However, because of the existing horizontal curves, roadway width on the dam, and pedestrian volumes, no significant improvements could be realized without provision of an alternate route. The existing traffic conditions will only deteriorate with future growth of the traffic volumes. The existing geometry of the highway approaching and over Hoover Dam is a source of difficulty for semitrailer trucks in making the necessary maneuvers around the hairpin curves and the 90-degree curve. This condition will continue to result in

accidents and extensive delays to through traffic. The study recommended that a new four-lane route should be provided.

Therefore, this alternative was eliminated from further consideration because it could not meet the purpose and need of the project. Since this alternative would only involve modifications to the existing route, it would not use additional Section 4(f) resources; however, the TSM Study concluded that only minor improvements in traffic flow could result from changes in operational conditions. This alternative was eliminated because:

1. No significant improvements to traffic flow would be realized due to the existing geometry of the highway approaching and crossing Hoover Dam, including the inadequate horizontal curves and highway width on the dam, and due to the high traffic and pedestrian volumes.
2. It does not fulfill the designated functional requirements of U.S. 93 as a principal arterial highway.
3. The vehicle-pedestrian, vehicle-vehicle, and vehicle-sheep conflicts would not be changed.

6.5.4 U.S. 95/I-40

This alternative to U.S. 93 improves the existing route between Boulder City and Kingman via Needles, California. Approximately 56 miles of U.S. 95 in Nevada and 13 miles of U.S. 95 in California would be widened to four lanes. No improvements to existing I-40 and its crossing of the Colorado River south of Needles are necessary.

The U.S. 95/I-40 Alternative does not meet the project purpose and need because it would not substantially eliminate roadway deficiencies and reduce traffic congestion on U.S. 93 at Hoover Dam and dam approaches, eliminate through traffic from the dam, enhance public safety, or protect Hoover Dam and its visitors. The U.S. 95/I-40 Alternative was eliminated because motorists would avoid driving the additional 70 miles by continuing to use the Hoover Dam crossing. Therefore, meeting the objectives of enhanced safety and reduced congestion on U.S. 93 at the dam would not be achieved.

6.6 Justification for Use of Section 4(f) Land

6.6.1 Evaluation of Potential Avoidance Alternatives

The basis for concluding that there are no feasible and prudent alternatives to the use of Section 4(f) land must demonstrate that:

- There are unique problems or unusual factors associated with the alternatives that avoid Section 4(f) lands, or
- The cost, social, economic, and environmental impacts, or community disruption from such alternatives reach extraordinary magnitudes.

The geographic shape of LMNRA and the location of existing U.S. 93 (i.e., a narrow strip of area extending approximately 60 miles south of the existing road corridor and a variable width strip of area extending approximately 40 miles east of the existing corridor, see Figure 6-1) creates a unique problem regarding total avoidance of Section 4(f) land.

6.6.1.1 U.S. 95/I-40

Any alternative that would route through traffic around the southern end of the LMNRA would add, at a minimum, approximately 25 miles of out-of-direction travel to the mileage currently traveled by existing U.S. 93 motorists. Based on analysis of the Laughlin-Bullhead City Alternative (LBA), which traverses the extreme southern end of LMNRA, this represents an additional $1.4 billion dollars in total 20-year costs (see Appendix B). These additional total user costs are an increase of approximately 10 percent over the build alternatives studied in detail and result in a negative benefit to cost ratio. Thus, the U.S. 95/I-40 alternative that passes far to the south of LMNRA and adds approximately 70-miles to the trip length is considered to be unfeasible with respect to engineering economics and imprudent regarding the increased travel time, user costs, and environmental impacts.

6.6.1.2 Restricting Traffic from Hoover Dam

This alternative was determined to be unfeasible and imprudent primarily because:

- It does not fulfill the designated functional requirements of U.S. 93 as a principle arterial highway
- It would eliminate a major segment of a primary north-south U.S. highway

Additional reasons are explained in section 6.5.2.

6.6.2 Purpose and Need

The U.S. 95/I-40 Alternative, passing to the south of LMNRA, and the No Build Alternative do not meet the project purpose and need because a substantial portion of the through traffic (all for the no build) would continue to use existing U.S. 93 due to the 70-mile trip length increase from Kingman, Arizona to Las Vegas, Nevada. Therefore, pedestrian-vehicle accident rates, congested bottleneck conditions, substandard approaches, and travel time would not be improved.

The Traffic Systems Management alternative would not significantly improve traffic flow across Hoover Dam, minimize the potential for pedestrian-vehicle accidents, improve protection of the dam facility, or improve operation and maintenance conditions, and therefore it does not meet the project purpose and need.

6.6.3 Least Harm Alternative

When there are no feasible and prudent alternatives that avoid the use of Section 4(f) land, the final Section 4(f) evaluation must demonstrate that the preferred alternative is a feasible and prudent alternative with the least-harm on the Section 4(f) resources after considering mitigation. To make a least harm determination, the net impact on Section 4(f) land may consider not only size of land used , but also the:

- Location of the portion used
- Severity of the portion used
- Function of the portion used

The remainder of this section describes the logic used to determine the least harm alternative. Two build alternatives with relatively lower Section 4(f) use are the Laughlin-Bullhead City and Modifications to Hoover Dam alternatives.

6.6.3.1 Modifications to Hoover Dam.

The two modification alternatives, widening the crest and elevating the highway structure, would not:

- Minimize the potential for pedestrian-vehicle accidents
- Improve protection of the dam facility
- Improve operation and maintenance conditions

Therefore, these alternatives do not meet the project purpose and need. In addition, the two modification alternatives would result in direct adverse physical alteration to the HDNHL in terms of its original design, setting, materials, and workmanship.

6.6.3.2 Laughlin-Bullhead City

The LBA does not meet the project purpose and need; would not reduce travel time; would have adverse impacts on public safety, sensitive wildlife species, and air quality; would not protect the HDNHL; and would not fully address long-term traffic issues on Hoover Dam.

Further, based on the LBA study in Appendix B an additional $1.4 billion dollars in total 20-year costs would be accrued. These additional total user costs are an increase of approximately 10 percent over the build alternatives studied in detail and result in a negative benefit to cost ratio. Thus, this alternative is considered to be unfeasible with respect to engineering economics and imprudent regarding the increased travel time, user costs, and environmental impacts.

6.6.3.3 Alternatives Eliminated Based on Acreage and Quality Impacts

Based on Section 4(f) acreage impact considerations the following initial alternatives can be readily eliminated.

- Gold Strike Canyon (128 acres)
- Boulder City North (145 acres)
- Boulder City South (165 acres)
- Boulder City South Option (135 acres)
- Willow Beach North (405 acres)
- Willow Beach South (575 acres)
- Nelson (491 acres)
- Cottonwood (436 acres)
- Temple Bar (818 acres)

In addition, the LMNRA Section 4(f) acreage traversed by these alternatives is essentially undisturbed.

6.6.3.4 Determination of Least-Harm Alternative

Based on the above discussion the remaining two alternatives are Sugarloaf Mountain and Promontory Point. Promontory Point Alternative uses approximately 74 acres of Section 4(f) land. Sugarloaf Mountain Alternative uses approximately 92 acres. However, much of Sugarloaf Mountain Alternative traverses or is adjacent to areas of existing disturbance (e.g., power lines and related facilities) that detract from recreational and scenic qualities.

The Sugarloaf Mountain Alternative uses approximately 58 acres of LMNRA, 12 acres of the HDNHL and 22 acres of the TCP. The Promontory Point Alternative uses approximately 40 acres of LMNRA, 20 acres of the HDNHL and 14 acres of the TCP.

As discussed earlier in this section, least-harm considerations are not always a function of minimizing acreage take. Other important factors such as location, severity and function of the portion taken also may play a role in the decision-making process.

Three primary Section 4(f) activities or features are affected by the Sugarloaf Mountain and Promontory Point Alternatives:

- Recreational opportunities associated with LMNRA
- Recreational opportunities associated with HDNHL
- The historic and cultural values of HDNHL and TCP

Both alternatives improve recreational opportunities at the dam and in the LMNRA by reducing congestion, vehicle-pedestrian conflicts, and environmental impacts associated with truck traffic. Neither alternative permanently restricts access to recreational sites currently in use or planned for use. Neither alternative results in perceptible changes in noise pollution.

Both alternatives cross waters of the Colorado River. However, during the comment period on the DEIS, there was strong public concern regarding the potential for a hazardous material spill in Lake Mead from the Promontory Point bridge. Furthermore, the resource and regulatory agencies, with the exception of the SHPOs who preferred Gold Strike Canyon during early reviews for its lack of visibility from the HDNHL, unanimously supported the Sugarloaf Mountain Alternative due to least impact to wildlife, wildlife habitat, water quality, and jurisdictional waters of the U.S.

The Sugarloaf Mountain Alternative would not impact views of the dam as motorists approach from Arizona or Nevada. Conversely, the Promontory Point Alternative would be directly visible and would detract from the "first impression" historic views of the dam.

Both alternatives would adversely impact the scenic views from the dam crest and Lake Mead. However, the Sugarloaf Mountain Alternative could be blended into the landscape more readily than the Promontory Point Alternative. This is because (1) the Sugarloaf Mountain Alternative deck structure would form a fairly contiguous horizontal line with the canyon rim, (2) the structure would not significantly protrude above the horizon line when viewed from the dam crest, and (3) the structure would not protrude above the horizon line when viewed from Lake Mead. Conversely, the Promontory Point Alternative would be obtrusive and protrude above the strong horizontal component of Lake Mead regardless of bridge type.

Both alternatives would affect the TCP. Both alternatives would be located in previously disturbed portions of the TCP. The Promontory Point Alternative would follow the northern boundary of the TCP along existing U.S. 93, whereas the Sugarloaf Mountain Alternative would traverse a portion of the TCP. Therefore, the Promontory Point Alternative would create less disturbance from a location standpoint. However, the Sugarloaf Mountain Alternative would traverse the southern boundary of the existing disturbed area, and the tribal elders interviewed stated that the integrity of the Sugarloaf TCP has not been diminished by existing disturbance. In addition, impacts due to land disturbance, visual changes, and noise would be mitigated through continuing consultation with Native American tribes and by Native American involvement in the Design Advisory Panel, formed by the Programmatic Agreement.

Therefore, the Sugarloaf Mountain Alternative has been determined to be the harm-minimizing alternative based on the following factors:

- Strong public concern regarding hazardous materials spills in Lake Mead from the Promontory Point Alternative
- Resource and regulatory agency support for Sugarloaf Mountain due to least impact to wildlife, wildlife habitat, and water quality
- No effect on the "first impression" historic views of Hoover Dam
- Ability to more readily blend Sugarloaf Mountain Alternative into the landscape
- Sugarloaf Mountain Alternative traverses the National Register-eligible TCP in an area of extensive disturbance
- Ability to minimize and mitigate impacts through continuing consultation and Native American participation on the Design Advisory Panel

6.7 Measures to Minimize Harm

Following is a description of the measures that will be implemented in an effort to minimize harm to Section 4(f) resources.

6.7.1 Recreation Resources

During the 5- to 6-year construction period for this project, certain recreation activity areas would be designated as construction safety zones and recreation would be limited, or in other places it would be eliminated entirely. Specifically during blasting operations, short periods would occur when recreation access to affected areas must be prohibited for protection of the public. Trail-use regulations within the LMNRA may need to be adjusted to accommodate construction activities and to assure the safety of trail users. Scheduling of these activities would be closely coordinated with the NPS and Reclamation, and there would be ongoing public information provided.

Bicyclists and pedestrians would be prohibited from using the new bridge on any of the bypass alignments. However, the existing crossing would be maintained on the roadway across Hoover Dam.

Construction safety practices would require that nets be used under the work area during construction to protect areas below the bridges from falling debris, tools, equipment, or building materials.

6.7.2 Aesthetics

Cuts, fills, and other construction activities would be performed so as to minimize impact to scenic values, especially in undeveloped areas like Gold Strike Canyon. Mitigation techniques would include rough cuts, feathering cut/natural environmental interfaces, use of artificial desert varnish on rock cuts to match adjacent natural colors, colored concrete, and other state-of-the-art methods (see Chapter 3). Care would be taken to remove all construction debris and other trash from the site as construction is completed.

Excavated topsoil would be stored during construction and replaced on appropriate disturbed areas outside the highway shoulders after construction to aid in re-establishing desert vegetation. Cactus, yucca, and candidate plant species would be removed and replanted, or reseeded in consultation with the NPS. The Programmatic Agreement for historic and cultural properties also specifies that Corridor Design Criteria must be developed for aesthetic consistency of major structural, roadway, and earthwork elements of the bypass.

Specific mitigation measures for the three bypass alternatives, as developed in the EIS Visual Resources Analysis, are as follows:

6.7.2.1 Promontory Point Alternative

In June 2000, FHWA applied the criteria of adverse effect (under 36 CFR 800.5) and determined in consultation with the Nevada and Arizona SHPOs that the Promontory Point Alternative would have an adverse effect on the Hoover Dam NHL because the bypass project would introduce visual elements that diminish the integrity of the significant historic features and setting of the property. Furthermore, FHWA and NPS concluded that the new Promontory Point bridge would adversely affect visitors' historic views of the dam from U.S. 93 in both Nevada and Arizona, and this could not be mitigated. Preliminary opinions of the Nevada and Arizona SHPOs were that the adverse visual effect of the Promontory Point Alternative could not be mitigated.

However, as documented in Chapter 3, impacts on visual resources from the steel truss rib through arch bridge could be lessened by coloring the steel to blend with the surrounding environment.

For a concrete cable-stayed bridge, to reduce the visibility of the pillars on the bridge, the concrete should be tinted with nonglare colors that blend with the surrounding environment. In addition, the cuts for the roadway approaches should be engineered to minimize impacts on visual resources. Any slope protection should be tinted to blend with the surrounding landscape.

For a suspension bridge, to reduce the impacts on visual resources from the bridge, the concrete pillars should be tinted with nonglare colors that blend with the surrounding environment. In addition, the roadway cuts for the roadway approaches should be engineered to minimize impacts on visual resources. Any slope protection should be tinted to blend with the surrounding landscape.

6.7.2.2 Sugarloaf Mountain Alternative (Preferred Alternative)

FHWA also determined in consultation with the Nevada and Arizona SHPOs that the Sugarloaf Mountain Alternative would have an adverse effect on the NHL because the bypass project would introduce visual elements that diminish the integrity of the significant historic features and setting. However, FHWA and NPS concluded that the preferred alternative would not detract from the historic views of the dam as would the Promontory Point Alternative. Measures to minimize the aesthetic/visual impact on the historic setting were developed in consultation with the SHPOs (see Section 6.7.3). Preliminary opinions of the Nevada and Arizona SHPOs were that the adverse effect of the Sugarloaf Mountain Alternative could be mitigated through design features.

Impacts on visual resources from a concrete cable-stayed bridge for the Sugarloaf Mountain Alternative could be reduced by using colored concrete or painting the bridge using a nonglare color that blends with the surrounding environment. However, the closeness of the bridge to the dam would still result in the bridge dominating the downstream view from the dam.

6.7.2.3 Gold Strike Canyon Alternative

Impacts on visual resources from either the concrete deck arch bridge or the steel deck arch bridge would be reduced by coloring the concrete or steel so that the bridge blends more effectively with the surrounding environment. This measure would reduce the visual impact perceived by the hikers, hot spring users, rafters, and other river users near the proposed alignment. No impact on views from either Lake Mead or Hoover Dam would be expected from this alternative.

6.7.3 Cultural and Historic Resources

A PA that commits FHWA to implement specific activities and mitigation measures to resolve the adverse effects on historic properties from the preferred alternative was developed in consultation among ACHP, FHWA, Nevada and Arizona SHPOs, NPS, Reclamation, WAPA, NDOT, ADOT, and interested Native American tribal governments. The PA stipulates, in part, that FHWA will establish a Design Advisory Panel to review bridge design concepts and corridorwide design elements, develop Corridor Design Criteria for aesthetic consistency of major structural, roadway and earthwork elements, mitigate adverse effects on historic resources according to the Secretary of Interior Standards, and minimize adverse effects on the TCP based on specific measures identified in consultation with the Native American tribes, who are invited signatories of the PA.

The PA incorporates a Treatment Plan for avoidance, minimization, and mitigation of adverse effects to historic and cultural properties. The specific mitigation measures in the Treatment Plan for historic resources include documenting the Hoover Dam National Historic Landmark viewshed and related historic features in accordance with the Historic American Engineering Record (HAER) standards, determined in consultation with the NPS/HAER authorities. HAER recordation may include large format photography of affected features, measured drawings where appropriate, reproduction of original design drawings and construction specifications and historic photographs, photography of the property setting, and preparation of an historical context.

Mitigation measures currently identified for the TCP have resulted from the ongoing government-to-government consultation meetings among FHWA, NPS, Reclamation and the Native American tribes. The mitigation measures recommended by the tribes to date

and incorporated in the PA include providing funding to the tribes for continuing consultation through design and construction, providing access for the tribes to the TCP, developing a statement of work for conducting additional studies of cultural landscapes in the surrounding area, and providing Native American cultural interpretive exhibits. (See Section 3.5.3.1 for further details.)

6.7.4 Noise

The Gold Strike Canyon Alternative would require consideration of mitigation measures in the upper reaches of the Gold Strike Canyon Trail along the alignment where the predicted noise levels would be increased by 26 decibels above the ambient noise levels (39 dBA). A modeling/monitoring receptor site (R4/M4) located on the Gold Strike Canyon Trail was used in the analysis of projected noise from the Gold Strike Canyon Alternative. Table 6-2 shows the effects of noise barriers constructed along the trail side of the U.S. 93 Bypass in the vicinity of receptor R4/M4.

Table 6-2
Gold Strike Canyon Alternative
Mitigated Future Peak-Hour Noise Levels (dBA-L_{eq})

Receptor Location	Build, No Mitigation	8-Foot Barrier[a]	10-Foot Barrier	12-Foot Barrier	14-Foot Barrier	16-Foot Barrier
R4/M4	65	59	59	59	59	59

[a]Minimum barrier height required to break the line-of-sight from an 11.5-foot truck exhaust stack and the noise receptor.

Table 6-2 shows that noise barriers located on the outside shoulder of the elevated roadway could reduce noise levels in the affected portion of the hiking trail to 59 dBA-L_{eq} (hourly equivalent sound pressure levels). However, the mitigated noise levels would still result in a substantial increase over existing ambient levels (more than 15 dBA) under NDOT and ADOT noise abatement policies.

Although the noise impact would not be mitigated below this federal and state criterion, an insertion loss of up to 6 dBA would be feasible with the addition of noise barriers. Under noise abatement policies of the FHWA, noise barriers would be constructed only if they are determined to be reasonable and feasible (FHWA, Highway Traffic Noise Analysis and Abatement - Policy and Guidance, June 1995). A 5-dBA noise reduction must be achieved for the noise barriers to be considered feasible, which can be accomplished for the Gold Strike Canyon Trail (as shown in Table 3-11). One reasonableness factor that can be analyzed for recommended barriers is benefit-cost. To achieve the minimum noise reduction of 5 dBA and break the line-of-sight along the portion of the hiking trail impacted by the Gold Strike Canyon Alternative would require construction of approximately 5,170 feet of noise barriers located along about 7,000 feet (1.3 miles) of the roadway. The barriers would begin near the trailhead off U.S. 93 (engineering station 45+50) and end at a major side-canyon/sheep crossing bridge (station 115+50), where the roadway diverges from the main canyon/trail and heads northeasterly (Figure 3-1).

To construct 5,170 feet of noise barriers at a height of 10 feet would cost approximately $1,048,000 (subject to adjustment during final design). The barriers would be placed only on the outside shoulder of the roadways and bridges facing the trail, but not in locations where the trail lies under the elevated roadway. This mitigation cost would benefit the hikers and rock-climbers using this hiking trail to the hot springs. The NPS estimates that

approximately 1,000 hikers currently use the Gold Strike Canyon Trail on an annual basis (Jim Holland, personal communication, July 2, 1998). Thus, the cost of the noise barriers would equate to approximately $1,000 per hiker annually, or about $50 per hiker over a 20-year period.

Although the FHWA noise abatement policy does not have a specific guideline for the number of people to be protected, as compared against the total cost of noise abatement, this is a critical factor in making a determination on the reasonableness of the cost of noise mitigation, and it needs to be considered during selection and design of the preferred project alternative. This cost may not be reasonable considering that the total number of hikers using the Gold Strike Canyon Trail is very small compared to the total number of visitors to the LMNRA (9.7 million in 1997) and since the barriers will not eliminate the substantial increase over existing ambient levels (i.e., more than 15 dBA). Even with mitigation, the projected traffic noise level from U.S. 93 through the canyon would be 20 dBA greater than existing ambient conditions. The final decision on installing noise abatement barriers would be made during completion of project design if the Gold Strike Canyon Alternative were selected in the Record of Decision.

6.7.5 Recreation Resources

Construction safety practices will require that nets be used under the work area during bridge construction to protect areas below from falling debris, tools, equipment, or building materials. Some seasonal and daily blasting restrictions may be imposed throughout the construction period. Restrictions and schedules for blasting will be determined before construction. Construction of the Promontory Point bridge may require access restrictions to Hoover Dam from Lake Mead; however, periodic closures would be coordinated with lake tour operators. Construction of the Sugarloaf Mountain bridge may cause minor interruptions in access for the rafting concession and canoeing put-ins; however, conflicts can be avoided by coordinating launching activities with construction access. Access to the Gold Strike Canyon Trail would be prohibited during all phases of construction and the rafting concession will continue to operate with minor interruptions.

6.8 Coordination

Two agencies have jurisdiction over Section 4(f) lands crossed by the U.S. 93 proposal. The LMNRA is administered by the NPS and the HDNHL is administered by Reclamation as a part of the HDRA.

Reclamation originally proposed the bridge project in 1965, and they issued the Notice of Intent and initiated scoping meetings as the lead agency in 1990. The NPS, as custodian over the park land involved in this proposal, has taken an active role in all planning phases of the proposed project. NPS is a member of the PMT, which was established by Reclamation in 1989 to oversee project planning, environmental studies, design development, and project funding. The PMT is an interagency project management team composed of the NPS, the Arizona and Nevada Divisions of the FHWA, NDOT, ADOT, and Reclamation. Representatives from these agencies attended monthly meetings beginning in November 1989 until Reclamation stopped work in 1993. The PMT meetings were reinitiated in 1997 under the FHWA, Central Federal Lands Highway Division as lead agency. This team has participated in reviews of the project area, environmental studies, preliminary engineering, and the EIS throughout the planning process. The Western Area Power Administration (WAPA), U.S. Army Corps of Engineers, EPA, USFWS, NDOW, and

AGFD have also met with the PMT and have provided input on project alternatives and purpose and need.

Site visits and field interviews with Native American tribal elders were conducted by the University of Arizona during May and June of 1998. This resulted in a draft report concluding that a potentially significant traditional cultural property (TCP) may exist in the vicinity of the bypass project. Following circulation of the draft report, the Nevada SHPO requested that FHWA conduct an ethnohistoric study to provide documentary context for assessing the potential TCP identified during the 1998 field interviews. Further, the Nevada SHPO requested that FHWA commence formal government-to-government consultation with the affected Native American tribes concerning the significance and National Register eligibility of the potential TCP in the project area. The Arizona SHPO also requested further consideration of potential TCPs in the area.

During the first government-to-government consultation meeting, the tribes requested that the 1998 studies be expanded to other locations and include additional tribes and elders. Subsequent studies by the University of Arizona and W & S Consultants and additional government-to-government consultations were conducted in 2000. These efforts resulted in an FHWA determination, and Nevada and Arizona SHPO concurrence, that the Gold Strike Canyon and Sugarloaf Mountain TCP is eligible for listing on the National Register of Historic Places. Continuing government-to-government consultations between FHWA and Native Americans, and Native American participation in the DAP, will be utilized to minimize and mitigate impacts to the TCP.

Consultations between FHWA and the Nevada and Arizona SHPOs resulted in concurrence on the adverse effects of the undertaking on historic properties and signing of a Programmatic Agreement in December 2000. FHWA will continue to consult with the Advisory Council on Historic Preservation, the SHPOs, and other signatories to implement the terms of the PA during the design and construction phases of the Hoover Dam Bypass.

Consultations will also continue with the NPS and Reclamation, as the officials having jurisdiction over the affected Section 4(f) lands, throughout the design and construction phases. As mandated under Section 6(f) of the Land and Water Conservation Fund (LWCF) Act, the NPS must also assure that any conversion of LWCF purchased or improved lands is compensated with replacement lands of equal value, location, and usefulness. In a letter dated April 30, 1998, the FHWA requested information from the following agencies to determine whether any LWCF monies were used to purchase or improve any of the recreational lands potentially impacted by the Hoover Dam Bypass Project: Arizona State Parks, Nevada Division of State Parks, NPS Midwest Support Office (for lands in Arizona), and NPS Great Basin Support Office (for lands in Nevada). The NPS has responded by letter dated May 18, 1998, indicating no LWCF monies were used to purchase or improve any LMNRA lands affected by the project.

6.9 Determination

Based upon the above considerations, there is no feasible and prudent alternative to the use of Section 4(f) land and the proposed action includes all possible planning to minimize harm to the Lake Mead National Recreation Area, the Hoover Dam National Historic Landmark, and the Gold Strike Canyon and Sugarloaf Mountain TCP resulting from such use.

CHAPTER 7

Coordination and Consultation

7.1 Introduction

A Public Involvement Strategy was developed for this project. The strategy was prepared following interviews with 17 key stakeholders to assess information needs and appropriate tools for communicating information about the project and receiving input from the public. Those stakeholders are listed below.

Bill Smith, Boulder City Councilman

Lou Sorenson, Kingman City Manager

Larry Castillo, Mohave County Commissioner

Kevin Hill, Henderson City Councilman

Bruce Woodbury, Clark County Commissioner

Kurt Weinrich, Director
Regional Transportation Commission

Randy Harness, Conservation Chair
Sierra Club

Jim Moore
Nature Conservancy

Joyce Larkin
Hoover Dam Visitor Center

Brad Benson, Chairman
CAUTION

Cheryl Ferrance
Boulder City Chamber of Commerce

Trish Williamson
Public Relations Coordinator
Las Vegas Chamber of Commerce

Ray Chamberlain or Ted Scott
American Trucking Association

Dave Berry
Swift Transportation Company

Terry Smalley
Executive Vice President

Daryl E. Capurro, Managing Director
Nevada Motor Transport Association

David Creer, Executive Director
Utah Motor Transport Association

Stan Randolph, Consultant
California Trucking Association

A total of six project newsletters were distributed for public information. Public participation and comment on potential environmental concerns were encouraged through two of these newsletters, three public open houses, and by providing project-dedicated voice mail and a project web site. Three public hearings were held for public comment on the DEIS in October 1998. Appendix C contains agency correspondence. Volume II contains a detailed description of the DEIS public hearings and the comments received.

7.2 Public Scoping

Following a May 1990 Notice of Intent published in the *Federal Register*, Reclamation initiated the EIS and began the scoping process. Public scoping meetings were held in June 1990 in Kingman, Arizona, and Boulder City and Las Vegas, Nevada. In Boulder City, there was general concurrence that a new crossing was needed to remove traffic from Hoover Dam; however, the public was divided on the solution. Some preferred to have a bypass around Boulder City in addition to Hoover Dam, while others felt that any road that bypassed Boulder City would severely impact downtown businesses. A newsletter, titled *Update*, was published in January 1991 and sent to interested individuals. Interviews with numerous community members and several meetings with interested members of the public, the Boulder City Chamber of Commerce, members of the Boulder City Council, and other organizations also occurred.

7.3 Public Comment Meetings

The FHWA filed a Notice of Intent in September 1997 to announce FHWA as the new lead agency for environmental review of the project. FHWA conducted three public open houses to allow comment on the alternatives carried forward from the June 1990 scoping meetings. The public open houses were noticed in the first newsletter mailed in early October 1997 and in the following newspapers: *Las Vegas Review Journal, Las Vegas Sun, Kingman Miner, Arizona Republic,* and *Boulder City News*. A press release announcing the public open houses was distributed to local media outlets through NDOT and ADOT public affairs offices.

7.3.1 Kingman, Arizona, Public Open House Held October 27, 1997

The first public open house was held in Kingman. The meeting was informal, consisting of six stations with a display board at each station. The display boards included the three proposed alternatives, the project schedule, the environmental review process, and an aerial photograph of the proposed project area. Comments were noted on flip chart pads at each station, and comment sheets were provided as handouts. Comments were varied and included concern for project funding, habitat impacts, existing hazardous roadway conditions, and consideration of a north-south alternative.

7.3.2 Boulder City, Nevada, Public Open House Held October 28, 1997

The second public open house was held in Boulder City. The meeting format was the same as for the Kingman meeting. Public comments were extensive and focused primarily on considering other alternative crossings, specifically those to the south, bypassing Boulder City. Other comments related to mitigation of traffic congestion, pedestrian safety, wildlife impacts, and funding and schedule.

7.3.3 Las Vegas, Nevada, Public Open House Held October 29, 1997

The third and final public open house was held in Las Vegas. The meeting format was the same as for the Kingman and Boulder City meetings. Comments focused on pedestrian safety, truck traffic considerations, visual impacts of a new crossing, project funding, and general support for one of the three alternatives.

7.4 Public Agency Partnering Session Held October 29, 1997

A partnering session with federal, state, and local agencies was conducted early in the project. The session was to inform these agencies of the Project Management Team's direction to complete the environmental review process, discuss individual agency issues and concerns about the project, and develop a partnership and promote communications among the agencies. The session resulted in a Team Charter signed by all participants acknowledging a willingness to work together to achieve the best possible project.

7.5 Project Management Team Meetings

The Project Management Team, described in Chapter 1, met regularly to discuss the project, review interim work products, and provide guidance and direction for preparing the EIS and other permit applications. In 1998 meetings were held on January 20, March 17, and May 12. In 1999, meetings were held on February 9, April 20, June 29, and November 15. In 2000, meetings were held on April 12, June 13, July 11, October 4, and November 30.

7.6 Public Outreach

A project presentation was developed to inform and educate stakeholders and the general public. Presentations to local agencies were given, and letters were sent to local governments and entities offering to give presentations to their staffs and constituents. Copies of these letters are found in Appendix C, Correspondence.

The presentation was made to the Laughlin Town Advisory Board in a public meeting on April 14, 1998. The FHWA Project Manager also presented the project and was available for questions on a live call-in televised program, NDOT Update, broadcast on channels 42 and 63 from Las Vegas on May 15, 1998.

In addition to DEIS public hearings held on October 13, 14, and 15, 1998, presentations about the project and the EIS process were made at annual Transportation Conferences jointly sponsored by the University of Nevada, Las Vegas; the American Society of Civil Engineers; and the Institute of Transportation Engineers in October 1998 and in September 1999. Similar presentations were made at the 1998 and 1999 Annual Statewide Conferences of the Arizona Public Works Association and at the 1999 and 2000 Annual Arizona Conferences on Roads and Streets.

A project web page was developed (http://www.hooverdambypass.org/) to provide project information including details on alternatives, an explanation of the environmental review process, a project schedule, and information material that is developed. An e-mail address was also established (haussler@road.cflhd.gov) for users to provide feedback to the Project Management Team.

7.7 DEIS Public Review and Comment

FHWA initiated public circulation of the DEIS on September 25, 1998, with publication of the Notice of Availability in the *Federal Register*. From October 13 to 15, 1998, FHWA held DEIS public hearings on successive evenings in Kingman, Arizona, and Boulder City and Las Vegas, Nevada. Approximately 250 people attended the DEIS public hearings. The court reporter transcripts of oral comments received at the hearings are included in Volume II of the final EIS (FEIS). The entire DEIS was also made accessible on the project

web site, with an online commenting feature. By November 10, 1998, the close of the DEIS comment period, the web site was accessed over 1,500 times. There were a total of approximately 160 public and agency commenters on the DEIS, including comments received after the close of comment period. See Volume II for a full description of the DEIS public input process, the comments received, and the responses to comments.

7.8 Consultation with Native American Tribes

Amendments to the regulations implementing the NHPA were published on July 1, 1999. These new regulations required initiation of formal government-to-government consultations between FHWA, Reclamation, and NPS with Native American tribes affected by the proposed project. The new regulation requires, in part:

> *...the Agency Official to consult with any Indian tribe...that attaches religious and cultural significance to historic properties that may be affected by an undertaking. Such Indian tribe...shall be a consulting party. The Agency Official shall ensure that consultation in the Section 106 process provides the Indian tribe...a reasonable opportunity to identify its concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate its views on the undertaking's effects on such properties, and participate in the resolution of adverse effects. It is the responsibility of the Agency Official to make a reasonable and good faith effort to identify Indian tribes...that shall be consulted in the Section 106 process. Consultation with an Indian tribe must recognize the government-to-government relationship between the Federal government and Indian tribes. The Agency Official shall consult with representatives designated or identified by the tribal government...(36 CFR 800.2).*

FHWA, in partnership with NPS and Reclamation, began identifying additional Native American tribes with an interest in the Hoover Dam Bypass in late summer through fall 1999. These activities occurred concurrently with consultation meetings held between FHWA, NPS, and Reclamation with the Arizona and Nevada SHPOs and the ACHP; these meetings addressed both the historic preservation issues associated with project impacts on the HDNHL and the Native American tribes' cultural values. FHWA sent out invitations to representatives of 17 tribes on December 9, 1999, requesting their participation in formal consultation meetings on the project. To date, five meetings have been held with the tribal representatives: on January 11, 2000, in Laughlin, Nevada; on March 30, 2000, at the Hoover Dam Visitor Center; on May 8, 2000, in Henderson, Nevada; and on August 15 and 16, 2000, and November 15, 2000, in Boulder City, Nevada. The May 8 meeting was held with a Core Consultation Group, consisting of six tribal representatives, that was delegated by the full assembly of tribes to lead the consultation process with FHWA on their behalf. Attendance by Native American tribal representatives at the government-to-government consultation meetings has ranged from about 25 to 30 participants.

The Agency/Native American government-to-government consultation meetings resulted in a Memorandum of Understanding (MOU) between the tribes and FHWA, and in the tribes being included as invited signatories on the Programmatic Agreement (PA) for treatment of historic properties affected by the Hoover Dam Bypass. The MOU and PA stipulate that the Native American tribes will continue in a formal consultation role with the agency officials involved in the project through its design and implementation.

7.9 Permits

Permits and approvals are required to construct and operate the Hoover Dam Bypass project. Table 7-1 summarizes the agency-regulated activities and required federal, State of Nevada, State of Arizona, Clark County, and Mohave County permits and approvals anticipated to construct and operate the alternatives at Promontory Point, Sugarloaf Mountain, or Gold Strike Canyon.

Table 7-1
Permits and Approvals Anticipated for the Hoover Dam Bypass Project

Agency	Regulated Activity	Required Permit or Approval
Federal		
U.S. Army Corps of Engineers	Discharge of dredge or fill material into U.S. waters	Section 404 Permits
Federal ACHP	Coordination of project design and construction to minimize impacts on historic properties	Programmatic Agreement between FHWA, NSHPO, ASHPO, and ACHP (Section 106 consultation)
U.S. Bureau of Reclamation	Use of additional right-of-way for roadway and bridge	Easement
U.S. Bureau of Reclamation	Water use during construction	Water Use Permit
National Park Service	Acquisition of additional right-of-way for roadway and bridge	Easement
U.S. Coast Guard	Impacts on navigable waters	Section 9 Permit
U.S. EPA	Stormwater discharges	National Pollution Discharge Elimination System (NPDES) Permit
U.S. Fish and Wildlife Service	Impacts on special-status vegetation and wildlife species	Biological Opinion
Nevada State		
Nevada State Historic Preservation Officer (NSHPO)	Impacts on cultural resources	Section 106 Review
Nevada Division of Environmental Protection	Impacts on water quality	Section 401 Water Quality Certification
Nevada Division of Environmental Protection	Construction activities disturbing more than 5 acres of land	General Stormwater Permit for Construction Activities
Nevada Division of Environmental Protection	Discharge to surface waters	National Pollutant Discharge Elimination System Permit
Nevada Division of Environmental Protection	Approval of plans and specifications necessary prior to construction start	Design Review of Plans and Specifications
Nevada Division of Environmental Protection	Discharge to surface waters	Temporary or Permanent Discharge Permit
Nevada Division of Water Resources	Water use during construction	Water Right Permit
Nevada Department of Transportation	Coordination of project design, construction, operation, maintenance, and financing	Memorandum of Agreement between FHWA, NDOT, and ADOT
Nevada Division of Wildlife	Potential disturbance of desert tortoise	Handling Permit

Table 7-1
Permits and Approvals Anticipated for the Hoover Dam Bypass Project

Agency	Regulated Activity	Required Permit or Approval
Nevada Division of Wildlife	Potential impacts on common and special-status wildlife species	Permit
Nevada State Division of State Lands	Acquisition of right-of-way in vicinity of Colorado River (Gold Strike Alternative only)	Easement
Arizona State		
Arizona State Historic Preservation Officer (ASHPO)	Impacts on cultural resources	Section 106 Review
Arizona Department of Environmental Quality or Arizona Department of Water Resources	Impacts on water quality	Section 401 Water Quality Certification
Arizona Department of Environmental Quality or Arizona Department of Water Resources	Construction activities disturbing more than 5 acres of land	General Stormwater Permit for Construction Activities
Arizona Department of Environmental Quality or Arizona Department of Water Resources	Discharge to surface waters	National Pollutant Discharge Elimination System
Arizona Department of Environmental Quality or Arizona Department of Water Resources	Approval of plans and specifications necessary prior to construction start	Design Review of Plans and Specifications
Arizona Department of Environmental Quality or Arizona Department of Water Resources	Discharge to surface waters	Temporary or Permanent Discharge Permit
Arizona Department of Environmental Quality or Arizona Department of Water Resources	Portable air pollution sources	Permit
Arizona Department of Environmental Quality	Classification of construction waste material and transport of solid wastes generated to an ADEQ-approved facility, at the contractor's option	May require facility approval (waste stored onsite more than 90 days)
Arizona Department of Water Resources	Water use during construction	Water Right Permit
Arizona Department of Transportation	Coordination of project design, construction, operation, maintenance, and financing	Memorandum of Agreement between FHWA, NDOT, and ADOT
Arizona Game and Fish Department	Potential impacts on common and special-status wildlife species	Permit
Clark County[a]		
Clark County Health District, Air Pollution Control District	Dust emissions from construction activities	Dust Control Permit
Clark County Health District, Air Pollution Control District	Emissions from portable emissions units used at project construction site; examples include but are not limited to rock crushers, generators, and cement plants	Various Location Permit
Clark County Planning Department	Construction of aboveground structures in Clark County	Use Permit

Table 7-1
Permits and Approvals Anticipated for the Hoover Dam Bypass Project

Agency	Regulated Activity	Required Permit or Approval
Clark County Building Department	Construction of aboveground structures in Clark County	Building Permit
Clark County Department of Public Works and Community Development	Grading at project site	Grading Permit
Clark County Department of Public Works and Community Development	Drainage associated with grading and construction activity	Drainage Study
Mohave County[a]		
Mohave County	Emissions from portable emissions units used at project construction site; examples include but are not limited to rock crushers, generators, and cement plants	Various Location Permit
Mohave County	Construction of aboveground structures in Mohave County	Use Permit
Mohave County	Construction of aboveground structures in Mohave County	Building Permit
Mohave County	Grading at project site	Grading Permit
Mohave County	Drainage associated with grading and construction activity	Drainage Study

[a]The federal government complies with county permitting requirements (personal communication, Kris Mills, Reclamation, July 2, 1998)

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CHAPTER 8

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CHAPTER 9

References

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CHAPTER 10

List of Agencies, Organizations, and Persons to Whom Copies of the Environmental Impact Statement Were Sent

Hoover Dam Bypass
DEIS Distribution
(Prior to November 10, 1998 Close of Comment Period)

Project Management Team

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Daryl James, NDOT, Carson City, NV

Bill Crawford, NDOT, Carson City, NV

Steve Thomas, FHWA-AZ, Phoenix, AZ

Conway Barlow, FHWA-NV, Carson City, NV

Dave Curtis, Reclamation, Boulder City, NV

Kris Mills, Reclamation, Boulder City, NV

Bill Burke, NPS-LMNRA, Boulder City, NV

Jim Holland, NPS-LMNRA, Boulder City, NV

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Federal Agencies

Advisory Council on Historic Preservation, Golden, CO

Advisory Council on Historic Preservation, Washington, DC

Bureau of Indian Affairs, Parker, AZ

Department of Energy, Las Vegas, NV

Department of Interior Headquarters, Washington, DC

EPA Headquarters, Washington, DC

EPA Regional Office, San Francisco, CA

FHWA, Region 9, San Francisco, CA

FHWA, Federal Lands Headquarters, Washington, DC

FHWA, Headquarters, Washington, DC

FHWA, Phoenix, AZ

NPS, Director, Washington, DC

NPS, Lake Mead National Recreation Area, Boulder City, NV

U.S. Army Corps of Engineers, Reno, NV

U.S. Coast Guard, Alameda, CA

U.S. Fish & Wildlife Service, Reno, NV

Western Area Power Administration, Phoenix, AZ

State Agencies (Arizona)

ADOT, District Office, Kingman, AZ

AZ Department of Commerce, Phoenix, AZ

AZ Game and Fish Dept, Kingman, AZ

AZ Dept of Environmental Quality, Phoenix, AZ

AZ State Historic Preservation Office, Phoenix, AZ

State Agencies (Nevada)

Colorado River Commission, Las Vegas, NV

NV Department of Conservation and Natural Resources, Carson City, NV

NDOT, District Office, Las Vegas, NV
NV Division of Wildlife, Las Vegas, NV

NV State Historic Preservation Office, Carson City, NV

NV State Office of Community Services, Carson City, NV

Local (City & County)

Boulder City Manager, Boulder City, NV

Clark County Board of Supervisors, Las Vegas, NV

Lake Chamber of Commerce, Meadview, AZ

Mohave County Board of Supervisors, Kingman, AZ

Mohave County Public Works/Eng., Hackberry, AZ

Mohave County Planning and Zoning, Kingman, AZ

Mohave County Supervisor, Bullhead City, AZ

Libraries

Boulder City Public Library, Boulder City, NV

Bullhead City Public Library, Bullhead City, AZ

Clark County Public Library, Las Vegas, NV

Green Valley Public Library, Henderson, NV

Henderson Public Library, Henderson, NV

Kingman Public Library, Kingman, AZ

Laughlin Library, Laughlin, NV

Special Interest Groups

American Trucking Association, Alexandria, VA

AZ Motor Transport Association, Phoenix, AZ

CAUTION, Boulder City, NV

Nature Conservancy, Las Vegas, NV

NV Motor Transport Association, Las Vegas, NV

NV Motor Transport Association, Sparks, NV

Sierra Club, Las Vegas, NV

Private Individuals

Bettner, David

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Cross, Ellen

Davis, Mike

Hill, Ronald

Hughes, Nicholas

Jones, Lyle

Kuhr, Sonny

Pollack, Doug

Corporations

Blakesley International, Marina del Rey, CA

BRW, Inc., Denver, CO

Cannan & Associates, Tucson, AZ

EcoPlan Associates, Inc., Mesa, AZ

EQS, Phoenix Area Office, Phoenix, AZ

Figg Engineering, Denver, CO

Huitt-Zollars, Inc., Dallas, TX

JBR Environmental, Reno, NV

Koch Materials Co., Englewood, CO

Steinman, Chicago, IL

Thomas Olsen Associates, Inc., Hemet, CA

Ty Lin International, San Francisco, CA

Ultrasystems Environmental, Irvine, CA

URS-Greiner, Denver, CO

Universities

University of Arizona, Tucson, AZ

University of Nevada, Las Vegas, NV

DEIS Distribution
(After November 10, 1998 Close of Comment Period)

Tribes

Algots, Mr. John, Fort Mohave Indian Tribe, Needles, CA

Anderson, Mr. Curtis, Las Vegas Paiute Colony, Las Vegas, NV

Anderson, Ms. Geneal, Paiute Tribe of Utah, Cedar City, UT

Anderson, Mr. Kenny, Las Vegas Paiute Colony, Las Vegas, NV

Arnold, Mr. Richard, Pahrump Paiute Tribe, Pahrump, NV

Barrackman, Mr. Llewellyn, Fort Mohave Indian Tribe, Needles, CA

Begay, Mr. Robert, Navajo Nation, Window Rock, AZ

Begay, Mr. Tim, Navajo Nation, Window Rock, AZ

Begaye, Mr. Kelsey A., Navajo Nation, Window Rock, AZ

Benson, Ms. Gloria Bulletts, Paiute Tribe of Utah, Cedar City, UT

Benson, Ms. Louise, Hualapai Tribe, Peach Springs, AZ

Bowekaty, Mr. Malcomb, Pueblo of Zuni, Zuni, NM

Bradly, Ms. Carmen, Kaibab Paiute Tribe, Fredonia, AZ

Butler, Ms. Elda, Ahamakav Cultural Society, Mohave Valley, AZ

Cabillo, Mr. Alex, Hualapai Tribe, Peach Springs, AZ

Chaco, Mr. Paulson, Navajo Nation, Window Rock, AZ

Chavez, Mr. David, Chemehuevi Tribal Council, Havasu Lake, CA

Chiago, Mr. Ron, Salt River Pima-Maricopa Indian Tribal Council, Scottsdale, AZ

Cloquet, Mr. Donald J., The Las Vegas Indian Center, Las Vegas, NV

Cornelius, Ms. Betty, Colorado River Indian Tribes, Parker, AZ

Downer, Dr. Alan, Navajo Nation, Window Rock, AZ

Drye, Ms. Brenda, Kaibab Paiute Tribe, Fredonia, AZ

Eddy, Mr. Daniel, Colorado River Indian Tribes, Parker, AZ

Eddy, Mr. Larry, Chemehuevi, Poston, AZ

Escalanti, Mr. Kenney, Fort Yuma Quechan Tribal Council, Yuma, AZ

Foster, Mr. Larry M., Navajo Nation, Window Rock, AZ

Hamilton, Mr. Clay, The Hopi Tribe, Kykotsmovi, AZ

Hayden, Ms. Nancy, Yavapai-Prescott Tribe, Prescott, AZ

Helton, Ms. Nora, Fort Mohave Indian Tribe, Needles, CA

Honga, Mr. Monza, Hualapai Tribe, Peach Springs, AZ

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James, Ms. Lynette, Yavapai-Prescott Tribe, Prescott, AZ

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Mapatis, Mr. Aaron, Hualapai Tribe, Peach Springs, AZ

Miller, Ms. Kami, Moapa Paiute Indian Tribe, Moapa, NV

Miller, Ms. Lalovi, Moapa Paiute Indian Tribe, Moapa, NV

Mitchell, Ms. Violet, Yavapai-Prescott Tribe, Prescott, AZ

Mogart, Mr. Terry, The Hopi Tribe, Kykotsmovi, AZ

Ogo, Ms. Linda, Yavapai-Prescott Tribe, Prescott, AZ

Ohte, Mr. Darryl, Moapa Paiute Indian Tribe, Moapa, NV

Otero, Ms. Linda D., Fort Mohave Indian Tribe, Mohave Valley, AZ

Owl, Ms. Pauline, Fort Yuma Quechan Tribal Council, Winterhaven, CA

Panteah, Mr. Loren, Pueblo of Zuni, Zuni, NM

Petach, Ms. Lynn, Chemehuevi, Reseda, CA

Pikyavit, Mr. Benn S., Kaibab Paiute Tribe, Fredonia, AZ

Putesoy, Mr. Matthew, Havasupai Tribe, Supai, AZ

Rice, Mr. Stan Jr., Yavapai-Prescott Tribe, Prescott, AZ

Savala, Ms. Gevene, Kaibab Paiute Tribe, Fredonia, AZ

Seowtewa, Mr. Octavius, Zuni, Zuni, NM

Simplicio Mr. Dan, Pueblo of Zuni, Zuni, NM

Smith, Mr. Edward, Chemehuevi Tribal Tribe, Chemehuevi Valley, CA

Stoffle, Dr. Richard, University of Arizona, Tucson, AZ

Susanyatame, Mr. (Ronald) Man, Hualapai Tribe, Peach Springs, AZ

Taylor, Mr. Dalton, The Hopi Tribe, Second Mesa, AZ

Taylor, Mr. Wayne, The Hopi Tribe, Kykotsmovi, AZ

Tom, Mr. Eugene, Moapa Paiute Indian Tribe, Moapa, NV

Welch, Mr. Russell, Colorado River Indian Tribes, Parker, AZ

Wilder, Mr. Lonnie, Hualapai Tribe, Peach Springs, AZ

Corporations

Dames & Moore, Phoenix, AZ

Hagler Bailly Services, Inc., Arlington, VA

Haley & Aldrich, Brea, CA

Haley & Aldrich, Denver, CO

Las Vegas Review-Journal, Las Vegas, NV

Vollmer Associates LLP, New York, NY

Universities

University of North Texas, Lewisville, TX

Private Individuals

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Cooper, Bill

Leporati, Arnold

Murray, Sam A.

Plummer, Bill

Federal Agencies

Bureau of Reclamation, Phoenix, AZ

NPS, San Francisco, CA

Hoover Dam Bypass
Summary DEIS Distribution
(Prior to November 10, 1998 Close of Comment Period)

Arizona Elected Officials

Governor Jane Dee Hull

Senator Jon Kyl

Senator John McCain

Congressman Bob Stump

Nevada Elected Officials

Governor Bob Miller

Senator Richard Bryan

Senator Harry Reid

Congressman John Ensign

Congressman Jim Gibbons

Organizations

Boulder City Chamber of Commerce, Boulder City, NV

Bullhead City Chamber of Commerce, Bullhead City, AZ

Henderson Chamber of Commerce, Henderson, NV

Kingman Chamber of Commerce, Kingman, AZ

Las Vegas Chamber of Commerce, Las Vegas, NV

Laughlin Chamber of Commerce, Laughlin, NV

Federal, State, and Local Government Agencies

AZ Department of Public Safety, Phoenix, AZ

AZ Department of Water Resources, Phoenix, AZ

AZ State Dept. of Commerce, Phoenix, AZ

AZ State Parks, Phoenix, AZ

Boulder City Council, Boulder City, NV

Bullhead City Manager, Bullhead City, AZ
Bureau of Indian Affairs, Phoenix, AZ

Bureau of Land Management, Las Vegas, NV

Bureau of Land Management, Kingman, AZ

Clark County Public Works Dept, Las Vegas, NV

Henderson City Manager, Henderson, NV

Kingman City Council, Kingman, AZ

Kingman City Manager, Kingman, AZ

Las Vegas City Manager, Las Vegas, NV

Laughlin Town Manager, Laughlin, NV

Mohave County Public Works Dept, Kingman, AZ

NV Commission on Tourism, Las Vegas, NV

NV Planning Commission, Carson City, NV

Regional Transportation Commission, Las Vegas, NV

Southern Nevada Water System, Boulder City, NV

Town Office of Searchlight, Searchlight, NV

Tribes

Chemehuevi Tribe, Lake Havasu, CA

Colorado River Indian Tribes, (Chemehuevi) AZ

Hualapai Tribe, Peach Springs, AZ

Kaibab Paiute Tribe, Pipe Springs, AZ

Las Vegas Indian Center, Las Vegas, NV

Las Vegas Indian Tribe, Las Vegas, NV

Moapa Paiute Tribe, Moapa, NV

Paiute Indian Tribes of Utah, Cedar City, UT

Pahrump Paiute Tribe, Pahrump, NV

Private Individuals

Friesema, Paul

Geddie, John

Corporations

EcoPlan Associates, Inc., Mesa, AZ

Toll Roads Newsletter, Frederick, MD

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Appendix A
Traffic Analysis

APPENDIX A

Traffic Analysis

Introduction

The purpose of this report is to summarize traffic forecast updates and operational analysis for the Hoover Dam Bypass Environmental Impact Statement (EIS). The work is being administered by the Central Federal Lands Highway Division (CFLHD) of the Federal Highway Administration (FHWA).

The study includes two traffic elements. The first element is an update of current forecasts and development of more comprehensive traffic operational data for the three relatively close new Colorado River Crossings. The updated information is used for impact definition and mitigation planning. The second element is the evaluation of a Laughlin-Bullhead City Alternative (LBA) (see FEIS Appendix B).

Traffic Forecast Update

Traffic forecast updates have been completed using historic traffic count information available from Arizona Department of Transportation (ADOT) and Nevada Department of Transportation (NDOT). Additional traffic counts or surveys were not included in the scope of this work. Key assumptions for traffic forecast updates are:

- Average annual daily traffic (AADT) data from NDOT and ADOT are the most current references to update traffic forecasts.
- The two sets of data showing different growth rates and forecasts on the east (NDOT Sta 03-222 and ADOT MP 20.50) and west side (NDOT Sta 03-221) of the Colorado River should be used to develop different traffic growth rates for those locations. This is consistent with the fact that traffic west of the Colorado River is influenced by regional development in Las Vegas and associated tourism, and traffic east of the Colorado River is influenced more by interstate trade and tourism.
- Long-range traffic forecasts will have the strongest correlation to the last 15 years of growth. Using this long of a study period will help identify and average out high and low years. It will also allow us to evaluate long-term and interim conditions that help prevent a "radical" forecast.
- Traffic on Hoover Dam should reflect a volume that is between the western and eastern forecasts.

Further details and calculations showing traffic growth and traffic diversion for the LBA Alternative are presented in Appendix B.

Traffic Forecast Calculations

Based on the above scope and assumptions, unconstrained AADT forecasts have been developed as follows.

AADT West of Colorado River. Traffic growth is forecasted at an uncompounded (straight line) rate of 5.0 percent per year.

The last 15 years of traffic data at NDOT Station 3-0222, U.S. 93, 0.6 mile south of Lake Shore Road show a 5.79 percent average annual rate (straight line) of traffic growth as compared to our '92 forecasted average annual rate of 4.14 percent. While 5.79 percent average growth per year might seem high, it has been sustained over a significant period of time. Based on this more current data, the previous '92 forecasted growth is low. For the purposes of this study, the approximate average, or 5.0 percent from the year 1996 is used to forecast future traffic growth.

Traffic forecasts west of the Colorado River reflect a location prior to eastbound traffic having a choice of using the existing dam crossing or a new Bridge. It can be assumed that the majority of this traffic is originating from locations near or northwest of Las Vegas and is destined for the Hoover Dam or locations east of Kingman. As shown in Figure A-1, forecasts are:

- Year 1997 forecast = 12,600 (1+0.05) = 13,230, use 13,200
- Year 2017 forecast = 12,600 (1+0.05*21) = 25,830, use 25,800
- Year 2027 forecast = 12,600 (1+0.05*31) = 32,130, use 32,100

AADT East of Colorado River. Traffic growth is forecasted at an uncompounded (straight line) rate of 4.0 percent per year

The last 15 years show a 7.46 percent average annual (straight line) rate of traffic growth as compared to our '92 forecasted average annual rate of 3.6 percent. This rate is high due to a recent 5-year traffic growth explosion over 9.4 percent average per year. During this period the highest single year was 36 percent. The last 5 years also included a reduction of traffic by 27.9 percent from 1995 to 1996. Using NDOT data that exclude the last 5 years, growth is 4.35 percent.

Given the volatile nature of traffic growth over the last 5 years at this location, counts from ADOT east of the dam were reviewed. These data show traffic growth of 3.7 percent for the last 10 years. Data from 1981 through 1986 were not included because the total volume was too low to reflect sustainable growth rates.

Based on both NDOT and ADOT data, a 4 percent average annual growth rate for growth east of the Colorado River is projected.

Traffic forecasts east of the Colorado River reflect a location prior to westbound traffic having a choice of using the existing dam crossing or a new bridge. It can be assumed that the majority of this traffic is originating from locations east of Kingman and destined for locations near or northwest of Las Vegas. As shown in Figure A-2, forecasts for this location are:

- Year 1997 forecast = 8,900(1+0.04) = 9,256, use 9,300.
- Year 2017 forecast = 8,900(1+0.04*21) = 16,376, use 16,400.
- Year 2027 forecast = 8,900(1+0.04*31) = 19,936, use 19,900.

AADT on Hoover Dam. Traffic on Hoover Dam is more directly proportional to traffic west of the dam than traffic east of the dam. Traffic east will be lower than the total traffic west of the dam because all Hoover Dam-destined trips are not expected to drive over the dam itself. The reason for this change from previous conditions is that the new visitor center parking garage is located west of the dam.

It is assumed that half the current traffic parks at the new parking garage. This is a reasonable estimate because the new garage represents over half the parking available in the area. Given this assumption, traffic (AADT volumes) on the dam would be (13,200-9,300)/2+9300=11,450. Forecasts for the years 2017 and 2027 are 21,100 and 26,000, respectively. NDOT's most recent AADT projections southeast of the dam are 17,800 and 22,100 for the years 2017 and 2027, respectively. Since the NDOT forecasts are consistent with our forecasts east of the river and on the dam, the following volumes are used as AADT forecasts at Hoover Dam:

- Year 1997 forecast = 11,500
- Year 2017 forecast = 21,100
- Year 2027 forecast = 26,000

Build Alternative Traffic Assignment

Unconstrained AADT forecasts for build alternatives have been developed on the following assumptions.

- Truck traffic will be prohibited from using the dam crossing.
- Since they are relatively close to each other, the three new crossings closest to Hoover Dam should not have significant differences in traffic demands. Therefore, forecasts for those alternatives are the same.
- The Laughlin Alternative will not significantly attract private auto trips from Hoover Dam until traffic congestion on the existing U.S. 93 Colorado River crossing on the dam consistently creates delays that are equal to the additional driving time. This delay time due to traffic congestion on the dam is estimated at 30 minutes. Operating conditions will need to be at LOS F for at least one-half hour for the delay to approach 30 minutes.
- Traffic Origins and Destinations have not changed significantly since the Traffic Study at Hoover Dam, 1991, or since the update for the Traffic and Revenue Study, 1992. Key items from those studies show that all trips using the dam are to and from the Las Vegas area and to and from southeast and east of Kingman.
- The crossings closest to Hoover Dam will provide an opportunity for trips from Las Vegas to Hoover Dam to circulate locally on a new Colorado River bridge. This could reduce the total number of tourist trips on the dam originating during times of traffic congestion.

Given these assumptions, unconstrained AADT forecasts for build alternatives have been developed as follows.

Key Locations. Key locations for AADT forecasts of these alternatives also include a new Colorado River crossing. The approach for making these forecasts is to distribute all traffic east of the river to the new crossing and to distribute the remaining traffic to the existing dam crossing. This approach may seem simplistic because it assumes all traffic currently east of the dam is through traffic that does not stop at the dam, but is the most accurate given available data. It is noted that this approach is also consistent with current Hoover Dam visitor travel characteristics.

AADT West of Colorado River

- Year 1997 forecast = 13,200
- Year 2017 forecast = 25,800
- Year 2027 forecast = 32,100

AADT on Hoover Dam

- Year 1997 forecast = 2,200
- Year 2017 forecast = 4,700
- Year 2027 forecast = 6,100

AADT East of Colorado River

- Year 1997 forecast = 9,300
- Year 2017 forecast = 16,400
- Year 2027 forecast = 19,900

AADT on New Bridge

- Year 1997 forecast = 9,300
- Year 2017 forecast = 16,400
- Year 2027 forecast = 19,900

Traffic Analysis

Analysis of traffic operations for existing conditions, build alternatives based on Highway Capacity Software (HCS) methods and procedures. Key factors for the analysis include:

Peak Hour of AADT = 9%
Percentage of Trucks = 18%
Percentage of Buses = 2%
Percentage of RVs = 4%
Peak Hour Factor = 95%
Directional Distribution = 53/47
All new alignments will have four lanes.

Further details and HCS calculations forms are attached to the end of this report.

No Build Alternative

Current (1997) level of service (LOS) for key No Build Alternative locations are:

- U.S. 93, west of the dam/LOS E
- U.S. 93, at the dam/LOS F
- U.S. 93, east of the dam/LOS E

These LOS calculations have been verified with field observations and correspondence from NDOT. As would be expected given current physical conditions, analysis of year 2017 and year 2027 traffic volumes shows that operations will deteriorate to LOS F for the three study locations. At this level of congestion, the dam crossing may not be able to serve the forecasted traffic volumes due to long delays caused by traffic backups approaching the crossing.

Build Alternatives

Traffic operations for the three build alternatives will be relatively the same. The following summarizes the operations at the key locations for those alternatives.

- U.S. 93, west of the dam/ year 2017- LOS B/ year 2027- LOS C
- U.S. 93, at the dam/ year 2017- LOS E/ year 2027- LOS E
- U.S. 93, east of the dam/ year 2017- LOS A/ year 2027- LOS B

At the new River Crossing/ year 2017- LOS A/ year 2027- LOS B

Key Findings and Conclusions

No Build Conditions

Current traffic operations at Hoover Dam are poor and expected to further deteriorate without significant capacity improvements. Existing traffic demands on the dam will increase due to growth in through trips and tourist activities related to both Las Vegas activities and Hoover Dam itself. LOS at the dam is currently F, indicating stop-and-go conditions with significant delays. These conditions will only be exacerbated with additional demands.

U.S. 93 approaches to the dam are currently at LOS E. This means full operating speeds are not maintained due to insufficient passing opportunities combined with a high percentage of trucks. LOS will deteriorate from E to F by year 2017. Traffic will experience significant congestion and delays for the length of the study area.

Build Alternatives

The three build alternatives will provide the needed capacity to adequately accommodate future traffic demands at key locations in the study area. This is evident from the level of traffic operations expected after the construction of additional lanes and a new Colorado River Crossing. Even in year 2027 after the project has been constructed for 20 years, traffic on the dam approaches will operate at LOS C or better; and operations on the dam will not fail.

It is noted that traffic operations on the dam are calculated at LOS E. This may seem poor, but the primary reason for the poor rating is the mountainous terrain, steep grades, and sharp curves. Speeds will be low, but capacity of the roadway is well above demand. The volume-to-capacity (V/C) ratio will be 0.57 in year 2017 and 0.74 in year 2027. Given these relatively good V/C ratios, traffic should not experience significant delays on the dam.

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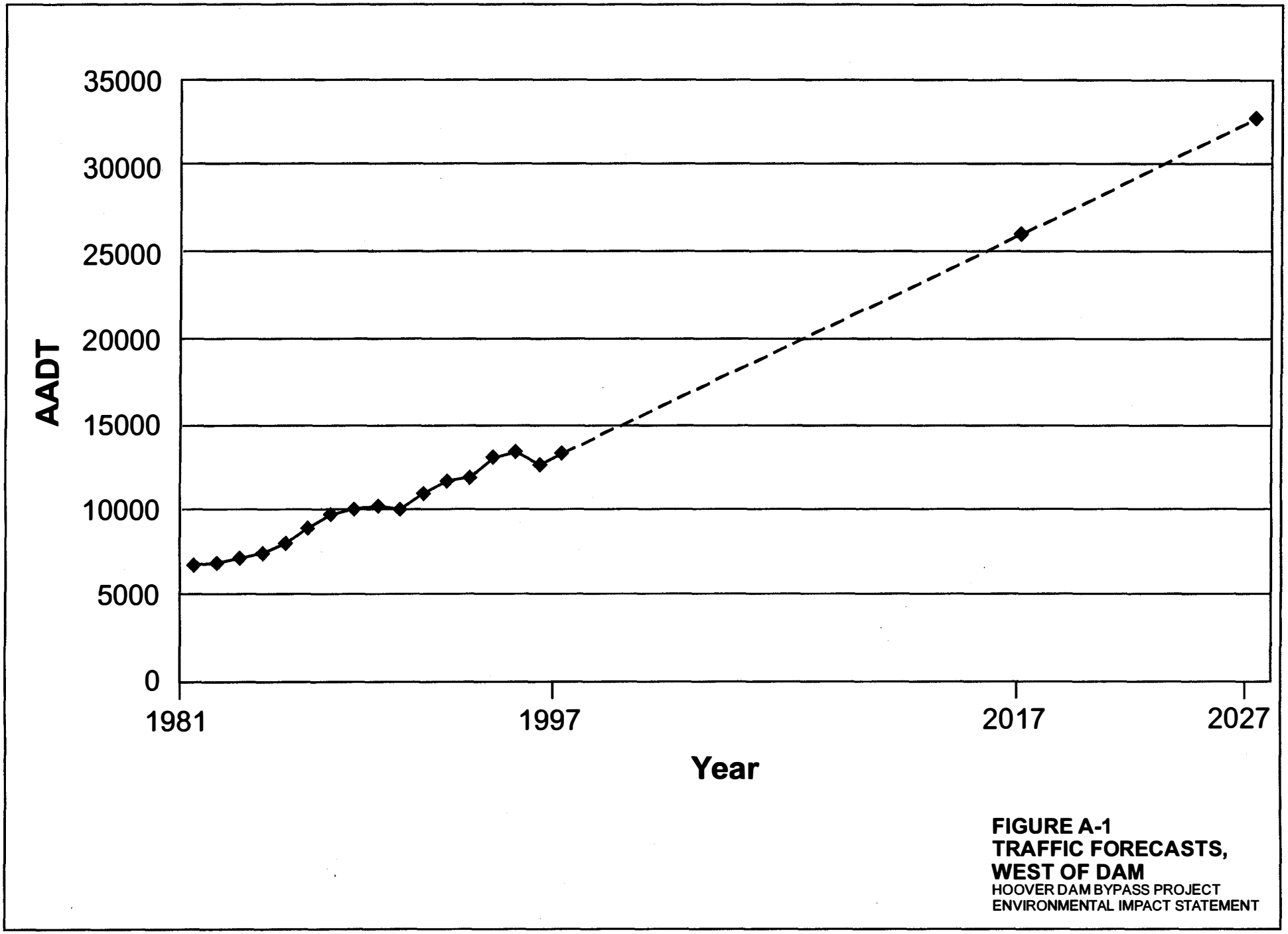

FIGURE A-1
TRAFFIC FORECASTS, WEST OF DAM
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

SCO142883.12.PM traffic 9/98

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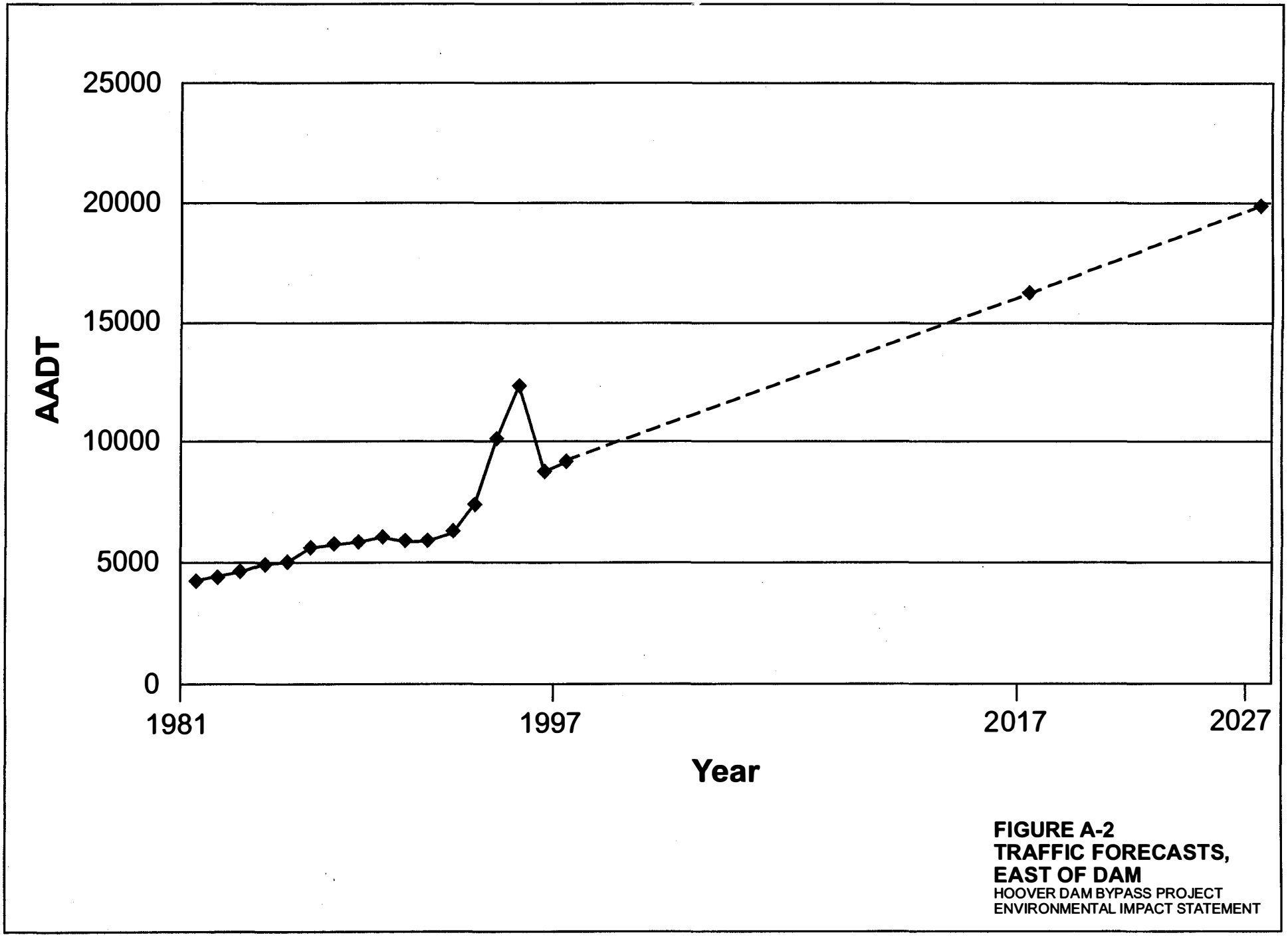

FIGURE A-2
TRAFFIC FORECASTS, EAST OF DAM
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

SCO142883.12.PM traffic fh 9/98

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1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... US 93 on Dam
ANALYST..... TKR
TIME OF ANALYSIS..... All
DATE OF ANALYSIS..... 05-21-1998
OTHER INFORMATION.... Build

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	2
PERCENTAGE OF RECREATIONAL VEHICLES	4
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.95
DIRECTIONAL DISTRIBUTION (UP/DOWN)	53 / 47
LANE WIDTH (FT)	11
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	2
PERCENT NO PASSING ZONES	100

B) CORRECTION FACTORS

MOUNTAINOUS TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	7	5.7	5	.75	.98	.8
B	10	6	5.2	.75	.98	.79
C	10	6	5.2	.75	.98	.79
D	12	6.5	5.2	.75	.98	.78
E	12	6.5	5.2	.88	.98	.78

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1000
ACTUAL FLOW RATE: 1053

LOS	SERVICE FLOW RATE	V/C
A	16	.01
B	163	.1
C	260	.16
D	532	.33
E	1477	.78

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... US 93 on Dam
ANALYST..... TKR
TIME OF ANALYSIS..... All
DATE OF ANALYSIS..... 05-19-1998
OTHER INFORMATION.... No Build

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	18
PERCENTAGE OF BUSES	2
PERCENTAGE OF RECREATIONAL VEHICLES	4
DESIGN SPEED (MPH)	50
PEAK HOUR FACTOR	.95
DIRECTIONAL DISTRIBUTION (UP/DOWN)	53 / 47
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	2
PERCENT NO PASSING ZONES	100

B) CORRECTION FACTORS

MOUNTAINOUS TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	7	5.7	5	.81	.98	.43
B	10	6	5.2	.81	.98	.35
C	10	6	5.2	.81	.98	.35
D	12	6.5	5.2	.81	.98	.31
E	12	6.5	5.2	.93	.98	.31

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1000
ACTUAL FLOW RATE: 1053

LOS	SERVICE FLOW RATE	V/C
A	10	.01
B	77	.1
C	123	.16
D	226	.33
E	612	.78

LOS FOR GIVEN CONDITIONS: F

1985 HCM:TWO-LANE HIGHWAYS

****

FACILITY LOCATION.... S 93 East and west of Dam
ANALYST..... TKR
TIME OF ANALYSIS..... All
DATE OF ANALYSIS..... 05-19-1998
OTHER INFORMATION.... N0 Build

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	18
PERCENTAGE OF BUSES.....	2
PERCENTAGE OF RECREATIONAL VEHICLES.....	4
DESIGN SPEED (MPH).....	60
PEAK HOUR FACTOR.....	.95
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	53 / 47
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	6
PERCENT NO PASSING ZONES.....	50

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	1	.98	.6
B	5	3.4	3.9	1	.98	.53
C	5	3.4	3.9	1	.98	.53
D	5	2.9	3.3	1	.98	.54
E	5	2.9	3.3	1	.98	.54

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1000
ACTUAL FLOW RATE: 1053

LOS	SERVICE FLOW RATE	V/C
A	115	.07
B	277	.19
C	511	.35
D	773	.52
E	1367	.92

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... S 93 East and West of Dam
ANALYST..... TKR
TIME OF ANALYSIS..... All
DATE OF ANALYSIS..... 05-19-1998
OTHER INFORMATION.... LCA Alt

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS	0
PERCENTAGE OF BUSES	2
PERCENTAGE OF RECREATIONAL VEHICLES	4
DESIGN SPEED (MPH)	60
PEAK HOUR FACTOR	.95
DIRECTIONAL DISTRIBUTION (UP/DOWN)	53 / 47
LANE WIDTH (FT)	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)	6
PERCENT NO PASSING ZONES	50

B) CORRECTION FACTORS

ROLLING TERRAIN

LOS	E T	E B	E R	f w	f d	f HV
A	4	3	3.2	1	.98	.89
B	5	3.4	3.9	1	.98	.86
C	5	3.4	3.9	1	.98	.86
D	5	2.9	3.3	1	.98	.88
E	5	2.9	3.3	1	.98	.88

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1000
ACTUAL FLOW RATE: 1053

LOS	SERVICE FLOW RATE	V/C
A	171	.07
B	449	.19
C	827	.35
D	1265	.52
E	2239	.92

LOS FOR GIVEN CONDITIONS: D

HCS: Multilane Highways Release 2.1

****

File Name .....

Facility Section.....
US 93 West of Dam
From/To.....

Analyst.....
TKR
Time of Analysis.....
2017
Date of Analysis.....
05/19/98
Other Information.... Build close in

A. Adjustment Data	Direction 1	Direction 2
Volume	1230	1090
Percentage of Trucks and Buses	20.0	20.0
Percentage of Recreational Vehicles	4.0	4.0
Ideal Free-Flow Speed	60.0	60.0
Peak-Hour Factor or Peak 15 Minutes	0.95	0.95
Lane Width	12.0	12.0
Access Points per Mile	4.0	4.0
Distance from Roadway Edge	6.0	6.0
Type of Median	U	U

B. Adjustment Factors

Terrain Type	E T	E R	F HV	F M	F LW	F LC	F A
ROLLING	3.00	2.00	0.69	1.60	0.00	0.00	1.00
	3.00	2.00	0.69	1.60	0.00	0.00	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	932	826
Average Passenger Car Speed (mph)	57	57
Free Flow Speed (mph)	57	57
Density (pcpmpl)	16	14
Level of Service (LOS)	B	B

HCS: Multilane Highways Release 2.1
****

File Name .....

Facility Section.....
US 93 West of Dam
From/To.....

Analyst.....
TKR
Time of Analysis.....
2027
Date of Analysis.....
05/19/98
Other Information.... Build close in

A. Adjustment Data	Direction 1	Direction 2
Volume	1530	1360
Percentage of Trucks and Buses	20.0	20.0
Percentage of Recreational Vehicles	4.0	4.0
Ideal Free-Flow Speed	60.0	60.0
Peak-Hour Factor or Peak 15 Minutes	0.95	0.95
Lane Width	12.0	12.0
Access Points per Mile	4.0	4.0
Distance from Roadway Edge	6.0	6.0
Type of Median	U	U

B. Adjustment Factors

Terrain Type	E T	E R	F HV	F M	F LW	F LC	F A
ROLLING	3.00	2.00	0.69	1.60	0.00	0.00	1.00
	3.00	2.00	0.69	1.60	0.00	0.00	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	1160	1031
Average Passenger Car Speed (mph)	57	57
Free Flow Speed (mph)	57	57
Density (pcpmpl)	20	18
Level of Service (LOS)	C	B

HCS: Multilane Highways Release 2.1

****

File Name .....

Facility Section.....
US 93 East of Dam
From/To.....

Analyst.....
TKR
Time of Analysis.....
2017
Date of Analysis.....
05/19/98
Other Information.... Build close in

A. Adjustment Data	Direction 1	Direction 2
Volume	780	695
Percentage of Trucks and Buses	20.0	20.0
Percentage of Recreational Vehicles	4.0	4.0
Ideal Free-Flow Speed	60.0	60.0
Peak-Hour Factor or Peak 15 Minutes	0.95	0.95
Lane Width	12.0	12.0
Access Points per Mile	4.0	4.0
Distance from Roadway Edge	6.0	6.0
Type of Median	U	U

B. Adjustment Factors

Terrain Type	E T	E R	F HV	F M	F LW	F LC	F A
ROLLING	3.00	2.00	0.69	1.60	0.00	0.00	1.00
	3.00	2.00	0.69	1.60	0.00	0.00	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	591	527
Average Passenger Car Speed (mph)	57	57
Free Flow Speed (mph)	57	57
Density (pcpmpl)	10	9
Level of Service (LOS)	A	A

HCS: Multilane Highways Release 2.1
****

File Name .....

Facility Section.....
US 93 East of Dam
From/To.....

Analyst.....
TKR
Time of Analysis.....
2027
Date of Analysis.....
05/19/98
Other Information.... Build close in

A. Adjustment Data	Direction 1	Direction 2
Volume	950	840
Percentage of Trucks and Buses	20.0	20.0
Percentage of Recreational Vehicles	4.0	4.0
Ideal Free-Flow Speed	60.0	60.0
Peak-Hour Factor or Peak 15 Minutes	0.95	0.95
Lane Width	12.0	12.0
Access Points per Mile	4.0	4.0
Distance from Roadway Edge	6.0	6.0
Type of Median	U	U

B. Adjustment Factors

Terrain Type	E T	E R	F HV	F M	F LW	F LC	F A
ROLLING	3.00	2.00	0.69	1.60	0.00	0.00	1.00
	3.00	2.00	0.69	1.60	0.00	0.00	1.00

C. Level of Service Results	Direction 1	Direction 2
Service Flow Rate (Vp)	720	637
Average Passenger Car Speed (mph)	57	57
Free Flow Speed (mph)	57	57
Density (pcpmpl)	13	11
Level of Service (LOS)	B	A

Appendix B
Laughlin-Bullhead City Alternative

APPENDIX B

Laughlin-Bullhead City Alternative

1. Introduction

The project management team (PMT) was requested, through the public outreach process and by the Laughlin Town Advisory Board, to address the feasibility of the Laughlin-Bullhead City Alternative (LBA) as an alternative route for the proposed Hoover Dam Bypass project. Numerous comments were also received during the Draft Environmental Impact Statement (DEIS) public review period questioning the feasibility and requesting further analysis of the LBA as an alternative route. This public feedback is addressed in this expanded report and in the Responses to Comments (Final Environmental Impact Statement [FEIS], Volume II).

This report defines the segment designations along the corridor and presents a preliminary cost estimate, engineering and traffic considerations, operational costs, and environmental issues associated with the LBA corridor. For comparative analysis purposes, the Sugarloaf Mountain Alternative is used. However, when broad operational characteristics and 20-year life-cycle costs are computed, all of the Hoover Dam Bypass "build alternatives" are essentially equal. In addition to Sugarloaf Mountain, the LBA is also compared with the No Build Alternative. This report, along with other documentation included in the Hoover Dam Environmental Impact Statement (EIS) document, will be used to evaluate the overall feasibility of the LBA alignment.

While the LBA was evaluated based on public feedback, it was found to not meet the purpose and need of the proposed project. Detailed discussion of the reasons for the failure of the LBA to meet the purpose and need is provided in Volume II. However, the analysis in this report focuses primarily on a comparison of costs and fuel consumption rates. Findings from this analysis indicate the LBA is not a reasonable alternative - either environmentally, socially, or economically - in addition to failing to meet the purpose and need for the proposed project.

2. Description of Alternative

This alternative uses existing U.S. Highway 95 (U.S. 95), Nevada State Route 163 (SR 163), and Arizona State Route 68 (SR 68) (see Figure B-1). The two-lane portions of these facilities would be widened to create a four-lane highway. A new multispan bridge would be constructed across the Colorado River between Davis Dam to the north and the existing Laughlin Bridge. Trucks would be required to use the LBA corridor. Passenger cars would not be regulated. Existing roads along the LBA corridor would be overlaid with additional pavement to accommodate the truck traffic diverted from U.S. Highway 93 (U.S. 93).

The analysis is based on the LBA being four lanes throughout to ensure that the LBA would have sufficient capacity for the projected increase in traffic and rerouting of trucks (e.g., approximately 3,000 additional vehicles per day in 2007 and 9,500 additional vehicles per day in 2027 [see Section 6.4, of this appendix]). Thus the total number of vehicles would range from 10,500 on SR 163 in Nevada to 17,400 on SR 68 in Arizona in 2007 and 26,000 on SR 163 in Nevada to 41,000 on SR 68 in Arizona in 2027. Although they may be needed, additional truck climbing lanes in the significantly greater steep grade sections of the LBA were not included in this analysis (see Section 4, of this Appendix).

Current improvements on SR 68 in Arizona and U.S. 95 in Nevada are to address existing high accident frequencies and current traffic levels. Therefore, the purpose for these improvements is based on current needs and is unrelated to the Hoover Dam Bypass project and the findings of that analysis.

The new bridge would be needed based on current and projected traffic congestion at the existing Laughlin Bridge. This crossing is a traffic bottleneck due to the signalized intersections located adjacent to the bridge. Currently, portions of the intersections are operating at a level of service (LOS) F (greater than 60 seconds of delay per vehicle). Increasing traffic volumes due to the rerouting of trucks would further increase delay at the existing bridge crossing and signalized intersections.

While the most technically sound location for the Laughlin structure would be between the existing bridge and Davis Dam, this bridge would have a severe impact on an existing recreational facility. Mitigation would require, at a minimum, a long high-level overpass that bridges not only the river but also critical-use areas of the existing Mohave County Park/Lake Mead National Recreation Area (LMNRA). Although a new bridge at this location is assumed to be feasible for purposes of this analysis, environmental, operational, and Section 4(f) considerations could necessitate construction of the bridge to the south of the park and Laughlin, including several miles of new roadway, thus further lengthening the route and bypassing Laughlin. Such a new route would require extensive environmental analysis and still would not meet the purpose and need for the proposed Hoover Dam Bypass project.

The length of the facility from the U.S. 93/U.S. 95 Interchange (IC) near Boulder City, Nevada, to Laughlin, Nevada, is approximately 75 miles, of which approximately 20 miles are existing four-lane divided highway. For the 55 miles of two-lane section along U.S. 95, a parallel set of lanes would be built adjacent to the existing lanes and the existing lanes would be overlaid. In the U.S. 95 segment to be widened, the two existing lanes would be retained as southbound lanes, with two new northbound lanes constructed to the east creating a divided highway section with a graded median. A typical section has been prepared to depict this proposed roadway section (Figure B-2). The length of the facility between Bullhead City and SR 68/U.S. 93 intersection in Arizona is approximately 28 miles, of which approximately 13.5 miles is existing four-lane divided highway. The Arizona Department of Transportation (ADOT) is currently widening the remaining 14.5 miles on SR 68 to four lanes; therefore, this segment would require only an overlay to accommodate the rerouted truck traffic.

The project has been divided into segments for this study for the purposes of estimating costs. These segments are described in Table B-1.

Table B-1
Segment Designations with Mileage

Segment Designation	Segment Descriptions and Features	No. of Miles
Nevada-1	U.S. 95 from U.S. 93/U.S. 95 IC to Nelson Turnoff (SR 165)—Adding two new lanes, overlay of existing highway, and drainage structures	10
Nevada-2	U.S. 95 from Nelson Turnoff (U.S. 95/SR165) to Searchlight—Adding two new lanes, overlay of existing highway, and drainage structures	26
Nevada-3	U.S. 95 from Searchlight to SR 163/U.S. 95—Adding two new lanes, overlay of existing highway, and drainage structures	19
Nevada-4	SR 163 from U.S. 95/SR 163 to the Colorado River—Adding 1 mile of new four-lane highway, overlay on existing four-lane highway, and truck emergency run-out ramp	20
Bridge	Nevada/Arizona Bridge—approximately 1,800 feet long	0.34
Arizona-1	SR 68 from the Colorado River to U.S. 93 in Arizona— Adding 28 miles of overlay pavement on existing highway	28
	Approximate Total Miles	***103***

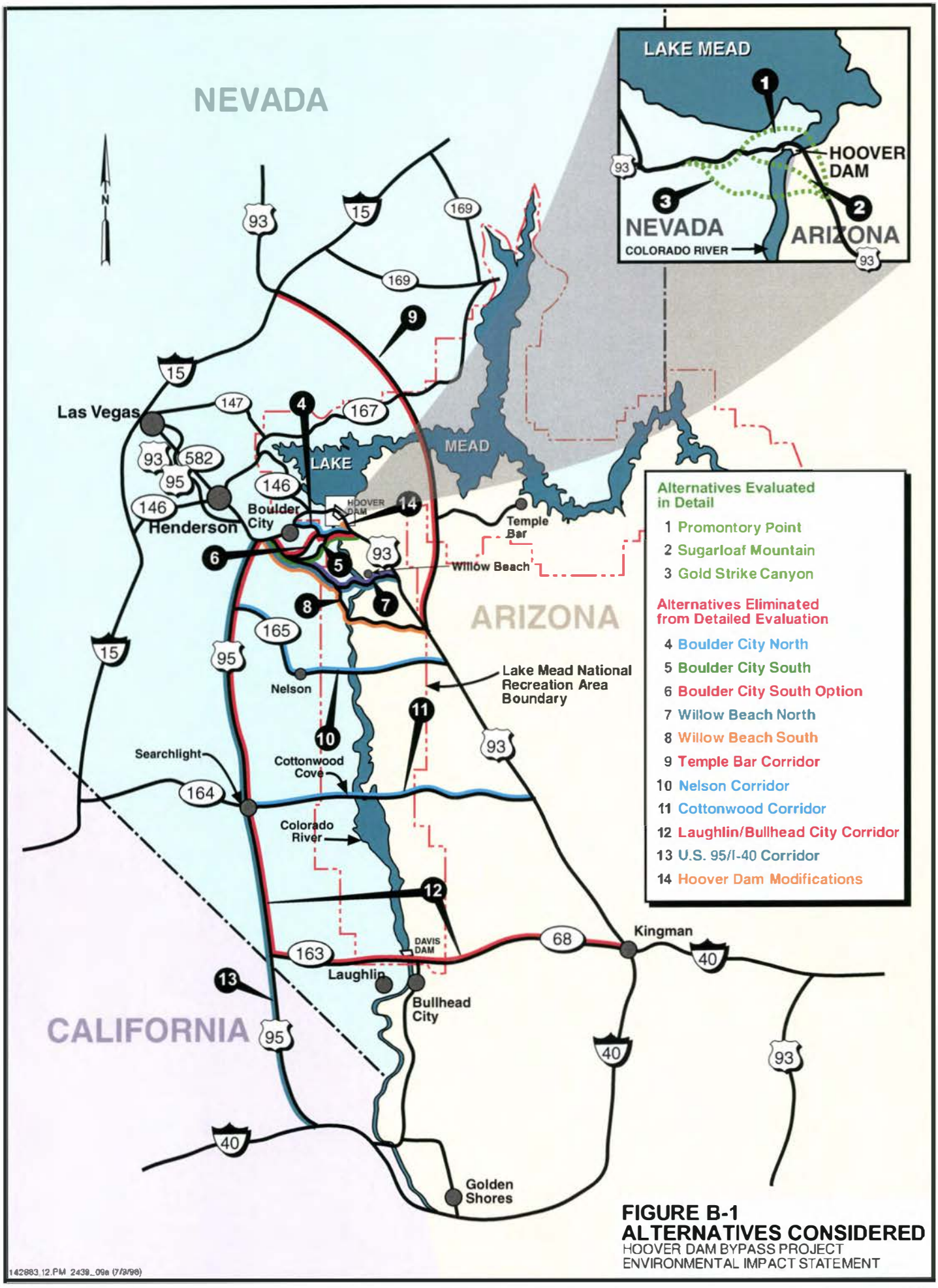

FIGURE B-1
ALTERNATIVES CONSIDERED
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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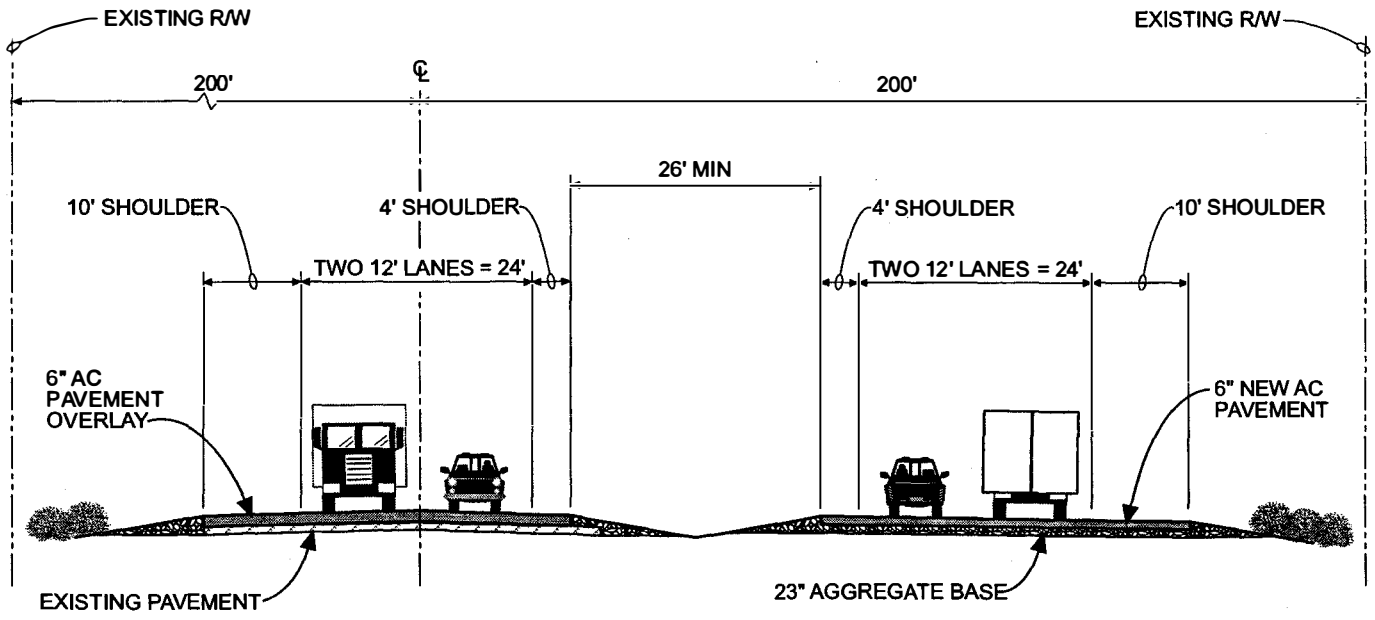

FIGURE B-2
U.S. 95 WIDENING IN NEVADA
TYPICAL STANDARD CROSS SECTION
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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2.1 Criteria and Assumptions

Based on a review of the existing U.S. 95 corridor as-builts, the existing road lies within a 400-foot right-of-way. A parallel highway section will use approximately 140 feet of the 200 feet of right-of-way available on the east side of U.S. 95. This evaluation assumes the following:

- U.S. 95 will be widened to four lanes with a graded median.
- All existing roads will be overlaid with 6 inches of pavement to accommodate the additional traffic to be diverted from U.S. 93 (Figure B-2).
- Structural sections for proposed widening are based on projected truck volume.
- Controlled access locations have only been analyzed conceptually in this study and are not considered in cost and impact analyses of this study.
- Truck climbing lanes may be warranted along the LBA, but are not included in cost and impact analyses of this study.
- One or more truck emergency run-out ramps would be constructed on the Nevada approach.
- The new Colorado River bridge will be constructed upstream of the existing Laughlin Bridge. This bridge will be approximately 1,800 feet long, including approaches. Mitigation for Section 4(f) impacts on Mohave County Park would require, at a minimum, a high-level viaduct over both the river and significant areas of the park.
- The cost of widening the 14.5-mile segment of Arizona SR 68 is not included in this study because it is currently under construction. The cost of widening the 55-mile segment of U.S. 95 in Nevada is shown in Table B-3 because these segments were programmed by NDOT subsequent to the DEIS. However, capital costs for improving U.S. 95 are not considered in computing the LBA Total 20-Year Costs in Section 6.6 of this Appendix.

3. Construction Costs

The total length of the LBA from Boulder City, Nevada, to Kingman, Arizona, via Laughlin is approximately 103 miles, the majority of which is two-lane undivided highway. Currently, about 42.5 miles of improved, divided highway exists along this route. Some realignment may be necessary to meet current highway engineering standards.

Because the corridor may eventually need to be improved to a controlled-access facility, interchanges may be justified at the following locations; however, as noted above, these facilities have not been analyzed in this study:

- Nelson, Nevada (U.S. 95 at SR 165)
- Searchlight, Nevada (U.S. 95 at SR 164)
- U.S. 95 at SR 163
- SR 163 at Laughlin, Nevada
- SR 68 at Bullhead City, Arizona

The bridge crossing, including approaches, is estimated to be approximately 1,800 feet long. The typical bridge section assumed is consistent with the 78-foot section included in the Phase B studies. For the purposes of this study, a structural unit cost of $150 per square foot is assumed. A bridge type has not been identified due to the limited information available from geotechnical data for foundations, bridge pier construction, materials availability, and other items necessary to construct the bridge. Based on discussions with National Park Service (NPS) LMNRA staff, to minimize the impact of the new bridge crossing on Mohave County Park, a longer bridge (estimated at 1,800 feet) would be required to span both the river and significant portions of the park, and specifically Davis Camp. The longer bridge would be a high-level structure, 40 to 60 feet above the river. It would be over twice as long as the original estimate in the DEIS, which indicated the bridge to be 700 feet long. At approximately 1,800 feet, the new bridge would be more than double the cost than was originally reported in Appendix B. Updated bridge crossing estimates are shown in Table B-2.

Table B-2
Bridge Crossing Summary of Estimates

Span	Length
Bridge	1,800 ft
Total Bridge Length[a]	*1,800 ft (0.34 mi)*
Total Bridge Area (1,800' x 78')	*140,400 sf*
Construction Cost	$21,060,000
Design, Construction Engineering, and Geotechnical Engineering assumed to be 20 percent	$4,212,000
Total Cost	***$25,272,000***

[a]Note that the DEIS had the bridge at 700 feet, which only spanned the river and not the park.

Further consideration could potentially prove this bridge crossing location to be impracticable due to the impact on Section 4(f) protected parkland. This could necessitate a more extensive roadway facility, including a potential bypass south of Laughlin to avoid Section 4(f) lands. Such a route would be even more expensive in capital costs, as well as user costs, due to the added distance (see User Costs, Section 6).

Preliminary engineering estimates for the costs associated with all segments the LBA corridor not currently under construction show that the implementation cost would be approximately $217 million.

Table B-3
Laughlin-Bullhead City Corridor
Order-of-Magnitude Cost Estimate

Description	Quantity	Unit	Unit Price ($)	Amount ($)
U.S. 95 Railroad Pass (U.S. 93) to Nelson Turnoff (SR 165) - 10 Miles[a]				
Borrow Material For Embankment	45,000	cy	9	405,000
Base Material	368,368	ton	13	4,788,780
Pavement Overlay[c]	72,732	ton	40	2,909,280
New Pavement	72,732	ton	40	2,909,280
Segment Subtotal (Rounded)				11,012,000

Table B-3
Laughlin-Bullhead City Corridor
Order-of-Magnitude Cost Estimate

Description	Quantity	Unit	Unit Price ($)	Amount ($)
U.S. 95 Nelson Turnoff (U.S. 95/SR 165) to Searchlight - 26 Miles[a]				
Borrow Material For Embankment	116,950	cy	9	1,052,550
Base Material	957,758	ton	13	12,450,850
Pavement Overlay[c]	189,103	ton	40	7,564,120
New Pavement	189,104	ton	40	7,564,160
Segment Subtotal (Rounded)				28,632,000
U.S. 95 Searchlight to SR 163/U.S. 95 Intersection - 19 Miles[a]				
Borrow Material For Embankment	85,460	cy	9	769,140
Base Material	699,898	ton	13	9,098,670
Pavement Overlay[c]	138,191	ton	40	5,527,640
New Pavement	138,191	ton	40	5,527,640
Segment Subtotal (Rounded)				20,923,000
SR 163 to New Colorado River Crossing - 20 Miles[c]				
Borrow Material For Embankment (New 1-Mile Section)	9,000	cy	9	81,000
Base Material (New 1-Mile Section)	64,477	ton	13	838,200
Pavement Overlay (Existing 20 Miles)	275,616	ton	40	11,024,640
New Pavement (New 1-Mile Section)	14,546	ton	40	581,840
Runaway Truck Ramp	1	ls	1,000,000	1,000,000
Segment Subtotal (Rounded)				13,526,000
Colorado River Bridge and Approaches[c]				21,060,000
Segment Subtotal				21,060,000
SR 68 - Colorado River to SR 40 in AZ into Kingman - 28 Miles[c]				
Pavement Overlay	385,863	ton	40	15,434,520
New Pavement	0	ton	40	-
Segment Subtotal (Rounded)				15,435,000
Subtotal				110,588,000
Allowance For Unlisted Items (20 percent)				22,118,000
Subtotal				132,706,000
Mobilization (8 percent)				10,616,000
Total Contract Cost				143,322,000
Contingencies (5 percent)				7,166,000
Total Field Cost				150,488,000
Final Design and Construction Management (25 percent)[b]				36,569,000
Subtotal				187,057,000
Inflation Factor (16 percent)				29,929,000
LBA Project Total				216,986,000
Minus Programmed Segments				(86,715,000)
Total Capital Costs (including markups)				130,271,000

[a]These segments of U.S. 95 were programmed by NDOT subsequent to the DEIS to resolve existing safety and operational deficiencies.
[b]Per Table B-2, Colorado River Bridge and Approaches cost was calculated with 20 percent for design, construction engineering, and geotechnical work.
[c]Total capital cost components.

It is important to reiterate that the LBA corridor improvements that have been programmed by the states are based on present needs that do not include any potential rerouting of traffic from the Hoover Dam crossing. Rerouting all truck traffic from the Hoover Dam crossing to the LBA would necessitate additional improvements to the entire 103-mile

corridor, resulting in much higher costs, to safely handle the substantially increased traffic, and, especially, truck volumes.

4. Profile Grades

Because of the heavy commercial truck traffic to be diverted, a comparison has been made between the profile grades along the U.S. 93 corridor versus the LBA. The purpose of this comparison is to evaluate the "steep" grades encountered along each corridor. The length of steep grades on transportation routes has a large impact on the trucking industry and the motoring public. Steep grades require trucks to use more fuel, lead to the need for increased maintenance, increase the potential for accidents, and have a negative effect on traffic operations. Steep grades are depicted as grades from 3 to 6 percent. The U.S. 93 corridor has 15 miles of steep grade versus 32 miles along the LBA (see Figure B-3 for LBA and Boulder City to Kingman profile grades). Profile grades are summarized in Table B-4.

Table B-4
Profile Grade Comparison

Segment Designation	Segment Description	Percent Grade	No. of Miles
Laughlin-Bullhead City Alternative			
Nevada – 1, 2, and 3			
	Railroad Pass (U.S. 93) to	0 to 3	50
	Laughlin Interchange (SR 163)	3 to 6	5
Nevada - 4	Laughlin Interchange to Colorado	0 to 3	7
	River	3 to 6	13
Arizona - 1	Colorado River to SR 40 in	0 to 3	17
	Arizona	3 to 6	14
	LBA TOTALS	**0 to 3**	**74**
		3 to 6	**32**
			106
U.S. 93 Corridor			
Nevada U.S. 93-1	Railroad Pass (U.S. 93) to	0 to 3	6
	Hoover Dam	3 to 6	5
Arizona U.S. 93-2	Hoover Dam to SR 40	0 to 3	62
	Interchange in Arizona	3 to 6	10
	U.S. 93 TOTALS	**0 to 3**	**65**
		3 to 6	**15**
			83

5. Traffic Operations

The existing conditions along the 103-mile LBA include about 61 miles of two-lane undivided highway. These segments exist on U.S. 95 in Nevada and SR 68 in Arizona, and they coincide with approximately 20 miles of steep grades (from 3 to 6 percent; see Section 4). These existing conditions result in safety and operational deficiencies, including a history of high accident rates and fatalities, and lower travel speeds and LOS, which prompted the states to program the current widening projects independent of any rerouting or redirection of Hoover Dam traffic. Furthermore, as noted in Section 6.3, the existing LBA river crossing is constricted due to signalized intersections located adjacent to the bridge. ADOT is currently making improvements to the Laughlin signal and turn-lane

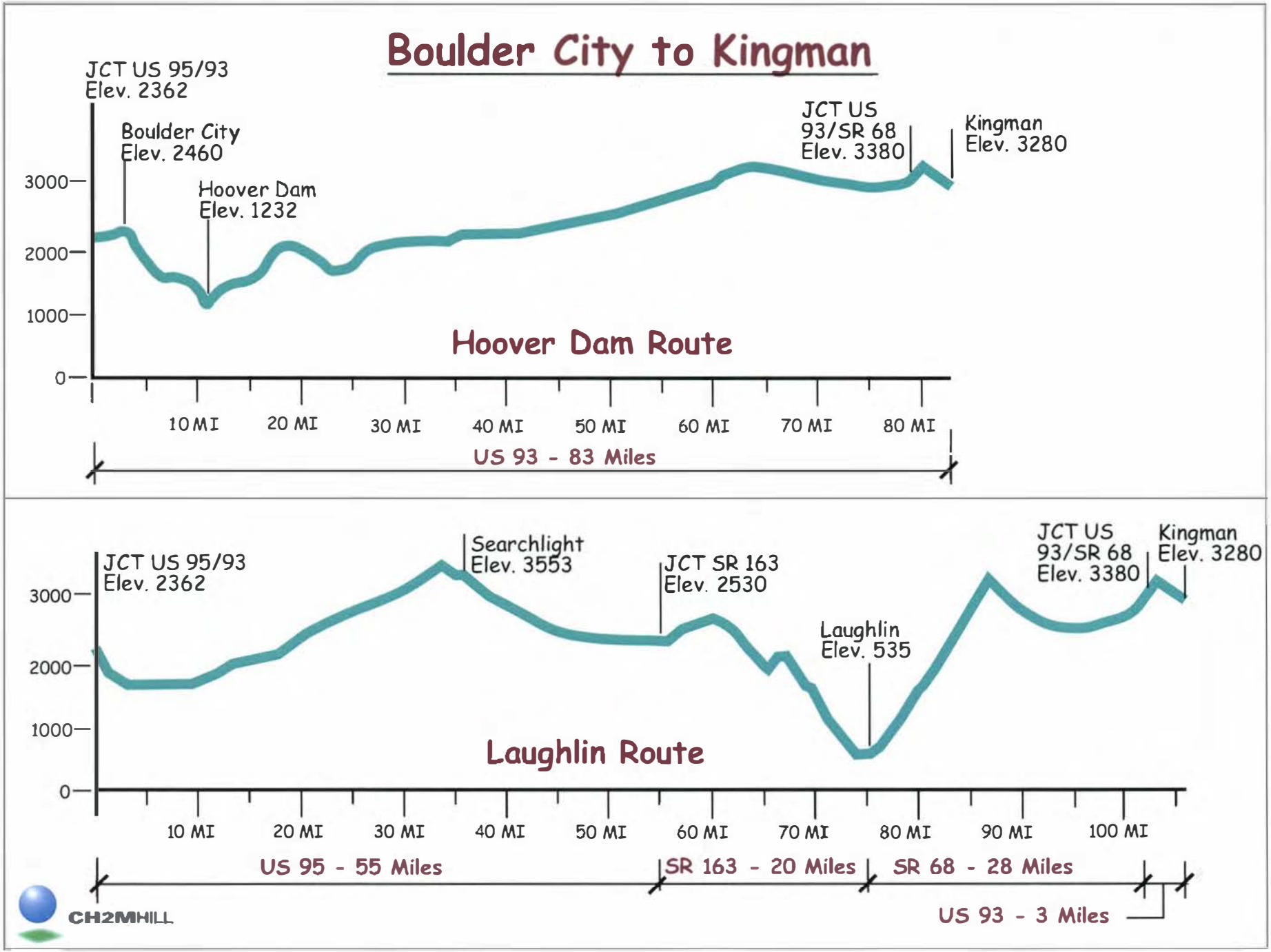

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FIGURE B-3
PROFILE GRADES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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configurations, as current traffic volumes are exceeding capacity. Despite these improvements, steadily increasing traffic volumes through this bottleneck are predicted to force the signalized intersections to LOS F on a daily basis within the next few years, and any major rerouting or addition of traffic from Hoover Dam would inundate the facility, resulting in absolute gridlock.

Traffic Forecasts

Traffic forecasts were developed for the LBA, and they include traffic volumes at both the new Laughlin crossing and the existing Hoover Dam crossing, assuming construction of a new Laughlin Bridge. (Further details, calculations, and graphs showing traffic projections for the Hoover Dam Bypass can be found in Appendix A of the FEIS.)

To estimate traffic in the vicinity of Hoover Dam assuming construction of the LBA, forecasts of Annual Average Daily Traffic (AADT) were made east of, west of, and at the dam. In making these forecasts, it was assumed that all truck traffic is distributed to the LBA crossing, and all other traffic is distributed to the existing dam crossing until it experienced significant congestion. When congestion at the dam reached levels where delays were 30 minutes or longer (LOS F), traffic was redistributed to the LBA in increasingly greater proportions as the period of congestion lengthened. The redistribution of traffic is shown in Table B-5.

This approach of redistributing the passenger car traffic that currently uses the Hoover Dam crossing is considered conservatively high because the approach assumes that Intelligent Transportation Systems applications will detect congestion and inform motorists early enough to divert traffic after the first half hour of congestion. It also assumes that almost all traffic will divert to the LBA crossing after the first hour of congestion. Depending on actual traffic demands and how information on traffic conditions is deployed, the actual reassignment to the LBA may be lower.

Table B-5
Traffic Distribution for the New LBA Crossing

Hours of Congestion/Day	Percent of AADT Reassigned to Laughlin Crossing
1	4
2	12
3	19
4	25
5	30
6	35

The maximum reassignment is limited to 35 percent. Approximately 41 percent of the daily traffic is anticipated during the 6 highest peak-hours of the day, and during these 6 hours, it is assumed that most visitations to the dam will occur (e.g., 9:00 a.m. to 3:00 p.m.). Traffic that crosses the dam outside this 6-hour period is not expected to experience an appreciable amount of congestion and would have no incentive to divert from US 93. Previous studies have indicated that 25 percent of the through trips are recreation trips that include Hoover Dam as a destination and would not divert. This leaves a remainder of 16 percent of the traffic that may divert from U.S. 93 if the delay caused by congestion is appreciable, which combined with the 18 percent truck traffic that would be required to divert amounts to approximately 35 percent of the traffic stream.

Using this methodology, AADT was forecasted for the new LBA crossing and in the vicinity of Hoover Dam for the years 2017 and 2027 compared to the estimated 1997 volume (Table B-6):

Table B-6
Forecasted AADT for the New LBA Crossing

Location	Year 1997 Forecast	Year 2017 Forecast	Year 2027 Forecast
AADT West of Colorado River (U.S. 95 in Nevada)	13,200-(1,700+0)=11,500[a]	25,800-(3,000+2,400)=20,400	32,100-(3,600+5,900)=22,600
AADT on Hoover Dam	11,500-(1,700+0)=9,800	21,100-(3,000+2,400)=15,700	26,000-(3,600+5,900)=16,500
AADT East of Colorado River (U.S. 93 in Arizona)	9,300-(1,700+0)=7,600	16,400-(3,000+2,400)=11,000	19,900-(3,600+5,900)=10,500
AADT Diverted to New LBA Bridge	1,700	3,000+2,400=5,400	3,600+5,900=9,500

[a]First number in parentheses is truck diversion, and the second number is cars expected to divert.

Level of Service

Analysis of traffic is based on Highway Capacity Software (HCS) methods and procedures. LOS calculations for diversion purposes at Hoover Dam are based on the following:

- Percent of AADT during the 6 highest peak hours is 9, 8, 7, 6, 6, and 5 percent
- No trucks will be allowed to use the existing dam crossing
- Peak hour factor of .95
- Directional distribution of 53/47
- Mountainous terrain
- Percentage of trucks = 18 percent
- Percentage of Buses = 2 percent
- Percentage of RVs = 4 percent
- All new alignments will have four lanes

Further details and HCS calculation forms can be found in Appendix A of the DEIS.

Table B-7 summarizes traffic operations at key locations for the LBA:

Table B-7
Traffic Operations at Key Locations for the New LBA Crossing

Location	Year 2017	Year 2027
U.S. 93, in Nevada	LOS D	LOS E
U.S. 93, at the dam	LOS F	LOS F
U.S. 93, in Arizona	LOS D	LOS D

The LOS on Hoover Dam and on the approaches to the dam would initially improve due to the rerouting of all truck traffic to the LBA. However, Hoover Dam itself would remain at LOS F in years 2017 and 2027. Existing traffic demands on the dam will increase due to growth in through trips and tourist activities related to both Las Vegas activities and Hoover Dam itself. U.S. 93 approaches to the dam currently operate at LOS E. LOS there will deteriorate from E to F by year 2017 under the No Build Alternative (see DEIS Appendix A, Traffic Analysis). With construction of the LBA, the LOS would be D in

year 2017 and E in year 2027 west of the dam, and LOS D in years 2017 and 2027 east of the dam.

The LBA will not adequately accommodate current or future traffic demands at Hoover Dam. Thus it will not reduce travel times and delays between Las Vegas and Kingman. Congestion will remain at unacceptable levels.

6. User Costs

Five independent costs, namely capital costs, vehicle-use costs, maintenance costs, cost of time, and cost of accidents, were calculated as a basis for comparison of the LBA with Sugarloaf Mountain Alternative (the preferred alternative) and the No Build Alternative. The 20-year user costs are calculated for the period from 2007 to 2027 and are reported in 1999 dollars.

6.1 Alternative Assumptions

The No Build Alternative assumes no improvements would be made along either route except for what is currently under construction or programmed. Improvements that are included in the No Build Alternative are the currently programmed reconstruction of SR 68 from AZ MP 1.2 to AZ MP 14.5 in Arizona and the programmed widening of U.S. 95 from SR 163/U.S. 95 to U.S. 93/U.S. 95 in Nevada. This would upgrade these facilities from a two-lane highway to a four-lane divided rural highway.

The Sugarloaf Mountain Alternative includes the construction of a new Colorado River crossing at Hoover Dam. The crossing would provide a four-lane divided facility from 1,000 feet east of the Hacienda Hotel to AZ MP 1.7 as described in the EIS. Costs to implement this alternative are included in the EIS.

This alternative would provide a continuous four-lane divided facility from the U.S. 93/ U.S. 95 intersection in Nevada to the U.S. 93/SR 68 intersection in Arizona. This alternative would include a new Colorado River crossing just north of Laughlin-Bullhead City. Total costs to implement this alternative are described in Table B-3. However, capital costs used to determine Total 20-year User Costs (Table B-16) do not include any segments currently under construction or programmed.

6.2 Project Segments

To simplify the traffic assignment for the user cost analysis, the alternative routes were divided into six segments (Figure B-4), as follows:

- Segment 1, U.S. 93 through Boulder City. This segment begins at the U.S. 93/U.S. 95 interchange and follows U.S. 93 east to the Hacienda Hotel near Hoover Dam. Trip time and mileage were based on traffic using the Truck 93 bypass around the commercial core of Boulder City.

- Segment 2, Hoover Dam Crossing. This segment begins at the Hacienda Hotel in Nevada and follows U.S. 93 across the dam to MP 1.5 in Arizona. This segment includes the entire length of U.S. 93, where speed limits are reduced for traffic to safely traverse the steep, narrow roadway crossing Hoover Dam. The Sugarloaf Mountain Alternative fits completely in this segment. For the Sugarloaf Mountain Alternative, traffic assignments were split between using the new bridge crossing and the dam crossing, assuming traffic will still cross the river on the dam for recreational trips.

- Segment 3, U.S. 93 in Arizona. This segment begins on U.S. 93 at MP 1.5 east of Hoover Dam and continues to the U.S. 93/SR 68 interchange north of Kingman, Arizona.
- Segment 4, SR 68. This segment begins at the U.S. 93/SR 68 intersection and continues along SR 68 west to the Colorado River Bridge crossing at Bullhead City, Arizona.
- Segment 5, SR 163. This segment begins at the Colorado River bridge crossing at Laughlin-Bullhead City and continues west to the SR 163/U.S. 95 intersection in Nevada.
- Segment 6, U.S. 95. This segment begins at the SR 163/U.S. 95 intersection and continues north through Searchlight, ending at the U.S. 93/U.S. 95 interchange near Boulder City.

6.3 Traffic Projections for No Build Alternative

Traffic was assigned to the No Build Alternative assuming Intelligent Transportation Systems (ITS) will be installed that will accurately inform drivers of traffic conditions along both routes. Each route considered includes a crossing of the Colorado River, and these river crossings represent the capacity constrictions for both routes. The Hoover Dam crossing is constricted due to poor geometric features and tourist traffic congestion. The Laughlin- Bullhead City crossing is constricted due to signalized intersections located adjacent to the bridge. Additionally, the LBA is a less desirable route since it is 23 miles longer than using U.S. 93 and has 17 miles of additional steep grades (3 to 6 percent).

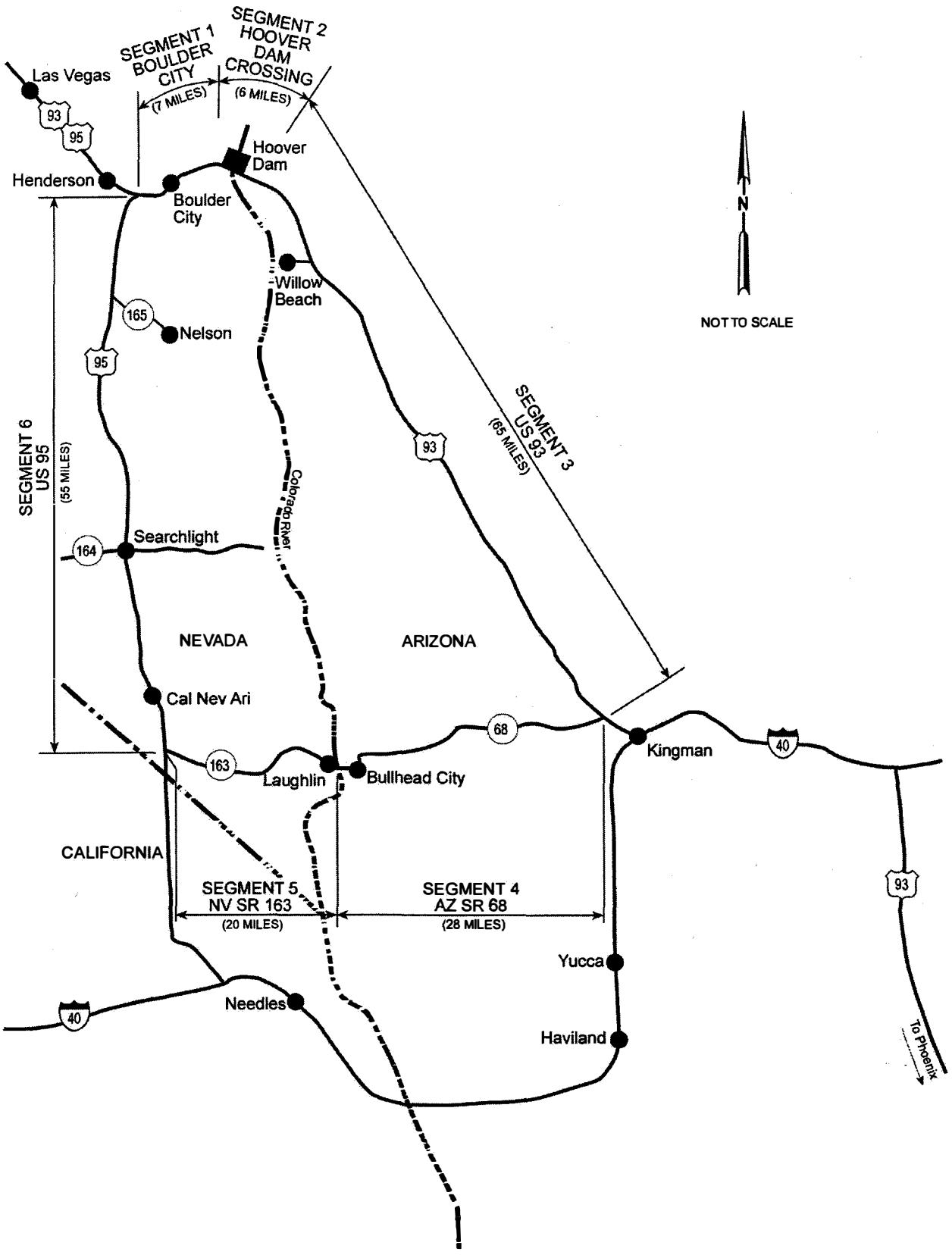
At the existing Laughlin-Bullhead City Colorado River crossing, background traffic is predicted to force the signalized intersections to LOS F (greater than 60 seconds of delay per vehicle) by 2007, and the additional 23 miles of driving will add 23 minutes (assuming 60 mph) of travel time compared to the Hoover Dam crossing. Therefore, it is assumed traffic will not divert to the Laughlin-Bullhead City route until a queue of traffic resulting in 30 minutes of delay is established at the Hoover Dam crossing. The No Build alternative does not assume the Hoover Dam crossing will be closed to truck traffic; therefore, traffic is assumed to divert at similar proportions to traffic crossing the dam.

Traffic projections indicate queues will delay drivers at least 30 minutes for 3 hours of the day in 2007, 7 hours in 2017, and as many as 10 hours in 2027. Table B-8 shows the diversions of traffic to the Laughlin-Bullhead City route under No Build.

Table B-8
Average Daily Traffic (ADT) Volumes Diverted from Hoover Dam Crossing to Laughlin-Bullhead City Under No Build, for Either LBA or No Build Alternative

Year	Passenger Vehicle Diversion	Truck Diversion	Total Vehicles Diverted
2007	230	50	280
2017	2,300	500	2,800
2027	5,170	1,130	6,300

The background traffic for U.S. 95 and SR 163 was established by projecting traffic for future years from traffic counts. Existing traffic is collected by NDOT at two automatic traffic recorders (ATR) along these routes. The ATR along SR 163 (ATR #0331609) established the 1997 ADT at 4,900 vehicles, and ATR #0331309 established the 1997 ADT of U.S. 95 at 6,000 vehicles. A constant growth of 4 percent per year was assumed to predict future volumes along these routes.



LEGEND

STATE BOUNDARY

HIGHWAYS

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FIGURE B-4
ANALYSIS SEGMENTS
HOOVER DAM CROSSING AND
LAUGHLIN/BULLHEAD ROUTES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

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Traffic projections for SR 68 were established by ADOT as part of the Design Concept Study (DCS) for SR 68 (ADOT, 1999). This study assumed a constant growth rate of traffic at 4 percent per year for this corridor. The SR 68 DCS also defined traffic factors for the corridor; these factors are assumed to apply also to SR 163 and U.S. 95 (Table B-9).

Table B-9
Traffic Factors (U.S. 95, SR 163, and SR 68)

Factor	Value
Percentage of ADT within the peak hour (K)	10 percent
Directional Distribution (D)	53/47
Percent of Heavy Vehicles	7 percent

Table B-10 shows the Annual Daily Traffic Volumes predicted for the background traffic of the Laughlin-Bullhead City Route.

Table B-10
ADT Background Volumes

Year	SR 68 (Segment 4)	SR 163 (Segment 5)	U.S. 95 (Segment 6)
2007	14,300	7,400	9,000
2017	21,200	11,000	13,500
2027	31,500	16,500	20,300

Background traffic volumes for Segments 1 through 3 are equal to those shown in Appendix A. Traffic was assigned to the No Build Alternative by subtracting the diverted traffic volumes from background volumes for Segments 1, 2, and 3, and adding the diverted volumes to Segments 4, 5, and 6.

6.4 Traffic Projections for the LBA and Sugarloaf Mountain Alternative

The traffic volumes assigned to Segments 1, 2, and 3 of the Sugarloaf Mountain Alternative are equal to those shown in Appendix A. No diversion of traffic to the Laughlin-Bullhead City route is assumed. The traffic volumes for Segments 4, 5, and 6 of the Sugarloaf Mountain Alternative are equal to the background volumes predicted for these corridors (Table B-10).

The traffic volumes assigned to Segments 1, 2, and 3 of the LBA are equal to the traffic volumes shown in Table B-6 for U.S. 93 and assume trucks would be banned from crossing Hoover Dam. The traffic volumes shown for Segments 4, 5, and 6 of the LBA are equal to the background volumes predicted in Table B-10 plus the traffic diverted to the new LBA crossing in Table B-6.

The traffic volumes assigned to Segments 1, 2, and 3 of the No Build Alternative are equal to the traffic forecast calculations shown in Appendix A minus the volumes predicted to divert (Table B-8). The traffic volumes shown for Segments 4, 5, and 6 of the No Build Alternative are equal to the background volumes predicted in Table B-10 plus the traffic diverted to Laughlin-Bullhead City in Table B-8.

Table B-11 documents the traffic assignment used for the 20-year analysis of the three alternatives compared.

Table B-11
2007 Traffic (ADT)

Segment	No Build Alternative	LBA	Sugarloaf Mountain Alternative
Boulder City (Segment 1)	19,220	16,400	19,500
Hoover Dam (Segment 2)	16,020	13,200	16,300[a]
U.S. 93 (Segment 3)	12,620	9,800	12,900
AZ SR 68 (Segment 4)	14,580	17,400	14,300
NV SR 163 (Segment 5)	7,680	10,500	7,400
U.S. 95 (Segment 6)	9,280	12,100	9,000

[a]Trips are spilt: 12,900 are predicted to use the new bridge crossing and 3,400 use the dam.

2017 Traffic (ADT)

Segment	No Build Alternative	LBA	Sugarloaf Mountain Alternative
Boulder City (Segment 1)	23,000	20,400	25,800
Hoover Dam (Segment 2)	18,300	15,700	21,100[b]
U.S. 93 (Segment 3)	13,600	11,000	16,400
AZ SR 68 (Segment 4)	24,000	26,600	21,200
NV SR 163 (Segment 5)	13,800	16,400	11,000
U.S. 95 (Segment 6)	16,300	18,900	13,500

[b]Trips are spilt: 16,400 are predicted to use the new bridge crossing and 4,700 use the dam.

2027 Traffic (ADT)

Segment	No Build Alternative	LBA	Sugarloaf Mountain Alternative
Boulder City (Segment 1)	25,820	22,600	32,100
Hoover Dam (Segment 2)	19,720	16,500	26,000[c]
U.S. 93 (Segment 3)	13,620	10,400	19,900
AZ SR 68 (Segment 4)	37,780	41,000	31,500
NV SR 163 (Segment 5)	22,780	26,000	16,500
U.S. 95 (Segment 6)	26,580	29,800	20,300

[c]Trips are spilt: 19,900 are predicted to use the new bridge crossing and 6,100 use the dam.

6.5 User Cost Comparison

The total 20-year user cost for the LBA, Sugarloaf Mountain, and No Build Alternatives was determined by summing the following: capital costs, vehicle use costs, maintenance costs, cost of time, and cost of accidents.

6.5.1 Capital Costs

The capital cost to construct the Sugarloaf Mountain Alternative is $198 million (see Section 2.6 of the FEIS). The capital cost to construct the LBA includes: (1) the pavement overlays for U.S. 95, SR 163, and SR 68; (2) the new 1-mile section of SR 163 and the runaway truck ramp; (3) the Colorado River Bridge; (4) a 20 percent allowance for unlisted items, an 8 percent mobilization cost, 5 percent contingencies, and 25 percent for final design and construction management; and (5) a 16 percent inflation factor to bring the costs up to 1999 dollars. The No Build Alternative is assumed to have no capital costs.

6.5.2 Vehicle Use Costs

The 20-year vehicle use costs were determined using the rate of $0.32 per mile for passenger vehicles and $1.00 per mile for trucks. Recent statistics have been published that indicate these costs could be higher than what was used in this analysis. However, the values used in this analysis are consistent with previous calculations for this project. (See the attached Vehicle Use Worksheet for cost calculations).

If higher values are used, the total user costs would increase; however, the results of benefit-to-cost comparisons would still be consistent. The most recent available passenger vehicle cost rate is published by the U.S. Department of Transportation, Bureau of Statistics, for 1997 at $0.45 per mile. Truck costs have been recently published in the Transportation Research Record 1359, based on a study done along Interstate 80, and indicate a rate of $1.07 per mile.

6.5.3 Maintenance Costs

Estimated maintenance costs were provided by ADOT personnel. Based on the EIS (Section 2.7), maintenance costs are higher for those alternatives that do not improve the Hoover Dam crossing. Rockfall containment and additional maintenance of safety features contribute to the additional costs for an unimproved Segment 2. The following assumptions were used:

- Maintenance costs for four-lane divided roadway = $30,000 per mile per year
- Maintenance costs for two-lane roadway = $15,000 per mile per year
- Maintenance costs for the existing U.S. 93 at the dam crossing (Segment 2) = $40,000 per mile per year

No costs were included for maintaining Hoover Dam.

6.5.4 Cost of Time

The time to travel each alternative was determined based on an average running speed maintained throughout the length. Based on time trials for the traffic study completed in 1991, the Hoover Dam Traffic and Revenue Report, and time trials taken in August 1999 for this analysis, the following average running speeds were established for the existing conditions:

Table B-12
Average Running Speeds

Segment	Average	Source(s)
Segment 1	44 mph	Time Trials August 1999
Segment 2	15 mph	Time Trials August 1999
		Hoover Dam Traffic Study (1991)
Segment 3	63 mph	Time Trials August 1999
Segment 4	53 mph	Time Trials August 1999
		Hoover Dam Revenue Report (1999)
Segment 5	61 mph	Time Trials August 1999
Segment 6	63 mph	Time Trials August 1999

The original Hoover Dam traffic study included origin-destination data that recorded the occupancy of the cars stopped. From review of this data, an occupancy rate of 2.0 is assumed; the occupancy rate for trucks is assumed to be 1.0.

Total annual travel time was calculated based on the total annual vehicles, the occupancy rate, and the average running speed. The cost of time was calculated using a value of time as a function of time saved curve (AASHTO, 1977, Figure 2).

The values of time (1977) derived from the curve are $2.20 for social recreational users, $4.00 for work trips, and $4.90 for personal business trips. From information collected during the origin-destination study completed in 1991, passenger vehicle trips are 84 percent recreational, 12 percent business, and 4 percent work trips (Reclamation, December 1991, Table 3-2). This mixture of trip types for passenger vehicles was used to calculate a blended cost per hour (1977) of $2.60. Truck traffic is assumed to be all business-related trips, and the user cost per hour (1977) is $4.90.

The 1977 costs were escalated to 1999 rates based on the Consumer Price Index (CPI) published by the U.S. Department of Labor, Bureau of Labor Statistics. In May 1977, the CPI was published at 60.3, and 166.2 in May 1999. The escalated 1999 rates are $7.17 for passenger vehicle occupants and $13.51 for truck occupants.

As volumes increase over time, traffic congestion will add travel delays. This needs to be accounted for on the segments that could have large amounts of delay. Three areas of the study area were looked at in more detail, as follows:

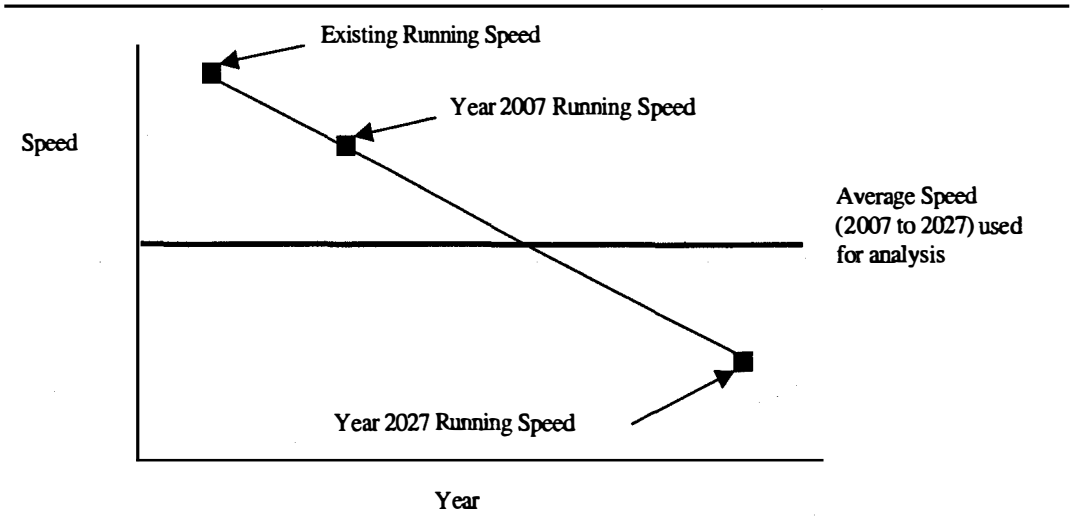
- **Boulder City (Segment 1).** Traffic growth from 2007 to 2027 through Boulder City is expected to increase travel delay throughout the segment and at key intersections. A detailed analysis of the Boulder City area was not completed for this document; therefore, reductions in travel speeds were determined based on volume to capacity ratios (v/c) expected. For example, for the No Build condition, traffic volumes are expected to increase 96 percent from 13,200 vehicles per day (vpd) in 1997 to 25,820 vpd in 2027. The existing running speed on Segment 1 is 44 mph; however, as congestion increases over time, the running speed is expected to decrease to approximately 25 mph in 2027. For the calculations in this analysis, an average of speeds from 2007 to 2027 was used, which is calculated to be 33 mph.

- **Hoover Dam Crossing (Segment 2).** For the alternatives that do not construct a new crossing at the dam (No Build and LBA), travel delays across the dam are expected to increase due to traffic growth. Running speeds for future years were predicted as stated above for Boulder City. The Sugarloaf Mountain Alternative includes a new river crossing that will add capacity. Vehicles predicted to use the bridge crossing are assumed to have a running speed of 60 mph. Those vehicles that would use the dam crossing in lieu of the bridge for recreational purposes are assumed to have a running speed of 15 mph..

- **Laughlin-Bullhead River Crossing (Segments 4 and 5).** Two signalized intersections at the river crossing will increase travel delays as traffic grows for the No Build and Sugarloaf Mountain Alternatives. The delay associated with these segments is confined to the signalized intersections located at the river crossing. These intersections were looked at in more detail, and the delays predicted were added to the travel time. The LBA includes a new river crossing, and travel delays at the river crossing are not expected.

For the purposes of calculating total user costs over a 20-year period, the average running speed for the time period was used as illustrated in the following graph (and see Table B-13). (Also, see Attachment, Cost of Time spreadsheet, for the cost calculations.)

Table B-13
Average Running Speeds for Alternatives



Segment	Existing Condition	No Build Condition	LBA	Sugarloaf Mountain Alternative
	Speed	Speed	Speed	Speed
Segment 1	44 mph	33 mph	39 mph	29 mph
Segment 2	15 mph	10 mph	12 mph	60/15 mph[a]
Segment 3	63 mph	63 mph	63 mph	63 mph
Segment 4	53 mph	52 mph	60 mph	55 mph
Segment 5	61 mph	52 mph	61 mph	55 mph
Segment 6	63 mph	63 mph	63 mph	63 mph

[a]Traffic using the bridge crossing travels at 60 mph; traffic using the dam travels at 15 mph.

6.5.5 Accident Costs

The existing accident rate on U.S. 93 is 1.35 accidents per million miles traveled (approaching Hoover Dam) and 3.97 in the immediate area of the dam, based on 1994 through 1997 data (EIS, Table 1-3). The composite accident rate used for the 5.5-mile section (Segment 2) at the Hoover Dam crossing is 1.59 accidents per million miles traveled. The other rural segments of the project have an improved accident rate over the existing condition; the rate of 1.24 was used for sections of four-lane roadway, and 1.33 was used for sections of two-lane roadway (AASHTO, 1977, Table 12).

The only section of roadway considered within an urban setting is Segment 1 (U.S. 93 through Boulder City). This section of roadway is assigned an average accident rate of 2.39 (AASHTO, 1977, Table 12).

The average costs for each accident were derived from the 1977 AASHTO publication, and the costs were escalated to 1999 dollars using the CPI. The average costs (1977) published are $130,000 for a fatality, $6,000 for an injury accident, and $1,100 for a property-damage-only accident. The distribution of accident types is shown in Table B-14.

Table B-14
Distribution of Accident Types

Accident Type	2-Lane Rural Highway	Rural Expressway (Divided)
Fatalities	3%	3%
Injury Accidents	40%	35%
Property Damage	57%	62%

Based on this distribution, the average accident costs (1977) are $6,900 for the two-lane sections of roadway and $6,700 for the four-lane sections of roadway. Adjusting to 1999 dollars, these costs are $19,020 for the two-lane roadways and $18,470 for the 4-lane roadways.

6.5.6 Fuel Consumption

While fuel is included in vehicle use costs, the total consumption of fuel has also been estimated for the 20-year period as a measure of the environmental impact. The most current data available (1997) from the U.S. Department of Transportation (USDOT), Bureau of Statistics, were used for fuel consumption rates of passenger vehicles. The statistics indicate that the average passenger vehicle consumes fuel at a rate of 20.3 miles per gallon (mpg). Fuel consumption of trucks was also calculated based on findings from a study of truck costs published in the Transportation Research Record #1359. This study concluded that the average fuel consumption for trucks ranged from 5.4 mpg to 5.8 mpg. For this analysis, 5.4 mpg was used because of the steep grades in the project area.

Based on these assumptions, Table B-15 shows the calculated fuel consumption levels for the 20-year period.

Table B-15
Fuel Consumption Levels for a 20-Year Period

Alternative	Passenger Vehicle Consumption (gallons)	Truck Consumption (gallons)	Total Fuel Consumption (gallons)
No Build	1,003,643,000	521,497,000	1,525,140,000
Sugarloaf Mountain	965,153,000	489,974,000	1,455,127,000
LBA	1,001,389,000	603,626,000	1,605,015,000

The results indicate that the Sugarloaf Mountain Alternative would produce a fuel consumption savings of 4.8 percent from the No Build Alternative. Conversely, the LBA would increase fuel consumption over 5.0 percent above the No Build Alternative, due to the additional miles traveled.

6.6 Total 20-Year Costs

The total 20-year user costs shown in Table B-16 were derived based on the traffic assignments and cost assumptions described in Sections 6.4 and 6.5.

Table B-16
Total 20-Year Costs[a]

Alternative	Capital Costs[b] ($000)	Vehicle Use Costs ($000)	Maintenance Costs ($000)	Cost of Time ($000)	Cost of Accidents ($000)	Total 20-Year Costs ($Billions)
No Build	$0	$9,335,753	$89,720	$6,725,206	$578,722	**$16.72**
Sugarloaf Mountain	$198,000	$8,915,493	$88,620	$5,584,357	$551,542	**$15.34**
LBA	$130,000	$9,764,603	$106,130	$6,171,615	$566,764	**$16.74**

[a]All results are reported in 1999 dollars.
[b]Capital costs for the LBA do not include projects programmed in the states' Transportation Improvement Plans (i.e., U.S. 95 in Nevada and SR 68 in Arizona).

6.6.1 Benefit to Cost

Various assumptions are inherent to each of the cost calculations, and each assumption results in a corresponding margin of error. The calculations with the lowest margin of error are vehicle costs and maintenance costs. These calculations are based on roadway mileage, future traffic volumes, and historic costs, with only the prediction of future traffic volumes having any appreciable margin of error. Using the No Build Alternative as the baseline for the benefit-to-cost comparison, the following results are calculated based on only the vehicle use and maintenance costs.

Table B-17
Cost to Benefit for Vehicle Use and Maintenance Costs

Alternative	Vehicle Use Costs ($000)	Maintenance Costs ($000)	Total ($000)	Benefit to Users[a] ($000)	Benefit/Cost Ratio[b]
No Build	$9,335,753	$89,720	$9,425,473		
Sugarloaf Mountain	$8,915,493	$88,620	$9,004,113	$421,360	2.1
LBA	$9,764,603	$106,130	$9,870,733	($445,260)	-3.4[c]

[a]The benefit to users is the savings in user costs between the No Build and the Build Alternatives.
[b]The capital costs represent the costs to implement a build alternative and are used for the cost part of the benefit-to-cost comparison.
[c]A negative benefit to users indicates no cost benefits are realized by the implementation of the alternative.

A higher margin of error is associated with the calculations for cost of time and accidents. The cost of time involves applying a value for an individual's time in combination with future traffic predictions and future delay caused by traffic congestion. The cost of accidents is based on historical accident rates being maintained until the design year (2027). When these user costs are taken into account in the benefit-to-cost comparisons, the following results are calculated.

Table B-18
Cost to Benefit for Total User Costs

Alternative	Total User Costs[a] ($Billions)	Total Benefit to Users ($000)	Benefit/Cost Ratio[b]
No Build	$16.72		
Sugarloaf Mountain	$15.14	$1,580,000	8.0
LBA	$16.61	$110,000	0.9

[a]Excludes capital costs.
[b]The capital costs represent the cost to implement a build alternative and are used for the cost part of the benefit-to-cost comparison.

6.6.2 Summary of User Costs

The 20-year cost analysis shows that a U.S. 93 bypass near Hoover Dam, specifically on the preferred Sugarloaf Mountain alignment, will result in substantial savings in user costs, accidents, and lower fuel consumption than either a Laughlin-Bullhead City Alternative (LBA) or the No Build Alternative. Using the most conservative cost comparison, combining vehicle use and maintenance costs over a 20-year period, the LBA would result in an estimated $867 million greater user cost than the preferred Sugarloaf Mountain Alternative and $445 million greater cost than the No Build Alternative. In terms of overall 20-year costs, excluding capital costs, the LBA would result in an estimated $1.5 billion greater user costs than the preferred alternative. Under this scenario, the LBA would have a benefit-to-cost ratio of 0.9; therefore, the benefits would clearly not justify the costs, as compared to Sugarloaf Mountain, with a benefit-to-cost ratio of 8.0.

Furthermore, the LBA would result in substantially higher fuel consumption over the 20-year period due to the 23 miles greater distance and 17 miles of steeper grades. Considering this important environmental factor, the user cost analysis found that the LBA would consume an estimated 150 million gallons more fuel than the Sugarloaf Mountain Alternative and 80 million gallons more than the No Build Alternative.

7. Environmental Considerations

The LBA involves building a parallel two-lane roadway largely within the existing 400-foot right-of-way corridor for U.S. 95 in Nevada, SR 163 in Nevada, and SR 68 in Arizona. Some realignment, widening through the town of Searchlight, and cuts and fills would be needed to meet current American Association of State Highway and Transportation Officials (AASHTO) standards. A full environmental review would be required if the LBA were selected for further study.

According to NPS, diverting 4 million vehicles per year from the U.S. 93 corridor to the U.S. 95/SR 163/SR 68 corridor, and the indirect impacts that could result from this increased level of use over the next 20 years, could have significant indirect environmental impacts, especially as traffic increases to 9.5 million vehicles in 2027. Unlike the U.S. 93 corridor, the LBA corridor contains critical desert tortoise habitat, the Section 4(f)-protected Spirit Mountain Traditional Cultural Property (TCP), and numerous residential communities along the route that would be impacted by the significant increase in traffic and, especially, truck volumes. The impacts would result from increased traffic noise, air pollution and accidents, off-road driving, vandalism, human-caused fires, poaching, and

artifact/specimen collecting as vehicles leave the right-of-way and venture into adjacent lands.

Moreover, as discussed in Section 6.6, the LBA would result in substantially greater fuel consumption over a 20-year period due to the longer driving distance and steeper grades. This route would result in traffic consuming an estimated 150 million more gallons of fuel than the Hoover Dam Bypass routes and 80 million more gallons of fuel than the No Build Alternative. Consequently, by all measures, the LBA route can be seen as environmentally inferior to the Hoover Dam Bypass routes.

7.1 Section 4(f) Lands

The existing bridge in Laughlin is at the southern edge of the LMNRA. Because the new bridge would likely be located to the north of the existing bridge and involves acquiring additional right-of-way, construction of the bridge and associated new highway would encroach on NPS land. Assuming the right-of-way on NPS land would be 1 mile long and 300 feet wide, approximately 36 acres of Section 4(f) lands would be impacted. However, during final design it is likely that the Section 4(f) acreage would increase with the addition of runaway truck ramps and truck climbing lanes.

The new crossing of the Colorado River would likely be located between Laughlin and Davis Dam where the two roads approach the river north of the existing Riverside Bridge in the area called Davis Camp. Davis Camp is developed for shoreline recreational uses with camping, picnicking, boat launching, and day-use facilities. It is operated by Mohave County as a county park under an agreement with NPS, as the area is included in LMNRA. According to NPS, this is an important unit of the Mohave County Park System because the revenue it generates is strategic to the overall operation of the County Park Program.

As discussed earlier in this report, any potential bridge structure through this Section 4(f)-recreation facility would require extensive mitigation of bridge design to minimize impacts to the existing park uses. Furthermore, this use of Section 4(f) lands may be impracticable and would require consideration of feasible alternative alignments further south to avoid the park, which would greatly increase the capital and user costs for the LBA and thus further reduce its benefit-to-cost ratio (see Section 6.6).

As noted above, NPS has also stated that as the LBA extends from the Colorado River to the west, it enters the Newberry Mountains, an area recognized as environmentally sensitive. The most prominent peak in this mountain range is Spirit Mountain, a sacred area to Native American tribes in the Southwest. This area was recently designated a TCP, only the second such area within a unit of NPS, due to its national cultural significance. It is now listed on the National Register of Historic Places (NRHP) and is, therefore, protected as Section 4(f) land. According to NPS, the LBA could impact an 8-mile-long portion of this significant cultural property.

7.2 Desert Tortoise

The LBA could result in substantial impacts to critical desert tortoise (*Gopherus agassizii*) habitat, according to a May 4, 1998, U.S. Fish and Wildlife Service (USFWS) letter to Federal Highway Administration (FHWA) (EIS Appendix C, Correspondence). The desert tortoise is federally listed as threatened with extinction. The letter stated that U.S. 95 bisects the Paiute-El Dorado Critical Habitat Unit for the desert tortoise, and increased traffic would

result in substantial direct and indirect impacts. These impacts are identified as road kills, increased risks of human-caused fires, vandalism, and poaching.

7.3 Air Quality

Bullhead City is currently a nonattainment area for particulate matter with diameter less than 10 microns (PM_{10}). The LBA would increase air pollution in the region. For all pollutants, other than carbon monoxide, emissions would exceed the No Build Alternative. The increased distance would also spread air pollution over a larger area.

The Laughlin-Bullhead City Alternative would increase the daily vehicle miles traveled (VMT) through the current nonattainment area, and in turn increase the amount of PM_{10} emissions which would further degrade the air quality in the area. The length of roadway affecting the nonattainment area is 20 miles and the PM_{10} emission factor is 5.22 grams per VMT.[1] The PM_{10} emission budget for the Bullhead City nonattainment area is 2,514.40 tons (2,281.05 metric tons) per year. The annual emissions are based on the daily emissions multiplied by 260 days per year. Based on the increased VMT for the projected years of 2007, 2017, and 2027, there would be increases in PM_{10} emissions within the nonattainment area over any of the Hoover Dam Bypass build alternatives (Table B-19).

Table B-19
Bullhead City Nonattainment Area Analysis

Year	2007	2017	2027
Daily VMT Increase	3,100	5,400	9,500
Emission Increase (T/yr)	93	161	284
Percent of Emission Budget (2,514.4 T/yr)	4 percent	6 percent	11 percent

The PM_{10} emissions from the LBA would contribute significantly to the nonattainment situation if this alternative were chosen, because it would exceed the 10 percent significance level that defines a regionally significant impact for a nonattainment or maintenance air quality area.[2]

On a regional basis, the LBA is 23 miles longer than using U.S. 93 and crossing Hoover Dam. This will increase the PM_{10} emissions in the three projected years over the Hoover Dam Bypass build alternatives (Table B-20).

Table B-20
Regional PM_{10} Analysis

Year	2007	2017	2027
Daily VMT Increase	9,300	16,200	28,500
Emission Increase (T/yr)	320	557	980

[1]Emission rate from Hoover Dam Bypass Project Draft Environmental Impact Statement and Section 4(f) Evaluation, Chapter 3, Table 3-3, Estimated 1997 Vehicle Emission Rates, Page 3-4.

[2]40 CFR51.852 Definition of *"Regionally Significant Action"*

Therefore, it can be seen that the Hoover Dam Bypass build alternatives result in lower PM_{10} emissions on a regional basis and eliminate the significant impact on the Bullhead City PM_{10} Nonattainment Area.

8. Conclusions

The Laughlin-Bullhead City Alternative does not meet the purpose and need of the Hoover Dam Bypass project. The traffic analysis shows that even with implementation of the LBA, traffic congestion at Hoover Dam will continue at unacceptable levels. In failing to improve LOS, the LBA does little to address critical needs of the Hoover Dam Bypass project: correcting inadequate roadway capacity in the vicinity of the dam, reducing the potential for accidents or interference in Dam operations. The additional 23 miles in travel distance would increase, rather than decrease, travel times. The extra distance would also lead to an increase in traffic accidents in this major commercial traffic corridor.

In addition to its failure to meet the project purpose and need, the LBA has several adverse environmental impacts including the use of an existing Section 4(f) recreation facility, a substantial impact on desert tortoises, and an increase in air pollution.

The cost of the LBA at $130 million (not including U.S. 95 and SR 68 improvements) is less than the alternatives in the vicinity of Hoover Dam, which vary from $198 million to $215 million. However, total costs over a 20-year period are $1.4 billion higher for the LBA than any of the other build alternatives, due to its longer distance.

Finally, there are approximately 32 miles of steep grades on the LBA alignment, compared to 15 miles along the U.S. 93 corridor. This would have a significant effect on the 1,700 trucks per day (projected to be 3,600 trucks per day in year 2027) that would be diverted to this commercial corridor. The LBA would also result in substantially greater fuel consumption over a 20-year period due to the steeper grades and longer driving distance. This route would result in traffic consuming an estimated 150 million more gallons of fuel than the Hoover Dam Bypass routes and 80 million more gallons of fuel than the No Build Alternative. Consequently, by all measures the LBA route can be seen as economically, operationally, and environmentally inferior to the Hoover Dam Bypass routes.

9. Works Cited

The following project documents used for this study are on file at the offices of CH2M HILL at 2000 East Flamingo, Suite A, Las Vegas, Nevada 89119.

- *SR 68 Design Concept Study*, ADOT, June 1999.
- *Traffic Projections/Pavement Evaluation and Profile Grades*, FHWA, April 23, 1998, and June 16, 1998, respectively.
- Nevada Senate Concurrent Resolution 60 Report, January 1997.
- *Laughlin Bridge Location Study*, Clark County Public Works Department. 1996.
- *Nevada Traffic Crashes*, NDOT, 1996.
- "A Policy on Geometric Design," *Green Book*, AASHTO, 1994 Edition.

- *U.S. 93 Colorado River Crossing*, NDOT, 1994.
- *Hoover Dam Traffic and Revenue Report*, August 1992.
- *Traffic Study: Colorado River Bridge*, Reclamation, December 1991.
- *Manual of User Benefit Analysis of Highway and Bus-Transit Improvements*, AASHTO, 1977.
- U.S. 93, U.S. 95, and SR 163 Construction Drawings and As-Built Record Documents

Appendix C
Correspondence

U.S. Department
of Transportation
Federal Highway
Administration

Central Federal Lands Highway Division
555 Zang Street, Room 259
Lakewood, CO 80228

December 22, 2000
Refer to: HFL-16.2

Ms. Nora Helton
Chairperson
Fort Mohave Indian Tribe
500 Merriman Avenue
Needles, CA 92363

Dear Ms. Helton:

Subject: U. S. Highway 93- Proposed Hoover Dam Bypass Project,
Invitation to Participate in continuing Government-to-Government Consultations and Programmatic Agreement.

The Federal Highway Administration has been actively involved with representatives of your Tribe on Government-to-Government consultations regarding the proposed Hoover Dam Bypass Project. While the project is not on Tribal lands, our goal is to consult with all interested Tribes along the Lower Colorado River to ensure a thorough understanding of the physical and cultural significance of the site. Through this consultation a great dialog regarding the potentially affected sites and processes to recognize and minimize potential impacts has evolved.

We would like to continue this dialog throughout the duration of the potential project. Thus, as a result of the ongoing consultations, two documents have been jointly created. The first is a Memorandum of Understanding (MOU) for continuing Government-to-Government consultations. The second is a Programmatic Agreement (PA) between the Federal Highway Administration, the Advisory Council on Historic Preservation, and the affected Federal and State partners on the project. As an interested Tribal Government and in recognition of the potential impacts to Traditional Cultural Properties, we are also inviting your Tribe to participate as a signatory to the PA.

FHWA and the partner agencies recognize and understand that continuing Tribal participation in this process through signing these documents is not an endorsement of the project or the preferred alternative. These documents do, however, establish the framework for continuing consultations with interested Native American Tribes (MOU) beyond those required by regulation and a process for the mitigation of impacts and treatment of affected historic and cultural properties (PA) if the project does advance.

As discussed at the last consultation meeting, highlight/strikeout versions of the PA and MOU are enclosed as well as final versions for signature. This is to help identify changes that have been previously recommended. Following the November 15, 2000, consultation meeting, a number of revisions were made as recommended by the Tribal consultation group. These include: broadening the dispute resolution process; adding language to note the sensitive nature and need for confidentiality regarding traditional, cultural, or religious information; clarifying termination elements; requiring the development of a separate treatment plan with procedures for inadvertent discovery of human remains or related objects; and requiring project updates be provided to the document participants on a regular schedule.

The document, with the above noted recommended changes, has been distributed to the agency participants for their signature. The Tribal representatives recommended this approach as the advance signatures by the participating agencies would serve to underscore the commitment to both the project and the process. This effort is now nearing completion. At this date, only two signatures are missing. They are the Advisory Council on Historic Preservation who will be the final signatory, and the National Historic Landmark Coordinator who is unavailable during the month of December. We have worked closely with these parties during development of these documents.

Since our distribution of the document to the participating agencies, we have received a few Tribal comments to the documents. These comments generally address the desire to add comments highlighting existing trust responsibilities, clarification that Tribal signature is not an endorsement, and a request to expand the compensation provision in the MOU. These changes have not been incorporated. The Programmatic Agreement does not restate already existing rights or responsibilities of the parties. It does not, nor is it intended to, waive any party's rights or legal responsibilities.

Thus, as recommended during the previous consultation meeting, we are formally extending an invitation to continue participation in this process. We are extremely proud of our combined efforts to date and truly believe this is an opportunity to set a new standard for positive Tribal involvement.

The Final Environmental Impact Statement for the project is scheduled for release on January 22, 2001. A 30-day notification period then follows. Our hope is to then issue a Record of Decision for the project soon after the public notification period. Our offer to participate is valid for a period of 60 days. Thus, we request your response by February 20, 2001. Following execution of these agreements, we anticipate scheduling a consultation meeting in late February or early March. We will solicit input regarding agenda topics and will provide more information in the near future.

We are anxious to continue working together to address this nationally significant transportation deficiency and safety problem. Upon your request, we are available to visit with you or attend a Tribal Council meeting, as necessary, to help facilitate execution of the documents. Please call

Mr. Dave Zanetell, Project Manager, at 303-716-2157 if you have questions or wish to arrange such a meeting.

Sincerely yours,

for Larry C. Smith, P.E.
Division Engineer

Enclosures
- Memorandum of Understanding
  - Final, for signature
  - Highlight/strikeout version
- Programmatic Agreement
  - Final for signature
  - Highlight/strikeout version

Identical letter to
- Chemehuevi Tribe
- Colorado River Indian Tribes
- Fort Mohave Indian Tribe
- Hopi Tribe
- Hualapai Tribe
- Kaibab Paiute Tribe
- Las Vegas Paiute Colony
- Moapa Paiute Indian Tribe
- Navajo Nation
- Pahrump Paiute Tribe
- Paiute Tribes of Utah
- Pueblo of Zuni

cc: Consultation participants

Arizona ® State Parks

"Managing and conserving natural, cultural, and recreational resources"

December 14, 2000

Larry C. Smith, Division Engineer
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street, Mail Room #259
Lakewood, CO 80228

Attention: David Zanetell, Project Manager

RE: US 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-d
FHWA; **SHPO-2000-533** (3328 and 3753)

Dear Mr. Smith:

Thank you for continuing to consult pursuant to 36 CFR Part 800 with our office regarding the proposed Hoover Dam Bypass Project and for providing us with a generous amount of time to review documentation in support of your Register eligibility recommendations. We offer the following comments, which are limited to those portions of the project's area of potential effect (APE) which are located in the State of Arizona:

We concur:

1. The identification of historic properties within the APE is complete.
2. The abandoned segment of Old Arizona US 93 within the APE is eligible as a contributing element to the Hoover Dam National Historic Landmark.
3. We have reviewed the information provided on Sugarloaf Mountain and are in agreement with FHWA that Sugarloaf Mountain is eligible for listing on the Arizona and National Registers of Historic Places. The most substantiated justification for listing of the property is under **Criterion A** for its cultural associations as a **Site** at the **Local** level of significance. Archaeological site NV:DD:14:21(ASM) is a character-defining element of Sugarloaf Mountain and contributes to its eligibility under **Criterion A.**
4. Other criteria cited and/or approaches to the eligibility of Sugarloaf Mountain do not, at this time, appear to be applicable. The mountain does not appear to be eligible under Criterion C because there are no designed features within the site boundary. Further, the mountain is Register eligible on its own as a Site, not as a component lacking individual distinction as part of a larger district.
5. The arguments presented in the Eligibility Statement (pp. 38—39) do not support eligibility of Sugarloaf Mountain under Criterion D. The National Register Bulletin "How to Apply the National Register Criteria for Evaluation" informs us that Criterion D encompasses properties that either have potential to answer, or have answered important research questions addressed by the actual physical materials of cultural resources or by the data derived therefrom. Information in this instance appears to come from outside historic property boundaries, (i.e., from elders that possess special cultural knowledge) rather than from the property itself or from data recovered from the property. Additional information on the significance of Sugarloaf Mountain may arise in the future, but that new information appears unlikely to be derived from the property itself.
6. The construction of the Hoover Dam Bypass preferred alternative would result in an **adverse effect** on historic properties.

Arizona State Parks
1300 W. Washington
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Tel & TTY: 602.542.4174
www.pr.state.az.us

800.285.3703
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Director's Office Fax:
602.542.4188

The draft Programmatic Agreement (PA) and proposed treatments for adversely affected historic properties as stipulated in the PA are acceptable. We look forward to signing the document and to continuing to consult on the project.

We appreciate your continued cooperation with our office in complying with the requirements of historic preservation. Please contact James Garrison at (602) 542-4009 or Jo Anne Miller at (602) 542-7142 if you have any questions or concerns.

Sincerely,

James W. Garrison
Arizona State Historic Preservation Officer

STATE OF NEVADA
DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS
STATE HISTORIC PRESERVATION OFFICE
100 N. Stewart Street
Carson City, Nevada 89701-4285

KENNY C. GUINN
Governor

MICHAEL D. HILLERBY
Department Director

RONALD M. JAMES
State Historic Preservation Officer

December 14, 2000

F. Dave Zanetell, P.E.
Project Manager
Federal Highway Administration
555 Zang St., Mail Room #259
Lakewood, CO 80228

Dear Mr. Zanetell:

As discussed with you, I reviewed the final revised programmatic agreement (PA) for the U. S. 93 Hoover Dam Bypass project. I have signed the document and returned it to your agency via Tom Greco of the Nevada Department of Transportation.

SHPO staff also reviewed the revised treatment plan. It too is satisfactory and we ask for no further changes in the document.

We appreciate your ready access and willingness to negotiate aspects of both these documents. We are pleased that you altered the documents in response to our request. Staff looks forward to working with you on the design advisory panel.

Sincerely,

Alice M Baldrica

ALICE M. BALDRICA, Deputy
State Historic Preservation Officer

Central Federal Lands Highway Division
555 Zang Street, Room 259
Lakewood, CO 80228

December 12, 2000

Refer To: HFL-16.2

Identical letter sent to Mr. Bill Dickinson, National Park Service

Mr. Tim Ulrich
Area Manager
Lower Colorado Dams Facilities Office
Attention: Don Bader
P.O. Box 60400
Boulder City, NV 89006

Dear Mr. Ulrich:

As a result of the most recent meeting on December 1, 2000, the PMT has approved the release of the Final Environmental Impact Statement for the project. This is a critical milestone and we, again, thank you for your support.

We received concurrence from the State Historic Preservation Offices for the determinations of eligibility and effects for historic and cultural properties. In support of this effort, as you are aware, we have continued consultation efforts with interested Tribal Governments. The most recent Government-to-Government meeting was held on November 15, 2000. The focus of this meeting was to provide the Tribes with an update on the responses from the SHPOs with respect to the recommendation of eligibility for the Sugarloaf and Goldstrike Canyon TCP. We also solicited input from the Tribes regarding implementation of the Programmatic Agreement and Memorandum of Understanding for continuing consultation.

During this meeting, several additional issues were discussed, including a request from the participating Tribes for the Government to submit a formal nomination of the TCP to the Keeper of the Register. After a lengthy discussion, it was ultimately resolved that a more appropriate first step is to submit the already prepared information to the Keeper for an informal review. The Tribes expressed an interest in having such a review as it could potentially identify areas of weakness and/or needing further information or clarification.

In response to this request, Federal Highways noted that extensive coordination with the Land Mangers is required. As noted during the previous consultation activities, FHWA's focus is project specific with a relative short-term presence in the area. Thus, we agreed with the consultation to forward this request to the Land Managers. With your guidance, we are available to support and/or assist in preparing an informal submittal to the Keeper. Also, as a follow up to this request, we have discussed this issue with the Keeper and verified that an informal request without substantial revision to the eligibility statement is possible.

Your guidance on this issue is requested. Please call me at 303-716-2157 if you require additional information. Thank you again for your cooperation and support as we work together to advance this critical project.

Sincerely yours,

Original signed by F. Dave Zanetell

F. Dave Zanetell, Jr.
Hoover Dam Bypass Project Manager

Enclosure

bc with enclosure:

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D. Zanetell
G. Walton
Hoover Dam Bypass Project Files

United States Department of the Interior

FISH AND WILDLIFE SERVICE
NEVADA FISH AND WILDLIFE OFFICE
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NEVADA 89502

December 5, 2000
File No. 1-5-01-SP-417

Mr. F. Dave Zanetell
Special Projects Manager
U.S. Department of Transportation
Central Federal Lands Highway Division
555 Zang Street, Mail Room #259
Lakewood, Colorado 80228

Dear Mr. Zanetell:

Subject: Updated Species List for the Hoover Dam Bypass Project, Clark County Nevada

This responds to your facsimile dated November 28, 2000, requesting updated information on threatened and endangered species that may occur in the subject project area. Enclosure A lists the threatened and endangered species and other species of concern that may be present within the area. Please reference the species list file numbers shown above in all subsequent correspondence concerning this project.

Please contact Debi Johnson of the Southern Nevada Field Office, at 702-647-5230 if you have questions regarding the enclosed updated list.

Sincerely,

For Robert D. Williams
Field Supervisor

Enclosure

ENCLOSURE A

LISTED SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE PROPOSED HOOVER DAM BYPASS PROJECT AREA, CLARK COUNTY NEVADA

File Number: 1-5-01-SP-417
December 5, 2000

Listed Species

Bird	
Southwestern willow flycatcher (E)	*Empidonax traillii extimus*
Fishes	
Devil's Hole pupfish (E)	*Cyprinodon diabolis*
Bonytail chub (E)	*Gila elegans*
Razorback sucker (E)	*Xyrauchen texanus*
Reptile	
Desert tortoise (T)	*Gopherus agassizii*

E = Endangered, T = Threatened

Species of Concern

Birds	
Western burrowing owl	*Athene cunicularia hypugea*
Black tern	*Chlidonias niger*
American peregrine falcon	*Falco peregrinus anatum*
Bald eagle	*Haliaeetus leucocephalus*
Least bittern	*Ixobrychus exilis hesperis*
White faced ibis	*Plegadis chihi*
Blue grosbeak	*Guiraca caerulea*
Phainopepla	*Phainopepla nitens*
Vermilion flycatcher	*Pyrocephalus rubinus*
Lucy's warbler	*Vermivora luciae*
Arizona Bell's vireo	*Vireo bellii arizonae*
Mammals	
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*
Spotted bat	*Euderma maculatum*
Greater western mastiff bat	*Eumops perotis californicus*
Allen's big-eared bat	*Idionycteris phyllotis*
California leaf-nosed bat	*Macrotus californicus*

ENCLOSURE A (cont)

LISTED SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE PROPOSED HOOVER DAM BYPASS PROJECT AREA, CLARK COUNTY NEVADA

File Number: 1-5-01-SP-417
December 5, 2000

Mammals (cont)	
Small-footed myotis	*Myotis ciliolabrum*
Long-eared myotis	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Cave myotis	*Myotis velifer*
Long-legged myotis	*Myotis volans*
Yuma myotis	*Myotis yumanensis*
Big free-tailed bat	*Nyctinomops macrotis*
Reptiles	
Banded Gila monster	*Heloderma suspectum cinctum*
Chuckwalla	*Sauromalus obesus*
Amphibian	
Relict leopard frog	*Rana onca*
Plants	
Las Vegas bearpoppy	*Arctomecon californica*
Three-corner milkvetch	*Astragalus geyeri* var. *triquetrus*
Las Vegas catseye*	*Cryptantha insolita*
Sticky buckwheat	*Eriogonum viscidulum*

*Taxon may be extinct

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street, Mail Room #259
Lakewood, CO 80228

December 4, 2000
Refer To: HFL-16.2

Mr. Ronald M. James
State Historic Preservation Officer
100 North Stewart Street
Carson City, NV 89701-4285

ATTN: Alice M. Baldrica

Dear Mr. James:

Re: U. S. 93 Hoover Dam Bypass Project

We are pleased to submit for your concurrence the final revised Programmatic Agreement (PA) and Treatment Plan (TP) for the subject project. The final documents reflect a number of minor revisions and changes which resulted from a comprehensive review by the signatories to the agreement.

In particular all of the comments and suggested revisions noted in the November 16, 2000 letter from your office are included herein. Attached to ease your review is an unmarked final copy of the PA/TP and a copy that identifies revisions. Your formal concurrence is requested.

In accordance with our conference call on November 29, 2000 we are anxious to begin implementation of the PA. As discussed, we will contact you in the near future to discuss the possibility of either stopping in with ready for signature documents, or executing simultaneously by express mail. Your guidance on this issue is appreciated.

In closing we would like to thank Ms. Alice Baldrica, Ms. Rebecca Palmer, and Ms. Rebecca Ossa or your office for their assistance and cooperation. We are looking forward to our continuing teamwork as we advance this extremely critical project. Please contact me at 303-716-2157 if you have any questions.

Sincerely

/s/

F. Dave Zanetell, P.E
Project Manager

bc:
yc: reading file
Central File: Hoover Dam Bypass Project
Zanetell:fdz:12/4/00:l:\design\hoover\nvshpo2.doc

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street, Mail Room #259
Lakewood, CO 80228

November 28, 2000

Refer To: HFL-16.2

Ms. Janet Bair
Assistant Field Supervisor
U.S. Fish and Wildlife Service
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147
Denver, CO 80225

Dear: Ms. Bair

Subject: Hoover Dam Bypass Project

The Federal Highway Administration (FHWA) initiated formal consultation for the subject project with your office in February 1999. This consultation resulted in the issuance of a Biological Opinion in June 1999 (File No. 1-5-99-F-105). FHWA is now nearing completion of the environmental process. Release of the Final Environmental Impact Statement (FEIS) is anticipated in late December or early January.

FHWA would like to verify that the species list received from your office (File No. 1-5-97-SP-346) is still valid for threatened and endangered (T&E) species. The project area and scope have not changed. Discussions with Michael Burrows of your office indicate that the species of concern list has likely been updated since the initial list was provided, however, he did not believe that the T&E list or critical habitat designations have changed. Obviously, this will be determined definitively based on your response to this request.

It would be greatly appreciated if the Service could respond to this request by December 7, 2000. This would allow FHWA sufficient time analyze the response and incorporate the information into the FEIS without delaying the scheduled release. Please send the updated species list to the address above and to the attention of George Walton. Thank you for your previous and ongoing assistance in development of this project. If you have any questions regarding this correspondence, please contact George Walton at 303.716.2155.

Sincerely yours,

/s/

F. Dave Zanetell, P.E.
Special Projects Manager

bc: G. Walton
yc: reading file
Central File: Hoover Dam Bypass Project
GWALTON:gcw:11/28/00:l:\design\hoover\revspecieslist.doc

STATE OF NEVADA
DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS
STATE HISTORIC PRESERVATION OFFICE
100 N. Stewart Street
Carson City, Nevada 89701-4285

KENNY C. GUINN
Governor

MICHAEL D. HILLERBY
Department Director

RONALD M. JAMES
State Historic Preservation Officer

November 16, 2000

Larry C. Smith, P.E.
Division Engineer
U. S. Department of Transportation
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street, Room 259
Lakewood, CO 80228

Re: U.S. 93 Hoover Dam Bypass Project – Treatment Plan for Avoidance, Minimization and Mitigation of Adverse Effects to Historic Properties

Dear Mr. Smith:

The Nevada State Historic Preservation Office (SHPO) has reviewed the Treatment Plan for the subject undertaking and has the following comments.

Page 2, Treatment Approach, third paragraph, third sentence: The treatment plan states that "the bypass will adversely affect the historic setting of the dam and downstream appurtenant structures, primarily by altering the view of Black Canyon from the dam." The view from Black Canyon (on either side) to the dam will also be affected. Recommend that the sentence be changed to include "all appropriate views."

Page 2, Treatment Approach, fourth paragraph, first sentence: Recommend adding "location" to setting and feeling.

Page 3, Treatment Approach, second full paragraph: Please include a discussion regarding who will receive a copy of the final HAER documentation package and where copies will be archived.

Page 3, Hoover Dam National Historic Landmark, Nevada and Arizona, third sentence: Although this paragraph states that additional feasible design alternatives will be considered, please include a discussion as to why the 'concrete or steel deck bridge' or a 'concrete cable stayed bridge' were mentioned in this treatment plan. Were they meant to be examples only? Or have these already become the 'preferred alternative' prior to discussion and consideration of other designs by the Design Advisory Panel? If these two examples have emerged due to life safety and engineering considerations, this should be noted in the treatment plan. Otherwise, our office recommends rewording the later part of the third sentence to "Colorado River bridge: including, *but not limited to...*"

Page 3, Hoover Dam National Historic Landmark, Nevada and Arizona, last sentence: Per earlier discussions regarding the Design Advisory Panel, the Advisory Council and an independent "outside"

bridge designer were to be included on the panel. Has this changed in discussion with other participants in the PA? Also, will the public have an opportunity to comment regarding the bridge designs that emerge from this panel?

Page 4, Hoover Dam National Historic Landmark, Nevada and Arizona, continuation of paragraph from page 3: This paragraph suggests that "large format photographic (HAER) recordation of historic and natural features downstream south of the dam and historic views of the dam from Black Canyon" will be done. Will photographs also be made of the dam looking from the north end of Black Canyon toward the dam and the bridge? Or has this been implied in the above quoted sentence? Please clarify.

Page 5, Cultural and Historic Properties in Nevada, 26CK5789, first paragraph, second sentence: The sentence states that "the gate columns will be moved or reconstructed..." This is implying new construction when in fact, it will not be new construction but the re-assembly of the gate columns at a new location. The SHPO recommends that the sentence be revised to state that the gate structure will be "dismantled, moved, and reassembled" at a suitable location.

If you have any comments or questions regarding this correspondence, please contact me at 775-684-3444 or Rebecca R. Ossa, Architectural Historian at 775-684-3441.

Sincerely,

Alice M Baldrica

Alice M. Baldrica, Deputy
State Historic Preservation Officer

STATE OF NEVADA
DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS
STATE HISTORIC PRESERVATION OFFICE
100 N. Stewart Street
Carson City, Nevada 89701-4285

KENNY C. GUINN
Governor

MICHAEL D. HILLERBY
Department Director

RONALD M. JAMES
State Historic Preservation Officer

November 13, 2000

Mr. Larry C. Smith
Division Engineer
Central Federal Lands Highway Division
Federal Highway Administration
555 Zang Street
Mail Room #259
Lakewood CO 80228

RE: U.S. Highway 93 Hoover Dam Bypass Project, Colorado River Basin, Clark County.

Dear Mr. Smith:

The Nevada State Historic Preservation Office (SHPO) reviewed your submission of October 12, 2000. The SHPO concurs with the Federal Highway Administration's determination that the following historic property is eligible for the National Register of Historic Places under criteria A, C, and D:

Gold Strike Canyon.

In your letter of October 12, 2000, you state that the boundaries of Gold Strike Canyon and Sugarloaf Mountain are coterminous at the Colorado River and they will be treated as a single TCP for evaluation purposes. The documentation submitted for our review clearly distinguishes between these two areas and evaluates them separately. The documents do not identify a single TCP. As a result, Sugarloaf Mountain is located entirely in Arizona and we cannot comment on the agency's determination of eligibility for this property.

The SHPO acknowledges receipt of the Programmatic Agreement and Treatment Plan for the proposed undertaking. The SHPO awaits a modified Programmatic Agreement as discussed in our meeting of October 30, 2000. Since no request to combine multiple steps in the consultation process had previously been made to this office in accordance with 36CFR Part 800.3(g) and multiple staff members are needed to review these documents, the SHPO requests an additional 30 days from this date to review the Federal Highway Administration's determination of effect and Programmatic Agreement for the subject undertaking.

If you have any questions concerning this correspondence, please feel free to call Rebecca Lynn Palmer at (775) 684-3443 or by electronic mail rlpalmer@clan.lib.nv.us.

Sincerely,

Alice M. Baldrica

Alice M. Baldrica, Deputy
State Historic Preservation Officer

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street, Mail Room #259
Lakewood, CO 80228

NOV. 7, 2000

Refer To: HFL-16.2

Mr. James Garrison
State Historic Preservation Officer
Arizona State Historic Preservation Office
1300 West Washington
Phoenix, AZ 85007

Dear Mr. Garrison:

Subject: Hoover Dam Bypass Project, FHWA-AZ NV-EIS-98-03-D

We would like to thank you and JoAnne Miller for sharing your comments and providing feedback regarding our recent submission.

As a follow up to our recent meeting, the Federal Highway Administration (FHWA) requests your concurrence that NV:DD:14:21 is eligible for listing on the National Register under Secretary's Criteria a and c, as part of the Gold Strike Canyon and Sugarloaf Mountain Traditional Cultural Property (TCP). The site contains a cobble deposit with associated lithic reduction debris located on the lower slope of Sugarloaf Mountain and contributes to the eligibility of a larger TCP. Specifically, the site contains "doctor rocks" used for healing and other ceremonial purposes. Please also refer to the Bureau of Reclamation letter dated October 6, 2000, which concurs in this determination.

We are looking forward to our continued partnership in delivering this project. If you have any questions, please do not hesitate to contact Mr. Dave Zanetell, Project Manager, at 303-716-2157.

Sincerely Yours,

/s/

Larry C. Smith, P.E.
Division Engineer

bc: D. Zanetell
yc: reading file
Central File: Hoover Dam Bypass Project
DZANETELL:gcw:11/8/00:l:\design\hoover\azsite1421.doc

U.S. Department
of Transportation
Federal Highway
Administration

Central Federal Lands Highway Division
555 Zang Street
Mail Room #259
Lakewood, CO 80228

October 27, 2000

Refer To: HFL-16.2

Dr. Leigh Kuwanwisiwma
Director, Cultural Preservation Office
The Hopi Tribe
P.O. Box 123
Kykotsmovi, AZ 86039

Dear Dr. Kuwanwisiwma:

This is to confirm arrangements for the Federal Highway Administration (FHWA) Native American consultation meeting regarding the Hoover Dam Bypass project scheduled for Wednesday, November 15, 2000. The meeting will be held in the Bingo Room at the Hacienda Hotel, Boulder City, Nevada. It is scheduled to start at 8:30 a.m. with a 1 ½-hour break for lunch. We should be finished by 3:30 p.m.

As has been the custom, a working agenda will be developed during the first portion of the meeting. The focus of this meeting will be to

- Update the group with respect to feedback from the SHPOs and others regarding the TCP recommendation,
- Discuss and develop a process for implementing the Programmatic Agreement,
- Continue implementation of the Memorandum of Understanding regarding the continuation of consultation activities, and
- Provide an opportunity to discuss future involvement such as the designee for the design advisory panel

A block of rooms has been reserved at the Hacienda Hotel for the nights of Tuesday, November 14, and Wednesday, November 15. **Please call the hotel as soon as possible to confirm your reservation. This block of rooms will not be available after Saturday, November 11.** As usual, you will be reimbursed for the cost of the room and any applicable taxes. Please note: There is a big computer show in Las Vegas this week, so available rooms are limited and also more expensive. Therefore, the cost of the rooms at the Hacienda will be $39 a night for a total of $78 plus tax.

Voucher forms will be available at the meeting. Reimbursement will be paid for up to three representatives from each Tribe. Covered expenses will be for lodging and meals plus round-trip mileage. Mileage is paid to the driver of each vehicle but not to passengers.

Please contact me at (303) 716-2157 if you have any questions concerning this meeting.

Sincerely yours,

F. David Zanetell
Project Manager

cc:
Project Management Consultation Participants

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street, Room 259
Lakewood, Colorado 80228

October 16, 2000

Mr. Wayne Taylor
Chairperson
The Hopi Tribe
P.O. Box 123
Kykotsmovi, AZ 86039

Dear Mr. Taylor:

Subject: U.S. 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-d
TCP Determination of Eligibility/Effect and Revised Programmatic Agreement (PA)

As agreed to during the Government-to-Government consultation of August 15 and 16, 2000, the Federal Highway Administration has submitted final eligibility and effects documentation, including Traditional Cultural Property recommendation and Programmatic Agreement for the Hoover Dam Bypass, to the Nevada and Arizona State Historic Preservation Office. The recommendation of eligibility includes the agreed upon provisions for facility maintenance by the Land Management Agencies.

The complete package as submitted to the SHPO's including the following documents is enclosed. As requested, only those minor revisions noted during the consultation were incorporated.

- Stoffle, Richard W., et al. *Ha'tata (The Backbone of the River): American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project*, September 2000.

- Whitley, David S. and Peter Nabokov. *Hoover Dam Bypass Project: Ethnohistoric Overview and Assessment*, September 2000.

- University of Arizona and American Indian Core Consultation Work Group. *The Land Still Speaks – Traditional Cultural Property Eligibility Statement for Gold Strike Canyon, Nevada and Sugarloaf Mountain, Arizona,* September 2000.

By this letter we are also inviting you or your representatives to attend a consultation meeting on November 15, 2000, at the Hacienda Hotel in Boulder City, NV. Our hope is to discuss expectations for continuing consultation, and receive guidance in developing a process for signature and execution of the Programmatic Agreement. It is FHWA's hope and goal to have

the Programmatic Agreement fully executed by all signatories within 60 days. Additional information regarding the November 15 consultation will be forthcoming under separate cover.

In addition, we are attaching the meeting notes from the August consultation meetings.

We look forward to our continuing consultation and teamwork. Please contact Mr. F. Dave Zanetell, Project Manager, at 303-716-2157 if you have any questions.

Sincerely yours,

/S/ F. Dave Zanetell

Larry C. Smith, P.E.
Division Engineer

Enclosures

cc: (without enclosures):
Consultation Group

Bc:

Hoover Dam Bypass files

FDZANETELL:la:10-16-00 \Hoover]PA to NAs

U.S. Department
of Transportation
Federal Highway
Administration

Central Federal Lands Highway Division
555 Zang Street
Mail Room #259
Lakewood, CO 80228

OCT 12 2000

Refer To: HFL-16.2

Mr. Ronald James
Nevada State Historic Preservation Officer
State Historic Preservation Office
Capitol Complex, 100 Stewart Street
Carson City, NV 89701-4285

Dear Mr. James:

Subject: U.S. 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-d
TCP Determination of Eligibility/Effect and Revised Programmatic Agreement (PA)

The Federal Highway Administration (FHWA) has completed the supplemental ethnographic and ethnohistoric research referenced in our June 6, 2000, letter to you for identification of cultural properties important to the Native American tribes involved with the Hoover Dam Bypass project. Based on the additional interviews with Tribal elders and ethnohistoric contextual research, and as requested by the Tribal representatives, FHWA, in conjunction with the National Park Service (NPS) and U.S. Bureau of Reclamation (USBR), has concluded that the Gold Strike Canyon and Sugarloaf Mountain areas constitute a Traditional Cultural Property (TCP) eligible for inclusion in the National Register of Historic Places under criteria A, C, and D. Your concurrence is hereby requested. Furthermore, FHWA requests your concurrence that the following TCP documentation, combined with previous documentation submitted in our August 27, 1999, and June 6, 2000, letters, constitutes completion of the identification of all historic properties and application of the criteria of adverse effects for the proposed undertaking.

Given the interconnectedness of these two places in terms of the cultural values ascribed to them by the Tribal elders and the fact that their boundaries are coterminous at the Colorado River, they are being treated as a single TCP for purposes of this National Register eligibility determination. The documentation to support this determination is enclosed, and consists of the following:

- Stoffle, Richard W., et al. *Ha'tata (The Backbone of the River): American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project*, September 2000.

- Whitley, David S. and Peter Nabokov. *Hoover Dam Bypass Project: Ethnohistoric Overview and Assessment*, September 2000.

- University of Arizona and American Indian Core Consultation Work Group. *The Land Still Speaks – Traditional Cultural Property Eligibility Statement for Gold Strike Canyon, Nevada and Sugarloaf Mountain, Arizona,* September 2000.

The three documents were distributed to all Tribal representatives in draft form for their review and were formally accepted, with minor amendments requested by the Fort Mojave Tribe and the NPS and USBR archaeologists, at our last Government-to-Government consultation meeting held August 14-16, 2000 in Boulder City, Nevada. As part of this endorsement, the Tribes also accepted the TCP boundaries, which were determined in consultation with the American Indian Core Group, as the official boundaries. The core Native American group also led the preparation of the TCP eligibility statement. The amendments requested by the Indian Tribes, NPS, and USBR have been incorporated in the referenced documents now being provided to the State Historic Preservation Officers (SHPOs). Furthermore, the Tribal representatives stated at the August consultation meeting that the elders have provided all the information they are able to for the statement of eligibility, and that additional information or clarification would violate their confidentiality.

Based on application of the criteria of adverse effect, FHWA, in consultation with the land managing agencies, has determined that construction of the Hoover Dam Bypass preferred alternative will have an adverse effect on the National Register-eligible TCP and requests your concurrence. Existing transmission lines and towers, a switchyard and other power facilities, maintenance roads, and sewer evaporation ponds already disturb the area where the Bypass would cross the TCP. However, construction of the preferred alternative would adversely affect the TCP by direct physical damage to a portion of the property, as well as by further changing its setting and introducing visual and audible elements that diminish the property's cultural values.

By this letter, FHWA is also submitting a revised Programmatic Agreement and Treatment Plan for your review and concurrence. The revised PA is now complete and includes a treatment approach and list of exempted activities relating to the TCP. The exempted activities, all relating to routine operation and maintenance of highway and power transmission facilities, were developed with the NPS, Western Area Power Administration (WAPA), USBR, the Arizona Department of Transportation (ADOT) and the Nevada Department of Transportation (NDOT), and were discussed with the Tribes during the August consultation meeting. The PA has also been somewhat reformatted and now incorporates definition of the area of potential effects and clauses on unanticipated discovery and term of agreement, all as suggested by MaryAnn Naber of the Advisory Council on Historic Preservation (ACHP) based on a review of the June 6, 2000, draft. Please note, too, that interested Indian Tribes will be offered the opportunity to participate as individual signatories to the PA, at their discretion.

Finally, after careful consideration of the Nevada SHPO's recommendation that treatment should also consist of an amendment of the National Register nomination for Hoover Dam to include elements previously omitted, FHWA feels that action would be beyond the scope of this

undertaking. Rather, this responsibility lies more appropriately with the land managing agencies and we encourage the SHPOs to consult with them on this matter. Nonetheless, FHWA will provide all the research and documentation for historic properties within the area of potential effects of the Hoover Dam Bypass to the land managing agencies to facilitate this effort.

In summary, the FHWA requests your concurrence that the identification of historic properties within the undertaking's area of potential effects has been completed and that the application of the criteria of adverse effects of the preferred alternative is agreeable. Furthermore, FHWA requests your concurrence that the proposed treatments for adversely affected historic properties including the TCP, as stipulated in the PA, are agreeable.

If you have any questions, please do not hesitate to contact Mr. Dave Zanetell, Project Manager, at 303-716-2157. Mr. Zanetell will be contacting your office within the next few weeks to set up a meeting to discuss any questions or concerns relative to the TCP eligibility statement or the revised PA. It is the FHWA's hope and goal to have the PA fully executed by all signatories within 60 days of your receipt of this letter.

Sincerely yours,

Larry C. Smith, P.E.
For Division Engineer

Enclosures

cc (w/ enclosures):

Project Management Team
Ms. MaryAnn Naber, Advisory Council on Historic Preservation, 1100 Pennsylvania Avenue NW, Suite 809, Washington, DC 20004
Mr. James W. Garrison, State Historic Preservation Officer, Arizona State Parks, 1300 West Washington, Phoenix, AZ 85007
Mr. Michael Crowe, National Historic Landmark Coordinator, National Park Service, 600 Harrison Street, Suite 600, San Francisco, CA 94107-1372
Ms. Rosie Pepito, Cultural Resource Manager, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005
Mr. Steve Daron, Archaeologist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005
Ms. Pat Hicks, Archaeologist, USBR, PO Box 61470, Boulder City, NV 89006
Mr. Chuck McEndree, Project Manager, Western Area Power Administration, Desert Southwest Region, 615 S. 43rd Avenue, P.O. Box 6457, Phoenix AZ 85005-6457 *(2 copies)*

Mr. Richard Arnold, Tribal Core Consultation Group Leader, Pahrump Paiute Tribe, P.O. Box 3411, Pahrump, Nevada, 89041 *(w/ copies to all tribal representatives)*

Ms. Tammy Flaitz, Arizona Department of Transportation, Environmental Planning Section, 205 South 17th Avenue, 619E, Phoenix, AZ 85007-3212

Mr. Dave Ruppert, Ethnographer, National Park Service Intermountain Region, 12795 W. Alameda Parkway, P.O. Box 25287, Denver, CO 80225

Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707

U.S. Department of Transportation
Federal Highway Administration

Central Federal Lands Highway Division
555 Zang Street
Mail Room #259
Lakewood, CO 80228

OCT 12 2000

Refer To: HFL-16.2

Mr. James Garrison
State Historic Preservation Officer
Arizona State Historic Preservation Office
1300 West Washington
Phoenix, AZ 85007

Dear Mr. Garrison:

Subject: U.S. 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-d
TCP Determination of Eligibility/Effect and Revised Programmatic Agreement (PA)

The Federal Highway Administration (FHWA) has completed the supplemental ethnographic and ethnohistoric research referenced in our June 6, 2000, letter to you for identification of cultural properties important to the Native American tribes involved with the Hoover Dam Bypass project. Based on the additional interviews with Tribal elders and ethnohistoric contextual research, and as requested by the Tribal representatives, FHWA, in conjunction with the National Park Service (NPS) and U.S. Bureau of Reclamation (USBR), has concluded that the Gold Strike Canyon and Sugarloaf Mountain areas constitute a Traditional Cultural Property (TCP) eligible for inclusion in the National Register of Historic Places under criteria A, C, and D. Your concurrence is hereby requested. Furthermore, FHWA requests your concurrence that the following TCP documentation, combined with previous documentation submitted in our August 27, 1999, and June 6, 2000, letters, constitutes completion of the identification of all historic properties and application of the criteria of adverse effects for the proposed undertaking.

Given the interconnectedness of these two places in terms of the cultural values ascribed to them by the Tribal elders and the fact that their boundaries are coterminous at the Colorado River, they are being treated as a single TCP for purposes of this National Register eligibility determination. The documentation to support this determination is enclosed, and consists of the following:

- Stoffle, Richard W., et al. *Ha'tata (The Backbone of the River): American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project*, September 2000.

- Whitley, David S. and Peter Nabokov. *Hoover Dam Bypass Project: Ethnohistoric Overview and Assessment*, September 2000.

- University of Arizona and American Indian Core Consultation Work Group. *The Land Still Speaks – Traditional Cultural Property Eligibility Statement for Gold Strike Canyon, Nevada and Sugarloaf Mountain, Arizona,* September 2000.

The three documents were distributed to all Tribal representatives in draft form for their review and were formally accepted, with minor amendments requested by the Fort Mojave Tribe and the NPS and USBR archaeologists, at our last Government-to-Government consultation meeting held August 14-16, 2000 in Boulder City, Nevada. As part of this endorsement, the Tribes also accepted the TCP boundaries, which were determined in consultation with the American Indian Core Group, as the official boundaries. The core Native American group also led the preparation of the TCP eligibility statement. The amendments requested by the Indian Tribes, NPS, and USBR have been incorporated in the referenced documents now being provided to the State Historic Preservation Officers (SHPOs). Furthermore, the Tribal representatives stated at the August consultation meeting that the elders have provided all the information they are able to for the statement of eligibility, and that additional information or clarification would violate their confidentiality.

Based on application of the criteria of adverse effect, FHWA, in consultation with the land managing agencies, has determined that construction of the Hoover Dam Bypass preferred alternative will have an adverse effect on the National Register-eligible TCP and requests your concurrence. Existing transmission lines and towers, a switchyard and other power facilities, maintenance roads, and sewer evaporation ponds already disturb the area where the Bypass would cross the TCP. However, construction of the preferred alternative would adversely affect the TCP by direct physical damage to a portion of the property, as well as by further changing its setting and introducing visual and audible elements that diminish the property's cultural values.

By this letter, FHWA is also submitting a revised Programmatic Agreement and Treatment Plan for your review and concurrence. The revised PA is now complete and includes a treatment approach and list of exempted activities relating to the TCP. The exempted activities, all relating to routine operation and maintenance of highway and power transmission facilities, were developed with the NPS, Western Area Power Administration (WAPA), USBR, the Arizona Department of Transportation (ADOT) and the Nevada Department of Transportation (NDOT), and were discussed with the Tribes during the August consultation meeting. The PA has also been somewhat reformatted and now incorporates definition of the area of potential effects and clauses on unanticipated discovery and term of agreement, all as suggested by MaryAnn Naber of the Advisory Council on Historic Preservation (ACHP) based on a review of the June 6, 2000, draft. Please note, too, that interested Indian Tribes will be offered the opportunity to participate as individual signatories to the PA, at their discretion.

Finally, FHWA would like to clarify the National Register eligibility of the Old Arizona U.S. 93 Highway Segment (NV:DD:14:30 [ASM]). FHWA's reconsideration of this property as eligible, as stated in our June 6, 2000, letter, only referred to the abandoned segment of the old highway

within the area of potential effects (APE) of the Hoover Dam Bypass and not the entire U.S. 93 corridor to Kingman. Neither our historic survey (Schweigert 1999) nor this determination covers more than the "affected segment." To document the entire old highway corridor would have been a major effort beyond this project's scope. Furthermore, our research indicated that the contract for construction of Hoover Dam included provision for completing approaches to the dam for the highway to Las Vegas and a road to Kingman, which indicates that this segment is most closely tied to the construction of the dam. Thus, in the PA and Treatment Plan, FHWA has clarified that the abandoned segment of Old Arizona U.S. 93, within the APE of the proposed undertaking, is eligible as a contributing element to the Hoover Dam NHL, under Criterion A. Your concurrence is requested.

In summary, the FHWA requests your concurrence that the identification of historic properties within the undertaking's area of potential effects has been completed and that the application of the criteria of adverse effects of the preferred alternative is agreeable. Furthermore, FHWA requests your concurrence that the proposed treatments for adversely affected historic properties including the TCP, as stipulated in the PA, are agreeable.

If you have any questions, please do not hesitate to contact Mr. Dave Zanetell, Project Manager, at 303-716-2157. Mr. Zanetell will be contacting your office within the next few weeks to set up a meeting to discuss any questions or concerns relative to the TCP eligibility statement or the revised PA. It is the FHWA's hope and goal to have the PA fully executed by all signatories within 60 days of your receipt of this letter.

Sincerely yours,

Larry C. Smith, P.E.
for Division Engineer

Enclosures

cc (w/ enclosures):

Project Management Team
Ms. MaryAnn Naber, Advisory Council on Historic Preservation, 1100 Pennsylvania Avenue, NW, Suite 809, Washington, DC 20004
Mr. Ronald James, Nevada State Historic Preservation Officer, State Historic Preservation Office, Capitol Complex, 100 Stewart Street, Carson City, NV 89701-4285
Mr. Michael Crowe, National Historic Landmark Coordinator, National Park Service, 600 Harrison Street, Suite 600, San Francisco, CA 94107-1372
Ms. Rosie Pepito, Cultural Resource Manager, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005

Mr. Steve Daron, Archaeologist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005

Ms. Pat Hicks, Archaeologist, USBR, PO Box 61470, Boulder City, NV 89006

Mr. Chuck McEndree, Project Manager, Western Area Power Administration, Desert Southwest Region, 615 S. 43rd Avenue, P.O. Box 6457, Phoenix AZ 85005-6457 *(2 copies)*

Mr. Richard Arnold, Tribal Core Consultation Group Leader, Pahrump Paiute Tribe, P.O. Box 3411, Pahrump, Nevada, 89041 *(w/ copies to all tribal representatives)*

Ms. Tammy Flaitz, Arizona Department of Transportation, Environmental Planning Section, 205 South 17th Avenue, 619E, Phoenix, AZ 85007-3212

Mr. Dave Ruppert, Ethnographer, National Park Service Intermountain Region, 12795 W. Alameda Parkway, P.O. Box 25287, Denver, CO 80225

Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

OCT 1 0 2000

In Reply Refer To:
HFL-16.2

Mr. Wayne Taylor
Chairperson
The Hopi Tribe
P.O. Box 123
Kykotsmovi, AZ 8603986039

Dear Mr. Taylor:

The Federal Highway Administration has been actively involved with representatives of your Tribe on Government-to-Government consultations on the Hoover Dam Bypass Project. Our goal has always been to involve Native American groups traditionally associated with the lands along the Lower Colorado River with this important project, and to seek advice on the best ways to manage the project site to maintain it's integrity. Progress, to date, has been productive and the Federal Highway Administration wishes to continue to build a positive and active relationship with your Tribe as the project moves ahead into the design and construction phases.

One of the documents developed during past consultation meetings is a Memorandum of Understanding (MOU) for continuing consultation on the Hoover Dam Bypass Project. This MOU outlines the procedures that will be used in the future to keep Tribal representatives actively involved in the project. It does not make any commitments related to the selection of alignment alternatives, project features, or any other physical aspects of the project; it simply formalizes our resolve to continue to work together in the future. We believe the MOU is a positive statement in the true spirit of consultation. We hope that you will join us in becoming partners on this project.

The enclosed MOU has been carefully reviewed by Tribal representatives. We discussed the entire document at the consultation meeting held on August 15-16, 2000, in Boulder City, Nevada. All the changes that were requested by Tribal representatives have been made, and, we believe, that the document is now ready for signatures. Participation is entirely voluntary and non -participation does not terminate any of our legal responsibilities. If you decide to participate in this MOU, please sign both copies in the appropriate areas, keep one copy for your files, and return the second copy to my office.

Also enclosed is a Designation Form for your use in providing us the names of the two Tribal representatives that will represent your Tribe on this project. For those that have previously completed the Designation Form, a copy is enclosed for verification. Please return the completed or verified form to my office to ensure our records are current.

If you have any questions regarding the MOU, please contact Dave Zanetell, Acting Project Manager at (303) 716-2157.

Sincerely yours,

ORIGINAL SIGNED BY
LARRY C. SMITH

Larry C. Smith, P.E.
Division Engineer

Enclosures

bc:
Hoover Dam Project Files

Identical letter sent to:
See attached mailing list

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:

LC-2512
ENV-3.00

Larry C. Smith
Division Engineer
Central Federal Lands Highway Division
Federal Highway Administration
555 Zang Street, Room 259
Lakewood CO 80228

Subject: Bureau of Reclamation (Reclamation) Concurrence With Federal Highway Administration (FHWA) Determinations of Eligibility for the Gold Strike Canyon and Sugarloaf Mountain Traditional Cultural Property and NV:DD:14:21 (ASM) Along the Proposed Alignments for the Hoover Dam Bypass Project

Dear Mr. Smith:

Having reviewed all supporting documentation and applying the guidance found in *National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties*, Reclamation concurs with FHWA's findings that the Sugarloaf Mountain and Gold Strike Canyon areas, as defined on maps found in *The Land Still Speaks: Traditional Cultural Property Eligibility Statement for Gold Strike Canyon, Nevada and Sugarloaf Mountain, Arizona*, constitute a traditional cultural property eligible for listing on the National Register under the Secretary's Criteria a, c, and d, for their association with the Salt Song of the Southern Paiute, Mohave, and Hualapai tribes. Furthermore, Reclamation concurs that NV:DD:14:21, a cobble deposit with associated lithic reduction debris located on the lower slope of Sugarloaf Mountain, should be considered to contribute to the eligibility of the larger Gold Strike Canyon and Sugarloaf Mountain TCP for listing on the National Register under the Secretary's Criteria a and c, being a source of "doctor rocks" used for healing and other ceremonial purposes.

We look forward to working with you and your staff on resolving the adverse effects of the Bypass Project on historic properties in the vicinity of Hoover Dam. Reclamation Regional Archaeologist,

Pat Hicks, will remain your contact for cultural resource matters relating to the Project. Ms. Hicks can be reached at 702-293-8705, or by E-mail at phicks@lc.usbr.gov.

Sincerely,

William J. Liebhauser, Manager
Environmental Compliance and Realty Group

cc: Acting Superintendent
National Park Service
Lake Mead National Recreation Area
Attention: Ms. Rosie Pepito
601 Nevada Highway
Boulder City NV 89005

Mr. James W. Garrison
State Historic Preservation Officer
Arizona State Parks
Attention: Ms. Joanne Miller
1300 W. Washington
Phoenix AZ 85007

Mr. Ronald M. James
State Historic Preservation Officer
Capitol Complex
Attention: Ms. Alice Baldrica
100 Stewart Street
Carson City NV 89710

United States Department of the Interior

NATIONAL PARK SERVICE
LAKE MEAD NATIONAL RECREATION AREA
601 Nevada Highway
BOULDER CITY, NEVADA 89005-2426

IN REPLY REFER TO:

H32(LAME-RM)

October 5, 2000

Larry C. Smith, Division Engineer
Central Federal Lands Highway Division
Federal Highway Administration
555 Zang Street, Room 259
Lakewood, Colorado 80228

Dear Mr. Smith:

The National Park Service (NPS) has reviewed the following documents prepared for the FHWA in support of the Traditional Cultural Property designation for the Gold Strike Canyon and Sugarloaf Mountain area:

- Stoffle, Richard W., et al. *Ha'tata (The Backbone of the River): American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project*, September 2000.
- Whitley, David S. and Peter Nabokov. *Hoover Dam Bypass Project: Ethnohistoric Overview and Assessment*, September 2000.
- University of Arizona and American Indian Core Consultation Work Group. *The Land Still Speaks – Traditional Cultural Property Eligibility Statements for Gold Strike Canyon, Nevada and Sugarloaf Mountain, Arizona*, September 2000.

The NPS has also participated in several government-to-government consultation meetings with FHWA, Bureau of Reclamation, and Native American tribal representatives. Based on the information in the above documents and the government-to-government consultation meetings, the NPS concurs with FHWA's finding that the Gold Strike Canyon and Sugarloaf Mountain area is a Traditional Cultural Property eligible for the National Register of Historic Places under criteria A, C, and D.

The NPS requests that you continue to keep this office appraised of progress being made on Section 106 and tribal consultations for the Hoover Dam Bypass Project. Cultural Resource

Specialist Rosie Pepito and Archeologist Steve Daron will remain your contacts for cultural resource matters relating to this project. Rosie Pepito can be reached at (702) 293-8959 and Steve Daron can be reached at (702) 293-8019.

Sincerely,

Katherine M Rohde

for William K. Dickinson
Acting Superintendent

cc: William J. Liebhauser, Manager
Environmental Compliance and Realty Group
Attn: Ms. Pat Hicks
Bureau of Reclamation
Boulder City, Nevada 89005

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

September 12, 2000

In Reply Refer To:
HFL-16.2

Mr. David Chavez
Chairperson
Chemehuevi Tribal Council
P.O. Box 1976
Havasu Lake, California 92362

Dear Mr. Chavez:

Thank you again for your participation in our ongoing consultation process. As a result of this interactive effort, we are in the final phases of preparing the Programmatic Agreement and recommendation of Traditional Cultural Property for the Sugarloaf and Gold Strike Canyon sites.

At our last gathering on August 16, you requested a list of the southern alternatives that were considered for the Hoover Dam Bypass. In response to this request, enclosed is a copy of the executive summary and chapters one and two of the Draft Administrative Final Environmental Impact Statement (EIS). The executive summary provides an overview of the EIS, chapter one outlines the purpose and need for the project, and chapter two provides an overview of the alternatives. Figure 2-1 is a map which presents the locations of the alternatives considered and Table 2-1 presents a tabular comparison of each alternative versus the screening criteria.

Please do not hesitate to call me at 303-716-2157 if you have additional questions. We appreciate your input and are looking forward to continued consultation.

Sincerely yours,

/s/

F. Dave Zanetell
Acting Project Manager

Enclosure

bc:
Hoover Dam Bypass Files
FDZANETELL:la:09/11/00

\hoover\dchavez

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

In Reply Refer To:
HFL-16.2

July 28, 2000

Native American
Consultation Tribes

This letter is a follow-up to two previous letters sent to you on May 25, 2000, and on June 29, 2000, and provides information on our continuing Government-to-Government consultation on the Hoover Dam Bypass Project.

Our interviews with Tribal Representatives and our ethnohistoric research have resulted in two reports that will certainly be of interest to you. These two reports are currently being edited and printed, and will be sent to you as soon as they become available. In addition, we are currently working with the National Park Service and the Bureau of Reclamation, the land owning agencies for the project, along with members of the Core Group, to develop eligibility statements for the potential Traditional Cultural Properties affected by the project.

In addition, we are eager to finalize the Memorandum of Understanding for continuing Government-to-Government consultation for the project. You received a copy of this document with our letter of May 25, 2000. This document calls for the identification of two tribal members to serve as official representatives authorized to act on behalf of the tribe in matters related to the project.

We are now planning for our next general consultation meeting to be held on August 15-16, and we welcome your attendance and participation. The meeting will be held in Boulder City, Nevada and arrangements have been made at the Hacienda Hotel and Casino, which is located near the project site. The basic agenda for the meeting is as follows:

Monday, August 14 will be a travel day with lodging at the Hacienda Hotel.

On Tuesday, August 15 we will provide transportation from the hotel to the Hoover Dam for opportunities to visit the project site near the Arizona side of the river in the early morning, before the summer heat builds up. Around 10:00 a.m., or so, we will retreat to the conference room at Hoover Dam Visitor Center to begin our discussions, and to have lunch. This meeting will continue until about 4:00 p.m. at the discretion of the group. We will spend the evening at the hotel.

Our meeting will resume on Wednesday, August 16, beginning at 8:00 a.m. in the Bingo

room at the Hacienda Hotel . We plan to conclude our meeting by 11:00 a.m. to allow participants time to check out of the hotel and return home in the afternoon.

As always, we hope to make this a productive and enjoyable meeting, so please join us if you can.

All the guidelines that were used for the consultation meetings on January 11 and March 30 apply to this meeting as well. Namely, that participants will be reimbursed for travel expenses associated with this meeting, including reimbursement for mileage, lodging, and meals at the normal government rates. We will furnish travel voucher forms at the meeting for your use and we will assist you in completing the forms. This applies for up to three members per Tribe, and consultation fees will be paid when appropriate.

We have attached several forms to assist you in preparing for the meeting. A copy of agenda topics will be forwarded to you with the reports in the next few days. As always, we will begin the meeting with an opportunity for participants to place any issue on the agenda, and we will allow participants to prioritize the topics for discussion.

As always, if you have any questions on either this next meeting, or on the project in general, please give Jim Roller a call at (303) 716-2009.

Sincerely yours,

/s/

Larry C. Smith, P.E.
Division Engineer

STATE OF NEVADA
DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS
STATE HISTORIC PRESERVATION OFFICE
100 N. Stewart Street
Carson City, Nevada 89701-4285

KENNY C. GUINN
Governor

MICHAEL D. HILLERBY
Department Director

RONALD M. JAMES
State Historic Preservation Officer

June 23, 2000

Larry C. Smith, P.E.
Division Engineer
Federal Highway Administration
555 Zang Street, Room 259
Lakewood, CO 80228

Dear Mr. Smith:

Nevada SHPO staff reviewed the proposed draft programmatic agreement for the Hoover Dam Bypass Project. Previously we concurred with your determinations of eligibility for properties located within the proposed area of potential effect. Efforts to identify historic properties have been concluded with the exception of traditional cultural properties. Our comments on the draft programmatic agreement for the Hoover Dam Bypass Project are as follows:

Treatment, as described in Stipulations 4 and 5, could also consist of an amendment of the National Register nomination for Hoover Dam to include elements previously omitted, such as transmission lines, railroad grades, switchyards, etc. Your agency will be treating historic properties that would potentially qualify as contributing elements to a Hoover Dam Historic District; why not proceed with adding properties identified during the numerous surveys, particularly for those that will not be effected by the proposed action?

The remainder of the document appears fine although we wish to review segments later drafted that consider treatment of traditional cultural properties. We agree with all other proposed treatments and also agree to the creation of a design advisory panel, provided Stipulation 7, the dispute resolution clause, remain unchanged.

Has Mary Ann Nabors approved the Native American Tribes Core Consultation Group signature block as adequately representing Native American interests?

If you have any questions regarding these comments please call me at 775-684-3444.

Sincerely,

Alice M Baldrica

ALICE M. BALDRICA, Deputy
State Historic Preservation Officer

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street, Room 259
Lakewood, Colorado 80228

JUN - 6 2000

In Reply Refer To:
HFL-16.2

Mr. James Garrison
State Historic Preservation Officer
Arizona State Historic Preservation Office
1300 West Washington
Phoenix, AZ 85007

Dear Mr. Garrison:

Subject: U.S. 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-d
Determinations of Eligibility and Effect and Draft Programmatic Agreement

The Federal Highway Administration has reassessed archaeological sites AZ:NV:DD:14:21 [ASM] and AZ:NV:DD:14:22 [ASM], pursuant to the Arizona SHPO's comment letter dated October 21, 1999. Additional documentation as requested by Jo Anne Miller of your office to our staff archaeologist, Steve Hallisy, and James Bard of CH2M HILL has been incorporated in the attached, revised April 2000 Archaeological Resources Survey Report. Specifically, the report now includes reduced site maps in the Survey Results section; detailed description of the in-field lithic analysis/selection methodology has been added (see pages 44-49); and the prehistoric cultural setting section of the report (see pages 62-64) has been supplemented with discussion of other potential settlement/subsistence pattern interpretations for the sites. No changes to Volume II of the report (August 1999) were required as a result of SHPO comments or follow-up discussions among our respective staffs. Based on this additional research and evaluation, and previous site analysis, FHWA still recommends that these two prehistoric archaeological sites are not eligible for inclusion in the National Register of Historic Places (NRHP).

FHWA has reconsidered the determination of eligibility for the affected segment of Old Arizona U.S. 93 Highway (NV:DD:14:30 [ASM]) and concurs with the Arizona SHPO's opinion that this site is eligible as an important historic transportation/economic artery between Las Vegas and Arizona, under Criterion A.

FHWA has also applied the criteria of adverse effect to listed and eligible historic properties within the area of potential effects (APE)/viewshed of the preferred alternative for the U.S. 93 Hoover Dam Bypass project. Properties on or eligible for listing in the NRHP within the APE were previously identified by FHWA by letter dated August 27, 1999, to the Arizona SHPO and concurred in by the SHPO by letter dated October 21, 1999. The U.S. Bureau of Reclamation (BOR) previously assessed eligibility and effects for historic properties relative to all three build alternatives: Sugarloaf Mountain, Promontory Point, and Gold Strike Canyon.

As we have discussed with your staff and MaryAnn Naber of the Advisory Council on Historic Preservation, this determination does not address potential Traditional Cultural Properties (TCP) currently being investigated with consulting Native American tribal representatives through additional ethnohistoric research and ethnographic interviews with tribal elders. We plan to consult with your office separately on TCP eligibility and effects within approximately one month from now, when the research and reporting is completed. Results of the TCP determination and the ongoing Government-to-Government tribal consultations will result in a MOU with the tribes and will be incorporated in the draft Programmatic Agreement that is attached hereto for your early review.

Based on application of the criteria of adverse effect, the U.S. Bureau of Reclamation (1992) and FHWA have made the following determinations and FHWA, as lead agency for the Hoover Dam Bypass Project, requests your concurrence. The table below summarizes the results of 10 years of Section 106-related historic properties identification, documentation, and consultation activities initiated by BOR and FHWA. BOR and FHWA studied all three alternatives to identify historic properties within the area of potential effects of each alternative. Historic properties information was then considered collectively with all other contributing factors in identifying the preferred alternative. This was followed by FHWA commissioning an intensive historic resources survey and site records update of the preferred alternative APE to ensure that no such properties were overlooked in the original BOR surveys.

Property Number	Description	Within Build Alternative APE/Viewshed	NRHP Eligibility	Source	AZ SHPO Eligibility Determination	Determination of Effect
26CK3916	Hoover Dam National Historic Landmark	Sugarloaf Promontory	Previously Listed; Criteria A & C	Middleton 1979	9/29/99 (Listed 4/8/81)	Adverse
NV/DD:14:1	Kingman Switchyard	Sugarloaf	Determined Eligible; Criterion A	White 1989	~~Unknown~~ 6/10/92	Adverse
NV:DD:14:15	Arizona Waste Tailings	Gold Strike	Eligible as contributing element to a potential HDHD associated with dam's construction;	BOR (Queen 1992)	4/23/93	Adverse[1]

Property Number	Description	Within Build Alternative APE/Viewshed	NRHP Eligibility	Source	AZ SHPO Eligibility Determination	Determination of Effect
			Criterion A			
NV:DD:14:16	Old Construction Road and Test Borings	Gold Strike	Eligible as contributing element to a potential HDHD associated with dam's construction; Criterion A	BOR (Queen 1992)	Unknown	Adverse[1]
NV:DD:14:18	World War II Bunker	Promontory	Individually Eligible; within NHL boundary; Criteria A and C	BOR (Queen 1992)	Unknown	Not Adverse[1]
AZF:2:87	Old Construction Road	Gold Strike	Eligible as contributing element to a potential HDHD associated with dam's construction; Criterion A	BOR (Queen 1992)	4/23/93	Adverse[1]
NV:DD:14:29	Hoover Dam Transmission Towers in Arizona	Sugarloaf	Eligible as elements of Multiple Property Designation; Criterion A	FHWA (Schweigert 1999)	10/21/99	Adverse
NV:DD:14:30	Old Arizona U.S. Highway Segment	Promontory Sugarloaf Gold Strike	Eligible as historic transportation/ economic artery; Criterion A	FHWA (Schweigert 1999)	10/21/99	Adverse
NV:DD:14:31	Sugarloaf Mountain Survey Station	Sugarloaf	Eligible as element of Multiple Property Designation; Criterion A	FHWA (Schweigert 1999)	10/21/99	Not Adverse

[1] Previous determinations by Bureau of Reclamation (Queen 1992)

As required under 36 CFR 800.11(e), the proposed undertaking's area of potential effects was described in FHWA's August 27, 1999, determinations of National Register eligibility. In addition, the eligibility determination describes the steps taken to identify historic properties and the affected historic properties, including information on the characteristics qualifying them for the National Register. Descriptions and exhibits documenting the undertaking's effects on the above historic properties are provided in the following documents:

- Queen, Rolla L., 1992. *Cultural Resources Report, Colorado Bridge Crossing/Hoover Dam Project Bridge Crossing and Highway Alignment Survey*, U.S. Bureau of Reclamation, submitted to Mr. Ronald James, SHPO by letter dated May 5, 1992.

- Schweigert, Kurt P., 1999. *U.S. 93 Hoover Dam Bypass Project Sugarloaf Mountain Alternative Historic Resources Survey.* Federal Highway Administration, submitted to Mr. Ronald James, SHPO, by letter dated August 27, 1999.

Proposed Undertaking

The proposed new 3.5-mile alignment of U.S. 93 requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,900 foot bridge over the Colorado River, and approximately 1.1 miles of highway approach in Arizona (EIS, Figure 2-8). The facility would consist of a four-lane highway and four-lane bridge. The typical highway section will require a 300-foot right-of-way corridor. The bridge will be approximately 80 feet wide. In addition to the proposed highway and Colorado River bridge, the preferred proposed undertaking includes a 400-foot-long highway bridge over Gold Strike Canyon in Nevada; a 300-foot-long tunnel just east of the Gold Strike Canyon bridge; an 800-foot-long bridge crossing a large ravine on the Arizona highway approach; four wildlife underpasses; three wildlife overpasses; and fencing to guide wildlife to crossing structures.

Effects on Historic Properties

26CK3916 – Hoover Dam National Historic Landmark

The preferred alternative for the U.S. 93 Hoover Dam Bypass crosses the Colorado River about 1,500 feet downstream of Hoover Dam. The center of the proposed bridge is approximately 836 feet above the water surface of the Colorado River and 254 feet higher than the crest of the dam. Several bridge designs are being considered for the new Colorado River bridge, including a concrete or steel deck arch bridge or a concrete cable-stayed bridge (EIS, Figures 2-9 and 2-10). Additional feasible design alternatives may be considered. From the crest of the dam looking downstream, the new bridge will emerge from rock through-cuts on both the Nevada and Arizona sides of Black Canyon and the central portion of the span will be fully visible from the dam, appearing above the tops of the cantilevered transmission towers and lines emanating from the power generating plants below the dam (EIS, Figures 3-9 and 3-10). The EIS concludes that the new bridge on the Sugarloaf Mountain alignment would dramatically alter the view of Black Canyon from the dam (Section 3.7.2.2).

NV:DD:14:1 – Kingman Switchyard

The Kingman Switchyard is technically not within the project's area of potential effects, but it is less than 200 feet outside the survey area. The facility is not within or adjacent to likely equipment access routes to the proposed construction zone, and construction within the defined 400-foot wide APE is not likely to result in direct physical impacts to the switchyard. A potential shift of the bypass roadway further north during final design to minimize the cut on Sugarloaf Mountain would not result in direct impacts to the switchyard. Construction of the bridge and new highway alignment would substantially alter the historic viewshed south of the switchyard, but the viewshed southward from the switchyard is far less important in defining setting for the site than is the viewshed to the northwest, which helps define the relationship of the switchyard with Hoover Dam.

NV:DD:14:29 – Hoover Dam Transmission Towers in Arizona

Based on the conceptual engineering completed to date, it appears that one or possibly both of the southernmost transmission lines, and as many as ten transmission towers, carrying electric current from the Arizona side of Hoover Dam would be eliminated for construction of the new bridge and highway approach. There are several line/tower removal and reconfiguration options to be evaluated during final design of the project, and the ultimate configuration will be determined in consultation with the Western Area Power Administration (WAPA).

NV:DD:14:31 – Sugarloaf Mountain Survey Control Station

The new bridge and Arizona highway approach would be within the historic viewshed north of the survey control station. However, the site will not be directly impacted and the roadway will be at least 700 feet north and 200 feet below this mountaintop location. The bridge and highway will not substantially affect the view of the dam and appurtenant structures from the site.

NV:DD:14:30 – Old Arizona U.S. 93 Highway Segment

The tie-in segment of the build alternatives bypass with existing U.S. 93 in Arizona directly impacts a portion of the abandoned former roadway of U.S. 93. The fill and cut segment of the historic roadway within the APE consists of a compacted fill roadbed with a concrete culvert. At the current conceptual level of design, neither the exact bypass alignment and bridge/cut/fill limits or the potential interchange configuration with existing U.S. 93 are well established. However, it is likely that the affected historic roadbed features would be covered over or graded for the new highway and interchange.

Application of Criteria of Adverse Effect

26CK3916 – Hoover Dam National Historic Landmark

FHWA has determined the proposed undertaking will have an adverse effect on the Hoover Dam National Historic Landmark due to the introduction of visual elements that diminish the integrity of the property's significant historic features. This adverse effect will be minimized through application of Corridor Design Criteria, as described in the Programmatic Agreement, developed and applied in consultation with the ACHP, Nevada and Arizona SHPOs, ADOT, NDOT, NPS, Reclamation, and consulting Native American Tribes. The criteria will be consistent with the contributing historic features of the national landmark. The design criteria will be applied consistently throughout the bypass corridor to bridges, railings, wing walls, tunnel portals, structural elements and colors, cut and fill slopes, and other highway appurtenances. In addition, the NHL viewshed will be subject to HAER recordation to preserve historic and natural features downstream south of the dam, and to record historic views of the dam from Black Canyon.

NV:DD:14:1 – Kingman Switchyard

The proposed undertaking will have an adverse effect on the Kingman Switchyard, as construction of the bridge and new highway alignment would substantially alter the historic viewshed south of the switchyard and introduce visual elements that diminish the integrity of the property's significant historic features. The adverse effect will be minimized by application of the

Corridor Design Criteria to the bypass roadways and bridges within the viewshed. Visual impacts to Kingman Switchyard will also be minimized as part of mitigation to NV:DD:14:29.

NV:DD:14:29 – Hoover Dam Transmission Towers in Arizona

The proposed undertaking will have an adverse effect on the Arizona transmission towers due to the physical destruction of important elements of the Hoover Dam hydroelectric generation and transmission complex. This adverse effect will be minimized by large format photography for representative towers of each type and of the setting/viewshed of impacted towers, and by reproduction of original construction specifications. Available historical photographs of tower construction will also be included in the HAER documentation.

NV:DD:14:31 – Sugarloaf Mountain Survey Control Station

The proposed undertaking will have no adverse effect on the Sugarloaf Mountain Survey Control Station. Furthermore, during final design FHWA will be analyzing a northerly shift of the highway to reduce the cut along the side of Sugarloaf Mountain. This would move the U.S. 93 bypass even further north of the survey station site. Therefore, other than application of the Corridor Design Criteria to the bypass roadways and bridges within the viewshed, no other mitigation is required for the survey station.

NV:DD:14:30 – Old Arizona U.S. 93 Highway Segment

The proposed undertaking will have an adverse effect on the abandoned historic U.S. 93 highway segment due to physical destruction of or damage to part of the property. The adverse effect will be minimized through complete pre- and post-construction HAER recordation of significant historic features of this eligible property.

Summary

This transmittal requests the Arizona SHPO to concur with FHWA's determinations of effect for the following properties on or eligible for the National Register:

- 26CK3916, Hoover Dam National Historic Landmark – Adverse Effect
- NV:DD:14:1, Kingman Switchyard – Adverse Effect
- NV:DD:14:29, Hoover Dam Transmission Towers in Arizona – Adverse Effect
- NV:DD:14:31, Sugarloaf Mountain Survey Control Station – No Adverse Effect
- NV:DD:14:30, Old Arizona U.S. 93 Highway Segment – Adverse Effect

FHWA has also prepared a draft Programmatic Agreement (PA), enclosed for your review. The draft PA provides a more detailed description of the measures considered to avoid or minimize the undertaking's adverse effects. We are requesting that you review this draft PA that is complete except for documentation on Traditional Cultural Properties (TCP), which will be incorporated upon completion of supplemental research and interview data still in preparation. The views of the Arizona and Nevada SHPOs, ADOT, NDOT, Native American Tribes, NPS, and Reclamation that emerge from this consultation will be incorporated in the final PA submitted for approval by all consulting parties, including the Advisory Council.

If you have any questions, please do not hesitate to contact Mr. James Roller, Project Manager, at 303-716-2009.

Sincerely yours,

James D. Roller
for

Larry C. Smith, P.E.
Division Engineer

Enclosures: CH2M HILL, U.S. 93 Hoover Dam Bypass Archaeological Resources Survey Report, April 2000

Draft Programmatic Agreement

cc w/ both enclosures:

Ms. Pat Hicks, Archaeologist, Bureau of Reclamation, PO Box 61470, Boulder City, NV 89006
Ms. Rosie Pepito, Cultural Resource Specialist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005

cc w/Draft Programmatic Agreement

Ms. MaryAnn Naber, Advisory Council on Historic Preservation, 1100 Pennsylvania Avenue, NW, Suite 809, Washington, DC 20004
Mr. Ronald James, Nevada State Historic Preservation Officer, State Historic Preservation Office, Capitol Complex, 100 Stewart Street, Carson City, NV 89701-4285
Mr. Michael Crowe, National Historic Landmark Coordinator, National Park Service, 600 Harrison Street, Suite 600, San Francisco, CA 94107-1372
Mr. Steve Daron, Archaeologist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005
Mr. George Wallace, Roadway Studies Manager, Arizona Department of Transportation, 1739 West Jackson, 050P, Phoenix, AZ 85007-3276
Ms. Tammy Flaitz, Arizona Department of Transportation, Environmental Planning Section, 205 South 17th Avenue, 619E, Phoenix, AZ 85007-3212
Mr. Tom Greco, Project Manager, Nevada Department of Transportation, 1263 S. Stewart Street, Carson City, NV 89712
Mr. Daryl James, Chief, Environmental Services Division, Nevada Department of Transportation, 1263 S. Stewart Street, Carson City, NV 89712
Ms. Mary Barger, WAPA, Mail Code A3400, PO Box 3402, Golden CO 80401-0098
Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street, Room 259
Lakewood, Colorado 80228

JUN - 6 2000

In Reply Refer To:
HFL-16.2

Mr. Ronald James
Nevada State Historic Preservation Officer
State Historic Preservation Office
Capitol Complex, 100 Stewart Street
Carson City, NV 89701-4285

Dear Mr. James:

Subject: U.S. 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-d
Determinations of Effect and Draft Programmatic Agreement

The Federal Highway Administration has applied the criteria of adverse effect to listed and eligible historic properties within the area of potential effects (APE)/viewshed of the preferred alternative for the U.S. 93 Hoover Dam Bypass project. Properties on or eligible for listing in the National Register of Historic Places (NRHP) within the APE were previously identified by FHWA by letter dated August 27, 1999, to the Nevada SHPO and concurred in by the SHPO by letter dated September 29, 1999. The U.S. Bureau of Reclamation (BOR) previously assessed eligibility and effects for historic properties relative to all three build alternatives: Sugarloaf Mountain, Promontory Point, and Gold Strike Canyon.
As we have discussed with your staff and MaryAnn Naber of the Advisory Council on Historic Preservation (ACHP), this determination does not address potential Traditional Cultural Properties (TCP) currently being investigated with consulting Native American tribal representatives through additional ethnohistoric research and ethnographic interviews with tribal elders. We plan to consult with your office separately on TCP eligibility and effects within approximately one month from now, when the research and reporting is completed. Results of the TCP determination and the ongoing government-to-government tribal consultations will result in a MOU with the tribes and will be incorporated in the draft Programmatic Agreement that is attached hereto for your early review.

Based on application of the criteria of adverse effect, the U.S. Bureau of Reclamation (1992) and FHWA have made the following determinations and FHWA, as lead agency for the Hoover Dam Bypass Project, requests your concurrence. The table below summarizes the results of 10 years of Section 106-related historic properties identification, documentation, and consultation

activities initiated by BOR and FHWA. BOR and FHWA studied all three alternatives to identify historic properties within the area of potential effects of each alternative. Historic properties information was then considered collectively with all other contributing factors in identifying the preferred alternative. This was followed by FHWA commissioning an intensive historic resources survey and site records update of the preferred alternative APE to ensure that no such properties were overlooked in the original BOR surveys.

Property Number	Description	Within Build Alternative APE/Viewshed	NRHP Eligibility	Source	NV SHPO Eligibility Determination	Determination of Effect
26CK3916	Hoover Dam National Historic Landmark	Sugarloaf Promontory	Previously Listed; Criteria A & C	Middleton 1979	9/29/99 (Listed 4/8/81)	Adverse
26CK4740	Culvert/ Drainage Ditch	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4741	Retaining Wall	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	No Effect[1]
26CK4742	Cantilevered Walkway	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4743	Wooden Ladders	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Adverse[1]
26CK4746	Explosives Storage Bunkers	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4747	Wooden Scaffolding	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4748	Tunnel	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]

Property Number	Description	Within Build Alternative APE/Viewshed	NRHP Eligibility	Source	NV SHPO Eligibility Determination	Determination of Effect
26CK4749	Old Gauging Station	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4750	Waste Tailings, Nevada side	Gold Strike	Eligible as contributing element to a potential HDHD associated with dam's construction; Criterion A	BOR (Queen 1992, White 1993)	4/7/93	Adverse[1]
26CK4751	Old Government RR Grade	Sugarloaf Promontory	Eligible as Element of Multiple Property Designation; Criterion A	BOR (Queen 1992, White 1993); FHWA (Schweigert 1999)	9/29/99	Adverse
26CK4752	Building Foundations	Promontory	Eligible; Criterion D	BOR (Queen 1992, White 1993)	4/7/93	Adverse[1]
26CK4753	Diversion Channel	Promontory	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Not Adverse[1]
26CK4754	Retaining Wall	Promontory	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Not Adverse[1]
26CK4755	Gauging Station	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4756 through 26CK4762	Stone Dams and Hot Springs	Gold Strike	Eligible as contributing elements to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4764	Cable Car	Gold Strike	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Undetermined [1]
26CK4765	Electrical Power Transmission	Promontory Sugarloaf[2]	Eligible as contributing element to a	BOR (Queen 1992)	6/4/92	Adverse

Property Number	Description	Within Build Alternative APE/Viewshed	NRHP Eligibility	Source	NV SHPO Eligibility Determination	Determination of Effect
	Switchyards		potential HDHD; Criterion C			
26CK4766	Scenic Overlook	Promontory	Eligible as contributing element to a potential HDHD; Criterion C	BOR (Queen 1992)	6/4/92	Not Adverse
26CK5180	Transmission Lines/Towers (14 steel towers)	Sugarloaf Promontory	9 Towers Previously Eligible; 2 Towers Determined Eligible as Elements of Multiple Property Designation; Criterion A	Blair 1994; FHWA (Schweigert 1999)	9/29/99	Adverse
26CK5789	Stone Gates and Lower Portal Access Road	Sugarloaf	Determined Eligible; Element of Multiple Property Designation; Criteria A & C	FHWA (Schweigert 1999)	9/29/99	Adverse
26CK5790	U.S. 93 Switchback Segment	Sugarloaf	Determined Eligible; Contributing Element of Hoover Dam NHL; Criteria A & C	FHWA (Schweigert 1999)	9/29/99	Adverse
26CK5792	Arizona-Nevada Switchyard	Sugarloaf	Determined Eligible; Element of Multiple Property Designation; Criterion A	FHWA (Schweigert 1999)	9/29/99	Adverse

[1]Previous determinations by Bureau of Reclamation (Queen 1992, White 1993)

[2]See site 26CK5792

As required under 36 CFR 800.11(e), the proposed undertaking's area of potential effects was described in FHWA's August 27, 1999 determinations of National Register eligibility. In addition, the eligibility determination describes the steps taken to identify historic properties and the affected historic properties, including information on the characteristics qualifying them for the National Register. Descriptions and exhibits documenting the undertaking's effects on the above historic properties are provided in the following documents:

- Queen, Rolla L., 1992. *Cultural Resources Report, Colorado Bridge Crossing/Hoover Dam Project Bridge Crossing and Highway Alignment Survey*, U.S. Bureau of Reclamation, submitted to Mr. Ronald James, SHPO by letter dated May 5, 1992.
- Schweigert, Kurt P., 1999. *U.S. 93 Hoover Dam Bypass Project Sugarloaf Mountain Alternative Historic Resources Survey.* Federal Highway Administration, submitted to Mr. Ronald James, SHPO, by letter dated August 27, 1999.

Proposed Undertaking

The proposed new 3.5-mile alignment of U.S. 93 requires constructing approximately 2.2 miles of highway approach in Nevada, a 1,900 foot bridge over the Colorado River, and approximately 1.1 miles of highway approach in Arizona (EIS, Figure 2-8). The facility would consist of a four-lane highway and four-lane bridge. The typical highway section will require a 300-foot right-of-way corridor. The bridge will be approximately 80-feet wide. In addition to the proposed highway and Colorado River bridge, the preferred proposed undertaking includes a 400-foot-long highway bridge over Gold Strike Canyon in Nevada; a 300-foot-long tunnel just east of the Gold Strike Canyon bridge; an 800-foot-long bridge crossing a large ravine on the Arizona highway approach; four wildlife underpasses; three wildlife overpasses; and fencing to guide wildlife to crossing structures.

Effects on Historic Properties

26CK3916 – Hoover Dam National Historic Landmark

The preferred alternative for the U.S. 93 Hoover Dam Bypass crosses the Colorado River about 1,500 feet downstream of Hoover Dam. The center of the proposed bridge is approximately 836 feet above the water surface of the Colorado River and 254 feet higher than the crest of the dam. Several bridge designs are being considered for the new Colorado River bridge, including a concrete or steel deck arch bridge or a concrete cable-stayed bridge (EIS, Figures 2-9 and 2-10). Additional feasible design alternatives may be considered. From the crest of the dam looking downstream, the new bridge will emerge from rock through-cuts on both the Nevada and Arizona sides of Black Canyon and the central portion of the span will be fully visible from the dam, appearing above the tops of the cantilevered transmission towers and lines emanating from the power generating plants below the dam (EIS, Figures 3-9 and 3-10). The EIS concludes that the new bridge on the Sugarloaf Mountain alignment would dramatically alter the view of Black Canyon from the dam (Section 3.7.2.2).

26CK4751 – Old Government Railroad Grade

The railroad grade will be directly impacted by the realignment of U.S. 93 with the Sugarloaf Mountain Alternative. The portion of the grade that would be directly affected by construction is one of the most dramatic fills along the line, but other portions of the grade within the viewshed of the National Historic Landmark will be unaffected by the highway realignment.

26CK5180 – Transmission Lines/Towers

Construction of the new Colorado River bridge and U.S. 93 bypass are likely to require relocation of 3 towers and related transmission lines within or near the area of potential effects in Nevada. The exact number of towers that will be relocated, and potential relocation sites, cannot be determined until completion of more precise design of the preferred alternative.

26CK5789 – Stone Gates and Lower Portal Access Road

The proposed highway realignment crosses existing U.S. 93 west and north of the stone gates and lower portal access road. Based on the conceptual level of engineering for the mainline of the proposed new highway, the bypass would have no direct physical effect on the gate structure and the road to the south of the gate structure. However, a potential interchange with existing U.S. 93 and the proposed bypass near the U.S. Bureau of Reclamation warehouse may directly impact the stone gates. The precise extent of the impact will not be known until completion of preliminary interchange plans. The portion of the road between the gate structure and the highway has been extensively altered, and construction of the new highway alignment in this area would not significantly affect the historic road.

26CK5790 – U.S. Highway 93 Switchback Segment

The footprint of the APE includes a portion of the historic road segment at an extreme hairpin turn. The existing U.S. 93 to the dam and visitors' center, including the switchback segment, will remain open for tourist access to the landmark. The Nevada end of the bridge and approach roadway will necessarily be located some distance back from the canyon wall. Construction of the Nevada approach and bridge will be accomplished without direct physical effect to the historic roadway.

26CK5792 – Arizona-Nevada Switchyard

A portion of the Arizona-Nevada Switchyard is within the 400-foot wide APE, and based on conceptual engineering there is the potential that the southwest corner of the facility would be directly affected by construction of the new highway alignment. Furthermore, grading and blasting for the Nevada bridge approach adjacent to the switchyard could require a closedown of yard operations during construction, or possibly permanent closure of the facility.

Application of Criteria of Adverse Effect

26CK3916 – Hoover Dam National Historic Landmark

FHWA has determined the proposed undertaking will have an adverse effect on the Hoover Dam National Historic Landmark due to the introduction of visual elements that diminish the integrity of the property's significant historic features. This adverse effect will be minimized through application of Corridor Design Criteria, as described in the Programmatic Agreement, developed and applied in consultation with the ACHP, Nevada and Arizona SHPOs, NDOT, ADOT, NPS, Reclamation, and consulting Native American Tribes. The criteria will be consistent with the contributing historic features of the national landmark. The design criteria will be applied consistently throughout the bypass corridor to bridges, railings, wing walls, tunnel portals, structural elements and colors, cut and fill slopes, and other highway appurtenances. In addition, the NHL viewshed will be subject to HAER recordation to preserve historic and natural features downstream south of the dam, and to record historic views of the dam from Black Canyon.

26CK4751 – Old Government Railroad Grade

The proposed undertaking will have an adverse effect on the Old Government Railroad Grade due to physical destruction of or damage to part of the property. The adverse effect will be minimized through HAER recordation of significant historic features of this eligible property.

26CK5180 – Transmission Lines/Towers

The proposed undertaking will have an adverse effect on the historic transmission towers and lines due to physical destruction of or damage to part of the property. This adverse effect will be minimized by HAER recordation and relocation of the impacted transmission towers and lines, in cooperation with the Western Area Power Administration (WAPA).

26CK5789 – Stone Gates and Lower Portal Access Road

The proposed undertaking will have an adverse effect on the eligible battered stone columns supporting the entrance gate due to physical destruction of or damage to part of the property. However, it is unlikely that the interchange to existing U.S. 93 will directly impact any portion of the lower portal access road. The adverse effect will be minimized by HAER recordation of affected features and reconstruction of the stone entrance gate columns on the lower portal access road at a suitable location for continued access and use of the gate and road by dam maintenance workers.

26CK5790 – U.S. Highway 93 Switchback Segment

The proposed undertaking will have an adverse effect on this eligible segment of existing U.S. 93 in Nevada due to the introduction of visual elements that diminish the integrity of the property's significant historic features. Although construction of the bridge will be accomplished without direct physical effect on the historic roadway, the new bridge will be approximately 125 feet nearly directly above the hairpin turn of the historic roadway. The historic roadway is within the general viewshed downstream from the dam, and large format photography of the viewshed will include the setting of the historic road. To further minimize the adverse effect, available original design drawings and specifications for this segment of road will be reproduced and included in the HAER documentation.

26CK5792 – Arizona-Nevada Switchyard

The proposed undertaking will have an adverse effect on the Arizona-Nevada Switchyard due to the potential physical destruction of or damage to all or part of the eligible switchyard facility. The adverse effect will be avoided, if possible, by applying engineering measures to realign the bypass roadway further south of the switchyard through a rock cut and, therefore, negating the need to either temporarily shut down or relocate the switchyard. If the switchyard cannot be avoided through more refined design, the facility will be subjected to HAER recordation.

Summary

This transmittal requests the Nevada SHPO to concur with FHWA's determinations of effect for the following properties on or eligible for the National Register:

- 26CK3916, Hoover Dam National Historic Landmark – Adverse Effect
- 26CK5180, Old Government RR Grade – Adverse Effect
- 26CK5180, transmission lines/towers – Adverse Effect
- 26CK5789, stone gates and lower portal access road – Adverse Effect
- 26CK5790, US 93 switchback segment – Adverse Effect
- 26CK5792, Arizona-Nevada switchyard – Adverse Effect

FHWA has also prepared a draft Programmatic Agreement (PA), enclosed for your review. The draft PA provides a more detailed description of the measures considered to avoid or minimize the undertaking's adverse effects. We are requesting that you review this draft PA that is complete except for documentation on Traditional Cultural Properties (TCP), which will be incorporated upon completion of supplemental research and interview data still in preparation. The views of the Nevada and Arizona SHPOs, NDOT, ADOT, Native American Tribes, NPS, and Reclamation that emerge from this consultation will be incorporated in the final PA submitted for approval by all consulting parties, including the Advisory Council.

In addition, relative to the Nevada SHPO's September 29, 1999 eligibility determination, our subcontracting architectural historian, Mr. Kurt Schweigert, is providing Historic Properties Inventory Forms (HPIF) under separate cover for sites 26CK5180 and 26CK4751. Recall that your office concurred in the determination of eligibility for these sites, but requested submittal of the HPIFs to supplement our August 1999 *U.S. 93 Hoover Dam Bypass Project Sugarloaf Mountain Alternative Historic Resources Survey* prepared by Kurt Schweigert for CH2M HILL.

If you have any questions, please do not hesitate to contact Mr. James Roller, Project Manager, at 303-716-2009.

Sincerely yours,

for Larry C. Smith, P.E.
Division Engineer

Enclosure: Draft Programmatic Agreement

cc w/ enclosure:

Ms. MaryAnn Naber, Advisory Council on Historic Preservation, 1100 Pennsylvania Avenue, NW, Suite 809, Washington, DC 20004
Mr. James W. Garrison, State Historic Preservation Officer, Arizona State Parks, 1300 West Washington, Phoenix, AZ 85007
Mr. Michael Crowe, National Historic Landmark Coordinator, National Park Service, 600 Harrison Street, Suite 600, San Francisco, CA 94107-1372
Ms. Rosie Pepito, Cultural Resource Specialist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005
Mr. Steve Daron, Archaeologist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005
Ms. Pat Hicks, Archaeologist, Bureau of Reclamation, PO Box 61470, Boulder City, NV 89006
Mr. George Wallace, Roadway Studies Manager, Arizona Department of Transportation, 1739 West Jackson, 050P, Phoenix, AZ 85007-3276
Ms. Tammy Flaitz, Arizona Department of Transportation, Environmental Planning Section, 205 South 17th Avenue, 619E, Phoenix, AZ 85007-3212
Mr. Tom Greco, Project Manager, Nevada Department of Transportation, 1263 S. Stewart Street, Carson City, NV 89712
Mr. Daryl James, Chief, Environmental Services Division, Nevada Department of Transportation, 1263 S. Stewart Street, Carson City, NV 89712
Ms. Mary Barger, WAPA, Mail Code A3400, PO Box 3402, Golden CO 80401-0098
Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

MAY - 1 2000

In Reply Refer To:
HFL-16.2

Dr. Leigh Kuwanwisiwma
Director, Cultural Preservation Office
The Hopi Tribe
Main Street
Kykotsmovi, Arizona 86039

Subject: Meeting of the Core Group for the Hoover Dam Bypass Project.

Dear Dr. Kuwanwisiwma:

This is a follow-up to my letter of April 21, 2000, requesting your participation in a meeting in Las Vegas on Monday, May 8, 2000. The purpose of the meeting is to address issues related to the expanded ethnographic research work that was requested by all the Tribes at our previous two meetings. In addition, we would like to present a draft Memorandum of Understanding for our continuing consultation process on the project.

The meeting will be held at the Henderson Green Valley Courtyard by Marriott Hotel, located at 2800 North Green Valley Parkway in Henderson, Nevada. The phone number of the hotel is (702) 434-4700. The meeting will begin at 1:00 p.m. and we anticipate finishing our work by 5:00 p.m. As stated in our earlier letter, the Federal Highway Administration will provide reimbursement for travel expenses related to this meeting. I will provide travel voucher forms at the meeting to assist you in claiming this reimbursement.

I have enclosed several documents to be used at the meeting:

1. A proposed meeting agenda
2. A copy of the Scope of Work for the expanded ethnographic research
3. A draft Memorandum of Understanding for continuing consultation
4. A map showing the location of the Courtyard Hotel in Henderson

I will bring to the meeting copies of the draft meeting notes from our consultation meeting of March 30, as well as copies of the final meeting notes from our initial meeting of January 11. These will also be distributed to all Tribal representatives next week.

Once again, thank you for serving on this Core Group. I look forward to seeing you again next week.

Sincerely yours,

/S/

James D. Roller
Hoover Dam Bypass Project Manager

Enclosures

Identical letters sent to:
Richard Arnold
Executive Direstor
Las Vegas Indian Center
2300 W. Bonanza Road
Las Vegas, Nevada 89106

Aaron Mapatis
Vice Chairman
Hualapai Nation
941 Hualapai Way
Peach Springs, Arizona 86434

Elda Butler
Director, Ahamakav Cultural Society
10225 South Harbor Avenue
Mohave Valley, Arizona 86440

Betty Cornelius
Museum Director
Colorado River Indian Tribe
Second Avenue and Mohave Road
Parker, Arizona 85344

Octavius Seowtewa
Z.C.R.A.T. Member
Zuni Heritage and Historic Preservation Office
House No. 20, Lessarley Road
Zuni, New Mexico 87327

Paulson Chaco
Director, Navajo Department of Transportation
Division of Community Development
Hogan Tso Building, Highway 264
Window Rock, Arizona 86515

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

April 21, 2000

In Reply Refer To:
HFL-16.2

Dr. Leigh J. Kuwanwisiwma
Director, Cultural Preservation Office
Hopi Tribe
P.O. Box 123
Kykotsmovi AZ 86039

Subject: Meeting of the Core Consultation Work Group for the Hoover Dam Bypass Project.

Dear Dr. Kuwanwisiwma:

At our last general consultation meeting for the Hoover Dam Bypass Project it was decided by the Tribal Representatives in attendance that a Core Work Group be formed. Members of this small work group were named and it was decided that the purpose of this group would be to address issues that needed immediate attention. Since you were selected to be a member of this work group, the Hoover Dam Bypass Project Office would like to invite you to attend a 1-day meeting in Las Vegas on May 8, 2000. This meeting is being organized to address issues related to the expanded ethnographic research work that was requested by all the tribes at our first meeting, held at the Avi Casino last January 11, and discussed at the general meeting on March 30. A major topic of this meeting will be the details of this research and how the research results will be used in fulfilling the agency's responsibilities under the regulations of the National Historic Preservation Act.

Should a draft of the proposed Memorandum of Understanding (MOU) be completed in time, this meeting can also be a forum to review the MOU before the next general consultation meeting. The draft MOU will be sent to you under separate cover before the meeting on May 8.

I would like to take the opportunity to thank you for agreeing to serve on this Core Work Group for the project. I know this letter is a short notice for the meeting, but I am hopeful you are able to attend. The Core Work Group will not replace the need for larger consultation meetings with all the tribal members, but it will certainly help facilitate communications between tribes and the agency, and it can help a great deal in providing tribal perspectives on issues that need immediate attention.

As with all meetings associated with consultation on the Hoover Dam Bypass Project, the Federal Highway Administration will provide reimbursement for travel expenses related to this meeting. The exact location for the meeting has not yet been set, however, we plan to hold it at a convenient hotel in the Las Vegas area. Dave Ruppert, our project Ethnographer, will call you to follow up on this letter, and based on availability of Core Work Group members, we will select a hotel for lodging and for the meeting. Dave will discuss your travel plans, and we will make lodging reservations for the group.

We anticipate that most members will drive to the meeting and we will provide reimbursement for mileage. If you plan to fly to Las Vegas, to receive reimbursement you must call LaVica Andre at 303-716-2003 before you make reservations.

Once again, thank you for serving on this Core Work Group. If you have any questions about either the project in general or about our March 8 meeting, please give me a call. My telephone number is 303-716-2009. I look forward to seeing you at the meeting.

Sincerely,

/s/

James D. Roller
Hoover Dam Bypass Project Manager

Identical letters sent to:
Consultation Work Group Members

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
Denver, Colorado 80228

March 8, 2000

In Reply Refer To:
HFL-16.2

Dr. Leigh Kuwanwisiwma
Director, Cultural Preservation Office
The Hopi Tribe
P.O. Box 123
Kykotsmovi, AZ 86039

Dear Dr. Kuwanwisiwma:

On February 18, 2000, the Federal Highway Administration invited you, as well as other members of your Tribe, to meet to continue consultations on the proposed Hoover Dam Bypass Project. We proposed that the meeting be held on Thursday, March 30, 2000.

We have now finalized the preparations for the meeting. All the guidelines that were used for our meeting on January 11 apply for this meeting--namely, that participants will be reimbursed for travel expenses associated with this meeting. This applies for up to three participants per Tribe. Consultation fees will be paid when appropriate. Enclosed are four items for your information and use:

1. Registration Form. Please complete the form and fax it to us as soon as possible.

2. Travel Expense Form. You may bring this completed form with you to the meeting and give it to LaVica Andre.

3. Hotel Information and Meeting Information. Basic information.

4. Information Form. Please complete this form and fax it to us as soon as possible.

We have also enclosed a copy of a Draft Consultation Plan for the project. We seek your input into the development of the final Consultation Plan, as well as for the development of a Memorandum of Understanding for Continued Consultation. It may be possible that these two documents could be combined, and we are interested in your thoughts and ideas.

Finally, as stated in our letter of February 18, we would like to offer you the opportunity to tour the project site on Wednesday afternoon, March 29. Jim Roller, Project Manager, will lead the tour, which will begin at the entrance to the Hacienda Casino at 1:30 p.m. The tour will last about 3 hours, and we will furnish transportation. If you would like to participate, please give Jim a call at (303) 716-2009.

We look forward to seeing you once again.

Sincerely yours,

James L. Roller

for Larry C. Smith, P.E.
Division Engineer

Enclosures

U.S. Department of Transportation
Federal Highway Administration

Central Federal Lands Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

February 18, 2000

In Reply Refer To:
HFL-16.2

Dr. Leigh Kuwanawisiwma
Director, Cultural Preservation Office
The Hopi Tribe
P.O. Box 123
Kykotsmovi, AZ 86039

Dear Dr. Kuwanwisiwma:

On January 11, 2000, the Federal Highway Administration met with 26 Tribal Representatives from 10 Tribes having traditional association with the lands along the Colorado River in the area of the proposed Hoover Dam Bypass Project. During the course of the meeting, most Tribal Representatives stated that they had not personally seen the Draft Environmental Impact Statement (EIS) for the project that was released in September 1998.

We have reviewed our records, which indicate that the following Tribes or organizations received the Summary Draft Environmental Impact Statement which was also released in September 1998:

Chemehuevi Tribe
Hualapai Tribe
Las Vegas Paiute Tribe
Moapa Paiute Tribe
Pahrump Paiute Tribe
Colorado River Indian Tribe
Kaibab Paiute Tribe
Moapa Paiute Tribe
Paiute Tribes of Utah
Las Vegas Indian Center

In response to requests, we also sent copies of the full copies of the Draft EIS to the following tribes in January 1999:

Fort Mohave Tribe
Salt River Pima-Maricopa Tribe
Fort Yuma Quechan Tribe

Our records show that we received comments from the following Tribes and organizations:

Pahrump Paiute Tribe
Colorado River Indian Tribe
Las Vegas Indian Center
Ahamakav Cultural Society
Las Vegas Paiute Tribe
Kaibab Paiute Tribe
American Indian Chamber of Commerce of NV

The official comment period for the Draft EIS closed on November 10, 1998. However, all of the comments that are listed above are included in the Final EIS.

While we cannot reopen the comment period, we would be willing to answer any questions that you have about the studies contained in the Draft EIS. We are in the process of completing the Final EIS and we would be willing to share any updated information that we developed. We believe that this would be an appropriate topic for our next meeting scheduled for March 30, 2000.

We are sending a copy of the full Draft EIS to each Tribal representative who attended the January 11 meeting, as well as to each Tribal Chairperson for the 17 Tribes that were invited to the meeting. For your information, the complete document is also located on our project web site, *www.hooverdambypass.org*. If you have any questions, you may contact Mr. James D. Roller, Project Manager, at 303-716-2009.

Sincerely,

JDR

for Larry C. Smith,
Division Engineer

Enclosure

Identical letter sent to those highlighted on attached list

bc: Hoover Dam Bypass Project files
JDROLLER:la:02/18/00

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
Mail Room #259
Lakewood, CO 80228

FEB 1 8 2000

In Reply Refer To:
HFL-16.2

Dr. Leigh Kuwanwisiwma
Director, Cultural Preservation Office
The Hopi Tribe
P.O. Box 123
Kykotsmovi, AZ 86039

Dear Dr. Kuwanwisiwma:

On January 11, 2000, the Federal Highway Administration met with 26 Tribal Representatives from 10 Tribes having traditional association with the lands along the Colorado River in the area of the proposed Hoover Dam Bypass Project. Officials from the Bureau of Reclamation and the National Park Service participated in the meeting.

Enclosed for your information and review are the draft notes from that meeting. These notes are not an exact transcript of the discussions, but, rather, a summary of the issues discussed, the questions asked, and the resolutions presented by the Tribal Representatives. We welcome your comments or corrections to these notes.

Also enclosed is an attendance list from the meeting. Please provide us with any updates or corrections to the information shown on the listing.

As proposed by Tribal Representatives at the meeting, and in keeping with our desire to establish an ongoing consultation process with Native Americans, we would like to schedule our next meeting. **The meeting will be held in the Las Vegas area on Thursday, March 30, 2000.** We are currently working with the Hacienda Casino (formerly the Gold Strike Casino), which is located on U.S. Highway 93, approximately 2 miles north of Hoover Dam. This is very close to the beginning of the Hoover Dam Bypass Project. We expect the meeting to begin at 9 a.m. and end about 4 p.m.

As a part of this next meeting, we would like to offer you the opportunity to tour the project site with Mr. James D. Roller, Project Manager, on Wednesday afternoon. We will begin the tour at 1:30 p.m. at the Hacienda Casino and transportation would be provided. The tour will last about 3 hours.

As with our meeting in January, the Federal Highway Administration will provide reimbursement for travel expenses related to this meeting for up to three members from each

Tribal group. We will assist you in any way that we can with your travel arrangements. One purpose of this letter is to provide advanced notification of this upcoming meeting to allow participants to plan for the travel and meeting. We would be pleased to have you join us. However, if you cannot join us, we will continue to keep your name on our mailing list and to provide copies of meeting notes to you.

At our January meeting, most Tribal Representatives stated that they had not seen the Draft Environmental Impact Statement that was distributed in September 1998. Our records indicate that several tribes received the full document and most received the Summary Draft Environmental Impact Statement that was distributed at the same time. We are currently having additional copies of the full document printed and they will be mailed directly to you, via separate cover, early next week. At our March meeting we can answer any questions that you have on this document. For your information, the full document is available on our web site, at www.hooverdambypass.org.

Finally, we are interested in your ideas for topics for discussion at the March meeting. One area that we have discussed is the development of a Consultation Plan to be used throughout the life of the project. This document would guide our consultation efforts as we move from the planning stages, into the design and construction stages, and, finally, into the operation stages for the project. We are currently working on a draft consultation plan and we will provide copies of it to you in advance of the meeting. Another area of possible interest is in the continuation of the ethnographic studies for the project. We have contracted for additional research, however, we would also be interested in your ideas about further field interviews and studies.

In about 2 weeks we will provide you with detailed information on the March meeting, including registration forms and travel information forms, similar to the documents that you received for the January meeting. If you have any questions about the meeting, please call Jim Roller at (303) 716-2009. We hope to see you in March.

Sincerely,

James D. Rollers

for Larry C. Smith
Division Engineer

Enclosures

Identical letter sent to all on attached list

bc: Hoover Dam Bypass Project file
JDROLER:la:02/18/00

U.S. Department of Transportation
Federal Highway Administration

Central Federal Lands Highway Division

555 Zang Street
Denver, Colorado 80228

December 9, 1999

In Reply Refer To:
HFL-16.2

Dr. Leigh Kuwanwisiwma
Director, Cultural Preservation Office
The Hopi Tribe
P.O. Box 5990P.O. Box 123
Kykotsmovi, AZ 86039

Dear Dr. Kuwanwisiwma:

The Federal Highway Administration wishes to continue consultations with the Native American groups traditionally associated with the lands along the lower Colorado River in the area of the proposed Hoover Dam Bypass Project. Our goal is twofold:

- First, the project team would like to update all participating Tribes on the results of ethnographic research that recommends that at least three landscapes may be eligible for listing on the National Register of Historic Places as Traditional Cultural Properties. These landscapes include the Colorado River, the Black Canyon, and the Salt Song Trail.

- Second, we feel that it is important to consult with Tribal representatives on areas of cultural importance that may have been overlooked in the study, and to seek advice on the best ways to manage these places to maintain their integrity. With this in mind, it is hoped that both Tribal Government Representatives as well as Tribal Traditionalists will be able to attend this meeting.

Key agency officials from the Federal Highway Administration, the National Park Service, and the Bureau of Reclamation will participate in this important Government-to-Government consultation. All discussions at the meeting will be confidential and the meeting will be open to Government officials and Tribal participants only. Meeting notes will be taken and distributed to all participants following the meeting for clarification and/or correction, if needed.

The meeting will be held at the AVI Resort and Casino on Tuesday, January 11, 2000, beginning at 9:00 a.m. The AVI is located at 10000 Aha Macav Parkway (off River Road just south of the town proper), in Laughlin, Nevada. Lunch will be provided and travel mileage will be reimbursed at the Government rate of $0.31 per mile. It is anticipated that the meeting will conclude about 4:00 p.m. If travel requires an overnight stay, the Federal Highway Administration will reimburse participants for room charges, and provide a meal allowance, for up to three members from each Tribal group. This applies to expenses for January 10, 11, and 12, as needed. Reimbursement for air travel and rental cars will be allowed where appropriate.

To facilitate the planning for the meeting, as well as to assist you in your travel accommodations, please complete the enclosed reservation form and fax it to 303-969-5900, Attention: James Roller, Project Manager, by December 22, 1999. If you have any questions on the meeting or have special travel needs, please call Mr. Roller at 303-716-2009.

A detailed agenda for the meeting will be developed and mailed to you in the very near future. A list of all Native American groups invited to this meeting is attached for your information. We look forward to seeing you in January.

Sincerely yours,

/s/ James D. Roller

for Larry C. Smith, P.E.
Division Engineer

List of Invited Participants for the Meeting:

Chemehuevi Indian Tribe
Colorado River Indian Tribes
Fort Mohave Indian Tribe
Fort Yuma Quechan Indian Tribe
Havasupai Tribe
The Hopi Tribe
Hualapai Tribe
Kaibab Paiute Tribe
Las Vegas Paiute Colony
Moapa Paiute Indian Tribe
Navajo Nation
Pahrump Paiute Tribe
Paiute Indian Tribe of Utah
Pueblo of Zuni
Salt River Pima - Maricopa Indian Tribe
San Juan Southern Paiute Tribe
Yavapai - Prescott Tribe
Ahamakav Cultural Society
Las Vegas Indian Center

Identical letter sent to all - see attached list

cc: L. Smith, HFL-16
J. Roller, HFL-16.2
JROLLER:la:12/09/99 \hoover\106ltr.cc

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General Fax:
602.542.4180

Director's Office Fax:
602.542.4188

October 21, 1999

Larry C. Smith, P.E., Division Engineer
Central Federal Lands Highway Division
Federal Highways Administration
555 Zang Street, Room 259
Lakewood, CO 80228

Re: Hoover Dam Bypass Project; **FHWA; BOR, NPS**

Dear Mr.Smith:

Thank you for continuing to consult with out office about the proposed Hoover Dam Bypass Project and for providing copies of two cultural resources reports (*U.S. 93 Hoover Dam Bypass Project Sugarloaf Mountain Alternative Historic Resources Survey* and *U.S. 93 Hoover Dam Bypass Project Archaeological Resources Survey Report*, vols. 1 and 2), and an ethnographic study report (*American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project*), and supporting documentation related to the Hoover Dam Bypass Project. James Garrison, Arizona State Historic Preservation Officer and SHPO staff have reviewed the documentation submitted and have the following comments, pursuant to 36 CFR Part 800:

We note that you have defined the Area of Potential Effect (APE) for the project as a 400 foot wide roadway corridor for each of the three alternatives. Per the discussion at today's meeting among FHWA, BOR, NPS and AZSHPO, we understand that the Hoover Dam Landmark is within the APE. We recommended that US Highway 93 also be included in the APE. If segments of Register eligible transmission lines will be relocated, those areas also should be included and would need to be inspected for cultural resources.

Sugarloaf Mountain Alternative Historic Resources Survey

The survey of the Sugarloaf Mountain alternative recorded six (*cf.* Table of Contents) historic resources in Arizona, two of which (Kingman Switchyard [NV DD:14:1 (ASM)] and the Hoover Dam National Historic Landmark) have previously been determined eligible for or listed on the National Register of Historic Places.

We note that the cooperating land managing agencies (Bureau of Reclamation (BOR) and the National Park Service (NPS) concur with your eligibility recommendations. We concur with three of your recommendations: Hoover Dam Arizona Transmission Towers (NV:DD:14:29 [ASM]) and Sugarloaf Mountain Survey Station (NV:DD:14:31 [ASM]) are eligible for inclusion on the Register under Criterion A; the Kingman Transmission Line (NV:DD:14:28 [ASM]) is not Register eligible.

We do not concur that the segment of Old US 93 (NV:DD:14:30 [ASM]) within the APE is ineligible for the National Register. The basis provided in the report for this recommendation is that the property has no significant association with any historic events and is not significant as an example of highway engineering. Rather than independently considering this property, the consultant has relied upon a statement by ADOT staff noting that their recently completed draft historic roads in Arizona context study does not identify US 93 as having any historic or engineering significance. This statement by ADOT staff was made in April, prior to completion of ADOT's public review period for the draft context. This office later provided a number of comments to ADOT in which we stated our belief that the draft report could not be used as a basis for making eligibility determinations. ADOT has since concurred that the draft report is not adequate for that purpose.

Although not enough information has been presented to evaluate the segment for engineering significance, we believe its historic significance under Criterion A is fairly easy to justify. As the report notes, the highway connection between Las Vegas and Arizona was planned as an original, although secondary benefit from the construction of Hoover Dam. The connection to Las Vegas had tremendous economic impact on Arizona. It was only shortly before the connection was made that gambling was legalized in Nevada and became the mainstay of the Las Vegas economy. This multi-billion dollar industry has had a large impact on both Arizona and southern California. Las Vegas tourist promoters successfully made their city a major destination for Arizonans and a major destination of Arizona's disposable income. Along with Interstate 15, US 93 is a major economic artery for Las Vegas. The economic and political influences are very notable. Las Vegas interests have heavily invested in the Arizona market and engaged in political debates over legalizing gambling in this state. For example, they are not silent bystanders to the debates over reservation gambling. US 93 and the crossing over Hoover Dam played an important role in the triangular linkage between Los Angeles, Las Vegas, and Phoenix.

The report notes that the segment in question remains in good condition. It is therefore our opinion that it should be considered eligible for the National Register.

Archaeological Resources Survey Report

The survey of 298 acres (comprising the 400 foot wide corridor for the Sugarloaf Mountain, Promontory Point and Goldstrike Canyon Alternatives) recorded two archaeological sites [AZ NV:DD:14:21 (ASM) and AZ NV:DD:14:22 (ASM)]. AZ NV:DD:14:21 (ASM) is a 17 acre site containing prehistoric and historic components located within the area inspected for the Sugarloaf Mountain Alternative at the base of Sugarloaf Mountain. AZ NV:DD:14:22 (ASM) is a 1.4 acre lithic scatter located on a bluff overlooking Black Canyon and Lake Mead within the Promontory Point Alternative corridor. FHWA recommends, and BOR and NPS agree, that both sites are not eligible for inclusion on the Register because they lack information potential.

We have concerns about the adequacy of site descriptions and discussions provided in the report. Much of the discussion offered for these sites revolves around description of the lithic artifacts. In fact, lithic technology is the only realm considered in evaluating the sites' information potential about the past. While we applaud the infield analysis approach, and think this has great utility, the "analysis" presented consists merely of description of what appears to be an unscientific, if not haphazard, consideration given of some artifacts. It is unclear how or why particular artifacts were chosen and certainly no indication presented of a sampling strategy, let alone a research design. It appears as if a walkover of the site was performed, with attention given to describing only certain "interesting" elements of the assemblage. Because the data is not presented in a format that can be used objectively, or quantitatively, it cannot be known if the data reliably characterizes the artifact assemblage or is representative of the site--(for example, we know nothing of the comparative ratios of various artifact categories that might inform on technology or resource use).

Because of the complete focus on lithic technology, there is a false impression that research potential of these sites has been exhausted, despite the cited research issues that similar sites could address. Although the authors recognize potential multiple uses of the sites as more than just lithic procurement and processing (e.g., hunting, camping, food processing, ceremonial and social gathering), these aspects are ignored as important elements in understanding how the sites might contribute to understanding prehistoric land use and settlement patterns.

The report acknowledges the fact that there has been little research on sites like these in the immediate project area. Given the current paucity of data in this vicinity, it seems appropriate to give them full consideration.

Therefore, we do not concur with your recommendation that sites AZ NV:DD:14:21 and AZ NV:DD:14:22 (ASM) are not Register eligible. The information potential and eligibility of these sites need to be evaluated within a historic context for Hoover Dam Bypass Project area (see comments below).

Specific comments on the quality of the report and requests for revisions are an attachment to this letter (see page 5).

American Indian Ethnographic Studies

The ethnographic study provides insightful documentation of native traditional uses of the landscape in the Hoover Dam area. General tribal concerns about the impacts of the Hoover Dam Bypass Project are identified; the document appears to be quite useful for NEPA purposes. It does not, however, address the purposes of Section 106 of the NHPA; i.e., by defining specific traditional cultural properties or evaluating the eligibility of any such properties for inclusion on the Register.

We believe the study provides a good foundation for establishing an historic context to use in evaluating eligibility--that historic context needs to be developed and should synthesize and integrate information now separately presented in three reports. We think it is possible that the historic context may provide additional insights about information potential at archaeological sites in this area.

Tribes did identify traditional cultural uses of the project area and expressed concerns over the potential destruction of traditional areas--in fact, interviewees believed damage would occur to cultural resources by the project. We need to see evidence that tribal concerns are taken into account in making recommendations of eligibility of the resources (and of project effect).

The approach taken to categorize resource types (as shown in the table of ethnographic resources in your cover letter) is acceptable; however, we have concerns with the eligibility recommendations as presented. It is premature to evaluate cultural resources without considering the historic context specific to this area and without tribal consultation on places of traditional value and their Register eligibility pursuant to 36 CFR Part 800. We recommend that FHWA reconsider eligibility recommendations for both archaeological sites and places of traditional value to Tribes after developing the historic context.

Because of the nature and complexity of this project, a Programmatic Agreement among the Advisory Council, FHWA, Nevada SHPO, and Arizona SHPO (signatories) will be necessary.

Thank you for your patience in waiting for our comments. We appreciate the opportunity to review the reports, and the considerable efforts FHWA has expended in continuing consultation with our office.

Sincerely,

James Garrison
State Historic Preservation Officer
Arizona State Historic Preservation Office

Jo Anne Miller
Compliance Specialist/Archaeologist

cc: Mary Ann Naber, Advisory Council, Washington
Ronald M. James, Nevada SHPO
Pat Hicks, BOR, P. O. Box 61470, Boulder City, NV
Steve Daron, NPS-LMNRA, 602 Nevada Hwy, Boulder City, NV 89005

It is likely that better presentation of the results of the survey (site description and mapping) and of the results of the infield analysis will address many of the concerns we have. Toward that end, we request the survey report be revised to address the following:

1. Page 39, which describes the survey methods, is missing from the copy we received.

2. The descriptions provided in the report (volume 1) for sites AZ NV:DD:14:21 and AZ NV:DD:14:22 are inadequate. The large fold-out maps and ASM site cards provided in volume 2 contain information about aspects of the sites that should be included as basic parts of site descriptions in the text; specifically, site maps (sketch maps would be acceptable) and descriptions of each site's key features and elements. For example, at AZ NV:DD:14:21, multiple "features" (most of which are "core break-ups"), a sheep trail, rock cairn, and modern/historic components (the sewage disposal ponds and features of the Kingman Transmission Line [AZ NV:DD:28 (ASM)] need to be described and evaluated. Also, two key elements (Loci 1 and Loci 2) are mentioned, but nowhere are the dimensions of these areas given. AZ NV:DD:14:22 contains a rock ring that is not given full consideration which should include some of the issues identified in the ethnographic study.

3. The report indicates that two test trenches were dug at site 21. From today's meeting, we understand that the trenches are not archaeological. Descriptions of these features should be included in the report.

4. It is our opinion that not all of the "features" mentioned in the report qualify as features according to ASM's definition. We recommend the consultant contact John Madsen at ASM in this regard.

5. The methods used to select sample units need to be included in the discussion, and location of units should be shown on site maps.

6. Analytical results should be presented (preferably in table format) and discussed in the text.

STATE OF NEVADA
DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS
STATE HISTORIC PRESERVATION OFFICE
100 N. Stewart Street
Carson City, Nevada 89701-4285

KENNY C. GUINN
Governor

DALE A.R. ERQUIAGA
Acting Department Director

RONALD M. JAMES
State Historic Preservation Officer

September 29, 1999

Larry C. Smith, P.E.
Division Engineer
U.S. Department of Transportation
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street, Room 259
Lakewood, CO 80228

Re: US 93 Hoover Dam Bypass Project - FHWA-AZ NV-EIS-98-03-d, Determinations of National Register Eligibility

Dear Mr. Smith:

The Nevada State Historic Preservation Office (SHPO) has reviewed the following reports:

- U.S. 93 Hoover Dam Bypass Project - Archeological Resources Survey Report, Volume 1.
- U.S. 93 Hoover Dam Bypass Project - Archeological Resources Survey Report, Volume 2.
- U.S. 93 Hoover Dam Bypass Project, Sugarloaf Mountain Alternative - Historic Resources Survey.
- Ha'tata (The Backbone of the River): American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project.

The SHPO concurs with your Agency that the following historical and architectural resources are eligible for inclusion in the National Register of Historic Places:

- Hoover Dam National Historic Landmark (listed April 8, 1981)
- 26CK5792 - Arizona-Nevada Switchyard (element of a Multiple Property Designation, Criterion A)
- 26CK5790 - US 93 Switchback Segment (contributing element to the Hoover Dam NHL, Criteria A & C)
- 26CK5789 - Stone Gates and Lower Portal Access Road (elements of a Multiple Property Designation, Criteria A & C)

- 26CK5180 - Transmission Line (element of a Multiple Property Designation, Criterion A). Our office concurs with the determination of eligibility, however, a Historic Properties Inventory Form (HPIF) was not included in the U.S. 93 Hoover Dam Bypass Project, Sugarloaf Mountain Alternative - Historic Resources Survey report. The 1994 report referenced on page 17 did not include the HPIF. Please submit a HPIF to our office.

  Also, please clarify the last sentence of the third paragraph on page 17. Based on the referenced correspondence and report(s), the transmission lines originating from Hoover Dam were determined eligible. Did this not also include the transmission towers between Hoover Dam and the respective switchyards?

- 26CK4751 - Old Government Railroad Grade (element of a Multiple Property Designation, Criterion A.) Our office concurs with the determination of eligibility, however an HPIF is required. Please submit a HPIF to our office.

Our office concurs with your Agency that the following sites are not eligible for inclusion in the National Register of Historic Places:

- 26CK5791 - Dam Construction Road
- 26CK5788 - Reclamation Warehouse
- 26CK5787 - Stone and Concrete Platform

Please note that our office requires original B/W photographs for the HPIFs. Please label them on the back in pencil and do not adhere them to forms in any way. Submit them in an envelope and we will attach them to the report.

The SHPO has also reviewed the ethnographic study conducted for the proposed undertaking and the agency's discussion of the potential eligibility of three "cultural landscapes." The three "cultural landscape's" should be further evaluated with a sufficient historic context and with reference to the Secretary of the Interior's National Register criteria. Only after this process is initiated, and the significant aspects of integrity identified, can the agency determine if the recent disturbances have so compromised the "cultural landscapes"'s integrity that certain segments might be considered non-contributing elements. The integrity of a traditional cultural property must be considered with reference to the views of traditional practitioners and National Register values that the property possesses. In some circumstances, a property may retain its traditional cultural significance even though it has been

substantially modified. Statements made by some of the informants indicate that the construction of the bridge will cause an "interference with ceremonies, songs, and trail systems." This suggests that such activities could still be conducted despite the previous disturbances.

The SHPO concurs with the Federal Highway Administration's determination that the class of resources identified as "local geographic landmarks" do not appear to be eligible for the National Register of Historic Places under any of the Secretary's criteria.

The Federal Highway Administration's submission did not contain evidence that the agency has consulted with the Native American tribal representatives concerning the historical significance and National Register eligibility of the "cultural landscapes" and "local geographic landmarks" identified in the ethnographic documentation (36 CFR Part 800.4(c)). Has this consultation occurred? If not, the SHPO recommends that this process be initiated as soon as possible to ensure that Tribal representatives are afforded adequate opportunity to comment.

If you have any questions regarding this correspondence, please contact Rebecca L. Palmer, Archeologist at 775-684-3443 or Rebecca R. Ossa, Architectural Historian at 775-684-3441.

Sincerely,

Ronald M. James
State Historic Preservation Officer

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, Nevada 89006-1470

IN REPLY REFER TO:

LC-2512
ENV-3.00

SEP 03 1999

Mr. Larry C. Smith
Division Engineer
Central Federal Lands Highway Division
Federal Highway Administration
555 Zang Street, Room 259
Lakewood CO 80228

Subject: Bureau of Reclamation (Reclamation) Concurrence With Federal Highway Administration (FHWA) Determinations of Eligibility for Archaeological and Historic Sites Recorded Along the Proposed Alternative Alignments for the Hoover Dam Bypass Project

Dear Mr. Smith:

Having reviewed all supporting documentation, and after conferring with Western Area Power Administration, which owns or manages power transmission facilities sited on Reclamation lands in the project area, Reclamation concurs with FHWA's findings that the following historic sites identified on, or in the immediate vicinity of the alignment of the preferred alternative should be considered to contribute to the eligibility of Hoover Dam National Historic Landmark, or should be considered elements of a multiple property designation eligible for listing on the National Register for its association with construction and maintenance of Hoover Dam:

State	Property Name/Number	Description	NRHP Eligibility
AZ/NV	Hoover Dam National Historic Landmark	Hoover Dam & Associated Properties	Previously Listed; Criteria A & C
AZ	NV:DD:14:1	Kingman Switchyard	Previously Eligible; Criterion A
AZ	NV:DD:14:29	Hoover Dam Arizona Transmission Towers	Eligible as Contributing Element to Multiple Property Designation
AZ	NV:DD:14:31	Sugarloaf Mountain Survey Station	Eligible as Contributing Element to Multiple Property Designation

NV	26CK4751	Old Government RR Grade	Eligible as Contributing Element to Multiple Property Designation
NV	26CK5180	Transmission Lines	9 Towers Previously Eligible; 2 Additional Towers Eligible as Contributing Elements to Multiple Property Designation
NV	26CK5789	Stone Gates/Lower Portal Access Road	Eligible as Contributing Element to Multiple Property Designation
NV	26CK5790	US 93 Switchback Segment	Eligible as Contributing Element to Hoover Dam NHL
NV	26CK5792	Arizona-Nevada Switchyard	Eligible as Contributing Element to Multiple Property Designation

Furthermore, Reclamation concurs with FHWA's recommendation that the following archaeological and historic sites situated on Reclamation withdrawn lands within the area of potential effect of the Promontory and Sugarloaf alignments should be considered not eligible for listing on the National Register:

State	Property Name/Number	Description	NRHP Eligibility
AZ	NV:DD:14:21 (ASM)	Prehistoric Archaeological Site	Not Eligible
AZ	NV:DD:14:22 (ASM)	Prehistoric Archaeological Site	Not Eligible
NV	26CK5788	Reclamation Warehouse	Not Eligible
NV	26CK5791	Dam Construction Road	Not Eligible

Having examined the information presented in letters to FHWA from the tribes and in the ethnographic report prepared for the Hoover Bypass Project, Reclamation concurs with FHWA's finding that, three cultural landscapes can be identified that contain the project area: 1) one encompassing, at the least, the main stem of the Colorado River; 2) one encompassing all or some portion of Black Canyon; and 3) one associated with the salt song trail. Considerable additional ethnographic work will be necessary in order to define boundaries and establish the full significance

of these landscapes, and their constituent features, to the different tribes. Reclamation also concurs with FHWA that the portion of these landscapes through which the three project alternatives pass has been so altered from its natural state by construction and operation of Hoover Dam and associated facilities, and additional impacts relating to heavy visitation and recreational use of the area, that the area should be considered a non-contributing portion of these cultural landscapes were they found to be eligible for listing on the National Register at some future date. Having examined statements made by tribal members cited in the ethnographic report for the project, Reclamation also concurs with FHWA's finding that none of the local geographic landmarks identified by tribal members appear to meet the definition of a "traditional cultural property" found in National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, thus are not eligible for consideration for listing on the National Register.

I am asking that you continue to keep this office appraised of progress being made on Section 106 and tribal consultations for the Bypass Project. Please note that if mitigation measures are necessary to treat adverse effects resulting from project implementation to any historic property located on Reclamation withdrawn lands, as the land managing agency Reclamation must be notified immediately and included as a party to all negotiations and agreements. Reclamation Archaeologist, Pat Hicks, will remain your contact for cultural resource matters relating to the Bypass Project. Ms. Hicks can be reached at 702-293-8705, or by E-mail at phicks@lc.usbr.gov.

Sincerely,

for William J. Liebhauser, Manager
Environmental Compliance and Realty Group

cc: Mr. Alan O'Neill
Superintendent
Lake Mead National Recreation Area
National Park Service
Attention: Ms. Rosie Pepito
601 Nevada Highway
Boulder City NV 89005

Mr. James W. Garrison
State Historic Preservation Officer
Arizona State Parks
Attention: Ms. Joanne Miller
1300 W. Washington
Phoenix AZ 85007

Mr. Ronald M. James
State Historic Preservation Officer
Capitol Complex
Attention: Ms. Alice Baldrica
100 Stewart Street
Carson City NV 89710

United States Department of the Interior

NATIONAL PARK SERVICE

LAKE MEAD NATIONAL RECREATION AREA

601 Nevada Highway

BOULDER CITY, NEVADA 89005-2426

IN REPLY REFER TO:

D18 (LAME-M)

August 31, 1999

Larry C. Smith, Division Engineer
Central Federal Lands Highway Division
Federal Highway Administration
555 Zang Street, Room 259
Lakewood, Colorado 80228

Dear Mr. Smith:

This letter is in reference to the National Park Service (NPS) concurrence with the Federal Highway Administration (FHWA) determinations of eligibility for archaeological and historic sites recorded along the proposed alternative alignments for the Hoover Dam Bypass Project.

Having reviewed all supporting documentation, the NPS concurs with FHWA's recommendation that sites NV DD:14:30 (segment of old US 93) and 26CK5787 (stone and concrete platform) situated on NPS land within the area of potential effect of the Sugarloaf alignment should be considered not eligible for listing on the National Register of Historic Places (NRHP).

Having examined the information presented in letters to FHWA from the tribes and in the ethnographic report prepared for the Hoover Dam Bypass Project, NPS concurs with FHWA's finding that three cultural landscapes can be identified that contain the project area: 1) one encompassing the main stem of the Colorado River; 2) one encompassing all or some portion of the Black Canyon; and 3) one associated with the Salt Song trail. Considerable additional ethnographic work will be necessary in order to define boundaries and establish the full significance of these landscapes, and their constituent features, to the different tribes. NPS also concurs with FHWA that the portion of these landscapes, through which the three project alternatives pass, has been so altered from its natural state, by construction and operation of Hoover Dam and associated facilities, and additional impacts relating to heavy visitation and recreational use of the area, that the area should be considered a noncontributing element to these cultural landscapes were they found to be eligible for listing on the NRHP at some future date. Having examined statements made by tribal members cited in the ethnographic report for the project, NPS also concurs with FHWA's finding that none of the local geographic landmarks identified

by tribal members appear to meet the definition of a "traditional cultural property" found in National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties.*

NPS requests that you continue to keep this office appraised of progress being made on Section 106 and tribal consultations for the Bypass Project. Please note that if mitigation measures are necessary to treat adverse effects resulting from project implementation to any historic property located on NPS lands, NPS, as the land managing agency, must be notified immediately and included as a party to all negotiations and agreements.

Cultural Resource Specialist Rosie Pepito and Archeologist Steve Daron will remain your contacts for cultural resource matters relating to the Bypass Project. Rosie Pepito can be reached at (702) 293-8959 and Steve Daron can be reached at (702) 293-8019.

Sincerely,

for Alan O'Neill
Superintendent

cc:
William J. Liebhauser, Manager
Attention: Ms. Pat Hicks
Environmental Compliance and Realty Group
Bureau of Reclamation
Boulder City, Nevada 89005

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street, Room 259
Lakewood, CO 80228

AUG 27 1999

In Reply Refer To:
HFL-16

Mr. James W. Garrison
State Historic Preservation Officer
Arizona State Parks
1300 West Washington
Phoenix, AZ 85007

Dear Mr. Garrison:

Subject: US 93 Hoover Dam Bypass Project – FHWA-AZ NV-EIS-98-03-D
Determinations of National Register Eligibility

The Federal Highway Administration (FHWA) is requesting your concurrence in National Register of Historic Places (NRHP) determinations of eligibility for historic properties located within the area of potential effects for the US 93 Hoover Dam Bypass Project. The FHWA has identified the following properties to be within the APE on the Arizona side of the proposed project, and has made NRHP eligibility recommendations for those properties not previously evaluated:

Historical and Archeological Resources

Property Name/Number	Description	NRHP Eligibility	Ownership/ Land Status
Hoover Dam National Historic Landmark	Hoover Dam	Previously Listed; Criteria A & C	Reclamation
NV:DD:14:1	Kingman Switchyard	Previously Eligible; Criterion A	Citizen Utilities/ Reclamation
NV:DD:14:28	Kingman Transmission Line	Recommended Not Eligible	Citizen Utilities/ Reclamation
NV:DD:14:29	Hoover Dam Arizona Transmission Towers	Recommended Eligible; Element of Multiple Property Designation; Criterion A	WAPA/ Reclamation
NV:DD:14:30	Old US 93 Segment	Recommended Not Eligible	NPS
NV:DD:14:31	Sugarloaf Mountain Survey Station	Recommended Eligible; Element of Multiple Property Designation; Criterion A	Reclamation
NV:DD:14:21	Prehistoric Archeological Site	Recommended Not Eligible	Reclamation
NV:DD:14:22	Prehistoric Archeological Site	Recommended Not Eligible	Reclamation

Ethnographic Resources

Resource Type	Property Name/Description	NRHP Eligibility	Owner/Land Status
Cultural Landscapes	Colorado River, Black Canyon, Salt Song Trail	Area encompassed by the APEs for the bypass alternatives is recommended as not contributing to the eligibility of these potential TCPs.	Various federal and state agencies.
Named Geographic Landmarks	Gypsum Cave, Pintwater Cave, Pah Tempe Hot Spring, Ash Meadows Artesian Springs, Spirit Mountain, Mt. Charleston, Sunrise-Frenchman Mountains	Unevaluated, located outside the APE for this project, evaluation of these resources is beyond the scope of this project.	Not Applicable
Local Geographic Landmarks	Sugarloaf Mountain, rock circles, cleared areas, caves, springs, healing rocks	Recommended not eligible.	Reclamation

Agency Undertaking

In the early 1990s, the Bureau of Reclamation consulted with the Arizona State Historic Preservation Office (SHPO) pursuant to 36 CFR 63 and 36 CFR 800.4(c)(1) on the effects of the proposed Colorado River Bridge Crossing Project on cultural resources. Reclamation staff conducted cultural resources inventory work to support the Draft Environmental Impact Statement (DEIS) effort (Queen 1992 and White 1993). Reclamation completed its DEIS/Section 4(f) Evaluation in mid-1993. Prior to release of a DEIS for public review, Reclamation withdrew from the project as lead agency.

In May 1997, the FHWA-Central Federal Lands Highway Division was named as the lead federal agency to resume the project, now referred to as the US 93 Hoover Dam Bypass Project. Four alternatives were considered in FHWA's September 1998 DEIS: the No-Build, Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon. For all three of the build alternatives, an approximate 3.5-mile long, four-lane highway and bridge on new alignment are proposed, meeting current highway design standards for a 60-mile-per-hour design. Relative to Hoover Dam, the Promontory Point alignment is located about 1,000 feet upstream and within view; Sugarloaf Mountain is about 1,500 feet downstream and within view; Gold Strike Canyon is about one mile downstream and mostly obstructed from view from Hoover Dam. After circulation of the DEIS, the FHWA and the Project Management Team (the Nevada Department of Transportation [NDOT], the Arizona Department of Transportation [ADOT], the National Park Service [NPS], and Reclamation) identified the Sugarloaf Mountain alignment as the preferred alternative.

Area of Potential Effects

Following FHWA standards, an Area of Potential Effects (APE) was established for each of the alternative corridors. The APE was defined as all ground 200 feet to each side of the staked centerline, or the maximum limits of cuts and fills depending on which was greater. The proposed APE and plan for updating previous Section 106 studies were provided to your office in a letter dated December 31, 1997, from Terry K. Haussler, FHWA Project Manager.

The FHWA commissioned archaeological and ethnographic surveys of the APE for the three Build Alternatives in 1998; a supplemental archaeological survey was conducted in June 1999. To supplement the 1992/1993 Reclamation surveys, the FHWA also commissioned a complete historic site survey of the preferred alternative in February 1999.

Identification of Historic Properties

Historic Sites

Associated Cultural Resource Experts (ACRE), under Kurt Schweigert as Principal Investigator, conducted a survey of historic period features within the APE for the preferred alternative. The survey also included examination of potential historic features within the viewshed of the preferred alternative, although outside the APE. Hoover Dam is the primary feature within the viewshed, although other features include electrical switch yards, transmission facilities, and historic engineering features associated with construction of the dam.

The APE contains, or is in proximity to, six historic features. The Hoover Dam National Historic Landmark is listed on the NRHP. Site NV:DD:14:1 (Kingman Switchyard) has been previously determined eligible for the NRHP. After completion of the investigations associated with this project, sites NV:DD:14:29 (Arizona transmission towers) and NV:DD:14:31 (Sugarloaf Mountain survey control station) are recommended eligible for the NRHP. Sites NV:DD:14:28 (Kingman transmission line) and NV:DD:14:30 (old US 93 in Arizona) are recommended not eligible for the NRHP.

Site Evaluations

Please refer to Enclosure A for site evaluations for those properties previously listed or determined eligible for the NRHP that are potentially affected by the preferred alternative. The following are summary evaluations of newly recorded properties documented for the present project. Enclosure A contains complete Arizona State Museum site cards for these properties.

<u>NV:DD:14:28 – Kingman Transmission Line</u>

This small, wood-pole, 69-kv transmission line extends southeastward, from the Citizens Utility Company (Kingman) Switchyard, to Kingman and other communities in Arizona. The line was probably built in 1939, when the switchyard was completed. The transmission structures are very simple, common types and all of the poles appear to have been replaced within the past 15 years. The line is not known to have particular historical significance, and it is recommended not eligible for the NRHP under any of the criteria for evaluation. The APE crosses this line southeast of the Kingman Switchyard. The line may be relocated or rebuilt as a result of construction of the proposed dam bypass.

<u>NV:DD:14:29 – Hoover Dam Transmission Towers in Arizona</u>

This property consists of 33 steel transmission towers located to the east of Hoover Dam. The towers support lines that carry electric current from the Arizona side of the dam power plant to the top of Black Canyon and then across the canyon to switch yards on the Nevada side. Three types of structures are present: cantilevered canyon rim towers and two types of standard-design, steel lattice towers. All towers are in excellent condition and appear to be essentially unchanged from original construction. These towers are components of the Hoover Dam hydroelectric generation and transmission complex, primarily built between 1935 and 1951. As generating units were completed, additional transmission lines were constructed from the power plant. The canyon rim towers in Arizona are identical in design to some rim towers on the Nevada side. The steel lattice towers

conform in design to structures used in transmission lines built between 1936 and 1942 from the switch yards to southern California and other locations. US Geological Survey topographic maps indicate that three towers in the Arizona group were built between 1983 and 1990.

Direct evidence has not been found that any of the towers are of unique design or construction. The rim towers may have been specifically designed for the exceptional power loading of conductors from what was once the largest hydroelectric plant in the world. Therefore, the towers may not be individually eligible for the NRHP under Criterion C. However, the towers are elements of the Hoover Dam hydroelectric generation and transmission complex, which clearly has engineering significance and is collectively eligible under Criterion C. The generating and transmission complex was also important in reclamation of arid lands in California, shipbuilding and other war industries during World War II, and in urban and industrial development in southern California, southern Nevada, and other locations. As elements of the Hoover Dam complex, the Arizona towers are recommended eligible for the NRHP under Criterion A. All these towers are within the boundary of the Hoover Dam National Historic Landmark.

NV:DD:14:30 – Old US 93 Segment

This feature is a segment of abandoned, former roadway of US 93. The old roadway surveyed is a fill or grade extending from the current highway on the north and running southward roughly parallel to the current highway. The road ascends a grade near the south end of this segment and passes through a cut before rejoining the current highway. The fill area appears to be simple compacted earth construction without reinforcement. A concrete culvert is located at the midpoint in this recorded segment. The abandoned roadway is in very good condition; the surface retains some gravel and small pieces of asphalt. This fill and cut segment is a portion built in 1936 or later, under the contract for construction of Hoover Dam, which included provision for completing approaches to the dam for the highway to Las Vegas and to Kingman. The approaches to Hoover Dam on both sides of the canyon were widened in 1957, and the old US 93 segment in Arizona may have been abandoned at that time.

According to the ADOT, a draft statewide historic context for roads in Arizona does not identify any portion of US 93 in the area as potentially eligible (Owen Lindauer, personal communication with Kurt Schweigert, April 30, 1999). This abandoned segment of roadway is not known to be associated with important events or persons significant to history (Criteria A and B) and it does not have engineering or architectural significance (Criterion C). Therefore, the old US 93 roadbed in the vicinity of the bypass APE is recommended not eligible for the NRHP.

NV:DD:14:31 – Sugarloaf Mountain Survey Control Point

This site is a survey control station located at the top of Sugarloaf Mountain, overlooking Hoover Dam. The site is about 500 feet south of the APE for the preferred alternative. Historic features consist of two approximately 11- by 16-foot areas in which rocks have been cleared from relatively level areas, a concentrated deposit of historic artifacts, and three survey markers. Two of the survey markers are US Coast and Geodetic Survey metal monuments captioned "Sugarloaf No. 1, 1935" and "Sugarloaf No. 2, 1935." These two monuments are concreted into holes bored in bedrock. The third survey marker is a metal monument captioned "Brock & Weymouth, Inc., Engineers, Phila. PA 1952." This monument includes concrete tripod foot impressions for leveling a surveying instrument. Just down slope of this marker is a scatter of milled lumber, including a pole and plain wire attached, possibly used as a radio antenna. Artifacts among the wood remains include

numerous cylindrical batteries and plain wire. Documentary evidence of the use of this site has not been found, but several surveying control points were used for construction of Hoover Dam. The battery parts and wire probably reflect use of a radio or telephone for coordination of survey activities. The two rock clearings on this exposed mountaintop are likely tent pads created by the surveyors.

The artifacts at this site do not appear to contain potential to yield information important in history, and the site does not have particular engineering, architectural, or artistic importance. Therefore, the site does not appear eligible for the NRHP under Criteria C or D. However, the presence of a permanent survey monument established by Brock & Weymouth Company indicates that this site was an important location in surveying activities for the dam project in 1930. The 1935 date on the USCGS monuments and the 1952 date on the Brock & Weymouth monument probably reflect reestablishment of earlier permanent survey monuments or replacement of temporary survey monuments. Other similar sites may exist, but none have been recorded to date. Because of the importance of the 1930 surveying program to design and construction of Hoover Dam, this site is a contributing element of a multiple properties group that is recommended eligible for the NRHP, under Criterion A.

Archeological Sites

A Class III (Intensive) archaeological survey of the APE was conducted by CH2M HILL for the three build alternatives. The complete archaeological resources survey report is included as Enclosure B. In March 1998, CH2M HILL surveyed all accessible areas of the APE. In June 1999, additional archaeological site mapping and refinement of site records and significance evaluations were completed. The surveys resulted in the recordation of two archaeological sites in Arizona, AZ NV:DD:14:21-ASM and AZ NV:DD:14:22-ASM, located on the Sugarloaf Mountain and Promontory Point alignments respectively. No archaeological sites were identified on the Nevada side of the project. The archaeological surveys, contracted by FHWA, involved close coordination and oversight by archaeological staffs from FHWA, Reclamation, NPS, and the Western Area Power Administration (WAPA).

Site Evaluations

The following are summary evaluations of newly recorded archaeological properties documented for the present project. Enclosure C contains detailed NRHP evaluations/recommendations and Arizona State Museum site cards for these properties.

Site Descriptions

AZ NV:DD:14:21 (ASM)

The site consists mostly of a large, diffuse lithic scatter of chipped stone debitage (e.g., flakes and cores) with two discernible loci of concentrated cultural materials (Loci AZ 1 and AZ 2). Lithic densities over much of the site are less than 1 artifact per square meter. Within the loci, the density rises to between 1 to 5 artifacts per square meter. These densities are rather low, but not atypical of sites where raw material was procured. Within discrete features, such as core-break-ups, the density of lithic debris can exceed 10 artifacts per square meter. Although the frequency of debitage across large portions of this site is sparse, widely scattered lithic artifacts indicate the site encompasses about 6.9 hectares. Transect sweeps across the site revealed the presence of numerous cores and core fragments, hammer stones, a few early stage biface fragments and what may be three fragments of unshaped grinding slabs. Raw materials quarried and reduced at the site are mostly nodular or

tabular pieces of naturally occurring chert or chalcedony that is easily picked up or dug/extracted directly from exposed rocky sediments. While it appears that core-flake reduction technology (large flakes detached from cores using hard hammer percussors) is most pronounced at this site, several biface thinning flakes were observed to indicate that bifacial reduction was also an activity at this site.

AZ NV:DD:14:22 (ASM)

This site extends some 167 meters in length along the top of the bluff overlooking Lake Mead. The site consists of several small core reduction features, a sparse lithic scatter (less than one artifact per square meter), and one associated rock alignment or ring feature. The rock alignment feature is ovoid and partially encloses an area cleared of stones. It measures about 2.7 x 3.7 meters. The lithic scatter and associated features contain almost 150 individual pieces of lithic debitage. The rock ring feature, like most such features, is difficult to interpret. The feature at this site could be classified as either an opened cache with a doorway, a sleeping circle or temporary campsite, or a vision (quest) circle.

Site Eligibility

Two treatment ponds constructed in the northern portion of site AZ NV:DD:14:21 (ASM), a large cleared area just east of the Kingman Transmission Lines, a dirt road used to install the original transmission line poles (in ca. 1936), and two small test trenches have all reduced site integrity somewhat. The two sewage treatment ponds have probably destroyed a large portion of what may have been the most important area within the site. The integrity of site AZ NV:DD:14:22 (ASM) is better preserved. A minor trail or jeep track runs along the bluff top and has disturbed some of the site (perhaps less than 10 percent) and earth movement associated with construction of an electric transmission tower has mostly destroyed the area immediately surrounding it. Both sites are remote, but only 14:21 is protected from public access by a locked, gated road. No evidence of looting was seen at either site. Thus, although both sites have suffered some loss of integrity, this would not substantially impair their information potential.

Concerning information (research) potential, both sites lack ceramics and are located in arid micro-environments unsuitable for agricultural activity. In the absence of any temporally diagnostic artifacts, neither site can be assigned within the prehistoric cultural sequence of the region. While it is possible that these sites might have been visited for the purpose of quarrying lithic raw material during the Archaic period and perhaps well beyond, the lack of ceramics suggests these sites cannot produce evidence of their possible connection of later period River Patayan or Anasazi occupations. Without temporally diagnostic artifacts, assigning these sites' archaeological remains to a specific period within the culture-historical sequence remains problematic. Neither site appears to have any chipped stone tools (other than hammer stones), nor preserved plant and/or animal remains. Hence, the ability of either site to provide information about prehistoric subsistence practices other than lithic raw material procurement is quite limited.

An in-the-field lithic analysis thoroughly documented the artifact types present at these sites (e.g., cores, early stage bifaces, hammer stones, flake reduction debitage, and some possible pieces of ground stone/milling stone). With the completion of field analysis, careful recordation and photography of several representative lithic reduction features, and an intensive surface reconnaissance survey, the FHWA has determined that both sites lack sufficient research potential to be considered eligible for inclusion in the NRHP under Criterion D. Surveying and mapping the two sites yielded information about lithic technology that has been learned from analysis at other sites in the region (i.e., their data is redundant) and no new information has been gleaned from these two

sites. These two sites lack temporal control and their artifact assemblages are very limited. Furthermore, the limited information potential inherent in these two sites has been exhausted through their recordation (see Enclosure C Site Cards).

Ethnographic Resources

In the ethnographic study, Stoffle (Enclosure D) discusses the way in which Native Americans perceive the world and demonstrates that they have a different world view than Euro-Americans. He uses the term "cultural landscape" to express the Native American perception of the world and indicates that these "cultural landscapes" can cover thousands of square miles. Within these large cultural landscapes are smaller units which Stoffle identifies as "ecoscapes" and "landmarks." An "ecoscape" is an area that is "clearly defined by an unusual or distinct local geography and its unique cultural relationship to an American Indian group or groups" (Stoffle 1998: 43). A "landmark" is a "discrete physical place within a cultural landscape . . .[and] tends to be a small part of the local geography that is topographically and culturally unique" (Stoffle 1998: 43). We acknowledge the Native Americans' unique world view and recognize these "cultural landscapes," "ecoscapes," and "landmarks" as ethnographic resources.

Several ethnographic resources were identified by Native Americans in chapters Four and Five of the ethnographic study and through ongoing consultations with the tribes. These ethnographic resources include cultural landscapes and landmarks.

Cultural Landscapes

Three cultural landscapes were identified in the ethnographic study and through consultations with the tribes: the Colorado River, Black Canyon, and the Salt Song Trail. These areas are talked about in the tribes' oral traditions and are important in the ceremonial life of the people. Below is a sample of the comments made by informants about these resources.

Colorado River

- In our legends we were created from the river. (p. 58)
- The Colorado River was really the backbone, our stamina, our purpose for being here. (p. 61)
- This is a living river it brings people together. (p. 63)
- People get songs from the water in the Colorado River. (p. 67)

Black Canyon

- The Mojave People of the lower Colorado River began their existence on earth in the Black Canyon/Spirit Mountain locale--where still is witnessed the caves, rock shelters, petroglyphs, trails, and wherein lie the source of Mojave legends and songs (Mojave correspondence).

Salt Song Trail

- Both the Hualapai and Southern Paiute share the Salt Song Trail. Uncle Jacob was a medicine man and he knew those things. (p. 64)
- The salt trail comes from Chemehuevis to Gypsum Cave where they learned those songs. (p. 65)
- This area is also part of the Salt Song Trail. (p. 65)
- The salt trail, but it is under water now. (p. 65)

Landmarks

The resources in the landmark category can be divided into two groups. The first group is the set of resources listed by Stoffle that were identified in informant responses. Informants referenced these resources by specific geographic place names; therefore, this group of resources is referred to here as

Named Geographic Landmarks. The second group of resources are those that the informants identify as being along the three proposed alternatives for the Hoover Dam bypass. This set of resources is referred to here as Local Geographic Landmarks.

Named Geographic Landmarks: Stoffle (1998: 81-88) identifies several geographic landmarks that were named and talked about by informants in the ethnographic study. These include Gypsum Cave, Pintwater Cave, Pah Tempe Hot Spring, Ash Meadows Artesian Springs, Spirit Mountain, Mt. Charleston, and Sunrise-Frenchman Mountains. Stoffle discusses the archeological evidence for the prehistoric use of these areas. Informants discuss their oral traditions and ceremonies relating to these resources, demonstrating that they have personal knowledge of them obtained through their oral traditions, by having visited the resources themselves, or knowing family members or friends that have visited the resources.

- Songs came from Gypsum Cave up in the Sunrise Mountains. (p. 66)
- Our creation story is on Spirit Mountain, and it goes up the canyon, but not close to this area. (p. 69)
- Interviews with Southern Paiute elders indicated that these springs (Pah Tempe Hot Springs) were visited regularly by Indian people from as far as Moapa Valley. Indian people used these springs well into this century for relieving various ailments and conducting healing ceremonies (Stoffle et al. 1995). (p. 86)

Local Geographic Landmarks: Several local geographic landmarks were identified as being important ethnographic resources. These were identified in informant responses to questions about Native American uses of the three proposed alternatives for the Hoover Dam Bypass Project. Local geographic landmarks include caves, springs, mountains, healing rocks, cleared areas, and stone circles. These resources are identified as places that Native Americans **could have used** because they are areas of power and healing. Below are samples of the ethnographer's summations of the responses received from informants for the three proposed alternatives.

Promontory Point

- Comments on the uses of elements such as rock rings for traditional use were few. Most chose not to elaborate, but if they did, it was on the use of rock rings within their culture for sleeping and keeping evil spirits away. Most comments revolved around the presence of rock rings at Promontory Point being evidence of previous occupation of the area. (p. 98)
- These features would have been used for seeking knowledge or power, communicating with other Indians or with spiritual beings, for ceremonies, as a territorial marker and for teaching other Indians. (p. 98)

Sugarloaf Mountain

- Many respondents felt that Sugarloaf was an area where Indian people prepared to hunt and a place for gathering and conducting ceremonies. (p. 101)
- One male commented that this area would be a good lookout area, and the rock circles are in the perfect place for a morning prayer. (p. 104)
- The most common answer to the question of what features are important and why was that the mountain itself was important because of its spirituality. The mountain's shape and location near the river lead at least two Native Americans to believe it is a powerful place . . . Also of importance were caves, because these are places where one prays for health and good luck, and were sometimes used for the dead. One male felt the area was good for gathering doctor rocks.

One female felt the caves were good for hunting ceremonies. Three respondents felt the mountain was used for camping and as a territorial marker. One male mentioned that the domed shape of the mountain would make it likely that the Ghost Dance was performed around this site. (p. 105)

Gold Strike Canyon

- The vast majority either felt it was used for ceremonies or gathering medicinal plants. One female felt it was a traveling route for men to get to the river and because of its connection to the Black Canyon area. Most felt temporary camps would be put up here for some ceremonial or medicinal reason. (p. 107)
- The most common answer to the question of what features are important and why was that the canyon was important because of its potential use and spirituality. (p. 110)
- Comments on the above answers referring to questions about the hot springs (in Gold Strike Canyon) centered around the healing and medicinal properties of hot springs. One female said they might have used the canyon also for hunting. Another female pointed out that the springs would also have been used for bathing, but the river for fishing. Most felt the area was sacred. One male felt the springs would be used to talk to the spirits. (p. 111)

Ethnographic Resource Evaluation

This section will evaluate the ethnographic resources based on the criteria in Bulletin 38 to determine if they are traditional cultural properties eligible for listing on the NRHP. Bulletin 38 defines a traditional cultural property (TCP) as a resource that is associated "with cultural practices or beliefs of a living community that a) are rooted in that community's history, and b) are important in maintaining the continuing cultural identity of the community" (Bulletin 38: 1).

Cultural Landscapes

As indicated above, three cultural landscapes can be identified based on comments made by the tribes: the Colorado River, Black Canyon, and the Salt Song Trail. Each of these landscapes cover vast areas which, at present, are poorly defined. For each of these cultural landscapes to be considered for listing on the NRHP as a TCP, it must be demonstrated that each is rooted in the histories of the tribes and is important in maintaining their continued cultural identities. The ethnographic report and the information it contains, begins to build a case for the significance of these cultural landscapes as TCPs. However, given the enormous size and complexity of these resources, to define fully and evaluate them in their entirety would require a significant amount of additional ethnographic data, the collection and analysis of which is well beyond the scope of the present project.

The APE for the Hoover Dam Bypass Project is contained within each of these cultural landscapes. If we accept that these cultural landscapes are potentially eligible for listing on the NRHP as TCPs, the question for the present project then becomes this: Does that portion of the larger cultural landscape encompass by the Bypass Project APE retain sufficient integrity for it to be considered to contribute to the eligibility of the landscape as a whole? Construction of Hoover Dam and the concomitant creation of Lake Mead, and heavy development and recreational use of the area, have severely compromised and altered the natural state of the surrounding terrain. Impacts vary from alternative to alterative.

The Promontory alternative is situated upstream of Hoover Dam. In this area the original course of the Colorado River and the uppermost reaches of Black Canyon are submerged beneath the waters of Lake Mead. The precise location of the Salt Song Trail in this area is not known, but informants were clear that it too lies beneath the waters of the lake.

Areas along the Sugarloaf alternative, which crosses the Colorado River and Black Canyon south of Hoover Dam, have been severely impacted by construction of the dam and associated facilities. Highway 93 winds its way up and down the sides of the Canyon. Power lines snake their way up the sides of the Canyon, substations are visible in its upper elevations, and noise from the powerhouse generators at the dam can be heard down canyon for some distance. A rafting concession near the base of the dam is in operation for portions of the year. Visitation and recreational use in general are extremely high in this area with visitor numbers exceeding one million in 1998.

The Gold Strike alternative is situated farther downstream from the dam, but this area has also been impacted by dam construction and recreational use. The appearance of Black Canyon in this area is marred by the presence of two large piles of spoils from construction of the dam, one on each side of the Canyon. The Gold Strike hiking trail receives heavy use by visitors attempting to reach the River and the springs. The springs at the base of the trail have been modified, rafters ply up and down the river from the concession south of the dam, while boaters and jet ski operators from Lake Mojave to the south make their way up river to this area. Noise from frequent helicopter over-flights beats its way into the canyon. Taken together, the construction of Hoover Dam and associated facilities, and heavy recreational use have served to significantly compromise the character of the Salt Song Trail, the Black Canyon, and the Colorado River in the project area. Comments made by informants indicate that they too believe that impacts have occurred to these resources. For example:

- The salt trail, but it is under water now. (p. 65)
- You cannot have water songs without the water, but also, songs came from Cottonweed Island, but it's underwater, so the songs went away. The people got songs from water in the Colorado River, but it is now a lake; it is gone. (p. 67)
- We need to start limiting [access] and start by being specific. Limit boats and the types of things people throw in the water, limit the boat to something they can row that is not going to damage our waters anymore. (p. 116)
- Control visits by tourists with monitoring by Indian people to assess new impacts. (p. 116)
- Protect natural resources here by limiting the number of visitors and by not advertising. That will limit human impact. (p. 116)
- Leave it alone; don't construct anymore. This place is already too modern. (p. 118)
- Don't put any more stuff around here. Don't build anything. (p. 118)
- Limit the pollution. (p. 119)
- Clean up the place and don't let anyone in here. (p. 119)

Given that the area encompassed by the APE of the Hoover Dam Bypass alternatives has been so severely impacted by the construction of Hoover Dam and its related features, and heavy recreational use, it is recommended that the area through which the alternatives pass be considered a non-contributing segment of the cultural landscapes identified above--were they to qualify for listing on the NRHP at some future date.

Landmarks

Named Geographic Landmarks: All of the named geographic landmarks identified by Stoffle (1998: 81-88) are outside the APE for the Hoover Dam Bypass Project (the closest named geographic location to the APE is Gypsum Cave which is approximately 25 miles northwest of Hoover Dam). Because of their location outside the APE for this project, construction of the bypass will have no effect on them and they remain unevaluated.

Local Geographic Landmarks: Resources in this group include rock circles, cleared areas, Sugarloaf Mountain, caves, springs, and healing rocks. The rock circles and cleared areas are those associated with archeological site NV DD:14:22 and historic site NV DD:14:31 (the Sugarloaf Mountain Survey Control Point) respectively. Information from informants about these resources is qualitatively different from the information received about the named geographic landmarks and cultural landscapes.

When discussing cultural landscapes and named geographic landmarks, informants talk about specific stories in their oral traditions that involve these resources. They also discuss historical events involving themselves, family members or other tribal members and the resources. However, when discussing resources in the local geographic landmark group, the information provided by the informants becomes generalized and speculative. The following are examples pulled from the quotations above with emphasis added:

- These features *would have been used* for seeking knowledge or power. . . .
- Many respondents *felt that* Sugarloaf was an area where Indian people. . . .
- One male commented that this area *would be* a good lookout area. . . .
- One male mentioned that the domed shape of the mountain *would make it likely that* the Ghost Dance was performed around this site.
- The vast majority either *felt it was used* for ceremonies or gathering medicinal plants.
- The most common answer to the question of what features are important and why was that the canyon was important because of its *potential* use and spirituality.
- One female said they *might have used* the canyon also for hunting. Another female pointed out that the springs *would also have been* used for bathing, but the river for fishing. Most *felt* the area was sacred. One male *felt the springs would be used* to talk to the spirits.

Informants do not give names to any of the resources, they do not cite any stories or songs about them, nor do they state that they, someone they know or someone they have heard about ever came to these locations for some specific purpose. As indicated above, for a resource to be significant and a TCP eligible for listing on the NRHP it must be rooted in the community's history and be important in maintaining the cultural identity of the community. Given the generalized and speculative nature of the information about the local geographic landmarks within the APE for the Hoover Dam Bypass Project, these resources cannot be said to meet the definition of a TCP as set forth in Bulletin 38, and are not eligible for consideration for listing on the NRHP.

Summary
This transmittal requests the Arizona SHPO to concur with FHWA's recommendations of:

- NV:DD:14:28, Kingman Transmission Line - not eligible for NRHP.
- NV:DD:14:29, Hoover Dam Arizona Transmission Towers - eligible under Criterion A for the NRHP as part of a multiple property designation.
- NV:DD:14:30, segment of Old U.S. 93 - not eligible for the NRHP.
- NV:DD:14:31, Sugarloaf Mountain Survey Station - eligible under Criterion A for the NRHP as part of a multiple property designation.
- NV:DD:14:21, a prehistoric archeological site - not eligible for the NRHP.
- NV:DD:14:22, a prehistoric archeological site - not eligible for the NRHP.
- Colorado River, Black Canyon, and Salt Song Trail; cultural landscapes - potentially eligible for the NRHP as TCPs; however, the APEs for the three alternatives have been severely affected by the construction of Hoover Dam and recreational use. They are recommended as non-contributing elements of the potentially eligible TCPs.
- Seven named geographic landmarks are located outside the APE for this project; therefore, evaluating these resources is beyond the scope of this project and they remain unevaluated.
- Sugarloaf Mountain, rock circles, cleared areas, caves, springs, and healing rocks; local geographic landmarks - These resources are not rooted in the tribal community's history and are not important in maintaining the cultural identity of the tribes; therefore, they are recommended as not eligible for the NRHP.

The FHWA will subsequently be seeking concurrence from the Arizona SHPO on determinations of effect for those properties previously listed and determined eligible for the NRHP, and any additional properties determined eligible as a result of this consultation.

If you have any questions, please do not hesitate to contact Messrs. James Roller, Project Manager, at 303-716-2009 or Steve Hallisy, Archeologist, at 303-716-2140.

Sincerely yours,

James W. Keeley
For Larry C. Smith, P.E.
Division Engineer

Enclosures:

A. *US 93 Hoover Dam Bypass Project Sugarloaf Mountain Alternative Historic Resources Survey*, Associated Cultural Resource Experts, August 1999
B. *US 93 Hoover Dam Bypass Project Archaeological Resources Survey Report, Volume 1*, CH2M HILL, August 1999
C. *US 93 Hoover Dam Bypass Project Archaeological Resources Survey Report, Volume 2*, Archaeological Site Records, CH2M HILL, August 1999
D. *American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project*, University of Arizona, Bureau of Applied Research in Anthropology, December 1998

cc (w/o enclosures):

Mr. Ronald M. James, Nevada State Historic Preservation Officer, State Historic Preservation Office, 100 N. Stewart Street, Carson City, NV 89701-4285

(w/enclosures A, B, and C):

Mr. Steve Daron, Archeologist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005

Mr. Pat Hicks, Archeologist, Bureau of Reclamation, PO Box 61470, Boulder City, NV 89006-1470

Ms. Tammy Flaitz, State of Arizona, Department of Transportation, Environmental Planning Section, 205 South 17th Avenue, 619E, Phoenix, AZ 85007-3212

Mr. Daryl James, Chief, Environmental Services Division, State of Nevada, Department of Transportation, 1263 S. Stewart Street, Carson City, NV 89712

Ms. Mary Barger, WAPA, Mail Code A3400, PO Box 3402, Golden, CO 80401-0098

cc: (w/o enclosures)

Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707

U.S. Department of Transportation
Federal Highway Administration

Central Federal Lands Highway Division

555 Zang Street, Room 259
Lakewood, CO 80228

AUG 27 1999

In Reply Refer To:
HPD-16

Mr. Ronald M. James
Nevada State Historic Preservation Officer
State Historic Preservation Office
Capitol Complex, 100 Stewart Street
Carson City, NV 89701-4285

Dear Mr. James:

Subject: US 93 Hoover Dam Bypass Project - FHWA-AZ NV-EIS-98-03-d
Determinations of National Register Eligibility

The Federal Highway Administration (FHWA) is requesting your concurrence in National Register of Historic Places (NRHP) determinations of eligibility for historic properties located within the area of potential effects for the US 93 Hoover Dam Bypass project. The FHWA has identified the following properties to be within the APE on the Nevada side of the proposed project, and has made NRHP eligibility recommendations for those properties not previously evaluated:

Historical and Archeological Resources

Property Name/Number	Description	NRHP Eligibility	Ownership/ Land Status
Hoover Dam National Historic Landmark	Hoover Dam	Previously Listed: Criteria A and C	Reclamation
26CK4751	Old Government RR Grade	Recommended Eligible: Element of Multiple Property Designation: Criterion A	Reclamation
26CK5180	Transmission Line	Nine Towers Previously Eligible: 2 Towers Recommended Eligible as Elements of Multiple Property Designation: Criterion A	WAPA/ Reclamation
26CK5787	Stone & Concrete Platform	Recommended Not Eligible	NPS
26CK5788	Reclamation Warehouse	Recommended Not Eligible	Reclamation
26CK5789	Stone Gates & Lower Portal Access Road	Recommended Eligible: Element of Multiple Property Designation: Criteria A & C	Reclamation
26CK5790	US 93 Switchback Segment	Recommended Eligible: Contribution Element of Hoover Dam NHL: Criteria A & C	Reclamation
26CK5791	Dam Construction Road	Recommended Not Eligible	Reclamation
26CK5792	Arizona-Nevada Switchyard	Recommended Eligible: Element of Multiple Property Designation: Criterion A	WAPA/ Reclamation

Ethnographic Resources

Resource Type	Property Name/Description	NRHP Eligibility	Owner/Land Status
Cultural Landscapes	Colorado River, Black Canyon, Salt Song Trail	Area encompassed by the APEs for the bypass alternatives is recommended as not contributing to the eligibility of these potential TCPs.	Various federal & state agencies.
Named Geographic Landmarks	Gypsum Cave, Pintwater Cave, Pah Tempe Hot Spring, Ash Meadows Artesian Springs, Spirit Mountain, Mt. Charleston, Sunrise-Frenchman Mountains	Unevaluated, located outside the APE for this project, evaluation of these resources is beyond the scope of this project.	Not Applicable
Local Geographic Landmarks	Sugarloaf Mountain, rock circles, cleared areas, caves, springs, healing rocks	Recommended not eligible.	Reclamation

Agency Undertaking

In the early 1990s, the Bureau of Reclamation consulted with the Nevada State Historic Preservation Office (SHPO) pursuant to 36 CFR 63 and 36 CFR 800.4(c)(1) on the effects of the proposed Colorado River Bridge Crossing Project on cultural resources. Reclamation staff conducted cultural resources inventory work to support the Draft Environmental Impact Statement (DEIS) effort (Queen 1992 and White 1993). Reclamation completed its DEIS/Section 4(f) Evaluation in mid-1993. Prior to release of a DEIS for public review, Reclamation withdrew from the project as lead agency.

In May 1997, the FHWA-Central Federal Lands Highway Division was named as the lead federal agency to resume the project, now referred to as the US 93 Hoover Dam Bypass Project. Four alternatives were considered in FHWA's September 1998 DEIS: the No-Build, Promontory Point, Sugarloaf Mountain, and Gold Strike Canyon. For all three of the build alternatives, an approximate 3.5-mile long, four-lane highway and bridge on new alignment are proposed, meeting current highway design standards for a 60-mile-per-hour design. Relative to Hoover Dam, the Promontory Point alignment is located about 1,000 feet upstream and within view; Sugarloaf Mountain is about 1,500 feet downstream and within view; Gold Strike Canyon is about one mile downstream and mostly obstructed from view from Hoover Dam. After circulation of the DEIS, the FHWA and the Project Management Team (the Nevada Department of Transportation [NDOT], the Arizona Department of Transportation [ADOT], the National Park Service [NPS], and Reclamation) identified the Sugarloaf Mountain alignment as the preferred alternative.

Area of Potential Effects

Following FHWA standards, an Area of Potential Effects (APE) was established for each of the alternative corridors. The APE was defined as all ground 200 feet to each side of the staked centerline, or the maximum limits of cuts and fills depending on which was greater. The proposed APE and plan for updating previous Section 106 studies were provided to your office in a letter dated December 22, 1997, from Terry K. Haussler, FHWA Project Manager.

The FHWA commissioned archaeological and ethnographic surveys of the APE for the three Build Alternatives in 1998; a supplemental archaeological survey was conducted in June 1999. To supplement the 1992/1993 Reclamation surveys, the FHWA also commissioned a complete historic site survey of the preferred alternative in February 1999.

Identification of Historic Properties

Historic Sites

Associated Cultural Resource Experts (ACRE), under Kurt Schweigert as Principal Investigator, conducted a survey of historic period features within the APE for the preferred alternative. The survey also included examination of potential historic features within the viewshed of the preferred alternative, although outside the APE. Hoover Dam is the primary feature within the viewshed, although other features include electrical switch yards, transmission facilities, and historic engineering features associated with construction of the dam.

The APE contains, or is in proximity to, nine historic features. The Hoover Dam National Historic Landmark is listed on the National Register. After completion of the investigations associated with this project, sites 26CK4751 (Old Government RR Grade), 26CK5180 (transmission lines), and 26CK5792 (Arizona-Nevada switchyard) are recommended eligible for the NRHP as contributing elements of a multiple property designation under Criterion A. Site 26CK5789 (stone gates and lower portal access road) is recommended eligible for the NRHP as a contributing element of a multiple property designation under Criteria A and C. Site 26CK5790 (US 93 switchback segment) is recommended eligible for the NRHP as a contributing element to the Hoover Dam National Historic Landmark under Criteria A and C. Sites 26CK5787 (stone and concrete platform), 26CK5788 (reclamation warehouse), and 26CK5791 (dam construction road) are recommended not eligible for the NRHP.

Site Evaluations

Please refer to Enclosure A for site evaluations for those properties previously listed or determined eligible for the NRHP that are potentially affected by the preferred alternative. The following are summary evaluations of newly recorded or resurveyed properties documented for the present project. Enclosure A contains complete Nevada SHPO Historic Properties Inventory Forms for these sites:

<u>26CK4751 – Old Government Railroad Grade</u>

Reclamation recorded a portion of the grade of the US Construction Railroad in 1990 (Queen 1992). The railroad grade consists of massive cuts and fills for a loop that was used primarily for hauling aggregate materials to the hi-mix concrete plant, as well as equipment and other materials to the dam site during construction. The railroad was built in 1931, was used heavily during the 1931-1935 main construction period for the dam, and was probably stripped of all rails and ties in 1962. This portion of the railroad grade is not within the listed National Historic Landmark. Reclamation previously concluded the property was not NRHP-eligible either individually or as a contributing element of an historic district, but Nevada SHPO disagreed. The SHPO requested additional photo documentation and evaluation. In 1993, Reclamation provided further documentation and determined the property was not eligible as a contributing element of an historic district under NRHP Criterion C, because it lacked integrity of workmanship, materials, and setting.

The Government Construction Railroad was a crucial feature of the construction of Hoover Dam. The NPS has previously determined other portions of the railroad grade to be eligible for the NRHP. Removal of rails and ties and other actions have reduced the integrity of the grade, but the extensive

cuts and fills of the grade continue to reflect the historical identity of the structure and the difficulty of construction. This segment of the Government Construction Railroad is clearly shown in many photographs from the era of dam construction, and the grade provides an opportunity for interpretive explanation of the movement of materials to the dam site. Portions of this railroad grade are the only remnants of this important construction feature within the view shed of the National Historic Landmark. Site 26CK4751 is therefore recommended to be an element of an eligible multiple properties designation, and eligible for the NRHP under Criterion A for its association with construction of Hoover Dam.

26CK5787 – Stone and Concrete Structure

A small structure of unknown function and origin is located on the west side of a draw, near the centerline of the proposed highway realignment. It is built of unworked native rocks, mortared with concrete, with a poured concrete flat deck. The feature is about 6 feet north-to-south, 9 feet east-to-west, and up to 3 feet high. It occupies a former roadbed leading from current US 93 to the lower tunnel portal access road (see 26CK5789 below) and may have been used during construction of the dam.

The function and age of this structure are unknown. It is within an area in which transmission towers have been removed, but no other evidence was observed to identify the structure with a former tower or other transmission feature. This isolated structure is not known to have significant associations with events or broad patterns of history (Criterion A) or persons important in history (Criterion B), and it does not exhibit evidence of architectural, artistic, engineering, or archaeological significance (Criteria C and D). Therefore, this structure is recommended not eligible for the NRHP.

26CK5788 – Bureau of Reclamation Warehouse Complex

The warehouse complex is located on the north side of US 93 about 3/4 mile west of Hoover Dam. The site includes a large gabled metal warehouse and office building, smaller metal and concrete block storage buildings, a large oil storage tank, and a large enclosure constructed of concrete blocks, partially paved with asphalt. At the east end of the complex are two concrete structures that have design, material, and color similarities to structures at the dam visitor center.

The warehouse complex occupies the former location of the Babcock & Wilcox Company plant used for fabricating massive steel linings for Hoover Dam tunnels and penstocks. The dam construction era buildings have been removed and the site has been extensively altered. Any former potential eligibility of the site under Criterion A, for its association with the construction and operation of Hoover Dam, no longer exists. None of the existing buildings appear to have historical or architectural significance, and evidence of archaeological or other scientific information has not been found (Criteria C and D). This property is recommended not eligible for the NRHP.

26CK5789 – Stone Gates and Lower Portal Access Road

The lower portal access road departs the south side of US 93 opposite the Reclamation warehouse complex. The road courses southward and then eastward to Black Canyon. Only the portion of the road within and immediately adjacent to the APE was examined and recorded. This segment of the road consists of a fill immediately south of the highway and a cut along the side of a slope. The road bed is paved with asphalt. Access to the road is controlled by a gate structure, including two battered stone columns with extruded mortar joints, similar to the rock work in retaining walls on the US 93 approach to Hoover Dam. Each column has a hooded light at top. Original gate hinges remain on both columns, but the original gates have been replaced with an electric gate that is not attached to the columns. Other than removal of the gates, this structure retains excellent integrity.

The lower tunnel portal access road provided access to the lower end of the dam construction zone for driving diversion tunnels and construction of outlet structures. As the dam was nearing completion, the lower portal road was extended by means of a 1900-foot long tunnel to allow vehicle access to the powerhouse complex. The road remains a key facility for dam operation and maintenance. The construction date of the gate structure is unknown, but the similarity to stone finish construction in retaining walls at the dam and the style of lighting fixtures indicates the 1930s or early 1940s. Most of the similar stone work on the highway near the dam was completed in 1932, but comparable stonework was installed at the switch yards as late as 1942. The road and gate structure are recommended eligible for the NRHP under Criterion A, as elements of a multiple properties designation related to construction and operation of Hoover Dam. The gate structure may also be eligible under Criterion C, representing the masonry regime of retaining walls and other features at Hoover Dam.

26CK5790 – US Highway 93 Switchback Segment

In 1930-31, the US Government constructed a 7-mile portion of US 93 from Boulder City to Black Canyon. The road was 22 feet wide and was graveled and oiled. The contract for construction of the dam included extension of the Government Highway by 3,500 feet on the Nevada side of the dam and about a mile on the Arizona side, to form a connection across the dam of the highway to Boulder City and the road to Kingman, Arizona. Most of the connection was completed in 1932, including stone retaining walls along steep switchbacks on the Nevada approach to the dam.

The Hoover Dam Bypass APE parallels US 93 for about 1.5 miles from near the Gold Strike Casino in Nevada, crosses the current highway alignment in three localities west of Black Canyon, and rejoins the current alignment at the east end of the bypass in Arizona. All of the sections of the highway in the near vicinity of the APE have been extensively altered by widening and other activities, except a small segment of about a quarter mile on the Nevada approach to Hoover Dam. This segment has not been rebuilt, and it includes stone retaining walls built in 1932. This segment is within the boundary of the National Historic Landmark, and the FHWA is recommending it as a contributing element of the landmark under NRHP Criteria A and C.

26CK5791 – Dam Construction Road

A small road extends southwest from US 93 near the west side of the Arizona-Nevada Switchyard. The road is about 10 feet wide and is unimproved, other than grading and clearing of larger rocks to the roadsides. The extreme eastern end of the road near US 93 appears to have been altered during gravel or rock removal, possibly associated with highway improvement or construction of the Arizona-Nevada Switchyard.

This road appears on several photographs dating from 1935 and later, and it is shown to be in use in a photograph taken after the Arizona-Nevada Switchyard was essentially complete, probably in 1952. This road may have initially been constructed as a bypass during construction of the Government Highway (US 93), and then remained in use for access to transmission tower construction sites. The road does not appear to have been a major element of construction of Hoover Dam, and it is not known to have other historical or engineering significance. This road is recommended as not eligible for the NRHP under any of the criteria for evaluation.

26CK5792 – Arizona-Nevada Switchyard

The Arizona-Nevada Switchyard is the southern-most of six electric power switch yards on the Nevada side of the dam. The fenced perimeter of the switchyard measures 282 feet by 156 feet. The switchyard exists at two levels: a lower concrete service building, 21 feet by 55 feet, that houses oil storage for circuit breakers and control equipment, and an upper graveled deck that contains bus structures, oil circuit breakers, disconnect switches, capacitors, and oil tanks on concrete foundations. The switchyard receives power from two transmission lines that cross the river from the Arizona powerhouse and a 230-kv tie circuit to the Metropolitan Water District Switchyard. This facility was built in 1951-52 as the last major switchyard in the Hoover Dam power complex. Most equipment in the switchyard dates from its original construction, and some of the equipment may have been reused from earlier applications at older Hoover Dam switch yards. Nearly all steel buswork and other steel work has not been altered since original construction.

In 1990, Reclamation recorded a portion of the electric power switchyard complex on the Nevada side of Hoover Dam (Queen 1992). However, the area recorded as Site 26CK4765 did not include the Arizona-Nevada Switchyard. Reclamation concluded the switch yards recorded in 1990 were NRHP eligible as a contributing element of the Hoover Dam Historic District/ National Historic Landmark, and the Nevada SHPO concurred with the determination of eligibility.

The Arizona-Nevada Switchyard is one of six switch yards built between 1935 and 1952 to provide terminals for major transmission lines carrying electricity to markets in California, Nevada, and Arizona. All of these facilities were built by the Bureau of Reclamation, and Reclamation documents referred to the entire complex of switch yards as "Boulder Switchyard." The Arizona-Nevada Switchyard is therefore part of the switchyard complex that was a major feature of Hoover Dam development, contributing to the historical significance of the complex. Unlike portions of the other switch yards, the Arizona-Nevada Switchyard is not within the boundary of the National Historic Landmark, but it is within the view shed of the landmark. The FHWA recommends the Arizona- Nevada Switchyard eligible for the NRHP as an element of an eligible multiple properties designation under Criterion A for its association with Hoover Dam and the broad patterns of history in which Hoover Dam is significant. There is no evidence that this switchyard might have engineering or other significance to support eligibility under Criterion C or D.

Archaeological Sites

A Class III (Intensive) archaeological survey of the APE was conducted by CH2M HILL for the three build alternatives. The complete archaeological resources survey report and detailed site cards are included as Enclosure B and C, respectively. In March 1998, CH2M HILL surveyed all accessible areas of the APE. In June 1999, additional archaeological site mapping and refinement of site records and significance evaluations were completed. The surveys resulted in the recordation of two archaeological sites, both in Arizona. No archaeological sites were identified on the Nevada side of the project, so summary evaluations of the newly recorded properties will not be presented here. The archaeological surveys, contracted by FHWA, involved close coordination and oversight by archaeological staffs from FHWA, Reclamation, NPS, and the Western Area Power Administration (WAPA).

Ethnographic Resources

In the ethnographic study, Stoffle (Enclosure D) discusses the way in which Native Americans perceive the world and demonstrates that they have a different world view than Euro-Americans. He uses the term "cultural landscape" to express the Native American perception of the world and indicates that these "cultural landscapes" can cover thousands of square miles. Within these large

cultural landscapes are smaller units which Stoffle identifies as "ecoscapes" and "landmarks." An "ecoscape" is an area that is "clearly defined by an unusual or distinct local geography and its unique cultural relationship to an American Indian group or groups" (Stoffle 1998: 43). A "landmark" is a "discrete physical place within a cultural landscape . . .[and] tends to be a small part of the local geography that is topographically and culturally unique." (Stoffle 1998: 43). We acknowledge the Native Americans' unique world view and recognize these "cultural landscapes," "ecoscapes," and "landmarks" as ethnographic resources.

Several ethnographic resources were identified by Native Americans in chapters Four and Five of the ethnographic study and through ongoing consultations with the tribes. These ethnographic resources include cultural landscapes and landmarks.

Cultural Landscapes

Three cultural landscapes were identified in the ethnographic study and through consultations with the tribes: the Colorado River, Black Canyon, and the Salt Song Trail. These areas are talked about in the tribes' oral traditions and are important in the ceremonial life of the people. Below is a sample of the comments made by informants about these resources.

Colorado River

- In our legends we were created from the river. (p. 58)
- The Colorado River was really the backbone, our stamina, our purpose for being here. (p. 61)
- This is a living river it brings people together. (p. 63)
- People get songs from the water in the Colorado River. (p. 67)

Black Canyon

- The Mojave People of the lower Colorado River began their existence on earth in the Black Canyon/Spirit Mountain locale--where still is witnessed the caves, rock shelters, petroglyphs, trails, and wherein lie the source of Mojave legends and songs (Mojave correspondence).

Salt Song Trail

- Both the Hualapai and Southern Paiute share the Salt Song Trail. Uncle Jacob was a medicine man and he knew those things. (p. 64)
- The salt trail comes from Chemehuevis to Gypsum Cave where they learned those songs. (p. 65)
- This area is also part of the Salt Song Trail. (p. 65)
- The salt trail, but it is under water now. (p. 65)

Landmarks

The resources in the landmark category can be divided into two groups. The first group is the set of resources listed by Stoffle that were identified in informant responses. Informants referenced these resources by specific geographic place names; therefore, this group of resources is referred to here as Named Geographic Landmarks. The second group of resources are those that the informants identify as being along the three proposed alternatives for the Hoover Dam bypass. This set of resources is referred to here as Local Geographic Landmarks.

Named Geographic Landmarks: Stoffle (1998: 81-88) identifies several geographic landmarks that were named and talked about by informants in the ethnographic study. These include Gypsum Cave, Pintwater Cave, Pah Tempe Hot Spring, Ash Meadows Artesian Springs, Spirit Mountain, Mt. Charleston, and Sunrise-Frenchman Mountains. Stoffle discusses the archeological evidence for the

prehistoric use of these areas. Informants discuss their oral traditions and ceremonies relating to these resources, demonstrating that they have personal knowledge of them obtained through their oral traditions, by having visited the resources themselves, or knowing family members or friends that have visited the resources.

- Songs came from Gypsum Cave up in the Sunrise Mountains. (p. 66)
- Our creation story is on Spirit Mountain, and it goes up the canyon, but not close to this area. (p. 69)
- Interviews with Southern Paiute elders indicated that these springs (Pah Tempe Hot Springs) were visited regularly by Indian people from as far as Moapa Valley. Indian people used these springs well into this century for relieving various ailments and conducting healing ceremonies (Stoffle et al. 1995). (p. 86)

Local Geographic Landmarks: Several local geographic landmarks were identified as being important ethnographic resources. These were identified in informant responses to questions about Native American uses of the three proposed alternatives for the Hoover Dam Bypass Project. Local geographic landmarks include caves, springs, mountains, healing rocks, cleared areas, and stone circles. These resources are identified as places that Native Americans **could have used** because they are areas of power and healing. Below are samples of the ethnographer's summations of the responses received from informants for the three proposed alternatives.

Promontory Point

- Comments on the uses of elements such as rock rings for traditional use were few. Most chose not to elaborate, but if they did, it was on the use of rock rings within their culture for sleeping and keeping evil spirits away. Most comments revolved around the presence of rock rings at Promontory Point being evidence of previous occupation of the area. (p. 98)
- These features would have been used for seeking knowledge or power, communicating with other Indians or with spiritual beings, for ceremonies, as a territorial marker and for teaching other Indians. (p. 98)

Sugarloaf Mountain

- Many respondents felt that Sugarloaf was an area where Indian people prepared to hunt and a place for gathering and conducting ceremonies. (p. 101)
- One male commented that this area would be a good lookout area, and the rock circles are in the perfect place for a morning prayer. (p. 104)
- The most common answer to the question of what features are important and why was that the mountain itself was important because of its spirituality. The mountain's shape and location near the river lead at least two Native Americans to believe it is a powerful place . . . Also of importance were caves, because these are places where one prays for health and good luck, and were sometimes used for the dead. One male felt the area was good for gathering doctor rocks. One female felt the caves were good for hunting ceremonies. Three respondents felt the mountain was used for camping and as a territorial marker. One male mentioned that the domed shape of the mountain would make it likely that the Ghost Dance was performed around this site. (p. 105)

Gold Strike Canyon

- The vast majority either felt it was used for ceremonies or gathering medicinal plants. One female felt it was a traveling route for men to get to the river and because of its connection to the Black Canyon area. Most felt temporary camps would be put up here for some ceremonial or medicinal reason. (p. 107)
- The most common answer to the question of what features are important and why was that the canyon was important because of its potential use and spirituality. (p. 110)
- Comments on the above answers referring to questions about the hot springs (in Gold Strike Canyon) centered around the healing and medicinal properties of hot springs. One female said they might have used the canyon also for hunting. Another female pointed out that the springs would also have been used for bathing, but the river for fishing. Most felt the area was sacred. One male felt the springs would be used to talk to the spirits. (p. 111)

Ethnographic Resource Evaluation

This section will evaluate the ethnographic resources based on the criteria in Bulletin 38 to determine if they are traditional cultural properties eligible for listing on the NRHP. Bulletin 38 defines a traditional cultural property (TCP) as a resource that is associated "with cultural practices or beliefs of a living community that a) are rooted in that community's history, and b) are important in maintaining the continuing cultural identity of the community" (Bulletin 38: 1).

Cultural Landscapes

As indicated above, three cultural landscapes can be identified based on comments made by the tribes: the Colorado River, Black Canyon, and the Salt Song Trail. Each of these landscapes cover vast areas which, at present, are poorly defined. For each of these cultural landscapes to be considered for listing on the NRHP as a TCP, it must be demonstrated that each is rooted in the histories of the tribes and is important in maintaining their continued cultural identities. The ethnographic report and the information it contains, begins to build a case for the significance of these cultural landscapes as TCPs. However, given the enormous size and complexity of these resources, to define fully and evaluate them in their entirety would require a significant amount of additional ethnographic data, the collection and analysis of which is well beyond the scope of the present project.

The APE for the Hoover Dam Bypass Project is contained within each of these cultural landscapes. If we accept that these cultural landscapes are potentially eligible for listing on the NRHP as TCPs, the question for the present project then becomes this: Does that portion of the larger cultural landscape encompass by the Bypass Project APE retain sufficient integrity for it to be considered to contribute to the eligibility of the landscape as a whole? Construction of Hoover Dam and the concomitant creation of Lake Mead, and heavy development and recreational use of the area, have severely compromised and altered the natural state of the surrounding terrain. Impacts vary from alternative to alterative.

The Promontory alternative is situated upstream of Hoover Dam. In this area the original course of the Colorado River and the uppermost reaches of Black Canyon are submerged beneath the waters of Lake Mead. The precise location of the Salt Song Trail in this area is not known, but informants were clear that it too lies beneath the waters of the lake.

Areas along the Sugarloaf alternative, which crosses the Colorado River and Black Canyon south of Hoover Dam, have been severely impacted by construction of the dam and associated facilities. Highway 93 winds its way up and down the sides of the Canyon. Power lines snake their way up the sides of the Canyon, substations are visible in its upper elevations, and noise from the powerhouse generators at the dam can be heard down canyon for some distance. A rafting concession near the base of the dam is in operation for portions of the year. Visitation and recreational use in general are extremely high in this area with visitor numbers exceeding one million in 1998.

The Gold Strike alternative is situated farther downstream from the dam, but this area has also been impacted by dam construction and recreational use. The appearance of Black Canyon in this area is marred by the presence of two large piles of spoils from construction of the dam, one on each side of the Canyon. The Gold Strike hiking trail receives heavy use by visitors attempting to reach the River and the springs. The springs at the base of the trail have been modified, rafters ply up and down the river from the concession south of the dam, while boaters and jet ski operators from Lake Mojave to the south make their way up river to this area. Noise from frequent helicopter over-flights beats its way into the canyon. Taken together, the construction of Hoover Dam and associated facilities, and heavy recreational use have served to significantly compromise the character of the Salt Song Trail, the Black Canyon, and the Colorado River in the project area. Comments made by informants indicate that they too believe that impacts have occurred to these resources. For example:

- The salt trail, but it is under water now. (p. 65)
- You cannot have water songs without the water, but also, songs came from Cottonweed Island, but it's underwater, so the songs went away. The people got songs from water in the Colorado River, but it is now a lake; it is gone. (p. 67)
- We need to start limiting [access] and start by being specific. Limit boats and the types of things people throw in the water, limit the boat to something they can row that is not going to damage our waters anymore. (p. 116)
- Control visits by tourists with monitoring by Indian people to assess new impacts. (p. 116)
- Protect natural resources here by limiting the number of visitors and by not advertising. That will limit human impact. (p. 116)
- Leave it alone; don't construct anymore. This place is already too modern. (p. 118)
- Don't put any more stuff around here. Don't build anything. (p. 118)
- Limit the pollution. (p. 119)
- Clean up the place and don't let anyone in here. (p. 119)

Given that the area encompassed by the APE of the Hoover Dam Bypass alternatives has been so severely impacted by the construction of Hoover Dam and its related features, and heavy recreational use, it is recommended that the area through which the alternatives pass be considered a non-contributing segment of the cultural landscapes identified above--were they to qualify for listing on the NRHP at some future date.

Landmarks

Named Geographic Landmarks: All of the named geographic landmarks identified by Stoffle (1998: 81-88) are outside the APE for the Hoover Dam Bypass Project (the closest named geographic location to the APE is Gypsum Cave which is approximately 25 miles northwest of Hoover Dam). Because of their location outside the APE for this project, construction of the bypass will have no effect on them and they remain unevaluated.

Local Geographic Landmarks: Resources in this group include rock circles, cleared areas, Sugarloaf Mountain, caves, springs, and healing rocks. The rock circles and cleared areas are those associated with archeological site NV DD:14:22 and historic site NV DD:14:31 (the Sugarloaf Mountain Survey Control Point) respectively. Information from informants about these resources is qualitatively different from the information received about the named geographic landmarks and cultural landscapes.

When discussing cultural landscapes and named geographic landmarks, informants talk about specific stories in their oral traditions that involve these resources. They also discuss historical events involving themselves, family members or other tribal members and the resources. However, when discussing resources in the local geographic landmark group, the information provided by the informants becomes generalized and speculative. The following are examples pulled from the quotations above with emphasis added:

- These features *would have been used* for seeking knowledge or power. . . .
- Many respondents *felt that* Sugarloaf was an area where Indian people. . . .
- One male commented that this area *would be* a good lookout area. . . .
- One male mentioned that the domed shape of the mountain *would make it likely that* the Ghost Dance was performed around this site.
- The vast majority either *felt it was used* for ceremonies or gathering medicinal plants.
- The most common answer to the question of what features are important and why was that the canyon was important because of its *potential* use and spirituality.
- One female said they *might have used* the canyon also for hunting. Another female pointed out that the springs *would also have been* used for bathing, but the river for fishing. Most *felt* the area was sacred. One male *felt the springs would be used* to talk to the spirits.

Informants do not give names to any of the resources, they do not cite any stories or songs about them, nor do they state that they, someone they know or someone they have heard about ever came to these locations for some specific purpose. As indicated above, for a resource to be significant and a TCP eligible for listing on the NRHP it must be rooted in the community's history and be important in maintaining the cultural identity of the community. Given the generalized and speculative nature of the information about the local geographic landmarks within the APE for the Hoover Dam Bypass Project, these resources cannot be said to meet the definition of a TCP as set forth in Bulletin 38, and are not eligible for consideration for listing on the NRHP.

Summary

This transmittal requests the Nevada SHPO to concur with FHWA's recommendations of:

- 26CK4751, Old Government RR Grade - recommended eligible for the NRHP as contributing elements of a multiple property designation under Criterion A.
- 26CK5180, transmission lines - recommended eligible for the NRHP as contributing elements of a multiple property designation under Criterion A.
- 26CK5787, stone and Concrete platform - recommended not eligible for the NRHP.
- 26CK5788, reclamation warehouse - recommended not eligible for the NRHP.
- 26CK5789, stone gates and lower portal access road - recommended eligible for the NRHP as a contributing element of a multiple property designation under Criteria A and C.
- 26CK5790, US 93 switchback segment - recommended eligible for the NRHP as a contributing element to the Hoover Dam National Historic Landmark under Criteria A and C.
- 26CK5791, dam construction road - recommended not eligible for the NRHP.

- 26CK5792, Arizona-Nevada switchyard - recommended eligible for the NRHP as contributing elements of a multiple property designation under Criterion A.
- Colorado River, Black Canyon, and Salt Song Trail; cultural landscapes - potentially eligible for the NRHP as TCPs; however, the APEs for the three alternatives have been severely affected by the construction of Hoover Dam and recreational use. They are recommended as non-contributing elements of the potentially eligible TCPs.
- Seven named geographic landmarks are located outside the APE for this project; therefore, evaluating these resources is beyond the scope of this project and they remain unevaluated.
- Sugarloaf Mountain, rock circles, cleared areas, caves, springs, and healing rocks; local geographic landmarks - These resources are not rooted in the tribal community's history and are not important in maintaining the cultural identity of the tribes; therefore, they are recommended as not eligible for the NRHP.

The FHWA will subsequently be seeking concurrence from the Nevada SHPO on determinations of effect for those properties previously listed and determined eligible for the NRHP, and any additional properties determined eligible as a result of this consultation.

If you have any questions, please do not hesitate to contact Messrs. James Roller, Project Manager, at 303-716-2009 or Steve Hallisy, Archeologist, at 303-716-2140.

Sincerely yours,

James W. Kerley

For Larry C. Smith, P.E.
Division Engineer

Enclosures:

A. *US 93 Hoover Dam Bypass Project Sugarloaf Mountain Alternative Historic Resources Survey*, Associated Cultural Resource Experts, August 1999
B. *US 93 Hoover Dam Bypass Project Archaeological Resources Survey Report, Volume 1,* CH2M HILL, August 1999
C. *US 93 Hoover Dam Bypass Project Archaeological Resources Survey Report, Volume 2,* Archaeological Site Records, CH2M HILL, August 1999
D. *American Indian Ethnographic Studies Regarding the Hoover Dam Bypass Project,* University of Arizona, Bureau of Applied Research in Anthropology, December 1998

cc w/o enclosures:

Mr. James W. Garrison, State Historic Preservation Officer, Arizona State Parks, 1300 West Washington, Phoenix, AZ 85007 (w/o enclosures)
Mr. Steve Daron, Archeologist, NPS-LMNRA, 601 Nevada Highway, Boulder City, NV 89005
Mr. Pat Hicks, Archeologist, Bureau of Reclamation, PO Box 61470, Boulder City, NV 89006
Ms. Tammy Flaitz, State of Arizona, Department of Transportation, Environmental Planning Section, 205 South 17th Avenue, 619E, Phoenix, AZ 85007-3212
Mr. Daryl James, Chief, Environmental Services Division, State of Nevada, Department of Transportation, 1263 S. Stewart Street, Carson City, NV 89712
Ms. Mary Barger, WAPA, Mail Code A3400, PO Box 3402, Golden, CO 80401-0098
Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION **INSPECTION REPORT**		
REGION NO. 16	**REPORT ON:** Hoover Dam Bypass - WAPA field review	**DIVISION:** CFLHD
DATE OF INSPECTION: April 7, 1999	**INSPECTION MADE BY:** Terry Haussler, EIS Manager	**PROJECT NO.:** U.S. 93
IN COMPANY WITH: Jim Roller, Project Manager		

A field review was held with Western Area Power Administration (WAPA) engineers. PMT members Mills and Duarte also attended. A sign-in sheet is attached. The purpose of the review was to familiarize WAPA's construction and design engineers with the project so they can proceed with preliminary engineering work to support the Final EIS.

Transmission Tower and Switchyard Impacts

There are three locations where WAPA facilities will be impacted:

1) **Station 65** - WAPA will evaluate the feasibility of moving the tower north, along a ridge line, toward the existing road. They will determine whether the adjacent towers need to be modified - either orientation or structurally, to accommodate the new tower location. If possible, the tower will be moved outside of the proposed 150-foot R/W. NDOT is considering a widening project along existing U.S. 93. Their preliminary plans indicate a "daylight" section here, which should not interfere with the relocated tower. If there are any problems associated with moving the tower north along the ridge, WAPA will also consider moving the tower to the north side of the existing road; however, this scheme is almost sure to have more effect on the adjacent towers.

2) **A&N Switchyard, Station 139, and two towers at Station 142+50** - This area is a major concern, since the proposed centerline is only 80 feet from the corner of the active switchyard. During final design, the centerline may be shifted as much as 40 feet to the right to provide more of a buffer. There are two options to explore here:

   - Construct the highway adjacent to the active switchyard - The switchyard is cut into the side of a steep hill. Roadway construction would require considerable rock excavation, as the terrain gets even steeper above the switchyard. The horizontal alignment is controlled largely by the saddle just east of the switchyard. The end of the proposed Colorado River Bridge is just below and east of the saddle. Blasting mats will be required to protect the switchyard from flying rock. Blasting is likely to trip the circuit breakers. WAPA will evaluate whether these breakers can be bypassed during blasting, without jeopardizing the switchyard or the circuits.

   - Abandon the switchyard - WAPA has considered abandoning this switchyard in the past. It may not be needed and the circuits could be bypassed. At first, this seemed to be the best solution; however, it was determined that an additional transmission line or possibly two lines may have to be run between Hoover Dam and the Mead Substation (approximately 8 miles) to accommodate the bypass. This would make this option much less attractive. If this option is chosen, the switchyard would likely remain in place, since

it is considered a contributing element to the historic landmark. Even though the switchyard would remain in place and blasting mitigation would still be required, the construction adjacent to the switchyard would be much easier and more expedient than if the switchyard is not abandoned.

The two towers at Station 142+50 need to be moved to the south side of the proposed highway. Because of the steep terrain, constructing an access road to the new tower locations would be very difficult (the two existing towers do not have vehicular access either). The access road would be very visible from the highway also. Without roadway access, helicopters will be needed to construct these two towers.

3) **Arizona side of Colorado River, Station 164+50** - The current design requires relocation of at least one tower and possibly two others. See attachment A. The proposed centerline passes directly through tower #2 (second existing tower from the south). Both this line and the line south of this line would need to be moved to the south of the proposed bridge. The tower for the existing southerly line may be located such that it could be used for the tower #2 relocation. WAPA will evaluate the new line geometry and determine whether this is possible. If not, a heavier and re-oriented tower may be constructed in this location. A new tower will be constructed south of this tower. These two lines will connect with the two towers adjacent to the A&N Switchyard, which will also be moved to the south. The third tower from the south is very close to the proposed construction limit (top of cut). It would be difficult to determine whether it needs to be moved until the preliminary design is fine-tuned using more accurate mapping. WAPA indicated that it could be moved 10 feet to the north, if necessary.

WAPA will also evaluate the effect of a horizontal alignment shift 80 feet north. An alignment shift may be desirable from the standpoint of reducing the impact and excavation costs on the north side of Sugarloaf Mountain (the current design shows more than 750,000 cubic yards of rock excavation between Station 164 and Station 193). This revised alignment and associated tower and line re-configuration are depicted in Attachment B. Initially, this option appears very complicated because of the "domino" effect that results. Although numerous lines would be moved, it is possible that only one tower would be relocated. The revised centerline would pass directly through tower #3 (third existing tower from the south). The proposed construction limit (top of cut) would be approximately 20 feet from the adjacent towers. WAPA will determine whether this is acceptable. They also need to determine the effect on these towers from the change in geometry created by moving the two towers on the Nevada side of the river.

A new tower needs to be constructed north of the battery of towers. It is possible that one tower may not be needed, just to the east of this new tower location. Then, all the circuits would be moved to the north to accommodate the removal of tower #3.

Both of the two scenarios (current design and a line shift to the north) have a minimal visual impact from Hoover Dam. WAPA feels that all the new towers could be lattice, which will closely match the existing towers. Under the current design, the change would not be discernible from the dam. Under the revised centerline scenario, one tower that is visible from the dam would be moved and replaced with another tower 100 feet west.

Other Transmission Line Impacts

The proposed centerline crosses under transmission lines at **Station 85+50** and **Station 90+00**. The proposed roadway grade is much lower than the existing road grade and it appears that these lines will not have to be raised; however, during final design, the lines will be surveyed to verify this. The proposed centerline also crosses under six lines between **Station 125** and **Station 136**, just west of the A&N Switchyard. The proposed grade is close to the grade of the existing road, so there is probably not a problem with clearance here unless the grade is raised. This needs to be checked during final design.

Action Items

1. Haussler will provide 1"=50' mapping to the WAPA office in Golden for their transmission line preliminary design.

2. Kris Mills will try to locate the "as-constructed" drawings or design drawings for the original towers and will provide to WAPA.

3. WAPA will provide a preliminary design report to FHWA by the middle of May. The report will identify available options for utility relocation in the areas identified in this report. It should include preliminary cost estimates and schedules for design and construction. It will also include a discussion of construction access and maintenance, so that we can identify any additional environmental studies that may be required.

APPROVED FOR DISTRIBUTION

Terry K. Haussler

Terry K. Haussler, P.E.
EIS Manager

9/12/99
Date

DISTRIBUTION

Federal Highway Administration
Mr. Jim Roller, Project Manager, Lakewood, CO
Mr. Steve Thomas, Environmental Coordinator, Phoenix, AZ
Mr. Conway Barlow, Environmental Coordinator, Carson City, NV
Mr. Terry Haussler, EIS Manager, Lakewood, CO
Mr. Rick Cushing, Environmental Planning Engineer, Lakewood, CO

CH2M HILL
Mr. Brian O'Halloran, Environmental Planner, San Jose, CA
Mr. Jeff Bingham, Environmental Planner, Santa Ana, CA

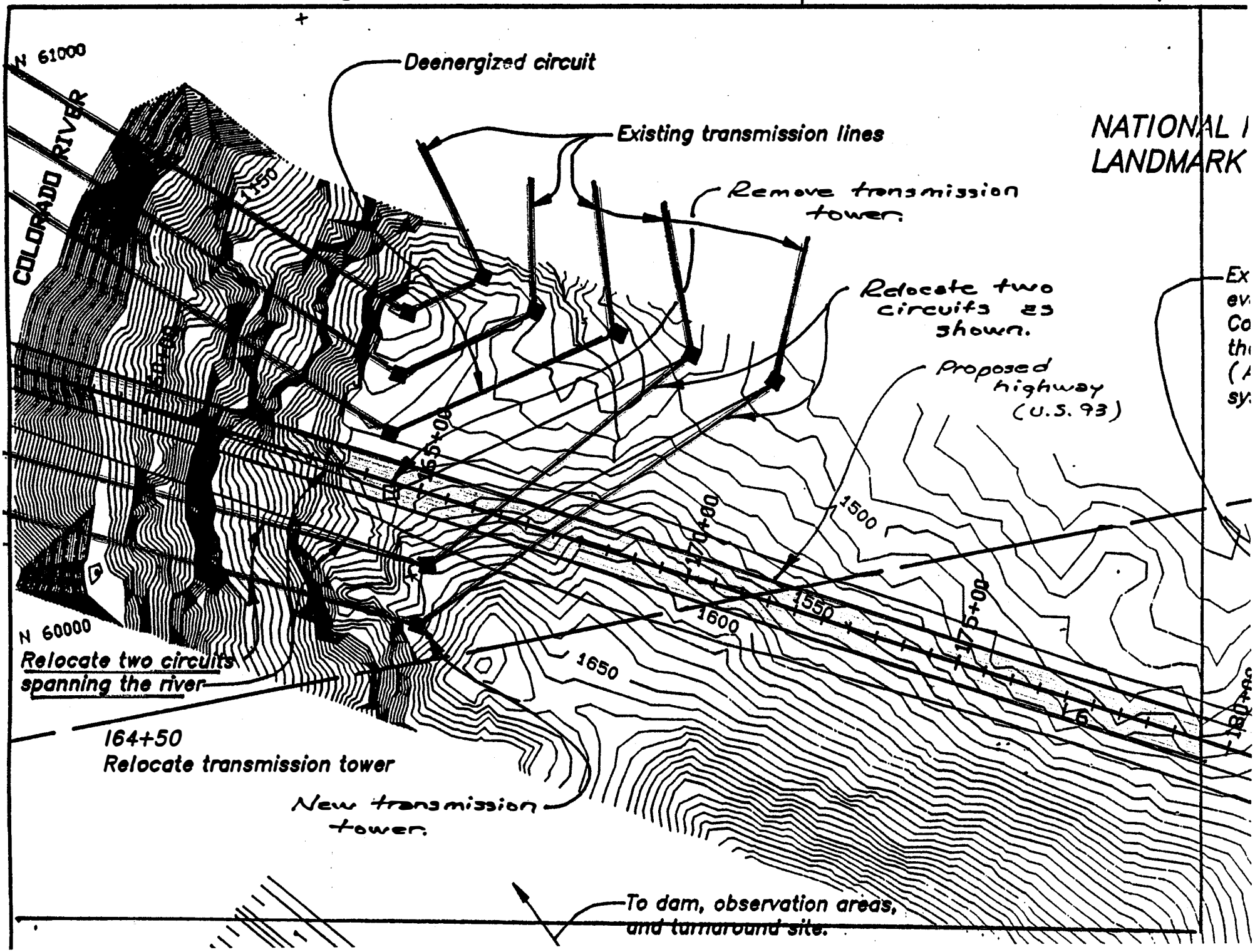
State of Nevada, Department of Transportation
Tom Greco, Project Manager, Carson City, NV
Mr. William C. Crawford, Jr., Chief Bridge Engineer, Carson City, NV
Mr. Daryl N. James, Chief, Environmental Services Division, Carson City, NV

State of Arizona, Department of Transportation
Mr. George E. Wallace, Roadway Studies Manager, Phoenix, AZ
Mr. Rick Duarte, Environmental Planning Manager, Phoenix, AZ

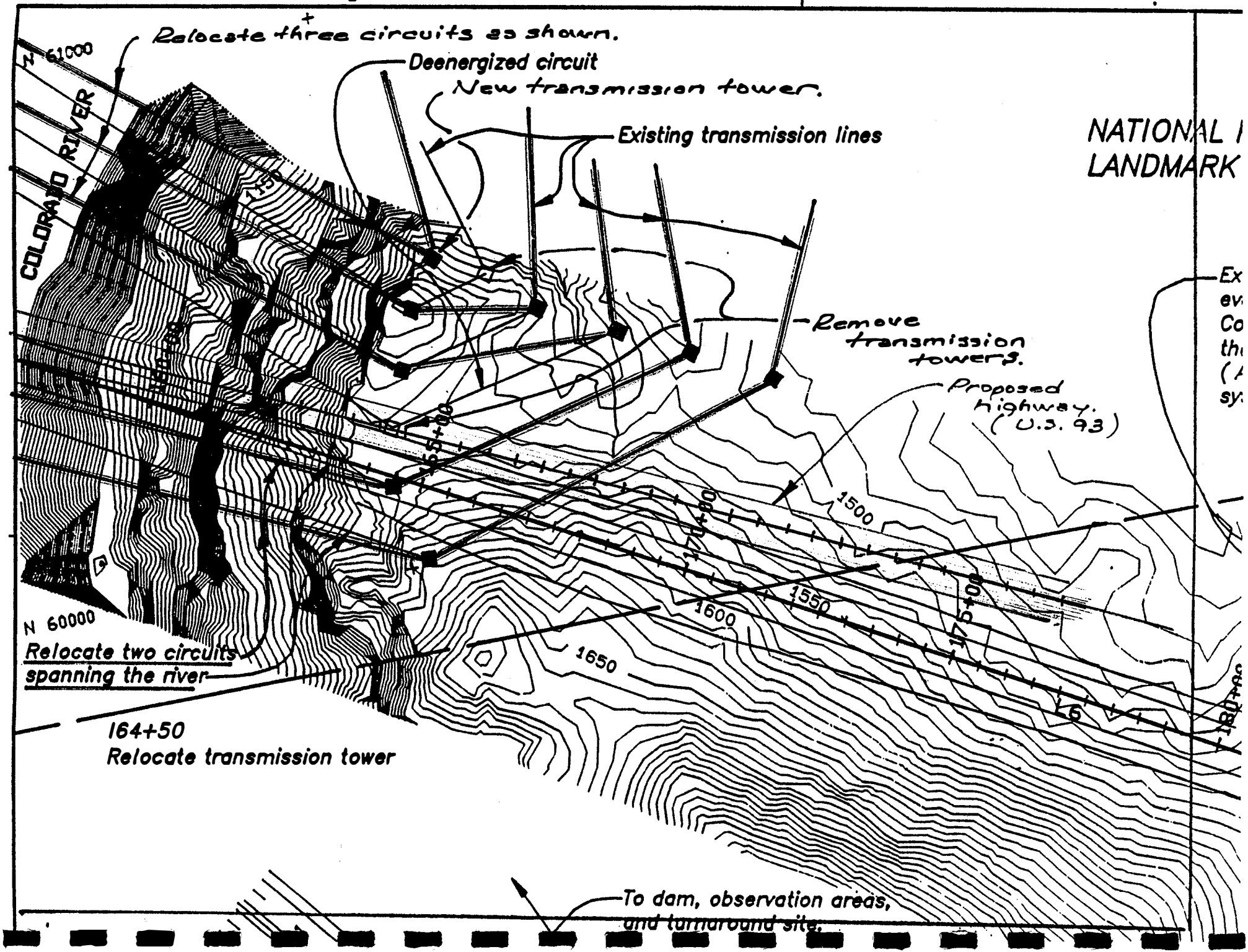
Bureau of Reclamation, Department of Interior
Mr. Kris Mills, Water Resources Manager, Boulder City, NV
Mr. Dave Curtis, Realty Specialist, Boulder City, NV

National Park Service, Lake Mead National Recreation Area
Mr. Bill Burke, Resource Management Specialist, Boulder City, NV
Mr. Jim Holland, Park Planner, Boulder City, NV

Western Area Power Administration, Department of Energy
John Holt, Environmental Manager, Phoenix, AZ
Gary Bates, Construction Engineer, Phoenix, AZ
Fred Cook, Transmission Line Design, Golden, CO
Chuck McEndree, Project Manager, Phoenix, AZ
Terry Burley, Structural Engineer, Golden, CO


N 61000
COLORADO RIVER
1450
1500
1550
1600
1650
165+00
170+00
175+00
180+00
Deenergized circuit
Existing transmission lines
Remove transmission tower.
Relocate two circuits as shown.
Proposed highway (U.S. 93)
NATIONAL L
LANDMARK
N 60000
Relocate two circuits spanning the river
164+50
Relocate transmission tower
New transmission tower.
To dam, observation areas, and turnaround site.

Attachment O. 4/9/99



HOOVER DAM BYPASS MEETING

Please Print

Sign-in Sheet

Date 4/7/99

WAPA Review

Name	Position	Agency/City	Phone
Terry Haussler	EIS Manager	FHWA-CFLHD Denver haussler@road.cflhd.gov	303-716-2116
Fred Cook	T/L Design	WAPA - Golden, CO	303-275-2805
Gary Bates	Construction Engineer	WAPA - Phoenix	602-352-2694
CHUCK McENDREE	PROJECT MANAGER	WAPA - PHOENIX	602-352-2790
Jim Roller	Project Manager	FHWA-CFLHD Denver, CO	303-716-2009
Kris Mills	Group Manager	USBR-Boulder City, NV	702 293-8620
Rick Duarte	Envir. Mngr.	ADOT-Phx	602-712-7760
TERRY BURGEY	STR. ENG	WAPA	303-275-2079

Department of Energy
Western Area Power Administration
P.O. BOX 3402
Golden, CO 80401

NOV 27 1998

James W. Keeley, P.E.
Federal Highway Administration
555 Zang Street, Room 259
Lakewood, CO 80228

Dear Mr. Keeley:

Thank you for your letter dated November 20, 1998, in which you invited Western to participate as a cooperating agency in your Hoover Dam Bypass Project Environmental Impact Statement. Since this project will require the relocation of some of our transmission facilities, we are pleased to accept your invitation.

Our point of contact will be John Holt, Environment Manager for Western's Desert Southwest Regional Office in Phoenix, Arizona. Mr. Holt's phone number is 602-352-2592.

We accept the responsibilities outlined in the attachment to your letter and know of no constraints on our participation at the level you described. We look forward to cooperating with you in this project.

Sincerely,

For Michael S. Hacskaylo
Administrator

U.S. Department of Transportation
Federal Highway Administration

Central Federal Lands Highway Division

555 Zang Street, Room 259
Lakewood, Colorado 80228

NOV 20 1998
In Reply Refer To:
HPD-16

Mr. Bill Karsell
Environmental Project Manager
Western Area Power Administration
PO Box 3402, Mail Code A-3400
Golden, CO 80401

Dear Mr. Karsell:

The Federal Highway Administration (FHWA), Central Federal Lands Highway Division, in cooperation with the Bureau of Reclamation (Reclamation), National Park Service, Arizona Department of Transportation, and Nevada Department of Transportation, is proposing to construct a bridge over the Colorado River near Hoover Dam. Environmental and engineering studies for this proposal were initiated by Reclamation in 1989, but were terminated in 1993 for funding reasons. The FHWA is proceeding with these studies, which were intitiated by Reclamation.

Your Phoenix office received a copy of the Draft Environmental Impact Statement in September. After receiving comments from your Phoenix and Golden offices, we realized that WAPA should be a cooperating agency and we regret that we did not coordinate with your office earlier. In accordance with CEQ REG 1501.6 and 23 CFR 771, the FHWA is requesting that your agency become a cooperating agency for the remaining development of this project.

The proposed improvement, along US 93 in Arizona and Nevada, consists of a bridge across the Colorado River and approximately three miles of associated new roadway construction. The entire project is on Federally-owned lands. See enclosed map showing project location and alternatives currently being considered.

The purpose of this proposal is to remove through-traffic and trucks from the crest of Hoover Dam, which will reduce the potential for pedestrian-vehicular conflicts; safeguard the dam and power plant facilities and the waters of Lake Mead and the Colorado River from potential spills or explosions involving transportation of hazardous cargo; protect the dam and power plant facilities in the interest of national security; provide improved conditions for operation and maintenance of the dam facilities; reduce traffic accidents and congestion near Hoover Dam; and enhance the visitors' experience in the Hoover Dam area.

The FHWA, as the lead agency, will prepare an Environmental Impact Statement (EIS) for the proposed project following the Council on Environmental Quality's (CEQ) "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA)" of

November 29, 1978, 40 CFR, Parts 1500-1508. The other cooperating agencies on this project are the US Fish and Wildlife Service (Reno office), the US Army Corps of Engineers (Reno office), the US Coast Guard, the Bureau of Reclamation, the National Park Service, the Arizona Department of Transportation, and the Nevada Department of Transportation.

The views of cooperating agencies will be sought throughout all stages of the development of the EIS. This coordination is intended to preclude any subsequent and duplicative reviews by cooperating agencies. This coordination will also aid in identifying social, economic, and environmental impacts; and measures to minimize adverse impacts that may result from this improvement.

Enclosed is a copy of the FHWA's "Guidance on Cooperating Agencies," which outlines the responsibilities of the FHWA (as lead agency) and of cooperating agencies. We look forward to your response for participating as a cooperating agency and for your designation of a single point of contact. If you have any questions or need additional information, you may phone Mr. Terry Haussler, Project Manager, at 303-716-2116, or write to the above address (Attention: Terry Haussler, HPD-16).

Sincerely yours,

James W. Keeley

James W. Keeley, P.E.
Project Development Engineer

Enclosures

cc w/o enclosures:
Mr. Jeff Bingham, CH2M HILL, 3 Hutton Center Drive, Suite 200, Santa Ana, CA 92707
TH bc: T. Haussler
yc: reading file
TLHAUSSL[redacted]R:jm:11/19/98:L\design\hoover\wapacoop.wpd

U.S.Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

July 31, 1998

In Reply Refer To:
HPD-16

Mr. David W. Brickey, Chair
Southern Nevada Group, Sierra Club
P.O. Box 19777
Las Vegas, NV 89132

Subject: Hoover Dam Bypass EIS

Dear Mr. Brickey:

In our previous letter to you, dated 5/11/98, we acknowledged your support for the Laughlin-Bullhead City alternative and indicated that we would re-evaluate our decision to drop it from detailed consideration. Our preliminary report has been completed and is now being reviewed by the other Federal and State agencies. The final report will be included in the draft EIS.

Although the report is subject to revisions, we feel that it is important to give you an early opportunity to review it. Given our assumptions to not include the cost of climbing lanes and controlled-access interchanges in the Laughlin-Bullhead City cost estimate, it is not surprising that the initial construction cost is less than the cost of the alternatives near Hoover Dam; however, over a 20-year period, the truck and vehicular operating cost associated with the additional 23 miles is $770 million. The study also concludes that a significant amount of through traffic will continue to use the U.S. 93 route over Hoover Dam. Even with all trucks diverted through Laughlin, in less than 20 years the road across the dam will again function at an unacceptable level of service. This does not meet the purpose and need of the project.

We will be glad to consider your comments prior to distributing the draft EIS. Your preliminary comments need to be received by August 26 to consider them in the draft. The draft EIS will be distributed in mid-September and the public hearings are tentatively scheduled for the week of October 12. We look forward to meeting with you either during the public hearings or anytime prior. Please feel free to contact me at (303) 716-2116 if you would like to discuss the report.

Sincerely yours,

Terry Haussler

Terry K. Haussler, P.E.
Project Manager

Enclosure

MOHAVE COUNTY BOARD of SUPERVISORS

1130 Hancock Road
Bullhead City, AZ 86442
Public Access: 888-735-3711

Phone (520) 758-0713
FAX: (520) 758-0729
e-mail:zman1@ctaz.com

JIM ZABORSKY
CHAIRMAN OF THE BOARD
DISTRICT 2 SUPERVISOR

July 1, 1998

Terry Haussler
Federal Highway Administration
555 Zang St., #259
Lakewood, CO 80228

Dear Mr. Haussler:

This letter is written to assure the Federal Highway Administration of Mohave County's support of the effort to obtain a new bridge near Hoover Dam. Many years of effort have gone into this endeavor and nothing should be done to alter, distract or delay that effort.

First and foremost is the need to complete the Federal Highway Administration's Environmental Impact Study of the now three preferred sites for a through traffic bridge over the Colorado River in the vicinity of the Hoover Dam. We are encouraging the administration to complete their study as soon as possible.

Second, there is need of another Route 68 study because by the time the present Route 68 improvement project is completed, this study will be outdated. Because of the extensive road improvements through Golden Valley and on through Mohave Valley Route 95, we will find the traffic will continue to increase on Route 68 and this will very soon cause such congestion at the present Bullhead City/Laughlin Bridge to be so great that it will necessitate a new through traffic Colorado River Bridge north of the present bridge and south of the County Park. Your consideration of a second Route 68 study will be appreciated.

Sincerely,

Jim Zaborsky, Chairman
Mohave County Board of Supervisors

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Field Area
Pacific Great Basin System Support Office
600 Harrison Street, Suite 600
San Francisco, California 94107-1372

IN REPLY REFER TO:

L3217(PGSO-PP)

May 18, 1998

Ken MacDonald
CH2M Hill
2000 E. Flamingo Road
Suite A
Las Vegas, NV 89119-5163

Dear Mr. MacDonald:

We received your letter dated April 30, 1998 requesting information regarding the use of Land and Water Conservation Fund (L&WCF) monies to purchase or improve any of the recreation lands that may be impacted by the Hoover Dam Bypass Project. We have reviewed the information provided and find that no L&WCF monies were involved.

Sincerely,

Joan Chaplick

Joan Chaplick
L&WCF Grants Manager

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

MAY 1 1 1998

In Reply Refer To:
HPD-16

Mr. David W. Brickey
Chair
Southern Nevada Group, Sierra Club
PO Box 19777
Las Vegas, NV 89132

Dear Mr. Brickey:

Thank you for your letter dated February 3, regarding the Hoover Dam Bypass project. The Laughlin route that the Sierra Club supports is one of several additional alternatives suggested by the public since the project resumed last spring.

We have been in contact with Fred Dexter, who is your Hoover Dam Bypass Sub-Committee Chairperson. We met briefly with Fred, as well as with Randy Harness, your Conservation Committee Chairperson, at the Laughlin Town Advisory Board meeting on April 14. As we discussed at the meeting, the Project Management Team (PMT) has agreed to do additional studies to evaluate the feasibility of the Laughlin alternative.

The study will address the improvements that would be required for U.S. 95, NV 163, and AZ 68. Assuming that the Arizona Department of Transportation completes their proposed upgrades on AZ 68, the additional improvements needed are likely to include the following:

1) Widening U.S. 95 to four lanes (55 miles)

2) Constructing a new Colorado River crossing in the Laughlin vicinity

3) Adding substantial pavement overlays to 105 miles of existing highways to accommodate the additional truck traffic

4) Constructing truck escape ramps, controlled access interchanges, and possibly adding climbing lanes on NV 163 and AZ 68

In addition, the study will assess the following:

1) Effects of 23 additional miles on productivity, fuel consumption, air quality, and number of accidents and fatalities

2) Potential effects of lower design speeds, sharper curvature, and steeper grades on commercial trucking

3) The amount of through-traffic expected to continue using U.S. 93 between Las Vegas and Kingman and its effect on the traffic and safety issues at Hoover Dam. Origin and destination surveys done on U.S. 93 and U.S. 95 will be used to help make this evaluation.

The results of this evaluation will help us determine whether the Laughlin alternative sufficiently meets the purpose and need for the project and whether it should be studied in detail as a viable alternative. The evaluation will be completed sometime in June.

We would be happy to get together to discuss these studies in more detail, prior to the formal distribution of the draft EIS. We are also looking forward to hearing more about your specific concerns with the alternatives closer to Hoover Dam. If you have any questions or comments, feel free to contact Terry Haussler, Project Manager, at 303-716-2116.

Sincerely yours,

/s/ lca

Larry C. Smith, P.E.
Division Engineer

cc: Bruce O'Halloran, CH2M HILL, 2107 No. 1st St., Ste. 210, San Jose, CA 95131-2026
Ken MacDonald, CH2M HILL, 2000 E. Flamingo Rd., Ste. A, Las Vegas, NV 89119-5163
bc: T. Haussler
yc: reading file
Central file - NV Hoover Dam Bypass Road
TH THAUSSLER:jm:5/8/98:L\des\hoover\sierra.wpd

United States Department of the Interior

FISH AND WILDLIFE SERVICE
RENO FISH AND WILDLIFE OFFICE
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NEVADA 89502

MAY - 4 1998

File No. 1-5-98-I-167

Mr. Terry K. Haussler
Federal Highway Administration
Post Office Box 25246
Lakewood, Colorado 80225-0246

Dear Mr. Haussler:

Subject: Hoover Dam Bypass Project, Clark County, Nevada and Mohave County, Arizona

This is in response to your March 6, 1998, letter requesting comments on the purpose and need and alternatives sections of the environmental impact statement (EIS) prepared for the Hoover Dam Bypass Project. The Fish and Wildlife Service (Service) has reviewed these sections of the EIS and offers the following comments pursuant to your request and the 1993 memorandum of understanding (MOU) for surface transportation projects in Arizona, California, and Nevada.

On September 4, 1997, the Service provided you a list of federally listed species and species of concern that potentially occur in the proposed project area. On November 21, 1997, we provided scoping comments to you by letter for the proposed construction of the Hoover Dam Bypass Project (File No. 1-5-98-TA-027). Please refer to these comments during the selection of the environmentally preferable alternative and development of mitigation measures for the project.

The purpose and need chapter of the EIS provides an adequate description of deficiencies that exist on U.S. Highway 93 in the vicinity of the Hoover Dam that result in traffic delays and safety hazards. We suggest that Federal Highway Administration (FHWA) identify references for data that supports the statement of need. Following review of this chapter, the Service believes that the purpose and need section of the EIS is appropriate for the proposed project.

In the alternatives chapter of the EIS, FHWA identified 3 alternatives for the Hoover Dam Bypass Project that have been chosen for further evaluation, and 11 alternatives that were eliminated from further evaluation based on screening criteria. In your comparison of alternatives, the Laughlin/ Davis Dam Crossing alternative was eliminated because it did not meet the purpose and need of the project. We suggest that you include screening criterion 4 (Table 2-2) to your evaluation of

the Laughlin/Davis Dam Crossing alternative. The Service is concerned that the Laughlin/ Davis Dam Crossing alternative would divert traffic onto U.S. Highway 95 (US 95) which bisects the Piute-Eldorado Critical Habitat Unit for the desert tortoise *(Gopherus agassizii)*, a species federally listed as threatened. Although installation of tortoise-proof barriers are proposed for US 95, the direct and indirect effects of increased traffic on this highway may result in substantial impacts to critical habitat. Such impacts may include road kills that result from breaches in the barrier, increased risk of human-caused fires, vandalism, and poaching. Also, we recommend that FHWA consider an additional screening criterion that addresses the issue of grades that vehicles may encounter along each route.

We further suggest that you include impacts to wetlands in your discussion on screening alternatives. As you are aware, each alternative potentially impacts wetlands to varying levels (e.g., the Goldstrike Alternative has the greatest potential impact to wetlands). An analysis pursuant to the Environmental Protection Agency's section 404 (b)(1) guidelines will need to be completed as part of the U.S. Army Corps of Engineers' permitting process under section 404 of the Clean Water Act to determine the least environmentally damaging practicable alternative. In addition, FWHA should quantify, in acres, the extent of impact the alternatives will have on wetlands, as suggested during the March 17, 1998, meeting in Las Vegas, Nevada.

Upon incorporation of Service comments above, we concur with the basic and overall purpose and need, section 404 coverage, alternatives, and criteria for alternative selection. We look forward to reviewing the final document and results of field studies planned by CH2M Hill Consultants in the proposed project area this spring and summer.

We appreciate the opportunity to participate in the planning process for this project. If you have any questions, please contact Michael Burroughs at (702) 646-3499.

Sincerely,

for Robert D. Williams
Field Supervisor

cc:
Administrator, Nevada Division of Environmental Protection, Carson City, Nevada
Administrator, Nevada Division of Wildlife, Reno, Nevada
Regional Manager, Nevada Division of Wildlife, Las Vegas, Nevada
Chief, Nevada Field Office, Army Corps Of Engineers, Reno, Nevada
District Manager, Las Vegas District, Bureau of Land Management, Las Vegas, Nevada
State Director, Bureau of Land Management, Reno, Nevada
Chief, Wetlands Section, Environmental Protection Agency, San Francisco, California
Field Supervisor, Arizona Field Office, Fish and Wildlife Service, Phoenix, Arizona
Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico
Assistant Regional Director, Interior Basin Ecoregion, Fish and Wildlife Service, Portland, Oregon
Assistant Regional Director, Klamath and California Ecoregions, Fish and Wildlife Service, Portland, Oregon

CITY OF BULLHEAD CITY

1255 Marina Boulevard
Bullhead City, AZ 86442-5733
(520) 763-9400 TDD (520)763-9400

April 29, 1998

Terry K. Haussler
U.S. Department of Transportation
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street
Lakewood, CO 80228

Dear Mr. Haussler:

Thank you for speaking to the community of Laughlin/Bullhead City earlier this month at the Laughlin Town Hall Meeting.

Also, I appreciate your keeping us informed via faxes on the status of the Hoover Dam Bypass; as you well know, this topic generates great interest among the residents of Bullhead City.

Thank you.

Sincerely,

CITY OF BULLHEAD CITY

James V. Thompson, Ph.D.
City Manager

lp
cc: City Council

KAIBAB PAIUTE TRIBE

Cultural Resources

March 13, 1998

CH2MHILL
2300 NW Walnut Blvd.
Corvallis, OR
97339-0428

Dear: Dr. James C. Bard

This letter is in response to your soliciting written statements of interest from Native American Tribes concerning consulting with FHWA on the Hoover Dam Bypass Project. There is interest by the Kaibab Paiute Band of Indians concerning this project and its possible impacts to cultural resources. Traditional Cultural Properties in this bypass area is of concern and importance to this Southern Paiute Tribe. We are writing this letter to express our interest in conducting consultations with FHWA.

Sincerely,

Carlos Mayo, Manager
Cultural Resource Program

cc: Nevada file

HC 65 Box 2 Pipe Spring AZ 86022 (602) 643-**6014**

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

March 6, 1998

In Reply Refer To:
HPD-16

See addressee list below

Subject: Hoover Dam Bypass, U.S. 93

We are enclosing a draft copy of the "Purpose & Need" and "Alternatives" for the Environmental Impact Statement on the Hoover Dam Bypass project. This transmittal initiates the NEPA-404 Integration Process. Per the Memorandum of Understanding between our agencies, you have up to 45 days to concur or nonconcur on NEPA purpose and need, section 404 basic and overall project purpose, criteria for alternative selection, and project alternatives to be evaluated in the draft EIS. A preferred alternative has not been identified at this time.

We are looking forward to your attendance at a field review on Monday, March 16, at 1:00 p.m. We will meet at the east end of the Goldstrike Casino parking lot. On Tuesday, March 17, we will meet at McCarran Airport in Meeting Room #2 (near Gate B-17) at 8:00 a.m. We will make a short presentation and the remainder of the morning will be spent discussing the "Purpose & Need" and "Alternatives."

We appreciate your early input on this important project. We hope to answer any questions you may have as well. Please contact me at (303) 716-2116 if you have any questions or comments.

Sincerely yours,

Terry Haussler

Terry Haussler, P.E.
Project Manager

Enclosure

cc: Rick Cushing, FHWA
Brian O'Halloran, CH2M HILL

Addressees:

Mr. David Carlson
Environmental Protection Agency
Region 9
75 Hawthorn Street
San Francisco, CA 94105

Mr. Kevin Roukey, Chief, Nevada Office
U.S. Army Corps of Engineers
C. Clifton Young Federal Building
300 Booth Street, Room 2103
Reno, NV 89509

Mr. Michael Burroughs
U.S. Fish & Wildlife Service
1500 N. Decatur Blvd. No. 1,
Las Vegas, NV 89108

Ms. Mary Jo Elpers
U.S. Fish & Wildlife Service
4600 Kietzke Lane, Suite 125C
Reno, NV 89502-5055

Ms. Susan Worden
U.S. Coast Guard (POW-2)
Building 50-6
Alameda, CA 94501-5100

Arizona Game and Fish Department
Attn: Tom Fresques
5325 N. Stockton Hill Road
Kingman, AZ 86401

Mr. Butch Padilla, Habitat Specialist
Nevada Division of Wildlife
4747 Vegas Drive
Las Vegas, NV 89108

PMT Members
Bill Crawford, NDOT
Daryl James, NDOT
George Wallace, ADOT
Rick Duarte, ADOT
Kris Mills, Reclamation
Tom Shrader, Reclamation
Bill Burke, NPS
Jim Holland, NPS
Conway Barlow, FHWA
Steve Thomas, FHWA

SIERRA CLUB - *Toiyabe Chapter*

Southern Nevada Group
P.O. Box 19777, Las Vegas,, Nevada 89132

March 6, 1998

Mr. Terry Haussler (HPD-16)
Project Manager
Hoover Dam Bypass
Federal Highway Administration
555 Zang Street, Room 259
Lakewood, CO 80228

Dear Mr. Haussler,

Enclosed is the list of recipients of copies of the Southern Nevada Group of the Sierra Club position documents on the proposed Hoover Dam Bypass. My regrets for the delay in providing this information to you, but additional names were being added until only a few days ago.

Sincerely,

Fred Dexter Jr.

Fred Dexter, Jr.
Chairman
Hoover Dam Bypass Sub-Committee
Southern Nevada Group
Sierra Club

cc: Governor Jane Dee Hull of Arizona
Governor Bob Miller of Nevada
U.S. Senator Richard Bryan of Nevada
U.S. Senator Jon Kyl of Arizona
U.S. Senator John McCain of Arizona
U.S. Senator Harry Reid of Nevada
U.S. Congressman John Ensign, Nevada First District
U.S. Congressman Jim Gibbons, Nevada Second District
U.S. Congressman Bob Stump, Arizona Third District
Nevada State Senator Bob Coffin
Nevada State Senator Jon Porter
Arizona State Senator Carol Springer
Nevada State Senator Dina Titus
Arizona State Senator John Wettaw
Boulder City Mayor Bob Ferraro
Bullhead City Mayor Norm Hicks
Laughlin Town Manager Jackie Brady
Bullhead City Manager's Office
Kingman City Manager's Office
Mohave County Manager's Office
Needles City Manager's Office
U.S. Bureau of Reclamation Director Robert Johnson
Hoover Dam Project Manager Tim Ulrich
LMNRA Superintendent Alan O'Neill
Arizona DOT Director Larry Bonine
Nevada DOT Director Thomas Stephens
Mr. Don Laughlin, Owner Laughlin Riverside Casino
Boulder City Chamber of Commerce
Bullhead City Chamber of Commerce
Laughlin Chamber of Commerce
Boulder City News
Bullhead City Bee
Kingman Daily Miner
Las Vegas Review Journal
Las Vegas Sun
Mohave Daily News/New West Publishing

SIERRA CLUB - *Toiyabe Chapter*

Southern Nevada Group
P.O. Box 19777, Las Vegas,, Nevada 89132

Mr. Terry Hausler (HPD-16)
Federal Highway Administration
555 Zang Street, Room 259
Lakewood, CO 80228

February 3, 1998

Dear Mr. Hausler:

The Southern Nevada Group of the Sierra Club has been participating in the Hoover Dam Bypass National Environmental Policy Act (NEPA) process since the scoping meeting held on June 7, 1990. On behalf of the 1700 members of the Southern Nevada Group, this letter and attachments constitute its position on this project.

The Southern Nevada Group approved the first attachment, "Hoover Dam Bypass Resolution," on January 6, 1998. The second attachment, "Hoover Dam Bypass Laughlin - Bullhead City Proposed Route," presents our analysis of a fifth alternative.

The Southern Nevada Group recognizes the need for a new Colorado River bridge to provide a bypass for heavy trucks crossing the Hoover Dam.

However, it is the position of the Sierra Club, Southern Nevada Group that this proposed southern crossing should be immediately added to the Hoover Dam bypass study Draft Environmental Impact Statement for consideration as one of the formally proposed alternatives. Failure to do so will render the Draft Environmental Impact Statement fatally flawed. Such an omission will waste a great amount of precious time and money that has already been dedicated to finding a solution to this hazardous truck congestion problem.

Thank you for your consideration of our proposal. The Sierra Club anxiously awaits the Draft Environmental Impact Statement for this proposed project.

If you have any questions please contact me at the address above or contact Fred Dexter (Hoover Dam Bypass Sub-Committee Chair) at 702-293-7736.

Sincerely,

David W. Brickey
Chair
Southern Nevada Group
Sierra Club

SIERRA CLUB - *Toiyabe Chapter*

Southern Nevada Group
P.O. Box 19777, Las Vegas,, Nevada 89132

HOOVER DAM BYPASS RESOLUTION
January 6, 1998

WHEREAS, the Southern Nevada Group recognizes the need for a new Colorado River bridge to provide a bypass for heavy trucks crossing the Hoover Dam;

WHEREAS, the SNG finds that the 3 current Federal Highway Administration proposals for a new Hoover Dam bypass are environmentally unacceptable due to the inevitable impacts on wildlife and plant life (including some protected species) and the destruction of desert springs and wetlands;

WHEREAS, the SNG finds that either of the 2 most northern proposed routes would irrevocably destroy a national treasure scenic vista from one direction of viewing from the Hoover Dam;

WHEREAS, the SNG finds that either of the 2 most southern proposed routes would unacceptably impact desert springs and wetlands;

WHEREAS, the three proposed routes do not include any mitigation of the urban congestion currently being caused in Boulder City by heavy truck traffic;

THEREFORE, the SNG resolves that it opposes the Promontory Point, Sugarloaf Mountain, and Goldstrike Canyon crossings for the aforementioned reasons;

FURTHERMORE, the SNG finds that the FHWA has not adequately considered other potentially acceptable alternatives;

THEREFORE IT RESOLVES that the FHWA must consider in the Hoover Dam bypass Draft Environmental Impact Statement, and resulting Environmental Impact Statement, a Laughlin-Bullhead City crossing route alternative;

IT FURTHER RESOLVES that the DEIS/EIS must consider the risk of truck accident caused hazardous material pollution of the Colorado River as a factor of the length of each proposed bridge span over the river and the slopes under the bridge leading to the river shoreline;

IT FURTHER RESOLVES that a new round of Public Open House meetings be held, including meetings in Laughlin and Bullhead City, and that printed materials be available with estimated costs for completion and time of completion of each proposed route, the environmental impacts of each proposed route, and including this Laughlin/Bullhead City proposed route;

IT FURTHER RESOLVES that future and ancillary costs, such as for additional state funded peripheral roads around Boulder City, and the cost and source of funds for yearly bridge maintenance, be clearly stated in the DEIS/EIS;

FINALLY, IT RESOLVES that the DEIS/EIS must specify the actual portions of any NAFTA route between Mexico and Canada which will feed heavy truck traffic to a new proposed Hoover Dam bypass and the cumulative total impact of this routing and bypass project on the regional area between Kingman, AZ and Henderson NV.

Signed: _____
David W. Brickey
Chairperson Southern Nevada Group

Signed: _____
Randy Harness,
Chairperson Conservation Committee
Southern Nevada Group

Signed: _____
Fred Dexter, Jr., Chairperson
Hoover Dam Bypass Sub-Committee
Southern Nevada Group

Signed: _____
Gary Beckman, Committee Member
Hoover Dam Bypass Sub-Committee
Southern Nevada Group

Signed: _____
Howard Booth, Committee Member
Hoover Dam Bypass Sub-Committee
Southern Nevada Group

Signed: _____
Jack Borden, Committee Member
Hoover Dam Bypass Sub-Committee
Southern Nevada Group

SIERRA CLUB - *Toiyabe Chapter*

Southern Nevada Group
P.O. Box 19777, Las Vegas,, Nevada 89132

HOOVER DAM BYPASS
LAUGHLIN - BULLHEAD CITY PROPOSED ROUTE

COMPARISON OF TRANSPORTATION PARAMETERS: DISTANCE, TIME, CONSTRUCTION, ENVIRONMENTAL IMPACT VS CURRENT FHWA PROPOSED ROUTES

January 21, 1998

METHOD

To compare the existing FHWA proposed preferred routes for an alternative crossing over the Colorado River to bypass the current route over the Hoover Dam, the preferred alternative routes were compared and the common factors were grouped. An additional proposed alternative route crossing at Laughlin-Bullhead City was then compared to the common factors of the 3 original proposed routes. Additionally, some of the environmental impacts were considered for the US 93 vs. US 95 north-south transportation corridors for the respective routings.

FHWA PROPOSED PREFERRED ROUTES

The 3 existing proposed northern routes, Promontory Point, Sugar Loaf Mountain and Gold Strike Canyon:

1. All are sufficiently close together that they share a common routing use distance,
2. All of these bridge crossings have estimated construction costs of over $100 million,
3. All will require over 2 miles of new access road construction over very rough desert terrain,
4. All will traverse sections of scenic and sensitive environmental habitat requiring mitigation,
5. All will continue to route heavy truck traffic along the existing route US 93 through Boulder City,
6. All will require at least 7 years for completion,
7. All will be very expensive bridges to maintain, and
8. All are very long spans prolonging the time-risk of river pollution from an accident when a truck is actually crossing over the river and the slopes leading to the river shoreline.

ADDITIONAL PROPOSED ROUTE CROSSING AT LAUGHLIN - BULLHEAD CITY

This southern route crossing, as measured from the intersection of US 95 + 93 north of Boulder City to the intersection of US 93 + AZ 68 north of Kingman,

1. would require the improvement of an existing portion of AZ 68, as is already planned by the State of Arizona,
2. additionally would require safety run-off ramps in portions of the NV & AZ 6% downgrades,
3. would require the widening of the existing Laughlin-Bullhead City bridge, or the addition of a new express bridge adjacent to this existing bridge,
4. is 24 miles greater point-to-point distance,
5. requires approximately 1 mile of new bridge access road construction over very mild terrain,
6. will not traverse any sections of scenic or sensitive environmental habitat requiring mitigation,
7. will not route heavy truck traffic through Boulder City, or the urban areas of Laughlin or Bullhead City,
8. would have a completion time of less than 2 years and a bridge cost of less than $8 million*, plus the relatively minor costs of adding several safety run-off ramps on the approach roads,
9. would be a much shorter bridge span, thus minimizing the risk of an accident on the bridge causing contamination of the Colorado River.

The current 3 Hoover Dam bypass proposals all require north-south routing along 20 miles of US 93 in Arizona which pass through the Lake Mead National Recreation Area. Future upgrading to a limited-access 4 lane freeway is probable. The cost and environmental impact of doing so along this highway will be quite severe. The habitats of such sensitive species as the desert bighorn sheep and desert tortoise would be irrevocably fragmented by the construction of an interstate-quality limited-access road, with the adjacent frontage roads on either side for access to the many recreational roads and trails which currently enter the LMNRA from along US 93. Splitting the LMNRA with such a highspeed road separating the dramatically scenic Lake Mohave breaks and the contiguous Mount Wilson wilderness area is an unacceptable intrusion into one of our national parks.

On the Nevada side, a similarly improved US 95 would be much less costly than doing so to US 93 in Arizona. This is because of the lesser contrast between the arterial and the flat, wide valley on the Nevada side of Lake Mohave. Also US 95 does not cross any major dry wash drainages, as is the case with US 93. There would be some impact on habitat within the desert tortoise preserve through which US 95 runs if that highway were widened, but the effects would be limited to the actual acreage lost, a small percentage of the total preserve area. Desert tortoise fencing is already implemented along the US 95 corridor. Also, along a future US 95 limited-access freeway there would be a much reduced need for frontage roads as compared with a similar highway along US 93 in Arizona, with reduced costs and reduced environmental impacts. This is because most access roads and trails into the LMNRA or the BLM public lands on the Nevada side enter from other secondary roads rather than from US 95 itself. Unlike the US 93

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* Cost estimate based on $4 million cost of recently constructed 4 lane Laughlin-Bullhead bridge.

corridor through the LMNRA on the Arizona side, there would be very little fragmentation of bighorn sheep habitat from a future limited-access highway and the required fencing. US 93 in Arizona runs directly through bighorn habitat, but US 95 in Nevada barely touches it.

CONCLUSION

Both Nevada and Arizona could apply for federal highway funds to offset any additional costs that would be incurred in the upgrading of the access routes to the improved or additional bridge. The overall cost would **still be less than 10% of the cost** of the northern proposed crossings, and project completion time would be at least 4 years sooner. To ensure that heavy truck traffic used this southern route, truck traffic would not be permitted on the Hoover Dam (a component of the current FHWA proposal).

The maintenance cost for a small additional bridge improvement at Laughlin/Bullhead City would be a very small fraction of the maintenance costs for a large span close to Hoover Dam. This would **save** the truck industry the **toll cost which would probably be needed to operate/maintain such a large bridge** - this would offset most, if not all, of the extra distance cost of the southern route.

Currently the very frequent delays encountered in using the Hoover Dam crossing add from 1/2 hour to over an hour to the amount of time needed to drive a truck to Kingman. This congestion-caused problem can only be expected to worsen as the 20% growth rate of Las Vegas continues. In a few years the delays will be totally intolerable, both for commercial and non-commercial drivers. **Already there is an almost permanent sign at US 95/93 suggesting an alternate truck route, which is the route down to Laughlin and over the bridge to Bullhead City to Kingman. To wait 7 more years for a new route is unacceptable.**

The additional 24-mile distance, at an actual per mile truck operational cost of approximately $1.00 per mile, would be partially offset by the value of the time saved using the new route without congestion delays. This is compared to waiting 7 years for a new crossing and paying the costs associated with more frequent and greater congestion delays to cross the dam. Combined with the cost saving gained from avoiding a hefty toll for using a long expensive bridge, this Laughlin-Bullhead City route would be a cost-effective alternative for truckers.

The US 95 southern route totally avoids any incursion into environmentally sensitive or scenic areas and thus no expensive, and doubtfully effective, mitigation would be required. The urban centers of Boulder City, Laughlin and Bullhead City would not be traversed by heavy truck traffic. To build a southern crossing would take less than 1/2 the time to complete any of the proposed northern routes, thus providing a more immediate relief to the existing serious problem, which is rapidly becoming more serious, which has prompted the urgent study for an alternative route. Also, the Lake Mead National Recreation Area would be relieved of impact by the lessening of heavy trucks using a transportation corridor passing through its boundaries.

This report was prepared with the assistance of a CDL licensed tractor-trailer driver. It is the opinion of this driver that the occasionally maximum 6% grades on both the Nevada and Arizona

approach roads do not present any unusual safety hazard that cannot be minimized with the placement of trucking industry standard run-off ramps as needed. The current 3-mile downgrade from the intersection of US 93 and Buchanan Blvd. in Boulder City to the Goldstrike Casino is no less hazardous than the proposed use of properly improved AZ 68 and NV 163 as access routes. Additionally, truckers would be allowed to use their engine brakes along the less populated southern route, something they are restricted from doing along the current Boulder City urban route.

(It is important to clearly note that the current 3 proposed routes all discharge traffic directly to US 93 at the area near the Gold Strike Casino. It then continues into/from the Hemenway hill south of Boulder City, thus not addressing the problem of congestion in Boulder City, but limiting their scope only to truck traffic crossing the dam. A southern crossing effectively solves both problems, without further future road construction costs to NDOT.)

It is the position of the Sierra Club, Toiyabe Chapter, Southern Nevada Group that this proposed southern crossing should be immediately added to the Hoover Dam bypass study Draft Environmental Impact Statement for consideration as one of the formally proposed alternatives. Failure to do so will render the Draft Environmental Impact Statement fatally flawed. Such an omission will waste a great amount of precious time and money that has already been dedicated to finding a solution to this hazardous truck congestion problem.

ADDENDUM

As a postscript to this position document, the SNG projects that the State of Arizona (and the State of Nevada) will accrue significant economic benefits from the placement of the Hoover Dam bypass route through Bullhead City and Laughlin. This is because the probable increased growth of the gaming industry in Laughlin resulting from the additional proximity of significant amounts of commercial truck traffic will necessitate the hiring of many additional employees. Many Arizona citizens currently work for the gaming and related companies in Laughlin. This projected growth in regional employment will mean many additional jobs for Arizona residents living in Bullhead City and in the Golden Valley along AZ 68. Furthermore, truck service facilities for repair, fuel and dining will likely also be developed along AZ 68 as traffic increases, thus adding to gross Arizona receipts from this proposed routing. It is unlikely that equivalent economic benefits will be enjoyed by the State of Arizona if any of the proposed 3 northern routes are adopted.

As remarked in the foregoing document, the projected 7 year time to completion for any of the current FHWA preferred alternative bypass bridges will unreasonably perpetuate the existing delays and congestion from the current Hoover Dam crossing route. The current allowed time to drive from Las Vegas to Phoenix for Yellow Freight is 5 hours 55 minutes. Delays from construction, accidents and unexpected congestion are not included, events which occur often on the existing route. A regular Las Vegas to Phoenix round trip within the 12-hour allowed hours of driving is not possible along the current route. If the entire route were 4-lane interstate highway, such a line haul round trip within the 12-hour limit would be feasible. Claims that a

southern alternative route crossing at Laughlin-Bullhead City will unreasonably impact the trucking industry round trip line haul operation from Phoenix to Las Vegas are false. Such a round trip cannot currently be accomplished legally. We recommend that the trucking Industry support a crossing at Bullhead City - Laughlin which can be constructed in a very short period of time, thus quickly eliminating many extra hours of operation caused by current route delays, and which will probably require no expensive crossing toll.

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

January 16, 1998

Regulatory Branch (199725481)(Coop. Agency)

Terry Haussler
Federal Highway Administration
565 Zang Street
Denver, Colorado 80225-0246

Dear Mr. Haussler:

We request to serve as a cooperating agency for the environmental review and documentation of the HOOVER DAM BYPASS DRAFT AND FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS). The project is proposed by the Project Management Team of the Federal Highway Administration; U.S. Bureau of Reclamation; National Park Service, Lake Mead National Recreation Area; Arizona Department of Transportation and Nevada Department of Transportation.

Although the project is within the jurisdictional boundaries of both the Laos Angeles District and the Sacramento District, the Sacramento District's Nevada Regulatory Office will be the lead office for this project and will provide coordination with the Phoenix Regulatory Office and provide official responses to the EIS.

A Department of the Army permit under the authority of Section 404 of the Clean Waters Act and Section 10 of the River and Harbor Act may be required to be obtained from the Corps of Engineers prior to initiating construction of the proposed facilities. Completion of an acceptable EIS is required prior to our permit decision.

As a cooperating agency, the Corps will provide comments specific to its expertise and regulatory authority. this will be particularly relevant to our jurisdiction over waters of the United States, including wetlands, and associated functions and values. We do not anticipate that we will be able to prepare sections of the document, but will review the EIS for content so that it may serve as the environmental documentation with regards to the 404 (b)(1) Guidelines. Therefore, we request to be included in all meetings and discussions concerning the scope and content of the EIS.

We appreciate your informal coordination and cooperation during the past several months with the agency coordination meetings for the project. We will continue to coordinate through you unless you provide us with the name of another point of contact.

Your consideration is appreciated. We look forward to working with you and your staff on this project. Our Project Manager for the Hoover Dam Bypass Project EIS preparation is Kevin J. Roukey, Chief of our Nevada Regulatory Office. If you have any questions, please write to our Nevada Office, C. Clifton Young Federal Building, 300 Booth Street, Room 2103, Reno, Nevada 89509, telephone (702) 784-5305, FAX (702) 784-5306.

Sincerely,

Tom Coe
Chief, Central California/Nevada
Section

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
206 South 17th Avenue
Phoenix, Arizona 85007-3213
Phone (602) 255-7226

Jane Dee Hull
Governor

LARRY S. BONINE
Director

THOMAS G. SCHMITT
State Engineer

January 16, 1998

Larry C. Smith, P.E.
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street
Denver, Colorado 80225-0246

RE: HPD-16
Hoover Dam EIS

Dear Mr. Smith:

This is in response to your letter of September 11, 1997 requesting that the Arizona Department of Transportation (ADOT) become a participating agency in the development of the Environmental Impact Statement (EIS) for the proposed new crossing of the Colorado River near Hoover Dam.

We support FHWA's proposed project concept and the role of the cooperating agencies as outlined in your letter and look forward to active participation on this project.

Mr. George Wallace of our Roadway Studies Section (602)255-7467 and Mr. Rick Duarte of our Environmental Planning Section (602)255-7767 will be ADOT's point of contact for this project.

We look forward to working with you and your staff on this very challenging project.

Sincerely,

John L. Louis, P.E.
Assistant State Engineer
Roadway Engineering Group

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

DEC 3 1 1997
In Reply Refer To:
HPD-16

Mr. Jim Garrison
Arizona State Historic Preservation Officer
1300 W. Washington
Phoenix, AZ 85007

Dear Mr. Garrison:

I enjoyed talking with Ann Howard recently regarding the proposed Hoover Dam Bypass project on U.S. 93. The details of our taking over the lead agency status on this project were included in our letter to you dated October 8, 1997; however, I found it very beneficial to discuss some of the specifics with Ann. This early exchange of information will be beneficial for us to get started in the right direction and to help us stay on schedule.

Your office is certainly familiar with the project and with the coordination that was done between your office and the Bureau of Reclamation in the early 90's. Our goal is to update Reclamation's studies, complete the consultation work, and deliver a final EIS in January 1999.

Following are the key items that I discussed with Ann:

- We plan to stake the three alternative alignments in January. With these staked alignments, we will confirm the corridor that Reclamation surveyed and also extend it by approximately 200 feet on each side of centerline. We are more comfortable with a wider corridor, so that any minor alignment changes made during final design will be covered.

- We will supplement the cultural resource studies that Reclamation performed in the early 90's with additional information from the wider corridor. We hope to minimize re-work by your office and this office by accepting the site eligibility agreements reached during your consultation with Reclamation.

- We will likely <u>not</u> designate a preferred alternative in our draft EIS.

- Our consultant (CH2M HILL) will be using the services of an ethnographic specialist to assist with the Traditional Cultural Properties work. We have received numerous ethnographic specialist recommendations from the Arizona Department of Transportation.

We would appreciate any comments you have regarding our plan for updating the Section 106 studies and completing the consultation with both the Arizona and Nevada SHPO offices. Specific comments on anything that was left unresolved during the consultation with

Reclamation would also be appreciated. Thanks again for the early coordination on this important project. Please call me at 303-969-5916 if you have any questions or concerns at any time throughout the development of the project.

Sincerely yours,

/s/

Terry K. Haussler, P.E.
Project Manager

cc: Brian O'Halloran, CH2M HILL, 2107 N. 1st Street, Ste. 210, San Jose, CA 95131-2026
bc: T. Haussler
R. Cushing
yc: reading file
TKHAUSSLER:jm:12/31/97:L\des\AD2\WP\Hoover\azshpo.wpd
TH

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:
LC-2318
PRJ-1.10

DEC 29 1997

Mr. Terry K. Haussler, P.E.
Federal Highway Administration
Project Development (HPD-16)
555 Zang Street, Room 259
Lakewood CO 80228

Subject: Cooperating Partner in the Development of the Environmental Impact Statement for the Hoover Dam Bypass (Bridge)

Dear Mr. Haussler:

This is in response to your September 11, 1997 letter requesting cooperating agency status from the Bureau of Reclamation for the development of an Environmental Impact Statement for the purpose of providing a Hoover Dam Bypass near Hoover Dam across the Colorado River between the states of Arizona and Nevada.

We appreciate being requested to participate in the project early in the process and agree to participate as a cooperating agency. The Reclamation primary representatives for this cooperative effort will be Mr. Kris Mills and Mr. Tom Shrader will be the alternate representative.

Please call Mr. Mills at 702-293-8620 for any questions that you may have regarding this cooperative effort.

Sincerely,

Kris A. Mills

Laura Herbranson
Director, Resource Management

cc: Brian O'Halloran
2030 East Flamingo Road, Suite 160
Las Vegas NV 89119

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

DEC 22 1997

In Reply Refer To:
HPD-16

Ms. Alice M. Baldrica
Deputy State Historic Preservation Officer
Nevada State Historic Preservation Office
100 N. Stewart Street
Carson City, NV 89701-4285

Dear Ms. Baldrica:

I enjoyed talking with you and Gene Hattori this week regarding the Hoover Dam Bypass project. I also appreciate the Hoover Dam Historic Landmark information that you furnished in October. This early exchange of information will be beneficial for us to get started in the right direction and to help us stay on schedule.

Your office is certainly familiar with the project and with the coordination that was done between your office and the Bureau of Reclamation in the early 90's. Our goal is to update Reclamation's studies, complete the consultation work, and deliver a Final EIS in January of 1999.

We plan to stake the three alternative alignments in January. With these staked alignments, we will confirm the corridor that Reclamation surveyed and also extend it by approximately 200 feet on each side of centerline. We are more comfortable with a wider corridor, so that any minor alignment changes made during final design will be covered.

Following is a summary of the key points of our discussion this week:

- We should contact Scott Brooks-Miller in your office at 702-687-7601 for anything related to "visual effects."

- We should contact Gene Hattori in your office at 702-687-6362 for coordination related to cultural resources.

- We will likely <u>not</u> designate a preferred alternative in our Draft EIS. Consultation required under the National Historic Protection Act will not begin until we have a preferred alternative.

- We understand that many of your records, site forms, etc. are housed at the Harry Reid Center in Las Vegas. Your recommendation was for us to update the original site forms on a "Condition Report", which is an abbreviated form that is accessible by computer. Any new sites that are identified will be recorded in your current format.

- Our consultant (CH2M HILL) will be using the services of an ethnographic specialist to assist in our TCP consultation. You mentioned Mr. Richard Stouffel, an ethnographic specialist from Arizona, who will be added to our list of possible resources.

Thanks again for the early coordination on this important project. Please call me at 303-969-5916 if you have any questions or concerns at any time throughout the development of this project.

Sincerely yours,

/s/

Terry K. Haussler, P.E.
Project Manager

cc: Brian O'Halloran, CH2M HILL, 2107 N. 1st Street, Ste. 210, San Jose, CA 95131-2026
bc: T. Haussler
R. Cushing
yc: reading file
TKHAUSSLER:jm:12/22/97:L\des\AD2\WP\Hoover\nvshpo.wpd
TH

U.S. Department of Transportation
United States Coast Guard

Commander (Pow)
Eleventh Coast Guard District

Bldg. 50-6
Coast Guard Island
Alameda, CA 94501-5100
Phone: (510) 437-3514
FAX: (510) 437-5836

16590
Colorado River (330.0)
Ser: 619-97
December 4, 1997

Larry C. Smith, P.E.
Division Engineer
Federal Highway Administration
555 Zang St.
P.O. Box 25246
Denver, CO 80225-0246

Dear Mr. Smith:

We received your letter of September 11, 1997 (HPD-16), concerning the proposed construction of a bridge over the Colorado River near Hoover Dam. We accept your request of us to become a cooperating agency in the development of this project.

Your point of contact for our office is Susan Worden, Bridge Administrator. She can be reached at the above address or contacted at (510) 437-3461. She was at the interagency scoping meeting of October 29 in Las Vegas, and visited the site at Hoover Dam.

Thank you for including the Coast Guard at this stage of your planning.

Sincerely,

W. R. TILL
Chief, Bridge Section
U. S. Coast Guard
By direction of the District Commander

United States Department of the Interior

FISH AND WILDLIFE SERVICE
RENO FISH AND WILDLIFE OFFICE
4600 KIETZKE LANE, SUITE 125C
RENO, NEVADA 89502

NOV 2 1 1997

File No. 1-5-98-TA-027

Mr. Terry K. Haussler
Federal Highway Administration
Post Office Box 25246
Lakewood, Colorado 80225-0246

Dear Mr. Haussler:

Subject: Notice to Prepare an Environmental Impact Statement for Construction of a Bridge Across the Colorado River to Bypass Hoover Dam, Clark County, Nevada, and Mohave County, Arizona

We have reviewed your request for scoping comments for the preparation of an environmental impact statement (EIS) for the construction of the proposed bridge across the Colorado River, Clark County, Nevada, and Mohave County, Arizona. The purpose of the proposal is to remove through-traffic from the Hoover Dam crossing by one of three proposed alternatives. Alternatives for bridge construction include approximately 4 miles of associated new roadway construction.

On October 29, 1997, Fish and Wildlife Service (Service) staff attended the interagency coordination workshop held in Las Vegas to discuss the proposed construction of a Hoover Dam bypass. Our comments and recommendations regarding issues to be addressed in the EIS are provided below, many of which were previously provided at the workshop.

Threatened, Endangered, and Candidate Species, and Species of Concern

A number of bat, plant, and other bird species of concern may occur in the project area, which are identified on the species list provided to Federal Highway Administration (FHWA) (File No. 1-5-97-SP-346) on September 4, 1997. Direct, indirect, and cumulative impacts on federally listed species and species of concern to the Service should be evaluated. Species of concern have no protection under the Endangered Species Act of 1973, as amended (Act). However, one potential benefit of considering species of concern is that by exploring alternatives early in the planning process, it may be possible to provide long-term conservation benefits for these species and avoid future conflicts that could otherwise develop.

The federally endangered peregrine falcon *(Falco peregrinus anatum)* is known to nest both upstream and downstream of Hoover Dam, and occurs in Boulder Canyon on Lake Mead. Black Canyon, located downstream from Hoover Dam, has five documented pairs. The southwestern willow flycatcher *(Empidonax traillii extimus)*, a federally endangered songbird, may also occur in Black Canyon, along Lake Mead, and other sites within the project area. The Mojave desert tortoise *(Gopherus agassizii)*, a species federally listed as threatened, occurs on the Nevada portion of the proposed project. The tortoise may occur along each of the proposed alternatives.

The Sugarloaf Alternative may impact the Devil's Hole pupfish *(Cyprinodon diabolis)* refugia. All three alternatives occur within designated critical habitat for either razorback suckers *(Xyrauchen texanus)* or bonytail chub *(Gila elegans)*. Razorback sucker critical habitat includes the Colorado River from Paria River to Hoover Dam including Lake Mead to the full-pool level. Razorback sucker and bonytail chub critical habitat includes the Colorado River from Hoover Dam to Davis Dam including Lake Mohave to the full-pool elevation. Bonytail chub are not known to occur in Lake Mead. Razorback suckers are found in two locations, Las Vegas Bay in the northern part of Boulder Basin, and Echo Bay in the Overton Arm of Lake Mead. The Promontory Alternative should not affect these two populations.

The Service believes that razorback suckers and potentially bonytail chub occur in the vicinity of the Gold Strike Alternative, but not near the Sugarloaf Alternative. However, the Service is concerned with potential downstream effects for these two fish species which may result from either of these alternatives. The largest remaining population of genetically diverse razorback suckers occurs downstream in Lake Mohave. This population could be affected by all three alternatives; however, effects caused by the Promontory Alternative may be easier to control in a pool situation versus a flowing river. Downstream effects caused by construction should be considered, as well as effects from accidents which may occur during operation.

The Service believes that the chuckwalla *(Sauromalus obesus)* and banded gila monster *(Heloderma suspectum cinctum)* occur within the project area, particularly along the Sugarloaf Alternative. Both of these reptiles are considered by the Service to be species of concern. The relict leopard frog *(Rana onca)* has been found in springs below the Dam and in springs on the Overton Arm of Lake Mead. Once considered extinct, this leopard frog was rediscovered in 1991. Any alignment which impacts springs or groundwater in the project area could impact the relict leopard frog.

Desert bighorn sheep *(Ovis canadensis nelsoni)*, a high-profile species of great interest to the public, is locally abundant in the vicinity of Hoover Dam, Black Canyon, and Gold Strike Canyon. Bighorn sheep are not protected by the Act, nor are they considered a species of concern by the Service. However, the Nevada Division of Wildlife actively manages the species as a game mammal for long-term sustainability.

We recommend the EIS address all federally listed or candidate species, and species of concern to the Service which may occur in the project area, be affected by the project, or occur in the area designated for cumulative impact analyses. The EIS should address whether project activities may cause direct, indirect, or cumulative impacts to these species or their habitats. FHWA should initiate consultation under section 7 of the Act to address potential impacts to federally listed species.

Cumulative Impacts

We support the Council on Environmental Quality's recommendation that cumulative effects analyses should be the tool for Federal agencies to evaluate the implications of project-level assessments on regional resources, and that cumulative effects should be conducted on the scale of human communities, landscapes, watersheds, and airsheds (CEQ 1997). Therefore, we suggest the appropriate scale of analysis for cumulative impacts should be adjacent portions of the lower Colorado River, and all tributaries influenced by the proposed project. Cumulative impact analyses should evaluate and quantify, where possible, all Federal and non-Federal past, present, and future actions which may affect the same resources potentially impacted by the proposed action.

Wildlife Populations and Habitat

Positive and negative impacts, either direct, indirect, or cumulative, to terrestrial and aquatic wildlife and habitats should be identified for each alternative. Impacts resulting from construction and subsequent operations, and all ancillary facilities and actions, should be included. Negative impacts that should be addressed include, but are not limited to, destruction or alteration of breeding, nesting, cover, and foraging habitat for wildlife. Descriptions of habitat should include both qualitative and quantitative information. Areas with sensitive resources, such as unique plant community types; wetland and riparian communities; raptor nest sites; winter and summer range for deer and antelope; desert bighorn sheep lambing areas; caves and abandoned mine shafts which may provide roosting or breeding areas for bats; and wildlife corridors, should be examined. Any activities which result in impacts to wildlife populations and riparian habitats should also be addressed.

Under the Migratory Bird Treaty Act (15 U.S.C. 701-718h), active nests (nests with eggs or young) of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, we recommend all land-clearing activities be conducted outside of the avian breeding season. If this is not feasible, we recommend that a qualified biologist survey the construction zone prior to land-clearing activities. If active nests are located, a protective buffer should be identified (depending on the requirements of the species) and the entire area avoided to prevent destruction or disturbance to the nests until they are no longer active. Land clearing could take place, however, if no active nests are found.

The two southern alternatives, particularly the Gold Strike Alternative, pass thru some unique geomorphology (slot canyons) and geothermal wells. These small canyons, which feed the Colorado River below the Dam, offer cool, relatively moist microclimates for a variety of bird and mammal species. The geothermal wells and downstream areas offer unique wildlife habitat, and may contain unique flora and fauna species.

The Service also has interest in wetland and riparian ecosystems. In addition to the Colorado River system, other wetland and riparian communities should be identified. As you are aware, discharge of dredged or fill materials into waters of the United States, including wetlands, is regulated by the U.S. Army Corps of Engineers (Corps) pursuant to section 404 of the Clean Water Act. We recommend the applicant contact the Corps' Reno Field Office, C. Clifton Young Federal Building, 300 Booth Street, Room 2103, Reno, Nevada, 89509, (702) 784-5304, regarding the possible need for a permit. If wetlands or waters of the United States cannot be avoided and will be filled or excavated, we recommend you contact our Reno office at (702) 784-5227. We can assist in developing mitigation and/or compensation for wildlife habitat losses.

Water Quality and Quantity

Impacts to water quality from each alternative should be addressed. This should include a discussion of impacts to surface and ground water, and increased erosion and sediment loads to the Colorado River. The EIS should discuss the presence of ground water supplies and potential effects that may result from the proposed project on these supplies and fish and wildlife resources. The techniques and assumptions used to construct support structures in the Colorado River should be explained.

Soil Quality

The impacts to soil quality from each alternative should be addressed. These impacts should be related to the potential for restoring wildlife habitat types and values in all portions of the proposed alignments following project completion. Areas of cut and fill should be identified for each alternative, including proposed sources and disposal sites.

Air Quality

The document should include discussions of impacts to air quality from particulate and dust emissions from road and bridge construction, as well as fugitive dust resulting from loss of vegetative ground cover, if applicable.

Hazardous Materials

All hazardous materials used during construction should be identified. Potential impacts of these materials on fish and wildlife should be discussed. A contingency plan for dealing with spills and accidents should be developed. The location and qualifications of personnel and equipment which would respond to transportation accidents involving hazardous materials should be identified.

Noise

The EIS should address impacts of construction and highway noise on wildlife. High levels of background noise are likely to interfere with the ability of wildlife, especially birds, to detect their mates, young, and predators. This, in turn, may reduce reproductive success and result in a decline in wildlife populations.

Mitigation/Compensation for Impacts

We recommend that FHWA develop measures to avoid, reduce, or compensate for direct and indirect habitat losses and other negative impacts to fish and wildlife resources that would result from this project. Compensation for temporal loss of fish and wildlife resources, habitat fragmentation, and other impacts could include reclamation of other Federal lands disturbed by past activities, placement of monies into a fund for restoration, or enhancement of other disturbed areas. Sites used to compensate for permanent or long-term impacts should be set aside in perpetuity. The EIS should discuss mitigation/compensation measures in detail, including restoration of areas disturbed by project construction. We recommend that only native plant

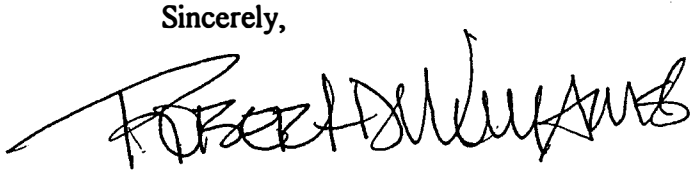
species indigenous to the area be used in restoration. The goal should be restoration of native ecosystems as well as reduction of erosion potential.

Should it be determined that this project may have long-term impacts to any stream system, we recommend that measures be developed to ensure such impacts do not occur or are reduced to insignificant levels. The EIS should describe how impacts will be monitored over the long-term to ensure significant impacts do not occur. Monitoring levels and parameters should be described, and assurances provided that they will be implemented, not only for the life of the project, but for whatever time frame indirect impacts are likely to occur. A mechanism to ensure implementation of additional mitigation/compensation measures should be provided in the event monitoring shows higher levels of adverse impacts than originally anticipated. Monitoring should also be provided to ensure success of any mitigation developed for the project.

Besides providing comments on the draft and final environmental document, we may comment on any public notice issued by the Corps for a permit pursuant to section 404 of the Clean Water Act for discharge of dredged or fill material into wetlands or waters of the United States. We may also comment on any public notice issued for a permit from the Nevada Division of Environmental Protection.

We appreciate the opportunity to provide scoping comments on this project. If you have any questions, please contact Michael Burroughs, in the Las Vegas Office, at (702) 646-3499.

Sincerely,



Robert D. Williams
Field Supervisor

cc:
Administrator, Nevada Division of Environmental Protection, Carson City, Nevada
Administrator, Nevada Division of Wildlife, Reno, Nevada
Regional Manager, Nevada Division of Wildlife, Las Vegas, Nevada
Chief, Nevada Field Office, U.S. Army Corps Of Engineers, Reno, Nevada
Deputy State Director, Resources, Land Use and Planning, Bureau of Land Management, Reno, Nevada

Chief, Wetlands Section, Environmental Protection Agency, San Francisco, California
Field Supervisor, Arizona Field Office, Fish and Wildlife Service, Phoenix, Arizona
Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico
Assistant Regional Director, Klamath and California Ecoregions, Fish and Wildlife Service, Portland, Oregon
Assistant Regional Director, Interior Basin Ecoregion, Fish and Wildlife Service, Portland, Oregon

References

Council on Environmental Quality, 1997. Considering cumulative effects under the National Environmental Policy Act.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

BOB MILLER, *Governor*

TOM STEPHENS, P.E., *Director*

November 20, 1997

In Reply Refer to:
Cooperating Agency
Hoover Dam Bypass

Mr. Larry C. Smith, P.E.
Division Engineer
FHWA, Central Federal Lands Highway Division
555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

Dear Mr. Smith:

I am writing in response to your letter requesting cooperating agency status from the Nevada Department of Transportation for the development of an EIS to construct a bypass of US 93 in the vicinity of Hoover Dam.

The Nevada Department of Transportation is already part of the Project Management Team and agrees to also be a cooperating agency for the development of this EIS. Bill Crawford is a member of the Project Management Team and will be the cooperating agency representative. He is familiar with the past studies and will keep me informed on the progress of this project.

Sincerely,

Tom E. Stephens, P.E.
Director

TES:WCC

STATE OF NEVADA
DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS
STATE HISTORIC PRESERVATION OFFICE
100 N. Stewart Street
Carson City, Nevada 89701-4285

BOB MILLER
Governor

JOAN G. KERSCHNER
Department Director

RONALD M. JAMES
State Historic Preservation Officer

October 27, 1997

Larry C. Smith, P.E.
Federal Highway Administration
Central Federal Lands Highway Division
555 Zang Street
P. O. Box 25246
Denver, CO 80225-0246

Dear Mr. Smith:

The Nevada State Historic Preservation Officer will be unable to attend this meeting because of prior commitment during the week of October 27, 1997. Other staff members are also committed.

We would like you to know that we are very interested in the process of selecting an alternative for the Hoover Dam bypass. Hoover Dam is a National Historic Landmark and any proposed effects to it must include Advisory Council participation in the consultation process (36CFR800.10).

Hoover Dam is one of the largest and earliest of the Bureau of Reclamation's massive multiple-purpose dams. Major engineering techniques were developed in its construction. Building the Dam made possible the increases in population growth, industry and agriculture for Arizona, California and Nevada.

The boundaries are indicated on the map enclosed with the Landmark nomination. However, other properties such as railroad grades, defense structures, and power lines extend beyond these boundaries.

We look forward to working with you on this project. If you wish to meet and discuss the alternatives' proposed effects to the Landmark please call me at (702) 687-6361.

Sincerely,

Alice M Baldrica

ALICE M. BALDRICA, Deputy
State Historic Preservation Officer

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

OCT 0 8 1997

In Reply Refer To:
HPD-16

Mr. Robert Williams
State Supervisor
U.S. Fish and Wildlife Service
4600 Kietzke Lane, Suite 125-C
Reno, NV 89502

Dear Mr. Williams:

Subject: Hoover Dam Bypass, U.S. 93, Interagency Coordination Meeting/Workshop

This letter is to confirm arrangements for an interagency coordination meeting/workshop on the subject project. The meeting is set for Wednesday, October 29, from 8:00 a.m. to 4:00 p.m. in the Pueblo Room (Room #1119) of the Clark County Government Center, 500 South Grand Central Parkway, Las Vegas, Nevada.

The environmental process for this project was begun by the Bureau of Reclamation (Reclamation) in 1989. Prior to the release of the Draft Environmental Impact Statement for public review in 1993, Reclamation withdrew from the project as the lead agency. Reclamation's emphasis changed from construction of major public works projects to more water resource management. With no lead agency or funding to continue the environmental process for a new crossing, the project was officially put on hold in 1995. In May 1997, the Federal Highway Administration, Central Federal Lands Highway Division, was named as the lead agency to resume the Hoover Dam Bypass project.

This meeting is to formally commence the interagency-coordination aspect of that process. This early coordination will help to facilitate an efficient Environmental Impact Statement (EIS) preparation process and ensure that the draft EIS adequately addresses relevant issues. The goals of the meeting are:

1. To identify the affected agency concerns,

2. To inform all agencies of the process for preparing the EIS,

3. To develop project goals and objectives, and

4. To identify the issues and concerns that will be examined in detail in the EIS.

The meeting will be professionally facilitated and will include the use of partnering techniques to encourage participation and promote effective communication between the agencies. We also plan to develop a "Common Goals and Objectives Charter" and an "Issue Resolution Escalation Process."

Furthermore, we have scheduled three Public Information Meetings to update the public on the project, explain the alternatives being considered, and receive public input on the project. The Public Information Meetings will be an open-house type format and are scheduled as follows:

Monday, October 27 - 5:00 to 8:00 p.m. at Mohave Community College, Kingman, Arizona

Tuesday, October 28 - 5:00 to 8:00 p.m. at the Community College of Southern Nevada, Room 100, Boulder City, Nevada.

Wednesday, October 29 - 6:00 to 9:00 p.m. at the Clark County Government Center, Pueblo Room (#1119), Las Vegas, Nevada

We look forward to working with you and your staff and encourage you to participate in both the Interagency and the Public Information Meetings. If you have any questions, please call Messrs. Rick Cushing, Environmental Planning Engineer, at (303) 969-5910, or Terry Haussler, Project Manager, at (303) 969-5916.

Sincerely yours,

LARRY D. HENRY

for Larry C. Smith, P.E.
Division Engineer

Enclosure--Draft Agenda

cc (w/enclosure):
Ms. Dolores Savignano, 1500 N. Decatur Blvd. No. 1, Las Vegas, NV 89108
bc (w/enclosure):
PMT members (Crawford, James, Wallace, Duarte, Mills, Shrader, Burke, Holland, Rud, Thomas)
Brian O'Halloran, CH2M HILL
Rick Cushing
Terry Haussler
Larry Smith
yc: reading file
Central file - Hoover Dam Road
RCushing:jm:10/08/97:L:\environm\wp\hoover\intermtg.wpd

RC

Identical letter to:

Mr. Kevin Roukey, Chief, Nevada Office
U.S. Army Corps of Engineers
C. Clifton Young Federal Building
300 Booth Street, Room 2103
Reno, NV 89509

Ms. Felicia Marcus
Regional Administrator
Environmental Protection Agency
Region 9
75 Hawthorn Street
San Francisco, CA 94105

Commander (POW-2)
U.S. Coast Guard
Building 50-6
Alameda, CA 94501-5100

Mr. Bob Posey, Habitat Program Manager
Arizona Game and Fish Department
5325 N. Stockton Hill Road
Kingman, AZ 86401

Mr. Butch Padilla, Habitat Specialist
Nevada Division of Wildlife
4747 Vegas Drive
Las Vegas, NV 89108

Mr. Robert Ferraro, Mayor
City Hall
401 California Avenue
Boulder City, NV 89005
cc: Mr. John Sullard, City Manager
City Hall
401 California Avenue
Boulder City, NV 89005

Mr. Jim Gibson, Mayor
City Hall
240 Water Street
Henderson, NV 89015
cc: Mr. Phil Speight, City Manager
City Hall
240 Water Street
Henderson, NV 89015

Mr. Les Byram, Mayor
310 North 4th Street
Kingman, AZ 86401
cc: Mr. Lou Sorensen, City Manager
310 North 4th Street
Kingman, AZ 86401

Ms. Jan Laverty-Jones, Mayor
City Hall
400 E. Stewart Avenue
Las Vegas, NV 89101
cc: Mr. Larry K. Barton, City Manager
City Hall
400 E. Stewart Avenue
Las Vegas, NV 89101

Ms. Yvonne Atkinson-Gates, Chair
Clark County Commission
500 South Grand Central Parkway, 6th Floor
Las Vegas, NV 89155-1601
cc: Mr. Martin J. Manning, Director
Clark County Public Works Department
500 S. Grand Central Parkway
Las Vegas, Nevada 89155

Ms. Carol Anderson, Chair
Mohave County Board of Supervisors
PO Box 7000
Kingman, AZ 86402-7000
cc: Mr. Mike Hendrix, Acting Public Works Director
Mohave County Transportation Board
PO Box 7000
Kingman, AZ 86402-7000

Mr. Ronald M. James
State Historic Preservation Officer-Nevada
100 N. Stuart Street
Carson City, Nevada 89701

Mr. Jim Garrison
State Historic Preservation Officer-Arizona
1300 W. Washington
Phoenix, Arizona 85007

United States Department of the Interior

FISH AND WILDLIFE SERVICE
NEVADA STATE OFFICE
4600 KIETZKE LANE, SUITE 125C
RENO, NEVADA 89502-5055

September 26, 1997
File No. FHWA 1

Mr. Larry C. Smith
Division Engineer
Federal Highway Administration
Post Office Box 25246
Denver, Colorado 80225-0246

Dear Mr. Smith:

Thank you for your September 11, 1997, request to be a cooperating agency for preparation of the environmental impact statement for the Hoover Dam Bypass/U.S. 93. We are interested in providing input on this project. However, we have reviewed your "Guidance on Cooperating Agencies" and, due to other program commitments and limitations on time and staff, we are precluded from fulfilling the responsibilities outlined in this guidance without transfer funding from your agency. If transfer of funds is not possible, we are willing to be a cooperating agency and provide input on issues for which we have special expertise as time and funding allows.

Thank you for this opportunity to be a cooperating agency under the National Environmental Policy Act. If you have any questions, please contact Mary Jo Eipers at (702) 784-5227.

Sincerely,

Allen R. Pfister
for Chester C. Buchanan
Acting State Supervisor

cc:
Office Supervisor, Las Vegas Fish and Wildlife Service Suboffice, Las Vegas, Nevada
Assistant Regional Director, Fish and Wildlife Service, Interior Basin Ecoregion, Portland, Oregon
Assistant Regional Director, Fish and Wildlife Service, Klamath and California Ecoregions, Portland, Oregon

United States Department of the Interior

NATIONAL PARK SERVICE

LAKE MEAD NATIONAL RECREATION AREA

601 Nevada Highway

BOULDER CITY, NEVADA 89005

IN REPLY REFER TO:

D18 (LAME-M)

September 24, 1997

Mr. Larry C. Smith, P.E., Division Engineer
Central Federal Lands Highway Division
Federal Highways Administration
P.O. Box 25246
Denver, Colorado 80225-0246

Dear Mr. Smith:

In reference to your letter dated September 11, 1997, we are requesting cooperating agency status for the preparation of the Environmental Impact Statement (EIS) for the construction of a bridge over the Colorado River near Hoover Dam. We will do so in accordance with the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act for the preparation of the EIS.

The National Park Service is a member of the Project Management Team and has been an active participant in this process, along with the Bureau of Reclamation, for the last ten years. We feel that our continued participation is important.

If there are any questions concerning this request, please contact Resource Management Specialist Bill Burke at (702) 293-8935 or Park Planner Jim Holland at (702) 293-8986.

Sincerely,

for Alan O'Neill
Superintendent

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

SEP 1 1 1997

In Reply Refer To:
HPD-16

Mr. Chet Buchanen
Acting Project Leader
U.S. Fish and Wildlife Service
4600 Kietzke Lane, Suite 125-C
Reno, NV 89502

Dear Mr. Buchanen:

The Federal Highway Administration (FHWA), Central Federal Lands Highway Division, in cooperation with the Bureau of Reclamation (Reclamation), National Park Service, Arizona Department of Transportation, and Nevada Department of Transportation, is proposing to construct a bridge over the Colorado River near Hoover Dam. Environmental and engineering studies for this proposal were initiated by Reclamation in 1989, but were terminated in 1993 for funding reasons.

The proposed improvement, along US 93 in Arizona and Nevada, consists of a bridge across the Colorado River and approximately three miles of associated new roadway construction. The entire project is on Federally-owned lands. See attached map showing project location and alternatives currently being considered.

The purpose of this proposal is to remove through-traffic and trucks from the crest of Hoover Dam, which will reduce the potential for pedestrian-vehicular conflicts; safeguard the dam and power plant facilities and the waters of Lake Mead and the Colorado River from potential spills or explosions involving transportation of hazardous cargo; protect the dam and power plant facilities in the interest of national security; provide improved conditions for operation and maintenance of the dam facilities; reduce traffic accidents and congestion near Hoover Dam; and enhance the visitors' experience in the Hoover Dam area. Reclamation's environmental and engineering studies will be used to the extent possible. The studies will be updated as necessary to assess social, economic, and environmental (SEE) impacts and any other potential impacts of the proposed improvement.

The FHWA, as the lead agency, will prepare an Environmental Impact Statement (EIS) for the proposed project following the Council on Environmental Quality's (CEQ) "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA)" of November 29, 1978, 40 CFR, Parts 1500-1508. In accordance with CEQ REG 1501.6 and 23 CFR 771, the FHWA is requesting that your agency become a cooperating agency in the development of this project.

We are requesting cooperating agency status from the following agencies: U.S. Fish and Wildlife Service (Reno office), U.S. Army Corps of Engineers (Reno office), Environmental Protection Agency, U.S. Coast Guard, Bureau of Reclamation, National Park Service, Arizona Department of Transportation, Nevada Department of Transportation, Arizona Game and Fish Department, and Nevada Division of Wildlife.

The views of cooperating agencies will be sought throughout all stages of the development of the EIS. This coordination is intended to preclude any subsequent and duplicative reviews by cooperating agencies. This coordination will also aid in identifying all reasonable alternatives; social, economic, and environmental impacts; and measures to minimize adverse impacts that may result from this improvement.

Enclosed is a copy of the FHWA's "Guidance on Cooperating Agencies," which outlines the responsibilities of the FHWA (as lead agency) and of cooperating agencies. More project-specific responsibilities may be worked out during the scoping process.

An interagency Project Management Team (PMT) was formed in May of this year to guide our project development process. Agencies already represented on the Project Management Team (PMT) may want to designate one or both of their PMT members as our point of contact. Cooperating agencies not represented on the PMT are asked to designate a single point of contact for their agency. Regardless of your decision to participate as a cooperating agency, your agency is invited to an interagency scoping meeting in Las Vegas that is tentatively scheduled for Wednesday, October 29. Evening public scoping meetings are scheduled for Kingman, Boulder City, and Las Vegas on October 27, 28, and 29, respectively. Meeting locations and times will be announced prior to the meetings.

We look forward to your response for participating as a cooperating agency and for participating in the interagency meeting. We ask that you please respond by September 26. If you have any questions or need additional information, you may call Mr. Terry Haussler, Project Manager, at 303-969-5916, or write to the above address (Attention: Terry Haussler, HPD-16).

Sincerely yours,

for Larry C. Smith, P.E.
Division Engineer

Enclosures

cc (w/ map encl):
Mr. Sam F. Spiller, Field Supervisor, US F&W Service, ~~3616 W. Thomas Road, Suite 6~~ 2321 W. Royal Palm Road, #103,
Phoenix, AZ ~~85019~~ 85021-4951

bc (w/ encl):
PMT members (Crawford, James, Wallace, Duarte, Mills, Shrader, Burke, Holland, Rud, Thomas)
Brian O'Halloran, CH2M HILL
Rick Cushing
Terry Haussler
yc: reading file
Central file - Hoover Dam Road TH
THAUSSLER:jm:9/11/97:L:\des\ad2\wp\hoover\coopagy.wpd

Identical letter (w/ enclosure) to:

Mr. Kevin Roukey, Chief, Nevada Office
U.S. Army Corps of Engineers
C. Clifton Young Federal Building
300 Booth Street, Room 2103
Reno, NV 89509
cc (w/ map encl): Chief, Phoenix Regulatory Branch, U.S. Army Corps of Engineers, 3636 N. Central, Suite 760, Phoenix, AZ 85012-1936

Ms. Felicia Marcus
Regional Administrator
Environmental Protection Agency
Region 9
75 Hawthorn Street
San Francisco, CA 94105

Commander (POW-2)
U.S. Coast Guard
Building 50-6
Alameda, CA 94501-5100

Mr. Robert W. Johnson
Regional Director
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Mr. Alan O'Neill, Superintendent
Lake Mead National Recreation Area
601 Nevada Highway
Boulder City, NV 89005

Mr. John Louis, Assistant State Engineer
Arizona Department of Transportation
205 South 17th Avenue, Mail Drop 611E
Phoenix, AZ 85007

Mr. Tom Stephens, Director
Nevada Department of Transportation
1263 South Stewart Street
Carson City, NV 89712

Mr. Bob Posey, Habitat Program Manager
Arizona Game and Fish Department
5325 N. Stockton Hill Road
Kingman, AZ 86401

Mr. Butch Padilla, Habitat Specialist
Nevada Division of Wildlife
4747 Vegas Drive
Las Vegas, NV 89108

United States Department of the Interior

FISH AND WILDLIFE SERVICE
NEVADA STATE OFFICE
4600 KIETZKE LANE, SUITE 125C
RENO, NEVADA 89502-5055

September 4, 1997
File No. 1-5-97-SP-346

Mr. Terry K. Haussler
Federal Highway Administration
Post Office Box 25246
Denver, Colorado 80225-0246

Dear Mr. Haussler:

Subject: Species List for Proposed Hoover Dam Bypass, Clark County, Nevada

In response to your letter received September 2, 1997, enclosed is a list of federally listed species that may occur in the vicinity of the proposed sites (Enclosure A). This fulfills the requirement of the Fish and Wildlife Service to provide information on listed species pursuant to section 7(c) of the Endangered Species Act of 1973, as amended. Enclosure B provides a discussion of the responsibilities Federal agencies have under section 7 of the Endangered Species Act and the conditions under which a biological assessment (BA) must be prepared by the lead Federal agency or its designated non-Federal representative. A list of published references dealing with the distribution, life history, and habitat requirements of the listed species is also included (Enclosure C).

If your agency determines that a listed species may be affected by the proposed project, you should initiate consultation pursuant to 50 CFR § 402.14. Informal consultation may be utilized prior to a written request for formal consultation to exchange information and resolve conflicts with respect to listed species. If a BA is required, and it is not initiated within 90 days of your receipt of this letter, your agency should informally verify the accuracy of this list with our office. If, through informal consultation or development of a BA, or both, the Federal agency determines that the proposed action is not likely to adversely affect the listed species, and the Service concurs in writing, then the consultation process is terminated and formal consultation is not required.

For your consideration, Enclosure A also contains a list of other species of concern to the Service that may occur in the project area. The Service has used information from the State and other private interests to assess the conservation needs and status of these species. Further biological research and field study are needed to resolve their conservation status. One potential benefit of considering these other species of concern is that by exploring alternatives early in the planning process, it may be possible to provide long-term conservation benefits for these species and avoid future conflicts that could otherwise develop. We recommend that you contact the Nevada Natural Heritage Program [1550 East College Parkway, Suite 145, Carson City, Nevada 89710, (702) 687-4245] and the appropriate regional office of the Nevada Division of Wildlife, as well as other local, State, and Federal agencies for data on distribution and conservation needs for these and other species of concern.

Any type of construction or related activity may necessitate the removal of vegetation on the project site. Destruction of bird nests and/or their contents may result if these actions are conducted during the avian breeding season. Such destruction may be a violation of the Federal Migratory Bird Treaty Act. We recommend that either vegetation removal be done outside the avian breeding season, or that surveys be conducted prior to brush removal to ensure that nests are not harmed or that activities do not result in nest failures.

Please reference File No. 1-5-97-SP-346 in future correspondence concerning this species list. If you have any questions, please contact Stephanie Byers at (702) 784-5227.

Sincerely,

Allan R. Pfuster

for Chester C. Buchanan
Acting State Supervisor

Enclosures (3)

ENCLOSURE A
ENDANGERED AND THREATENED SPECIES
AND SPECIES OF CONCERN
FOR PROPOSED HOOVER DAM BYPASS
CLARK COUNTY, NEVADA

File Number: 1-5-97-SP-346

Endangered

Birds	
Southwestern willow flycatcher	*Empidonax traillii extimus*
Peregrine falcon	*Falco peregrinus anatum*
Fishes	
Devil's Hole pupfish	*Cyprinodon dibolis*
Bonytail chub	*Gila elegans*
Razorback sucker	*Xyrauchuen texanus*

Threatened Species

Bird	
Bald eagle	*Haliaeetus leucocephalus*
Reptile	
Desert Tortoise	*Gopherus agassizii*

Species of Concern

Mammals	
Spotted bat	*Euderma maculatum*
Greater western mastiff-bat	*Eumops perotis californicus*
Allen's big-eared bat	*Idionycteris phylloteris*
California leaf-nosed bat	*Macrotus californicus*
Small-footed myotis	*Myotis ciliolabrum*
Long-eared myotis	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Cave myotis	*Myotis velifer*
Long-legged myotis	*Myotis volans*
Yuma myotis	*Myotis yumanensis*
Big free-tailed bat	*Nyctinomops macrotis*
Pale Townsend's big-eared bat	*Plecotus townsendii pallescens*
Birds	
Western burrowing owl	*Athene cunicularia hypugea*
Black tern	*Chlidonias niger*
Least bittern	*Ixobrychus exilis hesperis*
White-faced ibis	*Plegadis chihi*
Reptiles	
Banded Gila monster	*Heloderma suspectum cinctum*
Chuckwalla	*Sauromalus obesus*

Amphibian	
Relict Leopard frog	*Rana Onca*
Plants	
Las Vegas bearpoppy	*Arctomecon californica*
Threecorner milkvetch	*Astragalus geyeri* var. *triquetrus*
Las Vegas catseye*	*Cryptantha insolita*
Sticky buckwheat	*Eriogonum viscidulum*

* Taxon may be extinct

U.S. Department
of Transportation
Federal Highway Administration

Central Federal Lands
Highway Division

555 Zang Street
P.O. Box 25246
Denver, Colorado 80225-0246

AUG 2 8 1997

In Reply Refer To:
HPD-16

Mr. Chet Buchanen
Acting Project Leader
U.S. Fish and Wildlife Service
4600 Kietzke Lane, Suite 125-C
Reno, NV 89502

Dear Mr. Buchanen:

Subject: Hoover Dam Bypass, US 93

As you are aware, the Federal Highway Administration, in cooperation with the Nevada Department of Transportation, Arizona Department of Transportation, Bureau of Reclamation, and National Park Service, is proposing to construct a bridge across the Colorado River in the vicinity of Hoover Dam. The project also involves approximately four miles of new roadway construction, all of which is on Federally-owned lands.

The project area is covered by the "Hoover Dam" and "Boulder City" USGS quadrangles. Enclosed is an aerial photo showing the project location and the three alternatives being considered. Approximate photo scale is one inch equals one-half mile.

The Bureau of Reclamation began environmental and engineering studies for this project in 1989. Enclosed is a copy of the original species list provided to the Bureau by your Phoenix office. The project involves dealing with both state and regional boundaries and jurisdictions. Although the original consultation was done through your Phoenix office, the Project Management Team (PMT) has recommended that we resume the consultation process through the Nevada side of the U.S. Fish and Wildlife Service. This recommendation was made primarily because of the proximity of the project to your Las Vegas office. Your Albuquerque and Portland regional offices have verbally agreed to this change. We have also made initial contact with Dolores Savignano in your Las Vegas office.

As part of our analysis to complete the Environmental Impact Statement for this project, we request that you advise us of any threatened or endangered plant and animal species (as well as proposed or candidate species) that may be in the project area. We have already met with the

Nevada Division of Wildlife and the Arizona Game and Fish Department to update them and to discuss their concerns. If you have any questions, please contact me at 303-969-5916.

Sincerely yours,

/s/

Terry K. Haussler
Project Manager

Enclosures

cc (w/enclosures):
Ms. Dolores Savignano, Office Supervisor, Fish & Wildlife Service, 1500 N. Decauter Blvd., #1, Las Vegas, NV 89108
bc (w/o enclosures):
T. Haussler
yc: reading file
Central file: Hoover Dam Road Bypass
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United States Senate

COMMITTEE ON COMMERCE, SCIENCE,
AND TRANSPORTATION

WASHINGTON, DC 20510–6125

April 30, 1997

The Honorable Rodney Slater
Secretary
U.S. Department of Transportation
400 7th Street, S.W.
Washington, D.C. 20590

Dear Rodney:

I am writing to follow up on your testimony last week before the Senate Committee on Commerce, Science, and Transportation.

During the ISTEA reauthorization hearing, you indicated your willingness to work with the States of Arizona and Nevada to resolve a transportation safety problem concerning US 93, a designated high priority transportation corridor. On March 10, 1997, Senator Kyl and I wrote to you seeking your input on this very same transportation safety issue. As you know, the Nevada Congressional Delegation and the Governors of Arizona and Nevada are also very concerned over this problem.

Specifically, the two-lane bridge located on top of the federally-owned Hoover Dam poses critical transportation safety hazards. The crossing, which links Arizona and Nevada, has deteriorated severely over the years. In addition to serious safety concerns, the insufficient bridge leads to significant traffic congestion and resultant pollution at the federal facility. A replacement bridge has been authorized for more than a decade and I remain interested in receiving your views regarding what existing federal program or programs are best suited to advance this federal project along.

For your information, I am attaching a copy of our earlier correspondence to you concerning the Hoover Dam. I look forward to your reply.

Sincerely,

John McCain
Chairman

JM/cc

STATE OF ARIZONA

Fife Symington
Governor

STATE OF NEVADA

Bob Miller
Governor

April 23, 1997

The Honorable Rodney Slater
Secretary
United States Department of Transportation
Washington, DC 20590

Dear Secretary Slater:

We are writing to seek your assistance with a significant transportation safety matter shared by our states—the dangerous and congested roadway across Hoover Dam. At a recent joint meeting with our Congressional delegations, we were informed that this transportation infrastructure project is clearly under the sole jurisdiction of the federal government.

The establishment of a new bridge crossing near Hoover Dam is of utmost importance to the region since the dam is a choke point for a transit corridor defined as a high priority in the National Highway System Designation Act of 1995. We are aware that in 1984 the Secretary of the Interior was directed to build a bridge crossing the Colorado River at Hoover Dam. The Hoover Plant Act, P.L. 98-381, authorized this crossing "to alleviate traffic congestion and reduce safety hazards" on the two-lane highway across the federally-owned and operated dam, within the Lake Mead National Recreation Area.

Thirteen years have passed, and the federal government has not completed the task of funding and constructing a safe and efficient bridge. Increased truck, passenger and pedestrian traffic along this corridor have created tremendous congestion and contribute to the potential for tragic accidents.

We respectfully ask that you give this critical safety matter the highest priority. Our state departments of transportation have been directed to assist you with this project. Thank you for your time and consideration. We look forward to working with you on this and other transportation matters in the future.

Sincerely,

Fife Symington
Governor of Arizona

Bob Miller
Governor of Nevada

1700 West Washington | Capitol Complex
Phoenix, Arizona 85007 | Carson City, Nevada 89710

ARRY REID
NEVADA

United States Senate

WASHINGTON, DC 20510-2803

April 9, 1997

The Honorable Rodney Slater
Secretary of Transportation
400 Seventh Street, SW
Washington, DC 20590

Dear Mr. Secretary:

We are writing both to express our concern about a federal transportation infrastructure project that needs attention, and to seek your input regarding this project.

As you know, in 1984, the Secretary of the Interior was directed to build a bridge over the Colorado River at Hoover Dam. This bridge was authorized under the Hoover Plant Act (Public Law 98-381), "to alleviate traffic congestion and reduce safety hazards" on the two-lane highway bridge linking Arizona and Nevada atop the federally-owned and operated Hoover Dam. More than twelve years have passed, however, and the federal government has not moved on the project. The current Hoover Dam bridge is deteriorating to a point of critical risk. It is in extremely poor condition and has been the source of numerous accidents, particularly accidents involving large trucks. Moreover, something must be done to alleviate the extremely heavy traffic on the bridge, as well as the resulting safety and congestion problems.

Hoover Dam is federal property and the federal government has the chief responsibility to address this critical problem. Consequently, we would like to have your views on which federal programs and funding sources would be most appropriate to utilize in advancing this project. We firmly believe this bridge merits prompt attention and advancement.

Thank you for your kind attention to this request. We look forward to working with you on this and other transportation projects in the future.

Sincerely,

HARRY REID
United States Senator

RICHARD BRYAN
United States Senator

United States Senate

COMMITTEE ON COMMERCE, SCIENCE,
AND TRANSPORTATION
WASHINGTON, DC 20510-6125

March 10, 1997

The Honorable Rodney Slater
Secretary
U.S. Department of Transportation
Washington, D.C. 20590

Dear Rodney:

We are writing to seek your input regarding a safety-sensitive transportation infrastructure project which, we are informed, is under the jurisdiction of the federal government.

In 1984, the Secretary of the Department of Interior was directed to build a bridge crossing over the Colorado River at the Hoover Dam. Specifically, the Hoover Plant Act, P.L. 98-381, authorized this crossing "to alleviate traffic congestion and reduce safety hazards" on the two-lane highway bridge atop the federally-owned and operated Hoover Dam which links Arizona and Nevada. Yet more than 12 years have passed and the federal government has not been able to fulfill its obligation to move the authorized project forward. In the meantime, the current crossing continues to deteriorate to the point where critical transportation safety problems will multiply. Without a remedy, these risks will escalate even further on this designated high priority transportation corridor.

Because the Dam is federal property, we believe the federal government has the prime responsibility for the problem. Therefore, we would appreciate receiving your views regarding what existing federal program or programs may be best suited to advance this federal project and what funding resources may be available. From what we have learned about this federal project, it could compete well with other proposals and merits fair consideration for advancement.

Thank you for your time and consideration to our request. We look forward to working with you on this and other critical transportation matters in the weeks and months ahead.

Sincerely,

John McCain
U.S. Senator

Jon Kyl
U.S. Senator

JM/cc

JUL 28 1989

LC-155
ENV-4.000

Memorandum

To: Field Supervisor, Division of Ecological Services, Fish and Wildlife Service, 3616 W. Thomas Road, Suite 6, Phoenix AZ 85019

From: Regional Environmental Officer

Subject: Request for List of Threatened and Endangered Species for the Proposed Black Canyon Bridge Project (Endangered Species)

In accordance with Section 7(c) of the Endangered Species Act of 1973, as amended, we are requesting information on any listed species or species proposed for listing which may be present in the area involving the proposed Black Canyon Bridge and associated approaches.

The general project area and the presently preferred alternative for both the Nevada and Arizona approaches and the bridge site are shown on the enclosed map. A brief description of the proposed action is also enclosed for your information. Should the area of concern change significantly we will request an additional list of threatened and endangered species from your office.

Although the proposed project area involves two Fish and Wildlife Service Field Offices (Phoenix and Reno), we have only contacted your office. Please advise this office if you feel that the Reno office would be more appropriate to contact.

Should you have any questions please contact Mr. Michael Walker of my staff at FTS 598 7526.

WILLIAM E. RINNE

Enclosures 2

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U.S. Department of Transportation
United States Coast Guard

Commander
Eleventh Coast Guard District

Building 10, Rm 214
Coast Guard Island
Alameda, CA 94501-5100
Tel (510) 437-3514
Fax (510) 437-5836

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Colorado R (330)
22 February 1993

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Lundquist

William E. Rinne
Regional Environmental Officer
U.S. Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Mr. Rinne:

You asked for additional clarification of my 3 February 1993 letter concerning your proposed US# 93 bridge over the Colorado River near the Hoover Dam.

The Coast Guard has jurisdiction over bridges crossing the Colorado River from the international border to and including Lake Powell. Normally, the construction of a bridge over that reach of the Colorado River requires a Coast Guard bridge permit. The Surface Transportation Assistance Acts have exempted certain FHWA funded projects from the need to obtain a Coast Guard bridge permit. Specifically, the Act exempts waterways, or portions of waterways, where there is no navigation by vessels longer than 21 feet.

For your specific project, alternatives B and C are located downstream of the dam and according to our knowledge of current waterway use, meet the criteria for exemption.

Alternative A, upstream of the dam, appears to cross an area where vessels longer than 21 feet could or do operate. If that is the case, a Coast Guard permit would be required. Your field personnel may be able to verify whether that area upstream of the dam is used by maintenance boats, sailboats, larger houseboats, etc.

If all areas are exempt, the Coast Guard will have no further interest in this project.

If, however, the alternative A site is not exempt, and the final site selection has not been made, a Coast Guard bridge permit may be required, and I would request designation as Cooperating Agency in your EIS process.

If you have further questions concerning the Coast Guard jurisdiction, please contact my project officer, Susan Worden at (510) 437-3461.

Sincerely,

W. R. TILL
Chief, Bridge Section
By direction of the District Commander

Copy to: FHWA NV, AZ
CofE Sacramento; attn Art Champ

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ARIZONA ECOLOGICAL SERVICES FIELD OFFICE
3616 West Thomas Road, Suite 6
Phoenix, Arizona 85019

Telephone: (602) 379-4720 FAX: (602) 379-6629

2-21-89-F-170

February 2, 1993

MEMORANDUM

To: Regional Environmental Officer, Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada

From: Field Supervisor

Subject: Biological Opinion for the Colorado Bridge Crossing - Hoover Dam Project

This Biological Opinion (BO) responds to your request dated November 5, 1992, for initiation of formal consultation with the Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended. The action under consultation is the Bureau of Reclamation (BR) construction of a bridge and its associated approach roads and interrelated infrastructure. The Mojave population of the desert tortoise (*Gopherus agassizii*), a federally listed threatened species, may be impacted by your action. We concur with the determination that the Sugarloaf Alternative of the Colorado River Bridge Crossing Project will most likely not affect the endangered peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), bonytail chub (*Gila elegans*), razorback sucker (*Xyrauchen texanus*) or the Devil's Hole pupfish (*Cyprinodon diabolis*). The 90-day consultation period began on November 9, 1992 the day your request for initiation was received by our office.

This BO was prepared using information contained in your request for formal section 7 consultation dated November 5, 1993; a biological assessment dated November 3, 1993 (BR 1993); information in our files; field trips; and conversations with your staff.

BIOLOGICAL OPINION

It is our biological opinion that the proposed Sugarloaf Alternative of the Colorado River Bridge Crossing Project is not likely to jeopardize the continued existence of the threatened Mojave population of the desert tortoise. Critical habitat was designated for the Beaver Dam Slope subpopulation in Utah in 1980 but not for the subpopulations in Arizona, California, and Nevada. Therefore, no critical habitat will be destroyed or adversely modified by those activities.

DESCRIPTION OF THE PROPOSED ACTION

The BR is seeking a permanent solution to the high volume of vehicular traffic now using U.S. Highway 93 across Hoover Dam and the Colorado River on the Nevada/Arizona border (Figure 1). When the dam was constructed in 1935, there was very little traffic. During 1990, an average of 8,204 vehicles per day crossed the dam. The hazard to public safety has increased dramatically. During 1989, there were 50 accidents in the project area, 22 involved semi-tractor trailers. A serious environmental accident could occur if a truck containing volatile fuel, chemicals, or hazardous waste lost its load on the top of the dam and the material entered Lake Mead or the Colorado River. Public Law 98-381, dated August 17, 1984, authorized the Secretary of the Interior to construct a Colorado River bridge crossing, including suitable approach spans, immediately downstream from Hoover Dam for the purposes of alleviating traffic congestion and reducing safety hazards.

The proposed action is the construction of a bridge crossing the Colorado River approximately 1,500 feet downstream of Hoover Dam. The Sugarloaf Alternative was selected for the proposed action. The action would require the constructing about 2.2 miles of highway approach in Nevada, a 1,900-foot bridge, and approximately 1.1 miles of highway approach in Arizona. Construction time is estimated to be five to six years.

Highway Approach Construction

In Nevada the new approach would leave the existing highway about 1,000 feet east of the Goldstrike Casino (Figure 2). The new highway would be located immediately south of existing U.S. Highway 93 until it reaches the BR warehouse area. It would then make a sweeping turn to head directly southeast toward the Colorado River. The new road would cross the existing BR service road before joining existing U.S. Highway 93 for approximately 1,300 feet. In this section, a frontage road would need to be constructed along the south side of the new highway. This frontage road would provide access to the dam by passing beneath the new highway, thus allowing the existing highway to continue to function as the dam access road.

From the warehouse area, the grade steepens slightly to approximately three percent as the road would pass through a gap in the high rock ridge that parallels the river and then would descend to the long-span bridge over the river. On the Arizona side of the bridge, the approach road would transverse an area of deep through-cut along the north slope of Sugarloaf Mountain. This segment of new highway would then pass through an area containing two existing sewage evaporation ponds that would need to be relocated. Past the sewage ponds the highway would turn more southerly, crossing a wide ravine at a six percent grade, and intersecting existing U.S. Highway 93 (Figure 2).

Other features

On the Nevada approach a bridge, approximately 400 feet long, would cross a bend in Goldstrike Canyon to eliminate constructing a large fill area. The fill would have extended down into the canyon, completely covering the bottom of the wash throughout the bend. The bridge would keep the bottom of the canyon unchanged for drainage flows, would preserve access to the canyon, and would provide a large opening for wildlife to cross beneath the new highway.

On the Nevada approach, a 300-foot-long tunnel is proposed that would pass through a high, narrow ridge that separates the Goldstrike Canyon from the open valley to the northeast. Using this tunnel would keep upland terrain intact for wildlife crossing, would avoid having to relocate the transmission tower on the above ridge, and would result in no excess excavated material on the Nevada highway approach.

A highway bridge approximately 800 feet long, would cross a large ravine on the Arizona approach. This bridge would allow existing drainage flows and wildlife movements in the ravine to continue crossing beneath the new highway.

Preliminary engineering estimates indicate that balance of cut and fill would occur on both highway approaches, eliminating the need to dispose of excess excavated material.

No major detours, closures, or traffic delays are expected to occur during construction of the river bridge and highway approaches. The existing highway could remain open with minimal interference, except during construction at the beginning and ending locations of the project. Specifications would provide for maintaining two lanes of traffic during construction.

The approaches would include four wildlife underpasses, three wildlife overpasses, two highway bridges (which would also function as wildlife under passes), and one tunnel (which would also function as wildlife overpass). Continuous fencing would be placed along both side of the highway to guide wildlife to the crossing structures. Fencing would continue approximately 3,300 feet beyond the intersections of the new highway with existing U.S. Highway 93. Out-jumps would be strategically located to provide means of escape for any bighorn sheep that accidentally get inside the fenced highway right-of-way area.

The following measures would be undertaken to minimize the effects of the proposed action to the desert tortoise:

Qualified desert tortoise biologists would conduct preconstruction surveys on the exact highway routes according to current survey methods established by the Service, Nevada Department of Wildlife, and the Arizona Game and Fish Department.

To compensate for habitat lost, BR would contribute to a section 7 desert tortoise conservation fund.

Any tortoises found in the construction right-of-way would be moved according to protocol prescribed by the Service.

A qualified tortoise biologist would be available for the handling of tortoises found during construction

The BR would ensure that construction workers are briefed on tortoise activity patterns, tortoise sensitivity to human disturbance, and proper handling for removal from roadways.

Measures would be taken to prevent road kills in areas with high tortoise densities and where tortoise movements would be likely. These

measures would be designed and implemented from specifications provided from Nevada, Arizona, and California Departments of Transportation.

SPECIES ACCOUNT AND ENVIRONMENTAL BASELINE

On August 4, 1989, the Service published an emergency rule (FWS 1989) that afforded endangered status to the Mojave population of the desert tortoise. Subsequently, on April 2, 1990, the Mojave population of desert tortoises was listed as threatened throughout its range north and west of the Colorado River (FWS 1990). Critical habitat has not been designated in either Arizona nor Nevada.

Although the Mojave population of desert tortoises is widely distributed, the range of the population has been fragmented and tortoise numbers have declined (Berry 1978, Berry 1989). Desert tortoise population declines have been attributed to the encroachment of human activities (Berry 1978, Berry 1989). These activities include collecting, motor vehicle mortality, off-highway vehicle (OHV) mortality, and shooting. Habitat loss by development, road construction, powerlines, pipelines, agricultural practices, mineral extraction, and other human activities, reduces tortoise numbers. Habitat modification by grazing, or other modification of native vegetative communities and terrain morphology, has caused population declines (Berry 1978, Berry 1989). Further information on the range, biology, ecology, and population status of the desert tortoise can be found in Berry (1984), Duck and Snider (1988), Hohman and Ohmart (1980), Karl (1983), Luckenbach (1982), and Weinstein et al. (1987).

The project area is within the Black Canyon of the Colorado River which is characterized by precipitous rocky terrain and rolling hills dissected by desert washes. Plant communities and associated wildlife are typical for the Eastern Mojave Desert biome, characterized by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Precipitation averages 8 to 12 inches per year in the form of rain. Within the adjacent areas of Lake Mead National Recreation Area, the occurrence of plant and vertebrate animal species have been documented by Niles et al. (1977). Low density populations of desert tortoises are known to cccur adjacent to the project area in the Black Mountains, the Eldorado Mountains, and the Eldorado Valley (Rorabaugh and Allen 1990, and Schwartz et al. 1978). The project area encompasses portions of the threatened Mojave desert tortoise population (Nevada) and the non-listed Sonoran desert tortoise population (Arizona).

Mojave population desert tortoises typically inhabit creosote-burrobush or creosote-yucca vegetation types. Mojave population tortoises prefer bajadas and desert washes where soils range from sandy-loam to light gravel-clay which are optimal for burrow construction. Sonoran population tortoises are found on some steep rocky slopes of mountain ranges, primarily in Arizona uplands vegetation dominated by palo verde and saguaro cactus. However, the populations on both sides of the river in the Black Mountains are apparently more similar to the Mojave populations which typically inhabit less steep areas. The Black Mountains in Arizona are vegetatively similar to mountains of the Mojave Desert (Bureau of Land Management 1988). Thus, the low density population found in the project areas is probably a function of low habitat suitability and could be rated as marginal. Due to the steep, rocky nature of

the project area and the degree of existing disturbance, the area probably could never support more than low density populations.

A "Distribution and Abundance Survey" was conducted by Rorabaugh and Allen (1990) during April and May of 1990 per the "preliminary survey protocol" established by the Reno Field Office of the Service. A relatively small amount of tortoise sign was found on the Nevada and Arizona sides of the Goldstrike Canyon and Promontory Point alignments. During 43 transects totaling 93,450 feet (17.7 miles), four corrected sign, consisting of 5 scat, were encountered. No tortoises or tortoise remains were encountered during the survey. To summarize the survey results, the 0.68 corrected sign per three miles of transect is low compared to other similar studies and likely corresponds to low tortoise densities. For further information on desert tortoise populations at the project site refer to Desert Tortoise Occurrence: Proposed Highway 93-466 Hoover Dam Bypass Routes (Rorabaugh and Allen 1990).

EFFECTS OF THE PROPOSED ACTION ON LISTED SPECIES

Much of the land within the proposed project area and its zone of influence has been disturbed by Hoover Dam construction and its operational features. Approximately 79 percent of the proposed right-of-way has been previously disturbed. The proposed construction along the existing road alignment will affect primarily disturbed, unoccupied habitat. Therefore, the proposed action is not expected to reduce habitat quality or quantity in areas of previous disturbance. However, in other areas that have received less historic impact, some adverse impact to desert tortoises and/or desert tortoise habitat may occur. Since some areas adjacent to the proposed alignment are relatively undisturbed desert tortoise habitat, tortoises may wander into the project area during construction.

Construction of the proposed roadway alignments would result in impacts to approximately 80 acres of creosote-bursage plant community. The alignment does not transverse nearby seep wetland and riparian areas and measures would be taken to protect these areas from indirect impacts of construction.

The width of the construction right-of-way would average 300 feet. Roughly half of this area would be out of the roadway and would be restored if impacted. Temporary disturbance would result from heavy equipment operation and blasting.

The construction of the new highway may affect Mojave population desert tortoises through habitat loss and/or direct mortality. During and after construction the opportunity exists for tortoises to be impacted by vehicles or equipment. A BR estimate indicated that five Mojave desert tortoises may be affected by construction.

In addition to construction related impacts and loss of habitat, there could be mortality associated with road kills along the new highway. After construction is completed, the more efficient nature of the bridge and highway could allow vehicles to travel at higher rates of speed. An increased braking distance resulting from higher attainable automobile speeds could result in increased tortoise deaths from vehicular crushing.

The proposed action will not isolate desert tortoise populations.

REPORTING REQUIREMENTS

Upon locating dead, injured, or sick Mojave desert tortoises, initial notification must be made to the Service's Division of Law Enforcement, Special Agent, Edward Dominguez, Las Vegas (Telephone: 702/388-6380). Instructions for proper handling and disposition of such specimens will be issued by the Division of Law Enforcement consistent with the provisions of this incidental take statement. Care must be taken when handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. All tortoise remains will be frozen immediately and provided to an institution holding appropriate Federal and State permits per their instructions.

Prior to construction, the BR will make arrangements with the institution regarding proper disposition of potential museum specimens. Should no institutions want the tortoise specimens, the remains may be disposed of in any appropriate manner. In conjunction with the care of sick or injured tortoises, or the preservation of biological materials from a dead tortoise, the BR has the responsibility to ensure that information relative to the date, time and location of the tortoise when found, and possible cause of injury or death of each tortoise is recorded and provided to the Service. Should injured animals be treated by a veterinarian and survive, the Service should be contacted regarding final disposition of these tortoises. The Service contact person is Jay Slack, Arizona Ecological Services Office, Phoenix, Arizona (Telephone: 602/379-4720).

The BR will notify this office of all tortoises killed, injured, or removed from the project area within 3 days of each occurrence. The BR will submit annual reports (each calendar year) to the Service concerning all tortoise-related activities undertaken in association with this project. Within 30 days after the completion of the project, the BR will provide the Service with a report detailing all tortoise-related activities undertaken in association with this project, including tortoise biologist activities, actual number of tortoises injured, killed, or moved, and effectiveness of the terms and conditions provided in this Biological Opinion.

If, during the course of the action, the amount or extent of the incidental take limit is exceeded, the BR shall immediately notify the Service in writing. If the incidental take limit is exceeded, to avoid violation of section 9 of the Act, the BR must immediately cease the activity resulting in the take and reinitiate consultation with the Service. Operations must be stopped in the interim period between initiation and completion of the new consultation if it is determined by the Service that the impact of the additional take will cause an irreversible and adverse impact on the species. The BR should provide an explanation for the causes of the additional take.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as the Service's suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species, critical habitat, or regarding

development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibilities for the species.

The BR should initiate a monitoring program designed to determine the effects of the project on the local tortoise population.

For the Service to be kept informed of actions that either minimize or avoid adverse effects, or that benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

CONCLUSION

This concludes formal consultation on the Sugarloaf Alternative of the Colorado River Bridge Crossing in Clark County, Nevada and Mohave County, Arizona as outlined in your November 5, 1992, request. As required by 50 CFR § 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. We would appreciate notification of your final decision on this action.

CANDIDATE SPECIES

For BR to fulfill the intent of the proposed action by compensating for the loss of Sonoran desert tortoise habitat, the Service suggests the following conservation recommendation:

The BR should transfer $5,000 into an account administered by the Bureau of Land Management, Shivwitz Resource Area for mitigation for the destruction of Sonoran tortoise habitat within the project boundaries. The mitigation rate is based $125 per acre of habitat for 40 acres of long term disturbance of habitat. This rate was determined by the compensation formula developed by the Desert Tortoise Compensation Team (1991). These funds should be directly deposited into BLM's desert tortoise compensation fund number AZ-010-7122-5442 administered by BLM for the purpose of securing tortoise management areas, habitat enhancement, and tortoise research. Proposed expenditures should be approved by the Service.

Total payments should be made prior to construction initiation. Payment, if made directly, should be by certified check or money order payable to Bureau of Land Management, AZ-010-7122-5442, and delivered to:

Area Manager
Shivwits Resource Area
225 N. Bluff Street
St. George, Utah 84770

We appreciate the assistance and cooperation of your staff throughout this consultation process. In future written communication, please reference our file number 2-21-89-F-170. If we may be of further assistance, please contact Jay Slack or me.

Sam F. Spiller

cc: Director, Arizona Game and Fish Department, Phoenix, Arizona
Director, Nevada Department of Wildlife, Reno Nevada
State Director, Bureau of Land Management, Phoenix, Arizona
Superintendent, Lake Mead National Recreation Area, Boulder City, Nevada
Regional Director, Fish and Wildlife, Albuquerque, New Mexico (AES)
Senior Resident Agent, Division of Law Enforcement, Fish and Wildlife Service, Reno, Nevada
Field Supervisor, Fish and Wildlife Service, Reno, Nevada
Field Supervisor, Fish and Wildlife Service, Salt Lake City, Utah
Field Supervisor, Fish and Wildlife Service, Ventura, California

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Copy to MTW

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

November 12, 1992

MEMORANDUM

TO: Regional Environmental Officer, Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada

FROM: Field Supervisor

SUBJECT: Initiation of Formal Section 7 Consultation: Colorado River Bridge Crossing - Hoover Dam Project

We received your request, dated November 5, 1992, for formal Section 7 consultation with the Fish and Wildlife Service on November 9, 1992. The surface disturbance associated with the construction of the Sugarloaf Mountain alternative may affect the desert tortoise, a listed species.

The consultation will be processed as soon as possible within the 90-day time frame that started on November 9, 1992. If additional information or time is required, we will contact you.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation, the Federal action agency make no irreversible or irretrievable commitment of resources which limit future options. This practice insures that agency actions do not preclude the formulation or implementation of reasonable and prudent alternatives which avoid jeopardizing the continued existence of endangered or threatened species or adversely modify their critical habitats.

Thank you for assisting the conservation of biodiversity. In future written communication, please reference our file number 2-21-89-F-170. If you have any questions, please call Jay Slack or me (Telephone: 602-379-4720).

Sam F. Spiller

Sam F. Spiller

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico (AWE)
Director, Arizona Game and Fish Department, Phoenix, Arizona

ARIZONA STATE PARKS

800 W. WASHINGTON
SUITE 415
PHOENIX, ARIZONA 85007
TELEPHONE 602-542-4174

June 10, 1992

William E. Rinne
Regional Environmental Officer
DOI-Bureau of Reclamation
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, Nevada 89006-1470

RE: Colorado River Bridge Crossing/Hoover Dam Project -- Class III Survey Report; DOI-BR

Dear Mr. Rinne:

Thank you for providing our office with a copy of the cultural resources survey report for the above proposed project. I have reviewed the documents and have attempted to reach Mr. William White of your staff by telephone in order to clarify a number of issues, but have been unable to get an answer at 702/293-8705. Therefore, I have the following comments pursuant ot 36 CFR Part 800:

1. I note that three possible highway routes and bridge crossing locations were surveyed and encompassed approximately 145 acres of land. A total of eight sites in Arizona was identified within the project area.

2. I agree with the agency that the Kingman Switchyard/Transformer (NV DD:14:1[ASM]) and the World War II bunker (NV DD:14:18[ASM])are contributing elements to the National Historic Landmark since they are situated within the Landmark boundaries. I also agree that NV DD:14:14(ASM), the foundation of a suspension bridge, and NV DD:14:16(ASM), drill test borings, are eligible as contributing elements to a potential historic district focused on the construction, operation, and maintenance of Hoover Dam.

3. I do not agree, however, that the remaining four sites (NV DD:15, 17, and 19[ASM] and AZ F:2:87[ASM]) are not National Register-eligible. The archaeologist recommended that the three historic sites NV DD:14:15, 19(ASM), and AZ F:2:87(ASM) were also eligible as contributing elements to the potential Hoover Dam historic district; I agree with this recommendation and do not understand why the Agency believes that these sites are not eligible. Please provide an explanation of the Agency's eligibility recommendations for these three sites, as such an explanation is lacking from the Agency's cover letter.

4. With regard to the single prehistoric site (NV DD:14:17[ASM]) that was identified during the survey, examination of the photograph in the site file volume shows what may be a trail immediately adjacent to the rock ring. This "trail" is not mentioned in the site survey description or in the site form, yet it is clearly evident in the photo. Please address whether or not this feature is a prehistoric or historic trail. If the feature is a trail, then the site configuration will need to be changed and the eligibility of the site will need to be re-examined in order to consider the information potential of the trail. Once the presence of the possible trail has been addressed, then I will be better able to evaluate the eligibility of this site.

5. I also note that the archaeologist states that NV DD:14:17(ASM) needs to be mapped and photographed. Arizona survey standards include site sketch maps and photographs (see attached SHPO Policy Statement dated January 2, 1992); if this has not been done, please ensure that adequate recordation of NV DD:14:17(ASM) occurs.

6. I note that a site sketch map is also missing for NV DD:14:19(ASM), the historic trash scatter associated with the construction of Hoover Dam.

7. For AZ F:2:87(ASM), the archaeologist states that the site needs systematic photography and mapping; again, if this historic road has not been adequately photodocumented and mapped, please ensure that this occurs.

I look forward to further consultation on the eligibility of sites NV DD:15, 17, and 19(ASM) and AZ F:2:87(ASM). Once eligibility determinations have been made and the alignment/crossing has been selected, then we look forward to consulting with the agency on project effect.

We appreciate your cooperation with this office in complying with the historic preservation requirements for federal undertakings. If you have any questions or concerns, please contact me or Teresa Hoffman, Acting Chief, Historic Preservation Section, at 542-4174 or 542-4009.

Sincerely,

Ann V. Howard

Ann Valdo Howard
Archaeologist

BOB MILLER
Governor

STATE OF NEVADA

PETER G. MORROS
Director

RONALD M. JAMES
State Historic Preservation Officer

OFFICIAL FILE COPY
RECEIVED JUN 8 1992

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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF HISTORIC PRESERVATION AND ARCHEOLOGY

123 W. Nye Lane, Room 208
Capitol Complex
Carson City, Nevada 89710
(702) 687-5138

June 4, 1992

Mr. William E. Rinne
Lower Colorado Regional Office
Bureau of Reclamation
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Mr. Rinne:

The Division of Historic Preservation and Archeology has reviewed the following report submitted by the Bureau of Reclamation (BOR):

> Colorado Bridge Crossing/Hoover Dam Project. Bridge Crossing and Highway Alignment Survey.

The Division concurs that the following sites are eligible for inclusion in the National Register of Historic Places as contributing elements to a potential Hoover Dam historic district under criterion c.:

> 26Ck4695; 26Ck4696; 26Ck4740; 26Ck4741; 26Ck4742; 26Ck4743; 26Ck4746; 26Ck4747; 26Ck4748; 26Ck4749; 26Ck4753; 26Ck4754; 26Ck4755; 26Ck4756; 26Ck4757; 26Ck4758; 26Ck4759; 26Ck4760; 26Ck4761; 26Ck4762; 26Ck4764; 26Ck4765; 26Ck4766.

The Division cannot concur that the following sites are not eligible for inclusion in the National Register of Historic Places:

> 26Ck4698; 26Ck4739; 26Ck4750; 26Ck4751; 26Ck4752; 26Ck4753.

Justification is needed for considering these sites as non- contributing elements to the proposed Hoover Dam historic district. Mr. Queen (BOR) has suggested that these sites may be eligible as contributing elements to the district, and it is unclear why some sites are considered eligible and some are not. For example, both diversion canals (26Ck4753 and 26Ck4740) are functionally similar, are in good condition, and apparently date to the time of dam construction. Why is one (26Ck4740) considered eligible while the other (26Ck4753) considered not eligible for the National Register as a contributing element to the district?. The railroad grade (26Ck4753) is not sufficiently recorded to assess the condition of the grade; better photographic documentation and a more detailed discussion is required for our assessment. Finally, the waste dump (26Ck4750) apparently associated with the dam seems to be an integral feature associated with dam construction. It is an

interesting interpretive feature that provides some insight into dam construction technology. Was there a rail line or tram associated with transfer of waste from the construction site? If so, is this feature recorded?

Much of the site data presented with your submission is inadequate for conducting our review. The Division requests that IMACS site encoding forms be submitted for all recorded sites. The IMACS short form is not suited to recording sites containing architectural features and concentrations of artifacts. Please use the IMACS "long form" or other site recording form approved by this office. It is feared that there may have been diagnostic artifacts present at some of the sites that were not recorded. For example, were any artifacts present at site 26Ck4752? If so, could these provide insight into the function and significance of the structure? Furthermore, site documentation should include sketch maps or detailed topographic maps depicting plan views of the various features within their setting and also showing spacial relationships between the features at a site.

Please contact Eugene Hattori if you have any questions concerning this correspondence.

Sincerely,

Alice M. Baldrica

Alice M. Baldrica, Deputy
State Historic Preservation Officer

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

IN REPLY REFER TO:

LC-158A
ENV-3.00

MAY 5 1992

Mr. Ronald M. James
Nevada State Historic
Preservation Officer
123 West Nye Lane, Room 208
Capitol Complex
Carson City NV 89710

Subject: Colorado Bridge Crossing/Hoover Dam Project
(Cultural Resources)

ENV 3.00
BCP
9-2-1642
6565

Dear Mr. James:

As you are aware, the Bureau of Reclamation (Reclamation) is proposing to construct a bridge that spans the Colorado River in the vicinity of Hoover Dam (Project). Enclosed for your review and comment is a cultural resource report with associated site files. As part of Reclamation's on-going Section 106 consultation with your office for this Project, Reclamation requests your concurrence with our determinations of eligibility for cultural resource sites located within the Nevada side of the Project area.

A preliminary Class III survey was conducted to identify cultural resources that might be impacted during construction of the bridge and highway. Three possible highway routes and bridge crossing locations were investigated comprising approximately 145 acres surveyed. A 200-foot-wide corridor was inspected for each proposed route. Rugged or inaccessible terrain was not inspected for safety considerations. A total of 44 identified sites are located within the Project area of which 36 sites were identified as a result of this survey. Refinements to the highway routes have been made since this survey was conducted and those changes are so noted in the report.

A total of 34 previously and newly identified sites located in Nevada were evaluated for National Register of Historic Places (Register) eligibility. Five features were previously identified as contributing elements of the Register eligible Boulder City Water System. They have since been issued site numbers and are recorded as:

26CK4697 - Booster/Relay Station; 26CK4744 - Foundations;
26CK4745 - Intake/Foundations; 26CK4767 - Culvert; and
26CK4768 - Foundations.

Although not individually eligible, 23 sites are eligible as contributing elements to a potential historic district focused on the construction, operation, and maintenance of Hoover Dam. The boundaries for such a district have not been determined although historic contexts do exist. Three of the sites are located within or partially within the Hoover Dam National Historic Landmark boundaries and are here considered as contributing elements to Hoover Dam:

26CK4753 - Diversion Channel; 26CK4754 - Retaining Wall; and
26CK4765 - Transmission Switchyard.

The remaining 20 eligible sites which contribute to a potential historic district beyond the Landmark boundaries are:

26CK4695 - Campsite;	26CK4696 - Log Bridge;
26CK4740 - Culvert/Ditch;	26CK4741 - Retaining Wall;
26CK4742 - Cantilevered Walk;	26CK4743 - Wooden Ladders;
26CK4746 - Explosives Bunker;	26CK4747 - Wooden Scaffold;
26CK4748 - Tunnel;	26CK4749 - Gauging Station;
26CK4755 - Gauging Station;	26CK4756 through 26CK4762 - Stone Dams;
	26CK4764 - Cable Car; and
26CK4766 - Scenic Overlook.	

Six sites are determined not eligible. They are:

26CK4698 - Cairn;	26CK4739 - Foundations;
26CK4750 - Tailings;	26CK4751 - R.R. Grade;
26CK4752 - Dugout; and	26CK4753 - Trash Scatter.

As per 36 CFR 60, Reclamation wishes to consult with your agency on Reclamation's determination of eligibility for the above listed sites. Reclamation looks forward to receiving your comments and concurrence on Reclamation's determinations. The Arizona State Historic Preservation Officer is being consulted with a similar submission for those sites located on the Arizona side of the Project area.

If you have any questions, please contact Mr. William White, Archeologist, at 702-293-8705.

Sincerely,

JOHN E. PETERSON II
William E. Rinne
ACTING FOR Regional Environmental Officer

Enclosures 3

bc: Assistant Commissioner - Resources Management
Attention: D-5530 (Queen)

Advisory
Council On
Historic
Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 730 Simms Street
Golden, Colorado 80401

December 11, 1991

William E. Rinne
Regional Environmental Officer
Bureau of Reclamation
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Mr. Rinne:

Thank you for providing us with details* on the informational meeting concerning the sitting and design of the new Colorado River Bridge at Hoover Dam. The representatives of the National Park Service and the Nevada and Arizona State Historic Preservation Officers seem to have adequately identified and addressed the effects of constructing this bridge at each of the three alternative sites. From the information provided, we agree that the construction of the bridge at Gold Strike Canyon appears to be the alternative which is least likely to have an adverse effect on the Hoover Dam National Historic Landmark. We also agree that the concrete or steel arch bridge designs are compatible with the historic character of the dam complex. We encourage the Bureau of Reclamation to continue to refine the analyses outlined in your letter for the forthcoming draft Environmental Impact Statement, and look forward to assisting the Bureau of Reclamation in future reviews concerning this undertaking.

If you have any questions or would like to discuss these comments further, please contact Lee Keatinge of the Western Office of Project Review at (303) 231-5320 or FTS 554-5320.

Sincerely,

Claudia Nissley
Director, Western Office
of Project Review

* See October 2, 1991, meeting notes.

BOB MILLER
Governor

STATE OF NEVADA

RONALD M. JAMES
State Historic Preservation Officer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF HISTORIC PRESERVATION AND ARCHEOLOGY
123 W. Nye Lane. Room 208
Capitol Complex
Carson City, Nevada 89710
(702) 687-5138

November 6, 1991

William E. Rinne
Regional Environmental Officer
Bureau of Reclamation
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

Dear Mr. Rinne:

We have reviewed the letters * and photographic documentation forwarded by you to our office regarding the barrier-free access alterations to Building 100 of the Date Street Complex, Boulder City. The Division concurs with your no adverse effect determination for this undertaking. The alterations appear to have been sensitively completed and are in compliance with the Secretary of the Interior's Standards for Rehabilitation. We appreciate the Bureau of Reclamation's efforts to keep our office informed of the progress on the undertaking.

Regarding a second project, the review of the draft notes for the Hoover Dam Bridge Crossing, Michelle McFadden of our staff has penned a few comments on the copy we have enclosed. If you have any questions regarding her comments, please contact her at (702) 687-5138. Again, we wish to thank you for providing the opportunity for early consultation on an extremely important project.

We look forward to working with you in the future.

Sincerely,

Alice M. Baldrica

Alice M. Baldrica
Deputy State Historic Preservation Officer

* See October 2, 1991, meeting notes.

ARIZONA STATE PARKS

800 W. WASHINGTON
SUITE 415
PHOENIX, ARIZONA 85007
TELEPHONE 602-542-4174

22 October 1991

William E. Rinne
Regional Environmental Officer
Lower Colorado Regional Office
Bureau of Reclamation
PO Box 61407
Boulder City, NV 89006-1470

Attention: William White

RE: Hoover Dam NHL, New Vehicular Bridge,DOI-BR

Dear Mr. Rinne:

I have reviewed the draft meeting notes* concerning the Hoover Dam Bridge Crossings and Bridge Types held in Boulder City on October 2, 1991. I feel these notes reflect an accurate account of the facts and feelings of the meeting. The only correction I have is on page four where under Promontory Point, Design Preference, Steel Arch AZ should be high not NV.

Thank you for the opportunity to review this draft.

Sincerely,

J. Garrison

James Garrison
Historical Architect

for Shereen Lerner, Ph.D.
State Historic Preservation Officer

* See October 2, 1991, meeting notes.

COLORADO RIVER CROSSING - HOOVER DAM
MEETING WITH ARIZONA SHPO, NEVADA SHPO, AND NPS REPRESENTATIVES

On October 2, 1991, a meeting was held by the Bureau of Reclamation (Reclamation), Lower Colorado Regional Office to introduce and discuss various options for the location of the proposed Hoover Dam Bridge and bridge designs (Project) to representatives from the Arizona State Historic Preservation Office (SHPO), Nevada SHPO, and National Park Service (NPS).

Participants in the meeting included: Jim Garrison, Arizona SHPO; Michelle McFadden, Nevada SHPO; Ann Huston, NPS, San Francisco; Gary Bunney, NPS, Lake Mead National Recreation Area; Kris Mills, Reclamation Engineer/Bridge Project Manager; Lucy Gonyea, Reclamation Engineer; John Peterson, Reclamation Regional Archeologist; Chris Pfaff, Reclamation Architectural Historian, Denver; and William White, Reclamation Archeologist.

The purpose of the meeting was to familiarize the participants with the Project and to obtain views, opinions, and comments on the various options. It is felt that input from the SHPOs at this early stage will assist in Reclamation's planning efforts to lessen the visual effects to the Hoover Dam (Dam) National Historic Landmark (Landmark).

The meeting was divided into two segments: an on-site visit to the three crossing locations and a slide presentation and discussion at Boulder City.

On October 10, 1991, a rough draft of the meeting notes were sent to representatives from the two SHPOs and two NPS offices for comment on accuracy and intent of feelings as expressed by the participants. Additional comments from their replies have been incorporated into the notes and are enclosed with brackets ([]).

<u>On-site Tour</u>:

Participants were taken to the three proposed bridge crossing locations: Gold Strike; Sugarloaf Mountain; and Promontory Point. Kris Mills provided technical information for each location. The on-site visit allowed the participants to get a "feel" for the type of environment the bridge would span and the visual effects that a bridge might have on the Landmark.

The following represents some of the comments, views, and concerns expressed by the two SHPOs and NPS representative, Ann Huston, during the on-site tour:

- Gold Strike Canyon: The crossing location is much closer to the Dam than I had thought. It looked much further away on the maps that you sent me (Nevada SHPO).

• Sugarloaf Mountain: How will the Gold Strike bridge construction interfere with raft launching (NPS)?

Tools and equipment used for bridge construction could be a problem. Reclamation Safety Standards require that nets be used under the work area during construction; however, since the rafts only launch once daily, it would be reasonable to schedule the work and the raft launching so as to not have a potentially dangerous situation. (Kris Mills).

• Promontory Point: What will be the level of the deck at this crossing (NPS)?

1460 feet (Kris Mills).

Boulder City Meeting:

Kris started the afternoon session of the meeting with a brief presentation on the history of the Dam, the visitor population, and the traffic volumes both now and projected for 2016.

The main purpose for this Project is one of safety at the Dam, for visitors, traffic, and the Dam workers. Additional concerns are danger to the Dam facilities and the possibility of a major hazardous spill in the lake or river. The other benefit of the Project would be an enhancement of the visitor experience.

Kris commented that the Dam is not only a National Historic Landmark, but is also Reclamation's Landmark--An image of the Dam is on Reclamation's seal. We are very proud of it and want to protect it.

Kris briefly discussed the Project Management Team (PMT) membership. He explained that the PMT's main functions are to be sure all studies are completed, develop a funding agreement, and manage the Project through design and construction.

Kris explained that there are many considerations in addition to the historical significance and Landmark status that must be balanced in the selection of the crossing location: constructability, cost, park land acreage (section 4f), and impacts to wildlife and vegetation. [He noted that the Gold Strike location was most problematic with regard to Bighorn sheep crossing. Sugarloaf is also problematic, but adverse effects can be mitigated (NPS)]. The historical consideration is the reason for the meeting today.

The draft Environmental Impact Statement (EIS) is scheduled for filing in February 1992 and we hope to file the final in September 1992, with a Record of Decision in October 1992.

Kris briefly explained the process of the Phase A and Phase B preliminary design in support of the EIS.

- In the Phase A study, there were nine alternatives under consideration. It was determined that the routes south of Gold Strike Canyon were more costly, had significantly more impact on the environment, and had a much greater impact to NPS land. Section 4(f) requires that the feasible routes be prioritized in order of impacts to the least acreage of NPS land. The Phase A study determined that all but the three routes in the vicinity of the Dam had to be eliminated from further consideration.

- The Phase B study then further refined the roadway and bridge designs. Reclamation's Denver Office is doing the roadway design; Parsons, Brinkerhoff, Quade & Douglas (PBQD) is doing the bridge design. It was important to the PMT to use a major bridge designer because of the significance of this Project in such close proximity to the Dam.

Kris used the large aerial photo of the area to show the view point locations of the computer-generated perspectives: the lake, river, dam crest, and new visitor's center. He then showed the series of slides of the three crossing locations and the bridge types still under consideration at those crossings: Promontory Point (suspension, steel through-arch, concrete cable-stay), Sugarloaf Mountain (steel arch, concrete cable-stay), and Gold Strike Canyon (steel arch, concrete arch).

Comments/Questions:

- Sugarloaf: What is the first view of the Dam from this location (NPS)? Visitors using the bridge would be able to briefly observe the Dam at approximately the same location as the present Nevada hairpin turn and at the Arizona transmission towers on Sugarloaf. The view of the Dam would not be changed from existing turnouts. The Dam would not be visible from the bridge for safety reasons (Kris Mills).

  How did you eliminate the other six crossing alternatives (Nevada SHPO)? Analysis variables such as construction costs, accessibility, environmental and cultural impacts, routes that use the least acreage of NPS land, -- all contributed to the elimination and final selection of the three locations proposed here. (Kris Mills)

Kris then turned the meeting over to John Peterson.

John explained that he would like to go through the various locations with their associated design options and solicit the views of the meeting attendees. John emphasized that this is nothing official; but is intended as a "straw pole." It will help the PMT to consider the input of the SHPOs early in the

process and thereby minimize the effects of this Project on the historical significance of the Landmark.

John had prepared a flip-chart that listed each crossing location on a separate page, which included a listing of "Adverse Effect," "No Adverse Effect," and "No Effect." Then below that on the chart was a "Design Preference" section which included "High," "Medium," and "Low" for each of the bridge types still under consideration. The opinions of the two SHPOs and NPS are recorded in Table 1.

Following are some of the comments made as the opinions were being recorded on the flip charts. At this time, only the two SHPOs and Ann Huston, NPS, were offering comments.

General Comments:

- It was generally felt that the computer generated graphics provide the viewer with a distorted and somewhat deceptive perspective for bridge types and crossing locations in relation to the Landmark. The on-site tour provided the best "feeling" for the magnitude of the bridge/Landmark relationship. Another shared concern was the deck elevation of the Promontory Point and Sugarloaf bridges as "over-powering" the Landmark. [On-site visit also changed preliminary conceptions as to the visibility of the bridge in relation to the Dam at proposed locations (NPS)].

Promontory Point:

- There was a unanimous opinion that this location would have an <u>adverse effect</u> on the Landmark. All agreed that this was a bad choice for a bridge of any type. The crossing is too close and would compete with the Landmark.

- Of the three bridge types discussed for this location, the concrete cable-stayed type was preferred to the steel arch. The suspension bridge appears to be unacceptable from the participants perspective.

Comments for the suspension bridge included: Way too busy (NPS); incompatible with the Dam (SHPOs); no, this is not the Golden Gate (NPS).

Comments for the steel arch bridge included: The arch is too busy again (Nevada SHPO). Support above the deck would detract less at the ends rather than in the center over the lake (Arizona SHPO).

TABLE 1

FLIP CHARTS

PROMONTORY POINT

LOCATION

Adverse Effect	No Adverse Effect	No Effect
Nevada (NV) Arizona (AZ) National Park (NPS)		

DESIGN PREFERENCE	High	Medium	Low
Suspension			AZ, NV, NPS
Steel Arch	AZ	NPS	NV
Concrete Cable Stay		AZ, NV, [NPS]	

SUGARLOAF MOUNTAIN

LOCATION

Adverse Effect	No Adverse Effect	No Effect
Nevada Arizona NPS		

DESIGN PREFERENCE	High	Medium	Low
Steel Arch	AZ, NPS, NV		
Concrete Cable Stay			NPS, AZ, NV

GOLD STRIKE CANYON

LOCATION

Adverse Effect	No Adverse Effect	No Effect
	Nevada Arizona NPS	

DESIGN PREFERENCE	High	Medium	Low
Concrete Arch		AZ, [NPS]	
Steel Arch	NV	[NPS]	

Comments for the cable-stayed bridge included: There is a real problem in conflict with the Nevada Spillway - interferes with features of the Dam (Arizona SHPO); cleaner lines than the other types (NPS); more sympathetic to the Dam with some compatibility of material and massing - sympathetic in color and material - basic Dam elements are reproduced--concrete and cables - would not recommend [wholesale (NPS)] lifting and transference of Dam motifs (Nevada SHPO).

Sugarloaf Mountain:

- It was unanimously felt that this crossing was less of an adverse effect on the Landmark, but an adverse effect none the less. This crossing would be the second choice for the participants. Again, it was expressed that any type of bridge in this area would be too close to existing elements and features of the Landmark. All felt that a bridge in this location would be a great temptation for traffic slow-down and stoppage, as people would try to get a view of the Dam from the span. A solution might consist of a pedestrian walkway suspended under the bridge with parking turnouts at either end of the span. [I don't remember this, but I think it is a good idea (Nevada SHPO)].

- Although an adverse effect on the Landmark, it was felt in general that a bridge could be constructed at this location with acceptable mitigative measures. Mitigative measures would include a bridge designed and constructed with materials sympathetic with the Landmark, including a color of paint for the steel arch that would blend in rather than contrast with the environment. Additionally, an extensive photographic recordation would have to be initiated to record the Landmark and its environs prior to construction.

- An important factor in the acceptability of this crossing location is that the existing first views of the Dam from both the Arizona and Nevada sides will not be altered by construction of the new bridge. As visitors approach the Dam [on the road] their view of the Dam will be as it is now (NPS).

- The steel arch bridge type was preferred by all, over the cable-stayed.

- [Bridge would cross over facilities that extend out downstream from the powerhouse (NPS)].

- Comments for the steel arch include: Arch is less of a problem in that it is appropriate to the downstream canyon and shares common elements with the Dam--compression arch of Dam and open steel frames of the transmission towers

(Arizona SHPO); elevated deck would place the structure against the skyline when viewed from the Dam (NPS); less imposing if you would paint the bridge a color to match the canyon walls - darker colors would make it recede into the surrounding landscape (Nevada SHPO).

- Comments on the cable-stayed bridge include: Towers too high (Arizona SHPO); this structure looks better at the Promontory Point crossing than at this location (SHPOs).

Gold Strike Canyon:

- This is the preferred location by both SHPOs and NPS representative. All agreed that this location would represent a no adverse effect on the Landmark. This location competes the least with the Landmark and there are fewer issues involved with this location and/or bridge type.

- Of the two bridge types, concrete or steel arch, neither was generally favored over the other and either option was acceptable. The Nevada SHPO slightly favored the steel arch in the fact that it could be painted to be less imposing and complementary to the surrounding environment. The Arizona SHPO suggested that the concrete arch was extremely simplified, but felt that the skill of the designer would design a bridge that would also complement the setting.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

2-21-89-I-170

June 19, 1991

MEMORANDUM

TO: Regional Director, Bureau of Reclamation, Boulder City, Nevada

FROM: Acting Field Supervisor

SUBJECT: Review of biological assessment, Hoover Dam - Proposed Colorado River Bridge (LC-155, ENV-7.00) (BR-AZ/NV)

On May 24, 1991, the Fish and Wildlife Service (FWS) received your biological assessment (BA) for the proposed Colorado River Bridge crossing at Hoover Dam. The BA explicitly indicates that the proposed project may effect the endangered peregrine falcon (Falco peregrinus anatum), and the endangered Mohave populations of the desert tortoise (Xerobates agassizii). Page 9 of the BA under the peregrine falcon section states "the proposed project could affect at least one breeding pair". Page 12 of the BA under the desert tortoise section states that "a new highway could affect a few desert tortoises." The loss of habitat also may affect desert tortoise.

Because this project may affect the endangered peregrine falcon and desert tortoise, we recommend that the Bureau of Reclamation (Reclamation) re-evaluate the effects of this project and enter into formal Section 7 consultation with the FWS. At the conclusion of the formal consultation process, the FWS will determine if the proposed project is likely to jeopardize the continued existence of these species. Prior to initiating formal consultation, we recommend a meeting between Reclamation, the FWS and other appropriate parties. Once formal consultation has begun, a 90-day time limit is set in motion, which makes development of needed additional information difficult.

The FWS appreciates the level of detailed information provided on candidate species and conservation measures developed for the listed species. We believe this preliminary work will facilitate formal consultation. If we can be of further assistance, please contact Debra Bills, Jay Slack, or me (Telephone: 602/379-4720 or FTS 261-4720).

Gilbert D. Metz

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico (FWE/HC)
Director, Arizona Game and Fish Department, Phoenix, Arizona
Director, Nevada Department of Wildlife, Reno, Nevada
Regional Manager, Nevada Department of Wildlife, Reno, Nevada
Regional Supervisor, Arizona Game and fish Department, Kingman, Arizona

MAY 22 1991

LC-155
ENV-7.00

Memorandum

To: Mr. Sam Spiller, Field Supervisor, Division of Ecological Services, Fish and Wildlife Service, 3616 West Thomas Road, Suite 6, Phoenix AZ 85019

From: Regional Director

Subject: Biological Assessment on Threatened and Endangered Species for Proposed Colorado River Bridge - Hoover Dam Project (Your Memorandum Dated August 23, 1989) (Biological Assessment)

We have evaluated the potential impacts of the proposed subject project to those species which were listed as being potentially affected. Subsequent to this evaluation and in consideration of the incorporated conservation measures, it is our opinion that none of the species listed would be put in jeopardy; therefore, consultation as outlined in Section 7 of the Endangered Species Act of 1973, as amended, is not required.

Please notify us with a letter of concurrence or non-concurrence at your earliest convenience. If you have any questions concerning the enclosed biological assessment, please contact Mr. Michael Walker at FTS 598-7526.

ROBERT J. TOWLES

Enclosure

bc:
~~153A~~
220 (w/encl)
Daily
150-Chrono
WBR:MTWalker:mt:05-09-91:293-8526
(155:BIOASS-B)

RIZONA
TATE
ARKS

800 W. WASHINGTON
SUITE 415
ENIX, ARIZONA 85007
PHONE 602-542-4174

July 12, 1990

William E. Rinne
Regional Environmental Officer
Bureau of Reclamation
P.O. Box 427
Boulder City, Nevada 89005

RE: Proposed Colorado River Crossing Near Hoover Dam, DOI-BR

Der Mr. Rinne:

We have reviewed your letter and the accompanying maps of the four alternatives for a new crossing over the Colorado River or the lower end of Lake Mead in the vicinity of Hoover Dam, a National Historic Landmark (NHL). We recognize the need for a new crossing to resolve the severe traffic congestion which occurs on the dam.

Of the four alternatives presented, the option for widening the crest of the dam to a width of forty feet would, without question, constitute a substantial adverse effect to the Dam, as well as to the site and setting. Mitigation of the direct alteration to the Hoover Dam NHL would be virtually impossible.

The other alternatives, involving construction of a bridge at three potential sites, are more realistic from the standpoint of cultural resources. In each case however, archaeological survey and evaluation of the alignment of the approach roads would need to be completed before these routes can be evaluated.

Regarding historic resources, construction of a bridge at the Promontory Point crossing would pose concern about visual impact to the setting of Hoover Dam, but this could perhaps be resolved through appropriate design. The Gold Strike Canyon location appears to be sufficiently downstream from the Dam to be out of view, so that the issue of intrusive visual impact would be minor. The alternative involving the Willow Beach Crossing would in all likelihood have minimal concern to Hoover Dam. Please be advised that the Willow Beach Gauging station, located in this vicinity, is listed on the National Register of Historic Places (see enclosed).

BOB MILLER
Governor

STATE OF NEVADA

RONALD M. JAMES
State Historic Preservation Officer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF HISTORIC PRESERVATION AND ARCHEOLOGY

123 W. Nye Lane, Room 208
Capitol Complex
Carson City, Nevada 89710
(702) 687-5138

ENV 3.00
July 5, 1990

William E. Rinne
Environmental Officer
Bureau of Reclamation
Lower Colorado Regional Office
P. O. Box 427
Boulder City, NV 89005

Dear Mr. Rinne:

This letter is in response to the information you forwarded us regarding a new crossing of the Colorado River in the vicinity of Hoover Dam. We understand that the existing situation with traffic congestion and hazards at the Dam have led the Bureau of Reclamation and other state and federal agencies to search for a satisfactory solution to this problem. Hoover Dam is a National Historic Landmark and the construction of a new bridge near the Dam or widening the crest of the Dam will require the Bureau of Reclamation to consider the effects of the undertaking on this landmark.

The Division sees the widening of the crest as the most serious threat to the integrity of Hoover Dam. Without reviewing specific plans, my general impression would be that the widening would result in an adverse effect that would be difficult to mitigate. I am more favorably inclined toward a bridge spanning the canyon or Lake Mead. Although the Bureau would have to examine the effects of the construction and use if either the Lake Mead or Gold Strike Canyon alternative were selected, visual impacts would be easier and less costly to treat and would result in fewer effects to the Dam.

These comments are only preliminary, based on the brief descriptions forwarded to the Division. As plans are developed and an alternative selected, please feel free to discuss potential effects with the Division's architectural historian.

The Division appreciates receiving this information on alternatives being considered. Thank you for considering our views so early in the planning process.

Sincerely,

Alice M. Baldrica

ALICE M. BALDRICA, Deputy
State Historic Preservation Officer

cc: Shereen Lerner, Arizona SHPO
Jim Maxon, Bureau of Reclamation, Denver

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

August 23, 1989

MEMORANDUM

TO: Regional Environmental Officer, Lower Colorado Region
Bureau of Reclamation, Boulder City, Nevada

FROM: Acting Field Supervisor

SUBJECT: Response for List of Threatened and Endangered Species for the Proposed Black Canyon Bridge Project

This responds to your request of July 28, 1989 for information on species listed or proposed to be listed as threatened or endangered that may be in the vicinity.

The following species may be present in the area of the proposed project: the endangered peregrine falcon (Falco peregrinus anatum), bonytail chub (Gila elegans), Devil's Hole pupfish (Cyprinodon diabolis), and Mohave populations of the desert tortoise (Xerobates agassizii).

Also, present in the project area are the Category 1 razorback sucker (Xyrauchen texanus) and the Category 2 desert tortoise (Xerobates agassizii). Sonoran population, whose listing is warranted but precluded. Candidate category 1 species are those for which sufficient information exists to support their listing as endangered or threatened. Development of proposed rules for these species is anticipated. Category 2 species are those for which sufficient information to list the species as threatened or endangered is not available. Candidate species are not protected under the Endangered Species Act and information on their status is provided for your planning purposes only.

If we may be of further assistance, please contact Debra Bills or me (Telephone FTS 261-4720).

Sincerely,

Gilbert D. Metz,

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico (FWE/SE).
Director, Arizona Department of Game and Fish, Phoeniz, Arizona

Appendix D
U.S. Army Corps of Engineers
Section 404(b)(1) Guidelines

PART 230—SECTION 404(b)(1) GUIDELINES FOR SPECIFICATION OF DISPOSAL SITES FOR DREDGED OR FILL MATERIAL

Subpart A—General

Subpart B—Compliance With the Guidelines

Subpart C—Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem

Subpart D—Potential Impacts on Biological Characteristics of the Aquatic Ecosystem

Subpart E—Potential Impacts on Special Aquatic Sites

Subpart F—Potential Effects on Human Use Characteristics

Subpart G—Evaluation and Testing

Subpart H—Actions to Minimize Adverse Effects

Subpart I—Planning To Shorten Permit Processing Time

AUTHORITY: Secs. 404(b) and 501(a) of the Clean Water Act of 1977 (33 U.S.C. 1344(b) and 1361(a)).

SOURCE: 45 FR 85344, Dec. 24, 1980, unless otherwise noted.

Subpart A—General

§ 230.1 Purpose and policy.

(a) The purpose of these Guidelines is to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or fill material.

(b) Congress has expressed a number of policies in the Clean Water Act. These Guidelines are intended to be consistent with and to implement those policies.

(c) Fundamental to these Guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern.

(d) From a national perspective, the degradation or destruction of special aquatic sites, such as filling operations in wetlands, is considered to be among the most severe environmental impacts covered by these Guidelines. The guiding principle should be that degradation or destruction of special sites may represent an irreversible loss of valuable aquatic resources.

§ 230.2 Applicability.

(a) These Guidelines have been developed by the Administrator of the Environmental Protection Agency in conjunction with the Secretary of the Army acting through the Chief of Engineers under section 404(b)(1) of the Clean Water Act (33 U.S.C. 1344). The Guidelines are applicable to the

specification of disposal sites for discharges of dredged or fill material into waters of the United States. Sites may be specified through:

(1) The regulatory program of the U.S. Army Corps of Engineers under sections 404(a) and (e) of the Act (see 33 CFR Parts 320, 323 and 325);

(2) The civil works program of the U.S. Army Corps of Engineers (see 33 CFR 209.145 and section 150 of Pub. L. 94–587, Water Resources Development Act of 1976);

(3) Permit programs of States approved by the Administrator of the Environmental Protection Agency in accordance with section 404(g) and (h) of the Act (see 40 CFR parts 122, 123 and 124);

(4) Statewide dredged or fill material regulatory programs with best management practices approved under section 208(b)(4)(B) and (C) of the Act (see 40 CFR 35.1560);

(5) Federal construction projects which meet criteria specified in section 404(r) of the Act.

(b) These Guidelines will be applied in the review of proposed discharges of dredged or fill material into navigable waters which lie inside the baseline from which the territorial sea is measured, and the discharge of fill material into the territorial sea, pursuant to the procedures referred to in paragraphs (a)(1) and (2) of this section. The discharge of dredged material into the territorial sea is governed by the Marine Protection, Research, and Sanctuaries Act of 1972, Pub. L. 92–532, and regulations and criteria issued pursuant thereto (40 CFR parts 220 through 228).

(c) Guidance on interpreting and implementing these Guidelines may be prepared jointly by EPA and the Corps at the national or regional level from time to time. No modifications to the basic application, meaning, or intent of these Guidelines will be made without rulemaking by the Administrator under the Administrative Procedure Act (5 U.S.C. 551 *et seq.*).

§ 230.3 Definitions.

For purposes of this part, the following terms shall have the meanings indicated:

(a) The term *Act* means the Clean Water Act (also known as the Federal Water Pollution Control Act or FWPCA) Pub. L. 92–500, as amended by Pub. L. 95–217, 33 U.S.C. 1251, *et seq.*

(b) The term *adjacent* means bordering, contiguous, or neighboring. Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes, and the like are "adjacent wetlands."

(c) The terms *aquatic environment* and *aquatic ecosystem* mean waters of the United States, including wetlands, that serve as habitat for interrelated and interacting communities and populations of plants and animals.

(d) The term *carrier of contaminant* means dredged or fill material that contains contaminants.

(e) The term *contaminant* means a chemical or biological substance in a form that can be incorporated into, onto or be ingested by and that harms aquatic organisms, consumers of aquatic organisms, or users of the aquatic environment, and includes but is not limited to the substances on the 307(a)(1) list of toxic pollutants promulgated on January 31, 1978 (43 FR 4109).

(f)—(g) [Reserved]

(h) The term *discharge point* means the point within the disposal site at which the dredged or fill material is released.

(i) The term *disposal site* means that portion of the "waters of the United States" where specific disposal activities are permitted and consist of a bottom surface area and any overlying volume of water. In the case of wetlands on which surface water is not present, the disposal site consists of the wetland surface area.

(j) [Reserved]

(k) The term *extraction site* means the place from which the dredged or fill material proposed for discharge is to be removed.

(l) [Reserved]

(m) The term *mixing zone* means a limited volume of water serving as a zone of initial dilution in the immediate vicinity of a discharge point where receiving water quality may not meet quality standards or other requirements otherwise applicable to the receiving water. The mixing zone should be considered as a place where wastes and water mix and not as a place where effluents are treated.

(n) The term *permitting authority* means the District Engineer of the U.S. Army Corps of Engineers or such other individual as may be designated by the Secretary of the Army to issue or deny permits under section 404 of the Act; or the State Director of a permit program approved by EPA under section 404(g) and section 404(h) or his delegated representative.

(o) The term *pollutant* means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials not covered by the Atomic Energy Act, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. The legislative history of the Act reflects that "radioactive materials" as included within the definition of "pollutant" in section 502 of the Act means only radioactive materials which are not encompassed in the definition of source, byproduct, or special nuclear materials as defined by the Atomic Energy Act of 1954, as amended, and regulated under the Atomic Energy Act. Examples of radioactive materials not covered

by the Atomic Energy Act and, therefore, included within the term "pollutant", are radium and accelerator produced isotopes. See *Train* v. *Colorado Public Interest Research Group, Inc.*, 426 U.S. 1 (1976).

(p) The term *pollution* means the man-made or man-induced alteration of the chemical, physical, biological or radiological integrity of an aquatic ecosystem.

(q) The term *practicable* means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

(q-1) *Special aquatic sites* means those sites identified in subpart E. They are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. (See § 230.10(a)(3))

(r) The term *territorial sea* means the belt of the sea measured from the baseline as determined in accordance with the Convention on the Territorial Sea and the Contiguous Zone and extending seaward a distance of three miles.

(s) The term *waters of the United States* means:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

(ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(iii) Which are used or could be used for industrial purposes by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as waters of the United States under this definition;

(5) Tributaries of waters identified in paragraphs (s)(1) through (4) of this section;

(6) The territorial sea;

(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

(t) The term *wetlands* means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

[45 FR 85344, Dec. 24, 1980, as amended at 58 FR 45037, Aug. 25, 1993]

§ 230.4 Organization.

The Guidelines are divided into eight subparts. Subpart A presents those provisions of general applicability, such as purpose and definitions. Subpart B establishes the four conditions which must be satisfied in order to make a finding that a proposed discharge of dredged or fill material complies with the Guidelines. Section 230.11 of subpart B, sets forth factual determinations which are to be considered in determining whether or not a proposed discharge satisfies the subpart B conditions of compliance. Subpart C describes the physical and chemical components of a site and provides guidance as to how proposed discharges of dredged or fill material may affect these components. Subparts D through F detail the special characteristics of particular aquatic ecosystems in terms of their values, and the possible loss of these values due to discharges of dredged or fill material. Subpart G prescribes a number of physical, chemical, and biological evaluations and testing procedures to be used in reaching the required factual determinations. Subpart H details the means to prevent or mimimize adverse effects. Subpart I concerns advanced identification of disposal areas.

§ 230.5 General procedures to be followed.

In evaluating whether a particular discharge site may be specified, the permitting authority should use these Guidelines in the following sequence:

(a) In order to obtain an overview of the principal regulatory provisions of the Guidelines, review the restrictions on discharge in § 230.10(a)

through (d), the measures to mimimize adverse impact of subpart H, and the required factual determinations of § 230.11.

(b) Determine if a General permit (§ 230.7) is applicable; if so, the applicant needs merely to comply with its terms, and no further action by the permitting authority is necessary. Special conditions for evaluation of proposed General permits are contained in § 230.7. If the discharge is not covered by a General permit:

(c) Examine practicable alternatives to the proposed discharge, that is, not discharging into the waters of the U.S. or discharging into an alternative aquatic site with potentially less damaging consequences (§ 230.10(a)).

(d) Delineate the candidate disposal site consistent with the criteria and evaluations of § 230.11(f).

(e) Evaluate the various physical and chemical components which characterize the non-living environment of the candidate site, the substrate and the water including its dynamic characteristics (subpart C).

(f) Identify and evaluate any special or critical characteristics of the candidate disposal site, and surrounding areas which might be affected by use of such site, related to their living communities or human uses (subparts D, E, and F).

(g) Review Factual Determinations in § 230.11 to determine whether the information in the project file is sufficient to provide the documentation required by § 230.11 or to perform the pretesting evaluation described in § 230.60, or other information is necessary.

(h) Evaluate the material to be discharged to determine the possibility of chemical contamination or physical incompatibility of the material to be discharged (§ 230.60).

(i) If there is a reasonable probability of chemical contamination, conduct the appropriate tests according to the section on Evaluation and Testing (§ 230.61).

(j) Identify appropriate and practicable changes to the project plan to minimize the environmental impact of the discharge, based upon the specialized methods of minimization of impacts in subpart H.

(k) Make and document Factual Determinations in § 230.11.

(l) Make and document Findings of Compliance (§ 230.12) by comparing Factual Determinations with the requirements for discharge of § 230.10.

This outline of the steps to follow in using the Guidelines is simplified for purposes of illustration. The actual process followed may be iterative, with the results of one step leading to a reexamination of previous steps. The permitting authority must address all of the relevant provisions of the Guidelines in reaching a Finding of Compliance in an individual case.

§ 230.6 Adaptability.

(a) The manner in which these Guidelines are used depends on the physical, biological, and chemical nature of the proposed extraction site, the material to be discharged, and the candidate disposal site, including any other important components of the ecosystem being evaluated. Documentation to demonstrate knowledge about the extraction site, materials to be extracted, and the candidate disposal site is an essential component of guideline application. These Guidelines allow evaluation and documentation for a variety of activities, ranging from those with large, complex impacts on the aquatic environment to those for which the impact is likely to be innocuous. It is unlikely that the Guidelines will apply in their entirety to any one activity, no matter how complex. It is anticipated that substantial numbers of permit applications will be for minor, routine activities that have little, if any, potential for significant degradation of the aquatic environment. It generally is not intended or expected that extensive testing, evaluation or analysis will be needed to make findings of compliance in such routine cases. Where the conditions for General permits are met, and where numerous applications for similar activities are likely, the use of General permits will eliminate repetitive evaluation and documentation for individual discharges.

(b) The Guidelines user, including the agency or agencies responsible for implementing the Guidelines, must recognize the different levels of effort that should be associated with varying degrees of impact and require or prepare commensurate documentation. The level of documentation should reflect the significance and complexity of the discharge activity.

(c) An essential part of the evaluation process involves making determinations as to the relevance of any portion(s) of the Guidelines and conducting further evaluation only as needed. However, where portions of the Guidelines review procedure are "short form" evaluations, there still must be sufficient information (including consideration of both individual and cumulative impacts) to support the decision of whether to specify the site for disposal of dredged or fill material and to support the decision to curtail or abbreviate the evaluation process. The presumption against the discharge in § 230.1 applies to this decision-making.

(d) In the case of activities covered by General permits or section 208(b)(4)(B) and (C) Best Management Practices, the analysis and documentation required by the Guidelines will be performed at the time of General permit issuance or section 208(b)(4)(B) and (C) Best Management Practices promulgation and will not be repeated when activities are conducted under a General permit or section 208(b)(4)(B) and (C) Best Management

Practices control. These Guidelines do not require reporting or formal written communication at the time individual activities are initiated under a General permit or section 208(b)(4)(B) and (C) Best Management Practices. However, a particular General permit may require appropriate reporting.

§ 230.7 General permits.

(a) *Conditions for the issuance of General permits.* A General permit for a category of activities involving the discharge of dredged or fill material complies with the Guidelines if it meets the applicable restrictions on the discharge in § 230.10 and if the permitting authority determines that:

(1) The activities in such category are similar in nature and similar in their impact upon water quality and the aquatic environment;

(2) The activities in such category will have only minimal adverse effects when performed separately; and

(3) The activities in such category will have only minimal cumulative adverse effects on water quality and the aquatic environment.

(b) *Evaluation process.* To reach the determinations required in paragraph (a) of this section, the permitting authority shall set forth in writing an evaluation of the potential individual and cumulative impacts of the category of activities to be regulated under the General permit. While some of the information necessary for this evaluation can be obtained from potential permittees and others through the proposal of General permits for public review, the evaluation must be completed before any General permit is issued, and the results must be published with the final permit.

(1) This evaluation shall be based upon consideration of the prohibitions listed in § 230.10(b) and the factors listed in § 230.10(c), and shall include documented information supporting each factual determination in § 230.11 of the Guidelines (consideration of alternatives in § 230.10(a) are not directly applicable to General permits);

(2) The evaluation shall include a precise description of the activities to be permitted under the General permit, explaining why they are sufficiently similar in nature and in environmental impact to warrant regulation under a single General permit based on subparts C through F of the Guidelines. Allowable differences between activities which will be regulated under the same General permit shall be specified. Activities otherwise similar in nature may differ in environmental impact due to their location in or near ecologically sensitive areas, areas with unique chemical or physical characteristics, areas containing concentrations of toxic substances, or areas regulated for specific human uses or by specific land or water management plans (e.g., areas regulated under an approved Coastal Zone Management Plan). If there are specific geographic areas within the purview of a proposed General permit (called a draft General permit under a State 404 program), which are more appropriately regulated by individual permit due to the considerations cited in this paragraph, they shall be clearly delineated in the evaluation and excluded from the permit. In addition, the permitting authority may require an individual permit for any proposed activity under a General permit where the nature or location of the activity makes an individual permit more appropriate.

(3) To predict cumulative effects, the evaluation shall include the number of individual discharge activities likely to be regulated under a General permit until its expiration, including repetitions of individual discharge activities at a single location.

Subpart B—Compliance With the Guidelines

§ 230.10 Restrictions on discharge.

NOTE: Because other laws may apply to particular discharges and because the Corps of Engineers or State 404 agency may have additional procedural and substantive requirements, a discharge complying with the requirement of these Guidelines will not automatically receive a permit.

Although all requirements in § 230.10 must be met, the compliance evaluation procedures will vary to reflect the seriousness of the potential for adverse impacts on the aquatic ecosystems posed by specific dredged or fill material discharge activities.

(a) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

(1) For the purpose of this requirement, practicable alternatives include, but are not limited to:

(i) Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;

(ii) Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;

(2) An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.

(3) Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not "water dependent"), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

(4) For actions subject to NEPA, where the Corps of Engineers is the permitting agency, the analysis of alternatives required for NEPA environmental documents, including supplemental Corps NEPA documents, will in most cases provide the information for the evaluation of alternatives under these Guidelines. On occasion, these NEPA documents may address a broader range of alternatives than required to be considered under this paragraph or may not have considered the alternatives in sufficient detail to respond to the requirements of these Guidelines. In the latter case, it may be necessary to supplement these NEPA documents with this additional information.

(5) To the extent that practicable alternatives have been identified and evaluated under a Coastal Zone Management program, a section 208 program, or other planning process, such evaluation shall be considered by the permitting authority as part of the consideration of alternatives under the Guidelines. Where such evaluation is less complete than that contemplated under this subsection, it must be supplemented accordingly.

(b) No discharge of dredged or fill material shall be permitted if it:

(1) Causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard;

(2) Violates any applicable toxic effluent standard or prohibition under section 307 of the Act;

(3) Jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in likelihood of the destruction or adverse modification of a habitat which is determined by the Secretary of Interior or Commerce, as appropriate, to be a critical habitat under the Endangered Species Act of 1973, as amended. If an exemption has been granted by the Endangered Species Committee, the terms of such exemption shall apply in lieu of this subparagraph;

(4) Violates any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under title III of the Marine Protection, Research, and Sanctuaries Act of 1972.

(c) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluations, and tests required by subparts B and G, after consideration of subparts C through F, with special emphasis on the persistence and permanence of the effects outlined in those subparts. Under these Guidelines, effects contributing to significant degradation considered individually or collectively, include:

(1) Significantly adverse effects of the discharge of pollutants on human health or welfare, including but not limited to effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites.

(2) Significantly adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes;

(3) Significantly adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or

(4) Significantly adverse effects of discharge of pollutants on recreational, aesthetic, and economic values.

(d) Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem. Subpart H identifies such possible steps.

§ 230.11 Factual determinations.

The permitting authority shall determine in writing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment in light of subparts C through F. Such factual determinations shall be used in § 230.12 in making findings of compliance or non-compliance with the restrictions on discharge in § 230.10. The evaluation and testing procedures described in § 230.60 and § 230.61 of subpart G shall be used as necessary to make, and shall be described in, such determination. The de-

terminations of effects of each proposed discharge shall include the following:

(a) *Physical substrate determinations.* Determine the nature and degree of effect that the proposed discharge will have, individually and cumulatively, on the characteristics of the substrate at the proposed disposal site. Consideration shall be given to the similarity in particle size, shape, and degree of compaction of the material proposed for discharge and the material constituting the substrate at the disposal site, and any potential changes in substrate elevation and bottom contours, including changes outside of the disposal site which may occur as a result of erosion, slumpage, or other movement of the discharged material. The duration and physical extent of substrate changes shall also be considered. The possible loss of environmental values (§ 230.20) and actions to minimize impact (subpart H) shall also be considered in making these determinations. Potential changes in substrate elevation and bottom contours shall be predicted on the basis of the proposed method, volume, location, and rate of discharge, as well as on the individual and combined effects of current patterns, water circulation, wind and wave action, and other physical factors that may affect the movement of the discharged material.

(b) *Water circulation, fluctuation, and salinity determinations.* Determine the nature and degree of effect that the proposed discharge will have individually and cumulatively on water, current patterns, circulation including downstream flows, and normal water fluctuation. Consideration shall be given to water chemistry, salinity, clarity, color, odor, taste, dissolved gas levels, temperature, nutrients, and eutrophication plus other appropriate characteristics. Consideration shall also be given to the potential diversion or obstruction of flow, alterations of bottom contours, or other significant changes in the hydrologic regime. Additional consideration of the possible loss of environmental values (§§ 230.23 through 230.25) and actions to minimize impacts (subpart H), shall be used in making these determinations. Potential significant effects on the current patterns, water circulation, normal water fluctuation and salinity shall be evaluated on the basis of the proposed method, volume, location, and rate of discharge.

(c) *Suspended particulate/turbidity determinations.* Determine the nature and degree of effect that the proposed discharge will have, individually and cumulatively, in terms of potential changes in the kinds and concentrations of suspended particulate/turbidity in the vicinity of the disposal site. Consideration shall be given to the grain size of the material proposed for discharge, the shape and size of the plume of suspended particulates, the duration of the discharge and resulting plume and whether or not the potential changes will cause violations of applicable water quality standards. Consideration should also be given to the possible loss of environmental values (§ 230.21) and to actions for minimizing impacts (subpart H). Consideration shall include the proposed method, volume, location, and rate of discharge, as well as the individual and combined effects of current patterns, water circulation and fluctuations, wind and wave action, and other physical factors on the movement of suspended particulates.

(d) *Contaminant determinations.* Determine the degree to which the material proposed for discharge will introduce, relocate, or increase contaminants. This determination shall consider the material to be discharged, the aquatic environment at the proposed disposal site, and the availability of contaminants.

(e) *Aquatic ecosystem and organism determinations.* Determine the nature and degree of effect that the proposed discharge will have, both individually and cumulatively, on the structure and function of the aquatic ecosystem and organisms. Consideration shall be given to the effect at the proposed disposal site of potential changes in substrate characteristics and elevation, water or substrate chemistry, nutrients, currents, circulation, fluctuation, and salinity, on the recolonization and existence of indigenous aquatic organisms or communities. Possible loss of environmental values (§ 230.31), and actions to minimize impacts (subpart H) shall be examined. Tests as described in § 230.61 (Evaluation and Testing), may be required to provide information on the effect of the discharge material on communities or populations of organisms expected to be exposed to it.

(f) *Proposed disposal site determinations.* (1) Each disposal site shall be specified through the application of these Guidelines. The mixing zone shall be confined to the smallest practicable zone within each specified disposal site that is consistent with the type of dispersion determined to be appropriate by the application of these Guidelines. In a few special cases under unique environmental conditions, where there is adequate justification to show that widespread dispersion by natural means will result in no significantly adverse environmental effects, the discharged material may be intended to be spread naturally in a very thin layer over a large area of the substrate rather than be contained within the disposal site.

(2) The permitting authority and the Regional Administrator shall consider the following factors in determining the acceptability of a proposed mixing zone:

(i) Depth of water at the disposal site;

(ii) Current velocity, direction, and variability at the disposal site;

(iii) Degree of turbulence;

(iv) Stratification attributable to causes such as obstructions, salinity or density profiles at the disposal site;

(v) Discharge vessel speed and direction, if appropriate;

(vi) Rate of discharge;

(vii) Ambient concentration of constituents of interest;

(viii) Dredged material characteristics, particularly concentrations of constituents, amount of material, type of material (sand, silt, clay, etc.) and settling velocities;

(ix) Number of discharge actions per unit of time;

(x) Other factors of the disposal site that affect the rates and patterns of mixing.

(g) *Determination of cumulative effects on the aquatic ecosystem.* (1) Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.

(2) Cumulative effects attributable to the discharge of dredged or fill material in waters of the United States should be predicted to the extent reasonable and practical. The permitting authority shall collect information and solicit information from other sources about the cumulative impacts on the aquatic ecosystem. This information shall be documented and considered during the decision-making process concerning the evaluation of individual permit applications, the issuance of a General permit, and monitoring and enforcement of existing permits.

(h) *Determination of secondary effects on the aquatic ecosystem.* (1) Secondary effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Information about secondary effects on aquatic ecosystems shall be considered prior to the time final section 404 action is taken by permitting authorities.

(2) Some examples of secondary effects on an aquatic ecosystem are fluctuating water levels in an impoundment and downstream associated with the operation of a dam, septic tank leaching and surface runoff from residential or commercial developments on fill, and leachate and runoff from a sanitary landfill located in waters of the U.S. Activities to be conducted on fast land created by the discharge of dredged or fill material in waters of the United States may have secondary impacts within those waters which should be considered in evaluating the impact of creating those fast lands.

§ 230.12 Findings of compliance or non-compliance with the restrictions on discharge.

(a) On the basis of these Guidelines (subparts C through G) the proposed disposal sites for the discharge of dredged or fill material must be:

(1) Specified as complying with the requirements of these Guidelines; or

(2) Specified as complying with the requirements of these Guidelines with the inclusion of appropriate and practicable discharge conditions (see subpart H) to minimize pollution or adverse effects to the affected aquatic ecosystems; or

(3) Specified as failing to comply with the requirements of these Guidelines where:

(i) There is a practicable alternative to the proposed discharge that would have less adverse effect on the aquatic ecosystem, so long as such alternative does not have other significant adverse environmental consequences; or

(ii) The proposed discharge will result in significant degradation of the aquatic ecosystem under § 230.10(b) or (c); or

(iii) The proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem; or

(iv) There does not exist sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with these Guidelines.

(b) Findings under this section shall be set forth in writing by the permitting authority for each proposed discharge and made available to the permit applicant. These findings shall include the factual determinations required by § 230.11, and a brief explanation of any adaptation of these Guidelines to the activity under consideration. In the case of a General permit, such findings shall be prepared at the time of issuance of that permit rather than for each subsequent discharge under the authority of that permit.

Subpart C—Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem

NOTE: The effects described in this subpart should be considered in making the factual determinations and the findings of compliance or non-compliance in subpart B.

§ 230.20 Substrate.

(a) The substrate of the aquatic ecosystem underlies open waters of the United States and constitutes the surface of wetlands. It consists of

organic and inorganic solid materials and includes water and other liquids or gases that fill the spaces between solid particles.

(b) Possible loss of environmental characteristics and values: The discharge of dredged or fill material can result in varying degrees of change in the complex physical, chemical, and biological characteristics of the substrate. Discharges which alter substrate elevation or contours can result in changes in water circulation, depth, current pattern, water fluctuation and water temperature. Discharges may adversely affect bottom-dwelling organisms at the site by smothering immobile forms or forcing mobile forms to migrate. Benthic forms present prior to a discharge are unlikely to recolonize on the discharged material if it is very dissimilar from that of the discharge site. Erosion, slumping, or lateral displacement of surrounding bottom of such deposits can adversely affect areas of the substrate outside the perimeters of the disposal site by changing or destroying habitat. The bulk and composition of the discharged material and the location, method, and timing of discharges may all influence the degree of impact on the substrate.

§ 230.21 Suspended particulates/turbidity.

(a) Suspended particulates in the aquatic ecosystem consist of fine-grained mineral particles, usually smaller than silt, and organic particles. Suspended particulates may enter water bodies as a result of land runoff, flooding, vegetative and planktonic breakdown, resuspension of bottom sediments, and man's activities including dredging and filling. Particulates may remain suspended in the water column for variable periods of time as a result of such factors as agitation of the water mass, particulate specific gravity, particle shape, and physical and chemical properties of particle surfaces.

(b) Possible loss of environmental characteristics and values: The discharge of dredged or fill material can result in greatly elevated levels of suspended particulates in the water column for varying lengths of time. These new levels may reduce light penetration and lower the rate of photosynthesis and the primary productivity of an aquatic area if they last long enough. Sight-dependent species may suffer reduced feeding ability leading to limited growth and lowered resistance to disease if high levels of suspended particulates persist. The biological and the chemical content of the suspended material may react with the dissolved oxygen in the water, which can result in oxygen depletion. Toxic metals and organics, pathogens, and viruses absorbed or adsorbed to fine-grained particulates in the material may become biologically available to organisms either in the water column or on the substrate. Significant increases in suspended particulate levels create turbid plumes which are highly visible and aesthetically displeasing. The extent and persistence of these adverse impacts caused by discharges depend upon the relative increase in suspended particulates above the amount occurring naturally, the duration of the higher levels, the current patterns, water level, and fluctuations present when such discharges occur, the volume, rate, and duration of the discharge, particulate deposition, and the seasonal timing of the discharge.

§ 230.22 Water.

(a) Water is the part of the aquatic ecosystem in which organic and inorganic constituents are dissolved and suspended. It constitutes part of the liquid phase and is contained by the substrate. Water forms part of a dynamic aquatic life-supporting system. Water clarity, nutrients and chemical content, physical and biological content, dissolved gas levels, pH, and temperature contribute to its life-sustaining capabilities.

(b) Possible loss of environmental characteristics and values: The discharge of dredged or fill material can change the chemistry and the physical characteristics of the receiving water at a disposal site through the introduction of chemical constituents in suspended or dissolved form. Changes in the clarity, color, odor, and taste of water and the addition of contaminants can reduce or eliminate the suitability of water bodies for populations of aquatic organisms, and for human consumption, recreation, and aesthetics. The introduction of nutrients or organic material to the water column as a result of the discharge can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen, thereby potentially affecting the survival of many aquatic organisms. Increases in nutrients can favor one group of organisms such as algae to the detriment of other more desirable types such as submerged aquatic vegetation, potentially causing adverse health effects, objectionable tastes and odors, and other problems.

§ 230.23 Current patterns and water circulation.

(a) Current patterns and water circulation are the physical movements of water in the aquatic ecosystem. Currents and circulation respond to natural forces as modified by basin shape and cover, physical and chemical characteristics of water strata and masses, and energy dissipating factors.

(b) Possible loss of environmental characteristics and values: The discharge of dredged or fill material can modify current patterns and water cir-

culation by obstructing flow, changing the direction or velocity of water flow, changing the direction or velocity of water flow and circulation, or otherwise changing the dimensions of a water body. As a result, adverse changes can occur in: Location, structure, and dynamics of aquatic communities; shoreline and substrate erosion and depositon rates; the deposition of suspended particulates; the rate and extent of mixing of dissolved and suspended components of the water body; and water stratification.

§ 230.24 Normal water fluctuations.

(a) Normal water fluctuations in a natural aquatic system consist of daily, seasonal, and annual tidal and flood fluctuations in water level. Biological and physical components of such a system are either attuned to or characterized by these periodic water fluctuations.

(b) Possible loss of environmental characteristics and values: The discharge of dredged or fill material can alter the normal water-level fluctuation pattern of an area, resulting in prolonged periods of inundation, exaggerated extremes of high and low water, or a static, nonfluctuating water level. Such water level modifications may change salinity patterns, alter erosion or sedimentation rates, aggravate water temperature extremes, and upset the nutrient and dissolved oxygen balance of the aquatic ecosystem. In addition, these modifications can alter or destroy communities and populations of aquatic animals and vegetation, induce populations of nuisance organisms, modify habitat, reduce food supplies, restrict movement of aquatic fauna, destroy spawning areas, and change adjacent, upstream, and downstream areas.

§ 230.25 Salinity gradients.

(a) Salinity gradients form where salt water from the ocean meets and mixes with fresh water from land.

(b) Possible loss of environmental characteristics and values: Obstructions which divert or restrict flow of either fresh or salt water may change existing salinity gradients. For example, partial blocking of the entrance to an estuary or river mouth that significantly restricts the movement of the salt water into and out of that area can effectively lower the volume of salt water available for mixing within that estuary. The downstream migration of the salinity gradient can occur, displacing the maximum sedimentation zone and requiring salinity-dependent aquatic biota to adjust to the new conditions, move to new locations if possible, or perish. In the freshwater zone, discharge operations in the upstream regions can have equally adverse impacts. A significant reduction in the volume of fresh water moving into an estuary below that which is considered normal can affect the location and type of mixing thereby changing the characteristic salinity patterns. The resulting changed circulation pattern can cause the upstream migration of the salinity gradient displacing the maximim sedimentation zone. This migration may affect those organisms that are adapted to freshwater environments. It may also affect municipal water supplies.

NOTE: Possible actions to minimize adverse impacts regarding site characteristics can be found in subpart H.

Subpart D—Potential Impacts on Biological Characteristics of the Aquatic Ecosystem

NOTE: The impacts described in this subpart should be considered in making the factual determinations and the findings of compliance or non-compliance in subpart B.

§ 230.30 Threatened and endangered species.

(a) An endangered species is a plant or animal in danger of extinction throughout all or a significant portion of its range. A threatened species is one in danger of becoming an endangered species in the foreseeable future throughout all or a significant portion of its range. Listings of threatened and endangered species as well as critical habitats are maintained by some individual States and by the U.S. Fish and Wildlife Service of the Department of the Interior (codified annually at 50 CFR 17.11). The Department of Commerce has authority over some threatened and endangered marine mammals, fish and reptiles.

(b) Possible loss of values: The major potential impacts on threatened or endangered species from the discharge of dredged or fill material include:

(1) Covering or otherwise directly killing species;

(2) The impairment or destruction of habitat to which these species are limited. Elements of the aquatic habitat which are particularly crucial to the continued survival of some threatened or endangered species include adequate good quality water, spawning and maturation areas, nesting areas, protective cover, adequate and reliable food supply, and resting areas for migratory species. Each of these elements can be adversely affected by changes in either the normal water conditions for clarity, chemical content, nutrient balance, dissolved oxygen, pH, temperature, salinity, current patterns, circulation and fluctuation, or the physical removal of habitat; and

(3) Facilitating incompatible activities.

(c) Where consultation with the Secretary of the Interior occurs under section 7 of the Endangered Species Act, the conclusions of the Secretary con-

cerning the impact(s) of the discharge on threatened and endangered species and their habitat shall be considered final.

§ 230.31 Fish, crustaceans, mollusks, and other aquatic organisms in the food web.

(a) Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. All forms and life stages of an organism, throughout its geographic range, are included in this category.

(b) Possible loss of values: The discharge of dredged or fill material can variously affect populations of fish, crustaceans, mollusks and other food web organisms through the release of contaminants which adversely affect adults, juveniles, larvae, or eggs, or result in the establishment or proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species. Suspended particulates settling on attached or buried eggs can smother the eggs by limiting or sealing off their exposure to oxygenated water. Discharge of dredged and fill material may result in the debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent. Mollusks are particularly sensitive to the discharge of material during periods of reproduction and growth and development due primarily to their limited mobility. They can be rendered unfit for human consumption by tainting, by production and accumulation of toxins, or by ingestion and retention of pathogenic organisms, viruses, heavy metals or persistent synthetic organic chemicals. The discharge of dredged or fill material can redirect, delay, or stop the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places such as spawning or nursery grounds and potentially leading to reduced populations. Reduction of detrital feeding species or other representatives of lower trophic levels can impair the flow of energy from primary consumers to higher trophic levels. The reduction or potential elimination of food chain organism populations decreases the overall productivity and nutrient export capability of the ecosystem.

§ 230.32 Other wildlife.

(a) Wildlife associated with aquatic ecosystems are resident and transient mammals, birds, reptiles, and amphibians.

(b) Possible loss of values: The discharge of dredged or fill material can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. These adverse impacts upon wildlife habitat may result from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation. Increased water turbidity can adversely affect wildlife species which rely upon sight to feed, and disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms. The availability of contaminants from the discharge of dredged or fill material may lead to the bioaccumulation of such contaminants in wildlife. Changes in such physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species at the expense of resident species and communities. In some aquatic environments lowering plant and animal species diversity may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity.

NOTE: Possible actions to minimize adverse impacts regarding characteristics of biological components of the aquatic ecosystem can be found in subpart H.

Subpart E—Potential Impacts on Special Aquatic Sites

NOTE: The impacts described in this subpart should be considered in making the factual determinations and the findings of compliance or non-compliance in subpart B. The definition of special aquatic sites is found in § 230.3(q-1).

§ 230.40 Sanctuaries and refuges.

(a) Sanctuaries and refuges consist of areas designated under State and Federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources.

(b) Possible loss of values: Sanctuaries and refuges may be affected by discharges of dredged or fill material which will:

(1) Disrupt the breeding, spawning, migratory movements or other critical life requirements of resident or transient fish and wildlife resources;

(2) Create unplanned, easy and incompatible human access to remote aquatic areas;

(3) Create the need for frequent maintenance activity;

(4) Result in the establishment of undesirable competitive species of plants and animals;

(5) Change the balance of water and land areas needed to provide cover, food, and other fish and wildlife habitat requirements in a way that modifies sanctuary or refuge management practices;

(6) Result in any of the other adverse impacts discussed in subparts C and D as they relate to a particular sanctuary or refuge.

§ 230.41 Wetlands.

(a)(1) Wetlands consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

(2) Where wetlands are adjacent to open water, they generally constitute the transition to upland. The margin between wetland and open water can best be established by specialists familiar with the local environment, particularly where emergent vegetation merges with submerged vegetation over a broad area in such places as the lateral margins of open water, headwaters, rainwater catch basins, and groundwater seeps. The landward margin of wetlands also can best be identified by specialists familiar with the local environment when vegetation from the two regions merges over a broad area.

(3) Wetland vegetation consists of plants that require saturated soils to survive (obligate wetland plants) as well as plants, including certain trees, that gain a competitive advantage over others because they can tolerate prolonged wet soil conditions and their competitors cannot. In addition to plant populations and communities, wetlands are delimited by hydrological and physical characteristics of the environment. These characteristics should be considered when information about them is needed to supplement information available about vegetation, or where wetland vegetation has been removed or is dormant.

(b) Possible loss of values: The discharge of dredged or fill material in wetlands is likely to damage or destroy habitat and adversely affect the biological productivity of wetlands ecosystems by smothering, by dewatering, by permanently flooding, or by altering substrate elevation or periodicity of water movement. The addition of dredged or fill material may destroy wetland vegetation or result in advancement of succession to dry land species. It may reduce or eliminate nutrient exchange by a reduction of the system's productivity, or by altering current patterns and velocities. Disruption or elimination of the wetland system can degrade water quality by obstructing circulation patterns that flush large expanses of wetland systems, by interfering with the filtration function of wetlands, or by changing the aquifer recharge capability of a wetland. Discharges can also change the wetland habitat value for fish and wildlife as discussed in subpart D. When disruptions in flow and circulation patterns occur, apparently minor loss of wetland acreage may result in major losses through secondary impacts. Discharging fill material in wetlands as part of municipal, industrial or recreational development may modify the capacity of wetlands to retain and store floodwaters and to serve as a buffer zone shielding upland areas from wave actions, storm damage and erosion.

§ 230.42 Mud flats.

(a) Mud flats are broad flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems. When mud flats are inundated, wind and wave action may resuspend bottom sediments. Coastal mud flats are exposed at extremely low tides and inundated at high tides with the water table at or near the surface of the substrate. The substrate of mud flats contains organic material and particles smaller in size than sand. They are either unvegetated or vegetated only by algal mats.

(b) Possible loss of values: The discharge of dredged or fill material can cause changes in water circulation patterns which may permanently flood or dewater the mud flat or disrupt periodic inundation, resulting in an increase in the rate of erosion or accretion. Such changes can deplete or eliminate mud flat biota, foraging areas, and nursery areas. Changes in inundation patterns can affect the chemical and biological exchange and decomposition process occurring on the mud flat and change the deposition of suspended material affecting the productivity of the area. Changes may reduce the mud flat's capacity to dissipate storm surge runoff.

§ 230.43 Vegetated shallows.

(a) Vegetated shallows are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems as well as a number of freshwater species in rivers and lakes.

(b) Possible loss of values: The discharge of dredged or fill material can smother vegetation and benthic organisms. It may also create unsuitable conditions for their continued vigor by: (1) Changing water circulation patterns; (2) releasing nutrients that increase undesirable algal populations; (3) releasing chemicals that adversely affect plants and animals; (4) increasing turbidity levels, thereby reducing light penetration and hence photosynthesis; and (5) changing the capacity of a vegetated shallow to stabilize bottom materials and decrease channel shoaling. The discharge of dredged or fill material may reduce the value of vegetated shallows as nesting, spawning, nursery, cover, and forage areas, as well as their value in protecting shorelines from erosion and wave actions. It may also encourage the growth of nuisance vegetation.

§ 230.44 Coral reefs.

(a) Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef.

(b) Possible loss of values: The discharge of dredged or fill material can adversely affect colonies of reef building organisms by burying them, by releasing contaminants such as hydrocarbons into the water column, by reducing light penetration through the water, and by increasing the level of suspended particulates. Coral organisms are extremely sensitive to even slight reductions in light penetration or increases in suspended particulates. These adverse effects will cause a loss of productive colonies which in turn provide habitat for many species of highly specialized aquatic organisms.

§ 230.45 Riffle and pool complexes.

(a) Steep gradient sections of streams are sometimes characterized by riffle and pool complexes. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. Pools are characterized by a slower stream velocity, a steaming flow, a smooth surface, and a finer substrate. Riffle and pool complexes are particularly valuable habitat for fish and wildlife.

(b) Possible loss of values: Discharge of dredged or fill material can eliminate riffle and pool areas by displacement, hydrologic modification, or sedimentation. Activities which affect riffle and pool areas and especially riffle/pool ratios, may reduce the aeration and filtration capabilities at the discharge site and downstream, may reduce stream habitat diversity, and may retard repopulation of the disposal site and downstream waters through sedimentation and the creation of unsuitable habitat. The discharge of dredged or fill material which alters stream hydrology may cause scouring or sedimentation of riffles and pools. Sedimentation induced through hydrological modification or as a direct result of the deposition of unconsolidated dredged or fill material may clog riffle and pool areas, destroy habitats, and create anaerobic conditions. Eliminating pools and meanders by the discharge of dredged or fill material can reduce water holding capacity of streams and cause rapid runoff from a watershed. Rapid runoff can deliver large quantities of flood water in a short time to downstream areas resulting in the destruction of natural habitat, high property loss, and the need for further hydraulic modification.

NOTE: Possible actions to minimize adverse impacts on site or material characteristics can be found in subpart H.

Subpart F—Potential Effects on Human Use Characteristics

NOTE: The effects described in this subpart should be considered in making the factual determinations and the findings of compliance or non-compliance in subpart B.

§ 230.50 Municipal and private water supplies.

(a) Municipal and private water supplies consist of surface water or ground water which is directed to the intake of a municipal or private water supply system.

(b) Possible loss of values: Discharges can affect the quality of water supplies with respect to color, taste, odor, chemical content and suspended particulate concentration, in such a way as to reduce the fitness of the water for consumption. Water can be rendered unpalatable or unhealthy by the addition of suspended particulates, viruses and pathogenic organisms, and dissolved materials. The expense of removing such substances before the water is delivered for consumption can be high. Discharges may also affect the quantity of water available for municipal and private water supplies. In addition, certain commonly used water treatment chemicals have the potential for combining with some suspended or dissolved substances from dredged or fill material to form other products that can have a toxic effect on consumers.

§ 230.51 Recreational and commercial fisheries.

(a) Recreational and commercial fisheries consist of harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man.

(b) Possible loss of values: The discharge of dredged or fill materials can affect the suitability of recreational and commercial fishing grounds as habitat for populations of consumable aquatic organisms. Discharges can result in the chemical contamination of recreational or commercial fisheries. They may also interfere with the reproductive success of recreational and commercially important aquatic species through disruption of migration and spawning areas. The introduction of pollutants at critical times in their life cycle may directly reduce populations of commercially important aquatic organisms or indirectly reduce them by reducing organisms upon which they depend for food. Any of these impacts can be of short duration or prolonged, depending upon the physical and chemical impacts of the discharge and the biological availability of contaminants to aquatic organisms.

§ 230.52 Water-related recreation.

(a) Water-related recreation encompasses activities undertaken for amusement and relaxation. Activities encompass two broad categories of use: consumptive, e.g., harvesting resources by hunting and fishing; and non-comsumptive, e.g. canoeing and sight-seeing.

(b) Possible loss of values: One of the more important direct impacts of dredged or fill disposal is to impair or destroy the resources which support recreation activities. The disposal of dredged or fill material may adversely modify or destroy water use for recreation by changing turbidity, suspended particulates, temperature, dissolved oxygen, dissolved materials, toxic materials, pathogenic organisms, quality of habitat, and the aesthetic qualities of sight, taste, odor, and color.

§ 230.53 Aesthetics.

(a) Aesthetics associated with the aquatic ecosystem consist of the perception of beauty by one or a combination of the senses of sight, hearing, touch, and smell. Aesthetics of aquatic ecosystems apply to the quality of life enjoyed by the general public and property owners.

(b) Possible loss of values: The discharge of dredged or fill material can mar the beauty of natural aquatic ecosystems by degrading water quality, creating distracting disposal sites, inducing inappropriate development, encouraging unplanned and incompatible human access, and by destroying vital elements that contribute to the compositional harmony or unity, visual distinctiveness, or diversity of an area. The discharge of dredged or fill material can adversely affect the particular features, traits, or characteristics of an aquatic area which make it valuable to property owners. Activities which degrade water quality, disrupt natural substrate and vegetational characteristics, deny access to or visibility of the resource, or result in changes in odor, air quality, or noise levels may reduce the value of an aquatic area to private property owners.

§ 230.54 Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

(a) These preserves consist of areas designated under Federal and State laws or local ordinances to be managed for their aesthetic, educational, historical, recreational, or scientific value.

(b) Possible loss of values: The discharge of dredged or fill material into such areas may modify the aesthetic, educational, historical, recreational and/or scientific qualities thereby reducing or eliminating the uses for which such sites are set aside and managed.

NOTE: Possible actions to minimize adverse impacts regarding site or material characteristics can be found in subpart H.

Subpart G—Evaluation and Testing

§ 230.60 General evaluation of dredged or fill material.

The purpose of these evaluation procedures and the chemical and biological testing sequence outlined in § 230.61 is to provide information to reach the determinations required by § 230.11. Where the results of prior evaluations, chemical and biological tests, scientific research, and experience can provide information helpful in making a determination, these should be used. Such prior results may make new testing unnecessary. The information used shall be documented. Where the same information applies to more than one determination, it may be documented once and referenced in later determinations.

(a) If the evaluation under paragraph (b) indicates the dredged or fill material is not a carrier of contaminants, then the required determinations pertaining to the presence and effects of contaminants can be made without testing. Dredged or fill material is most likely to be free from chemical, biological, or other pollutants where it is composed primarily of sand, gravel, or other naturally occurring inert material. Dredged material so composed is generally found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels. However, when such material is discolored or contains other indications that contaminants may be present, further inquiry should be made.

(b) The extraction site shall be examined in order to assess whether it is sufficiently removed from sources of pollution to provide reasonable assurance that the proposed discharge material is not a carrier of contaminants. Factors to be considered include but are not limited to:

(1) Potential routes of contaminants or contaminated sediments to the extraction site, based on hydrographic or other maps, aerial photography, or other materials that show watercourses, surface relief, proximity to tidal movement, private and public roads, location of buildings, municipal and industrial areas, and agricultural or forest lands.

(2) Pertinent results from tests previously carried out on the material at the extraction site, or carried out on similar material for other permitted projects in the vicinity. Materials shall be considered similar if the sources of contamination, the physical configuration of the sites and the sediment composition of the materials are comparable, in light of water circulation and stratification, sediment accumulation and general sediment characteristics. Tests from other sites may be relied on

only if no changes have occurred at the extraction sites to render the results irrelevant.

(3) Any potential for significant introduction of persistent pesticides from land runoff or percolation;

(4) Any records of spills or disposal of petroleum products or substances designated as hazardous under section 311 of the Clean Water Act (See 40 CFR part 116);

(5) Information in Federal, State and local records indicating significant introduction of pollutants from industries, municipalities, or other sources, including types and amounts of waste materials discharged along the potential routes of contaminants to the extraction site; and

(6) Any possibility of the presence of substantial natural deposits of minerals or other substances which could be released to the aquatic environment in harmful quantities by man-induced discharge activities.

(c) To reach the determinations in § 230.11 involving potential effects of the discharge on the characteristics of the disposal site, the narrative guidance in subparts C through F shall be used along with the general evaluation procedure in § 230.60 and, if necessary, the chemical and biological testing sequence in § 230.61. Where the discharge site is adjacent to the extraction site and subject to the same sources of contaminants, and materials at the two sites are substantially similar, the fact that the material to be discharged may be a carrier of contaminants is not likely to result in degradation of the disposal site. In such circumstances, when dissolved material and suspended particulates can be controlled to prevent carrying pollutants to less contaminated areas, testing will not be required.

(d) Even if the § 230.60(b) evaluation (previous tests, the presence of polluting industries and information about their discharge or runoff into waters of the U.S., bioinventories, etc.) leads to the conclusion that there is a high probability that the material proposed for discharge is a carrier of contaminants, testing may not be necessary if constraints are available to reduce contamination to acceptable levels within the disposal site and to prevent contaminants from being transported beyond the boundaries of the disposal site, if such constraints are acceptable to the permitting authority and the Regional Administrator, and if the potential discharger is willing and able to implement such constraints. However, even if tests are not performed, the permitting authority must still determine the probable impact of the operation on the receiving aquatic ecosystem. Any decision not to test must be explained in the determinations made under § 230.11.

§ 230.61 Chemical, biological, and physical evaluation and testing.

NOTE: The Agency is today proposing revised testing guidelines. The evaluation and testing procedures in this section are based on the 1975 section 404(b)(1) interim final Guidelines and shall remain in effect until the revised testing guidelines are published as final regulations.

(a) No single test or approach can be applied in all cases to evaluate the effects of proposed discharges of dredged or fill materials. This section provides some guidance in determining which test and/or evaluation procedures are appropriate in a given case. Interim guidance to applicants concerning the applicability of specific approaches or procedures will be furnished by the permitting authority.

(b) *Chemical-biological interactive effects.* The principal concerns of discharge of dredged or fill material that contain contaminants are the potential effects on the water column and on communities of aquatic organisms.

(1) *Evaluation of chemical-biological interactive effects.* Dredged or fill material may be excluded from the evaluation procedures specified in paragraphs (b) (2) and (3) of this section if it is determined, on the basis of the evaluation in § 230.60, that the likelihood of contamination by contaminants is acceptably low, unless the permitting authority, after evaluating and considering any comments received from the Regional Administrator, determines that these procedures are necessary. The Regional Administrator may require, on a case-by-case basis, testing approaches and procedures by stating what additional information is needed through further analyses and how the results of the analyses will be of value in evaluating potential environmental effects.

If the General Evaluation indicates the presence of a sufficiently large number of chemicals to render impractical the identification of all contaminants by chemical testing, information may be obtained from bioassays in lieu of chemical tests.

(2) *Water column effects.* (i) Sediments normally contain constituents that exist in various chemical forms and in various concentrations in several locations within the sediment. An elutriate test may be used to predict the effect on water quality due to release of contaminants from the sediment to the water column. However, in the case of fill material originating on land which may be a carrier of contaminants, a water leachate test is appropriate.

(ii) Major constituents to be analyzed in the elutriate are those deemed critical by the permitting authority, after evaluating and considering any comments received from the Regional Administrator, and considering results of the evaluation in § 230.60. Elutriate concentrations should be compared to concentrations of the same constituents in

water from the disposal site. Results should be evaluated in light of the volume and rate of the intended discharge, the type of discharge, the hydrodynamic regime at the disposal site, and other information relevant to the impact on water quality. The permitting authority should consider the mixing zone in evaluating water column effects. The permitting authority may specify bioassays when such procedures will be of value.

(3) *Effects on benthos.* The permitting authority may use an appropriate benthic bioassay (including bioaccumulation tests) when such procedures will be of value in assessing ecological effects and in establishing discharge conditions.

(c) Procedure for comparison of sites.

(1) When an inventory of the total concentration of contaminants would be of value in comparing sediment at the dredging site with sediment at the disposal site, the permitting authority may require a sediment chemical analysis. Markedly different concentrations of contaminants between the excavation and disposal sites may aid in making an environmental assessment of the proposed disposal operation. Such differences should be interpreted in terms of the potential for harm as supported by any pertinent scientific literature.

(2) When an analysis of biological community structure will be of value to assess the potential for adverse environmental impact at the proposed disposal site, a comparison of the biological characteristics between the excavation and disposal sites may be required by the permitting authority. Biological indicator species may be useful in evaluating the existing degree of stress at both sites. Sensitive species representing community components colonizing various substrate types within the sites should be identified as possible bioassay organisms if tests for toxicity are required. Community structure studies should be performed only when they will be of value in determining discharge conditions. This is particularly applicable to large quantities of dredged material known to contain adverse quantities of toxic materials. Community studies should include benthic organisms such as microbiota and harvestable shellfish and finfish. Abundance, diversity, and distribution should be documented and correlated with substrate type and other appropriate physical and chemical environmental characteristics.

(d) Physical tests and evaluation. The effect of a discharge of dredged or fill material on physical substrate characteristics at the disposal site, as well as on the water circulation, fluctuation, salinity, and suspended particulates content there, is important in making factual determinations in §230.11. Where information on such effects is not otherwise available to make these factual determinations, the permitting authority shall require appropriate physical tests and evaluations as are justified and deemed necessary. Such tests may include sieve tests, settleability tests, compaction tests, mixing zone and suspended particulate plume determinations, and site assessments of water flow, circulation, and salinity characteristics.

Subpart H—Actions To Minimize Adverse Effects

NOTE: There are many actions which can be undertaken in response to §203.10(d) to minimize the adverse effects of discharges of dredged or fill material. Some of these, grouped by type of activity, are listed in this subpart.

§230.70 Actions concerning the location of the discharge.

The effects of the discharge can be minimized by the choice of the disposal site. Some of the ways to accomplish this are by:

(a) Locating and confining the discharge to minimize smothering of organisms;

(b) Designing the discharge to avoid a disruption of periodic water inundation patterns;

(c) Selecting a disposal site that has been used previously for dredged material discharge;

(d) Selecting a disposal site at which the substrate is composed of material similar to that being discharged, such as discharging sand on sand or mud on mud;

(e) Selecting the disposal site, the discharge point, and the method of discharge to minimize the extent of any plume;

(f) Designing the discharge of dredged or fill material to minimize or prevent the creation of standing bodies of water in areas of normally fluctuating water levels, and minimize or prevent the drainage of areas subject to such fluctuations.

§230.71 Actions concerning the material to be discharged.

The effects of a discharge can be minimized by treatment of, or limitations on the material itself, such as:

(a) Disposal of dredged material in such a manner that physiochemical conditions are maintained and the potency and availability of pollutants are reduced.

(b) Limiting the solid, liquid, and gaseous components of material to be discharged at a particular site;

(c) Adding treatment substances to the discharge material;

(d) Utilizing chemical flocculants to enhance the deposition of suspended particulates in diked disposal areas.

§ 230.72 Actions controlling the material after discharge.

The effects of the dredged or fill material after discharge may be controlled by:

(a) Selecting discharge methods and disposal sites where the potential for erosion, slumping or leaching of materials into the surrounding aquatic ecosystem will be reduced. These sites or methods include, but are not limited to:

(1) Using containment levees, sediment basins, and cover crops to reduce erosion;

(2) Using lined containment areas to reduce leaching where leaching of chemical constituents from the discharged material is expected to be a problem;

(b) Capping in-place contaminated material with clean material or selectively discharging the most contaminated material first to be capped with the remaining material;

(c) Maintaining and containing discharged material properly to prevent point and nonpoint sources of pollution;

(d) Timing the discharge to minimize impact, for instance during periods of unusual high water flows, wind, wave, and tidal actions.

§ 230.73 Actions affecting the method of dispersion.

The effects of a discharge can be minimized by the manner in which it is dispersed, such as:

(a) Where environmentally desirable, distributing the dredged material widely in a thin layer at the disposal site to maintain natural substrate contours and elevation;

(b) Orienting a dredged or fill material mound to minimize undesirable obstruction to the water current or circulation pattern, and utilizing natural bottom contours to minimize the size of the mound;

(c) Using silt screens or other appropriate methods to confine suspended particulate/turbidity to a small area where settling or removal can occur;

(d) Making use of currents and circulation patterns to mix, disperse and dilute the discharge;

(e) Minimizing water column turbidity by using a submerged diffuser system. A similar effect can be accomplished by submerging pipeline discharges or otherwise releasing materials near the bottom;

(f) Selecting sites or managing discharges to confine and minimize the release of suspended particulates to give decreased turbidity levels and to maintain light penetration for organisms;

(g) Setting limitations on the amount of material to be discharged per unit of time or volume of receiving water.

§ 230.74 Actions related to technology.

Discharge technology should be adapted to the needs of each site. In determining whether the discharge operation sufficiently minimizes adverse environmental impacts, the applicant should consider:

(a) Using appropriate equipment or machinery, including protective devices, and the use of such equipment or machinery in activities related to the discharge of dredged or fill material;

(b) Employing appropriate maintenance and operation on equipment or machinery, including adequate training, staffing, and working procedures;

(c) Using machinery and techniques that are especially designed to reduce damage to wetlands. This may include machines equipped with devices that scatter rather than mound excavated materials, machines with specially designed wheels or tracks, and the use of mats under heavy machines to reduce wetland surface compaction and rutting;

(d) Designing access roads and channel spanning structures using culverts, open channels, and diversions that will pass both low and high water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement;

(e) Employing appropriate machinery and methods of transport of the material for discharge.

§ 230.75 Actions affecting plant and animal populations.

Minimization of adverse effects on populations of plants and animals can be achieved by:

(a) Avoiding changes in water current and circulation patterns which would interfere with the movement of animals;

(b) Selecting sites or managing discharges to prevent or avoid creating habitat conducive to the development of undesirable predators or species which have a competitive edge ecologically over indigenous plants or animals;

(c) Avoiding sites having unique habitat or other value, including habitat of threatened or endangered species;

(d) Using planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics. Habitat development and restoration techniques can be used to minimize adverse impacts and to compensate for destroyed habitat. Use techniques that have been demonstrated to be effective in circumstances similar to those under consideration wherever possible. Where proposed development and restoration techniques have not yet advanced to the pilot demonstration stage, initiate their use on a small scale to allow corrective action if unanticipated adverse impacts occur;

(e) Timing discharge to avoid spawning or migration seasons and other biologically critical time periods;

(f) Avoiding the destruction of remnant natural sites within areas already affected by development.

§ 230.76 Actions affecting human use.

Minimization of adverse effects on human use potential may be achieved by:

(a) Selecting discharge sites and following discharge procedures to prevent or minimize any potential damage to the aesthetically pleasing features of the aquatic site (e.g. viewscapes), particularly with respect to water quality;

(b) Selecting disposal sites which are not valuable as natural aquatic areas;

(c) Timing the discharge to avoid the seasons or periods when human recreational activity associated with the aquatic site is most important;

(d) Following discharge procedures which avoid or minimize the disturbance of aesthetic features of an aquatic site or ecosystem;

(e) Selecting sites that will not be detrimental or increase incompatible human activity, or require the need for frequent dredge or fill maintenance activity in remote fish and wildlife areas;

(f) Locating the disposal site outside of the vicinity of a public water supply intake.

§ 230.77 Other actions.

(a) In the case of fills, controlling runoff and other discharges from activities to be conducted on the fill;

(b) In the case of dams, designing water releases to accommodate the needs of fish and wildlife;

(c) In dredging projects funded by Federal agencies other than the Corps of Engineers, maintain desired water quality of the return discharge through agreement with the Federal funding authority on scientifically defensible pollutant concentration levels in addition to any applicable water quality standards;

(d) When a significant ecological change in the aquatic environment is proposed by the discharge of dredged or fill material, the permitting authority should consider the ecosystem that will be lost as well as the environmental benefits of the new system.

Subpart I—Planning To Shorten Permit Processing Time

§ 230.80 Advanced identification of disposal areas.

(a) Consistent with these Guidelines, EPA and the permitting authority, on their own initiative or at the request of any other party and after consultation with any affected State that is not the permitting authority, may identify sites which will be considered as:

(1) Possible future disposal sites, including existing disposal sites and non-sensitive areas; or

(2) Areas generally unsuitable for disposal site specification;

(b) The identification of any area as a possible future disposal site should not be deemed to constitute a permit for the discharge of dredged or fill material within such area or a specification of a disposal site. The identification of areas that generally will not be available for disposal site specification should not be deemed as prohibiting applications for permits to discharge dredged or fill material in such areas. Either type of identification constitutes information to facilitate individual or General permit application and processing.

(c) An appropriate public notice of the proposed identification of such areas shall be issued;

(d) To provide the basis for advanced identification of disposal areas, and areas unsuitable for disposal, EPA and the permitting authority shall consider the likelihood that use of the area in question for dredged or fill material disposal will comply with these Guidelines. To facilitate this analysis, EPA and the permitting authority should review available water resources management data including data available from the public, other Federal and State agencies, and information from approved Coastal Zone Management programs and River Basin Plans;

(e) The permitting authority should maintain a public record of the identified areas and a written statement of the basis for identification.

Appendix E
U.S. Fish and Wildlife Service
Biological Opinion

U.S. Department
of Transportation
**Federal Highway
Administration**

Central Federal Lands
Highway Division

555 Zang Street, Room 259
Lakewood, CO 80228

FEB 17 1999

In Reply Refer To:
HPD-16

Mr. Robert Williams
Field Supervisor
U.S. Fish and Wildlife Service
1340 Financial Boulevard, Suite 234
Reno, NV 89502-7147

Dear Mr. Williams:

Subject: Hoover Dam Bypass, U.S. 93

The Federal Highway Administration (FHWA) wishes to initiate formal consultation with the Fish and Wildlife Service on the subject project. Enclosed are three copies of the Biological Assessment. We understand that you will forward a copy to your Las Vegas and Phoenix offices.

As you are aware, the FHWA has taken over the lead agency status that the Bureau of Reclamation held from 1989 to 1995. Reclamation's Biological Assessment and your subsequent Biological Opinion (Reference 2-21-89-F-170) are included as enclosures to this Biological Assessment.

Your office received copies of the Draft Environmental Impact Statement (DEIS) in September 1998. The Biological Assessment was not included, since we had not specified a preferred alternative in the DEIS. Late last year, after evaluating comments received on the DEIS, the Sugarloaf Mountain Alternative was selected as the preferred alternative.

As noted in the Biological Assessment, we believe that the Sugarloaf Mountain Alternative may affect the desert tortoise, but will not affect any of the other listed species in the project area. It is unlikely that fish species, such as the Devil's Hole pupfish and razorback sucker would be affected by activities associated with bridge construction, if proper blasting and rock scaling measures are utilized.

We would like to know if you concur with the findings in the Biological Assessment. We look forward to working with your office in developing appropriate mitigation for other species of concern. If you have any questions, please contact me at 303-716-2116 or write to the above address, Attention: HPD-16.

Sincerely yours,

jm /s/

Terry K. Haussler, P.E.
Project Manager

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE
NEVADA FISH AND WILDLIFE OFFICE
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NEVADA 89502

June 3, 1999
File No. 1-5-99-F-105

Mr. Terry K. Haussler
Federal Highway Administration
Post Office Box 25246
Lakewood, Colorado 80225-0246

Dear Mr. Haussler:

Subject: Biological Opinion for Construction of the Hoover Dam Bypass Project, Clark County, Nevada and Mohave County, Arizona

The Fish and Wildlife Service (Service) received your February 17, 1999, request for formal consultation on construction of the Sugarloaf Mountain Alternative for the Hoover Dam Bypass Project. Your request was made pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.) and 50 CFR § 402 of our interagency regulations governing section 7 of the Act. This document represents the Service's biological opinion on the potential effects of the proposed action on the Mojave desert tortoise (*Gopherus agassizii*), a species federally listed as threatened under the Act.

Federal Highway Administration (FHWA) has determined that the proposed project is *not likely to adversely affect* the bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus anatum*), razorback sucker (*Xyrauchen texanus*), or southwestern willow flycatcher (*Empidonax traillii extimus*), which are federally listed species. This determination is based on: (1) Distribution and abundance of the species, (2) perceived effects that may result from the proposed project, and (3) measures proposed by FHWA to avoid or minimize potential impacts to the species, itemized below in the **Description of the Proposed Action**. Following review of your request, we concur with FHWA's determination that the proposed project will not likely affect the bald eagle, American peregrine falcon, razorback sucker, or southwestern willow flycatcher. Furthermore, FHWA determined that construction of the proposed Hoover Dam Bypass Project would not affect the bonytail chub (*Gila elegans*) or Devil's Hole pupfish (*Cyprinodon diabolis*).

This biological opinion is based on information provided in FHWA correspondence dated February 17, 1999; biological assessment for the Hoover Dam Bypass Project dated February 1999; draft environmental impact statement (EIS) and section 4(f) evaluation dated September 1998; biological opinion for the Hoover Dam Bypass Project issued to the Bureau of Reclamation (Reclamation) on February 2, 1993; conversations with FHWA staff; and our files. A complete administrative record of this consultation is on file in the Service's Southern Nevada Field Office, in Las Vegas, Nevada.

Consultation History

File No. 2-21-89-F-170. On February 2, 1993, the Service issued a non-jeopardy biological opinion to Reclamation for construction of a bridge across the Colorado River and its associated roads and interrelated infrastructure in the vicinity of Hoover Dam. The biological opinion evaluated the potential effects to desert tortoise that may result from the project. The Service concurred with Reclamation's determination that the proposed project will not likely adversely affect the bonytail chub, bald eagle, American peregrine falcon, razorback sucker, or Devil's Hole pupfish. Subsequent to issuance of the biological opinion, Reclamation withdrew from the project as the lead agency because their mission emphasis changed from constructing major public works projects to water resource management.

File No. 1-5-97-SP-346. The Service provided FHWA a list of threatened and endangered species and species of concern on November 12, 1997. The list identified seven listed species and 23 species of concern that are known to occur, or potentially occur within the proposed project area. Potential impacts to those listed species are addressed this document and biological assessment for the proposed project (FHWA 1999).

File No. 1-5-98-TA-027. An interagency workshop was held in Las Vegas, Nevada on October 29, 1997, to inform all agencies of the EIS process and proposed project schedule, to enlist support, and identify and address issues and concerns raised by agency representatives. The Service provided preliminary scoping comments on the proposed project at the workshop. On November 21, 1997, the Service provided additional comments to FHWA on the preparation of an EIS for construction of the proposed project. FHWA addressed these comments in the preliminary draft EIS for the project.

File No. 1-5-98-I-167. On May 4, 1998, the Service provided comments to FHWA on the sections of the EIS prepared for the Hoover Dam Bypass Project that discussed the purpose and need of the proposed project and alternatives chosen for evaluation. The Service concluded that

(1) The purpose and need section provided an adequate description of deficiencies of the existing road system across the Hoover Dam, and (2) the alternatives chosen for further evaluation were reasonable.

File No. 1-5-98-TA-257. The Service reviewed the administrative draft EIS for the proposed project and provided verbal comments at a meeting held in Boulder City, Nevada on August 12, 1998. The Service provided written comments to FHWA on September 3, 1998.

On February 19, 1999, the Service received your February 17, 1999, request for consultation on construction of the Sugarloaf Mountain Alternative of the Hoover Dam Bypass Project, at which time formal consultation was initiated.

Description of the Proposed Action

The present route of U.S. Highway 93 (US 93) traverses the crest of Hoover Dam as a bridge to cross the Colorado River, and provides vehicular flow between Nevada and Arizona. Because US 93 cannot safely accommodate all of the traffic where it crosses over the dam, FHWA proposes to bypass Hoover Dam with a new bridge and approach roadway crossing the Colorado River. Design and construction of the project involves cooperation and consultation primarily with Reclamation, National Park Service (NPS), the Service, Arizona Department of Transportation, Nevada Department of Transportation (NDOT), Arizona Game and Fish Department (AGFD), and Nevada Division of Wildlife (NDOW). The 3.35-mile-long construction right-of-way would average 300 feet in width. Roughly half of the right-of-way width would occur outside the actual roadway and will be restored if affected. The new route would eliminate the steep grades, sharp curves, narrow highway width, insufficient shoulders, poor sight distances, and slow travel speeds of the existing route. In addition to public safety concerns and traffic, re-routing traffic to bypass the dam should safeguard the dam and waters of the Colorado River and Lake Mead from spills or explosions involving hazardous cargo, and improve conditions for operation and maintenance of the dam facilities.

FHWA chose the Sugarloaf Mountain Alternative on the basis of screening criteria including environmental impacts. This preferred route would cross the Colorado River approximately 1,500 feet downstream (south) of Hoover Dam and require 2.2 miles of new road construction in Nevada, a 1,900-foot bridge over the river, two highway bridges, a tunnel, and 1.1 miles of highway construction in Arizona (Figure 1). The project will entail construction of four-lane highway and approaches to the new river bridge. Construction of the Sugarloaf Mountain Alternative would likely begin in 2002 and be completed by 2007. The project would be located

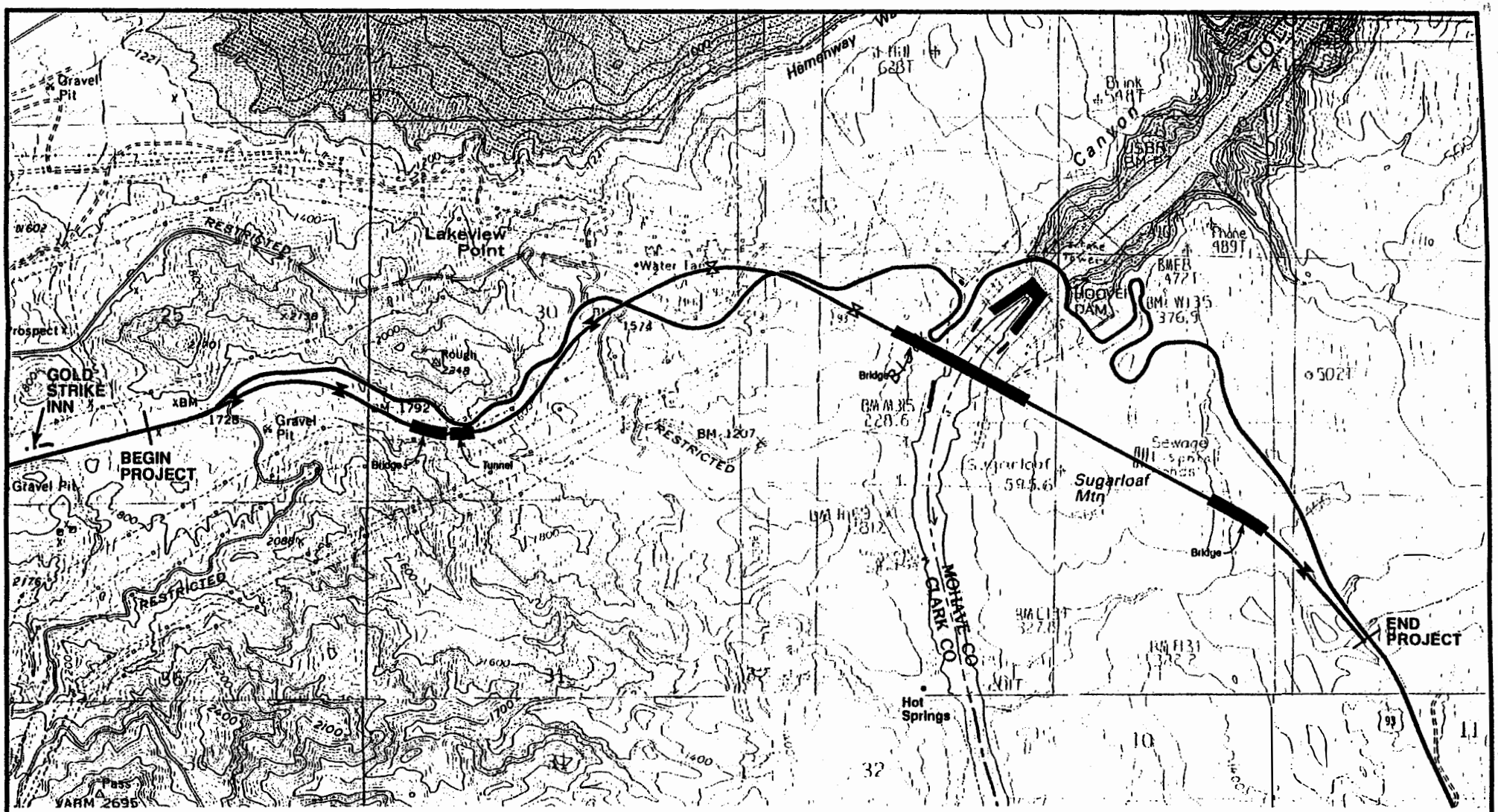

FIGURE 1
SUGARLOAF MOUNTAIN PROJECT FEATURES
HOOVER DAM BYPASS PROJECT
ENVIRONMENTAL IMPACT STATEMENT

on lands administered by Reclamation and NPS. The Sugarloaf Mountain Alternative would result in the least amount of disturbance to desert tortoise habitat of the three construction alternatives evaluated by FHWA in the EIS.

The new highway begins on the Nevada side of the project area about 1,000 feet east of the Gold Strike Inn, following a route just south of the existing US 93 to the Reclamation warehouse area. A highway bridge, approximately 400 feet long, would cross a bend in upper Gold Strike Canyon to eliminate the need for a large fill area, thus keeping the canyon bottom unchanged for drainage flows and allowing wildlife to pass underneath the bridge. A 300-foot-long tunnel would be constructed just east of the highway bridge. The highway grade then steepens to 3 percent, passes through a gap in the high rock ridge that parallels the river, and then descends to the southeast to the proposed bridge over the Colorado River.

From the Arizona end of the proposed river bridge, traveling eastward, the highway traverses a deep cut along the north slope of Sugarloaf Mountain. The highway then passes through an area containing two existing sewage evaporation ponds. To the east of the sewage ponds, an 800-foot-long highway bridge would be constructed across a large ravine. The highway then turns southeast at a 6-percent downgrade, and intersects existing US 93 approximately 1.1 miles from the dam.

The Sugarloaf Mountain Alternative would include four wildlife overpasses, two additional wildlife passes provided by the two highway bridges, one additional wildlife overpass provided by the tunnel, and fencing to continue approximately 2,400 feet beyond the intersection of the new highway with US 93.

FHWA proposes the following measures to minimize take of tortoise (FHWA 1999):

1. Qualified desert tortoise biologists will conduct preconstruction surveys on the exact highway routes according to current survey methods established by the Service, NDOW, and AGFD.

2. To compensate for habitat lost, FHWA will contribute to the habitat compensation program using a formula set by the Desert Tortoise Management Oversight Group. This formula will consider habitat value, existing disturbances, and indirect effects (Hastey, et al. 1991).

3. Any tortoises found in the construction right-of-way will be moved according to protocol used by the Service.

4. A qualified tortoise biologist will be available for handling tortoises found during construction.

5. FHWA will ensure that construction workers are briefed on tortoise activity patterns, tortoise sensitivity to human disturbance, and proper notification procedures for removal from project right-of-way.

6. Measures will be taken to prevent road kills in areas with high tortoise densities and where tortoise movements would be likely. These will be designed from the most effective measures to date from specifications provided from the Nevada, Arizona, and California Departments of Transportation.

In addition, FHWA proposes the following measures to avoid or minimize potential effects to peregrine falcon, bald eagle, Devil's Hole pupfish, razorback sucker, and bonytail chub. If unavoidable impacts to these five listed species are identified, FHWA will request reinitiation of formal consultation (FHWA 1999).

- The AGFD will conduct follow-up surveys of peregrine falcons in the project area for at least 2 years before construction, through construction, and into 1 year of public use of the new bridge.

- If occupied peregrine falcon nests are found within 0.5-mile of construction activities, consultation will be reinitiated with the Service to determine appropriate mitigation measures.

- Biologists from the AGFD, NDOW, NPS, and/or Reclamation will monitor bald eagle use of the bridge crossing site(s) during the winter before construction. Any preferred hunting perch sites or night roosts will be identified. Measures will be taken to not affect any preferred hunting perch sites or night roosting sites for bald eagles. If bald eagles were to nest in the project vicinity, consultation with the Service will be resumed [reinitiated].

- No construction below the water line will occur in the Colorado River in Black Canyon. A catch net and temporary spill containment system will be constructed at the Colorado River crossing to catch falling debris and collect contaminants if spilled. For construction of the bridge abutments, loose rocks will be scaled prior to and during excavation work; and netting on the canyon slopes will be used during blasting to minimize rock fall.

- An assessment of the potential effects of the blasting activities of the project will be completed prior to implementation.

Status of the Species/Environmental Baseline

The desert tortoise, a large, herbivorous reptile, is generally active when annual plants are most common (spring, early summer, autumn). Desert tortoises usually spend the remainder of the year in sheltered sites, escaping the extreme weather conditions of the desert. Sheltering habits of desert tortoises vary greatly in different geographic locations. Shelter sites may be located under bushes, in the banks or beds of washes, in rock outcrops, or in caliche caves. The size of desert tortoise home ranges vary with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 25 to 200 acres (Berry 1986). Over its lifetime, each desert tortoise may require more than 1.5 square miles of habitat and make forays of more than 7 miles at a time (Berry 1986). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for tortoise survival. During droughts, tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators. Desert tortoises possess a combination of life history and reproductive characteristics which affect the ability of populations to survive external threats. Tortoises may require 20 years to reach sexual maturity (Turner, et al. 1987). Further information on the range, biology, and ecology of the desert tortoise can be found in Berry and Burge (1984); Burge (1978); Burge and Bradley (1976); Bury, et al. (1994); Hovik and Hardenbrook (1989); Karl (1981, 1983a, 1983b); and Weinstein, et al. (1987).

The range of the Mojave population of the desert tortoise includes a portion of the Mojave Desert and the Colorado Desert subdivision of the Sonoran Desert and spans portions of four States. The Mojave Desert is located in southern California, southern Nevada, northwestern Arizona, and southwestern Utah. It is bordered on the north by the Great Basin Desert, on the west by the Sierra Nevada and Tehachapi Ranges, on the south by the San Gabriel and San Bernardino Mountains and the Colorado Desert, and on the east by the Grand Wash Cliffs and Hualapai Mountains of Arizona. In Nevada, the native range of this species is generally restricted to Clark County and those portions of Nye and Lincoln Counties south of 37 degrees north latitude and below approximately 1,330 meters elevation (4,000 feet).

The Mojave desert tortoise is most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub vegetation, but also in succulent scrub, cheesebush scrub, blackbush scrub, hopsage scrub, shadscale scrub, microphyll woodland, and Mojave saltbush-allscale scrub (Service 1994). Within these vegetation types, desert tortoises potentially can

survive and reproduce where their basic habitat requirements are met. Throughout most of the Mojave Region, tortoises occur most commonly on gently sloping terrain with soils ranging from sand to sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, tortoises can be found in steeper, rockier areas. In southern Nevada, tortoises are considered to be active from approximately March 1 through October 31.

Desert tortoises in southern Nevada are found primarily in valley bottoms and on bajadas where current and historical threats to tortoise and its habitat are most prevalent. Desert tortoise surveys were conducted in the project area during April and May 1990 in accordance with Service-approved protocol (Rorabaugh and Allen 1990). Standard transects consist of walking the perimeter of an equilateral triangle, 0.5-mile on each side, while recording observations of desert tortoise sign in an area 33 feet (10 meters) wide. Average total adjusted sign (TAS) is determined and relative desert tortoise density is calculated based on the formula developed by Berry and Nicholson (1984). During the 1990 survey, 43 transects were walked in the proposed project area totaling 93,450 feet (17.7 miles). The results of the survey include four TAS, none of which were tortoises or tortoise remains. Based on the results of the survey, a very low-density tortoise population occurs in the project area.

Brussard and Britten (1993) identified four genetically discernable groups based on differences in mtDNA among Nevada desert tortoise populations. These groups are: (1) Piute Valley, (2) Amargosa Desert/Pahrump, (3) southern-central Nevada, and (4) north-central group. The latter two groups merge in the Las Vegas Valley and are fairly homogeneous. Genetic differences among these groups are not large, nor are they accompanied by any significant shell-shape differentiation, as seen between Mojave Desert and Sonoran Desert populations. However, tortoise populations in the Piute Valley have a different mtDNA clone from the rest of the Nevada populations and should be protected (Lamb, et al. 1989, Brussard and Britten 1993). Further information on the desert tortoise and its habitat can be found in Karl (1990) and Clement Associates (1990).

Description of the Affected Area.

The proposed project area occurs within the Black Canyon of the Colorado River and is characterized by precipitous rocky terrain and rolling hills dissected by desert washes. Plant communities in the area are typical of the Eastern Mojave Desert biome, characterized by creosotebush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Approximately 79 percent of the habitat along the Sugarloaf Mountain Alternative has been previously disturbed. Although the project area includes portions of the federally threatened Mojave desert tortoise

population (Nevada) and the non-listed Sonoran desert tortoise population (Arizona), this biological opinion will only evaluate those potential effects to the Mojave population

Previous disturbances in the project area and vicinity include the Hoover Dam, mining, paved and unpaved roads including US 93, utility construction, hotel/casino, a warehouse, sewage ponds, hiking trails, and developed recreation facilities. Other activities occurring in the area of the proposed project affecting the desert tortoise and its habitat include cattle grazing, OHV use not associated with organized events, tourism, and urban development. Because of the hot, dry conditions, the project area and surrounding region are susceptible to high particulate concentrations during construction.

Desert Tortoise Listing and Recovery Actions

Listing. On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). The Mojave population includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California (a division of the Sonoran Desert). Reasons for the determination included loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and off-road vehicles have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence were illegal collection, upper respiratory tract disease (URTD), and predation on juvenile desert tortoises by common ravens *(Corvus corax)*. Fire is an increasingly important threat to desert tortoise habitat. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s. Fires in Mojave Desert scrub degrade or eliminate habitat for desert tortoises (Appendix D of Service 1994).

Critical habitat. On February 8, 1994, the Service designated approximately 6.4 million acres of critical habitat for the Mojave population of the desert tortoise (59 FR 45748), which became effective on March 10, 1994. Approximately 1.2 million acres were designated as critical habitat in Nevada. Critical habitat units (CHUs) were based on recommendations for desert wildlife management areas (DWMAs) outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (Service 1993). These DWMAs are also identified as "desert tortoise areas of critical environmental concern (ACECs)" by the BLM. Because the CHU boundaries were drawn to optimize reserve design, the CHUs may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the constituent elements of nesting, sheltering, foraging, dispersal, and/or gene flow. Of the 16 CHUs designated, 4 occur entirely, or partially, within Nevada.

Recovery plan. On June 28, 1994, the Service approved the final Recovery Plan (Service 1994). The Recovery Plan divides the range of the desert tortoise into 6 distinct population segments or recovery units (RUs) and recommends establishment of 14 DWMAs or ACECs throughout the RUs. Within each DWMA/ACEC, the Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs/ACECs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, land management within all DWMAs/ACECs should restrict human activities that negatively impact desert tortoises (Service 1994). DWMAs/ACECs will be designated by the BLM through development or modification to resource management plans or management framework plans in Nevada, Arizona, Utah, and California. The regulation of activities within critical habitat through section 7 (of the Act) consultation will be based on recommendations in the Recovery Plan.

Summary of Regional HCPs in Clark County, Nevada

Short-Term HCP. On May 23, 1991, the Service issued a biological opinion on the issuance of incidental take permit PRT-756260 (File No. 1-5-91-FW-40) under section 10(a)(1)(B) of the Act. The Service concluded that the incidental take of 3,710 desert tortoises on up to 22,352 acres of habitat within the Las Vegas Valley and Boulder City in Clark County, Nevada, was not likely to jeopardize the continued existence of the desert tortoise. The permit application was accompanied by the *Short-Term Habitat Conservation Plan for the Desert Tortoise in the Las Vegas Valley, Clark County, Nevada* (Regional Environmental Consultants 1991) (short-term HCP) and an implementation agreement that identified specific measures to minimize and mitigate the effects of the action on desert tortoises.

On July 29, 1994, the Service issued a non-jeopardy biological opinion (File No. 1-5-94-FW-237) on the issuance of an amendment to the short-term HCP and incidental take permit to extend the expiration date of the existing permit by 1 year (to July 31, 1995) and include an additional disturbance of 8,000 acres of desert tortoise habitat within the existing permit area. The amendment did not authorize an increase in the number of desert tortoises allowed to be taken under the existing permit. Additional measures to minimize and mitigate the effects of the additional loss of tortoise habitat were also identified. Approximately 1,300 desert tortoises were taken under the authority of PRT-756260, as amended. Under the short-term HCP and extension, a total of 29,261 acres of tortoise habitat was disturbed and 2,067 tortoises collected, which translates to a mean average of 0.0706 tortoises per acre or 45 tortoises per square mile.

During the short-term HCP and incidental take permit as amended, approximately 541,000 acres of desert tortoise habitat were conserved in perpetuity on lands administered by the BLM and NPS in southern Clark County. For purposes of the short-term HCP, tortoise habitat is considered to be conserved when the following conditions are met: (1) Grazing permits are acquired; (2) the area to be conserved is located within an area identified for such purpose; (3) land-use controls are in place to restrict or eliminate adverse effects to tortoise; (4) adequate funding is available for ongoing management of the area; (5) the area includes sufficient acreage to support viable tortoise populations or be modified through management to meet this goal; and (6) the area is designed to minimize land-use conflicts.

Desert Conservation Plan. On July 11, 1995, the Service issued an incidental take permit (PRT-801045) to Clark County, Nevada, including cities within the county and NDOT. The permit became effective August 1, 1995, and allows the "incidental take" of desert tortoises for a period of 30 years on 111,000 acres of non-Federal land in Clark County and approximately 2,900 acres associated with NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye Counties, Nevada. The *Clark County Desert Conservation Plan* (CCDCP) (Regional Environmental Consultants 1995) serves as the permitees' habitat conservation plan and details their proposed measures to minimize, monitor, and mitigate the effects of the proposed take on the desert tortoise. The permittees will impose, and NDOT will pay, a fee of $550 per acre of habitat disturbance to fund these measures. The permittees propose to expend $1.35 million per year, and up to $1.65 million per year for the first 10 years, to minimize and mitigate the potential loss of desert tortoise habitat. It is anticipated that the majority of these funds will be used to implement minimization measures, such as increased law enforcement; construction of highway barriers; road designation, signing, closure, and rehabilitation; and tortoise inventory and monitoring. The benefit to the species, as provided by the CCDCP, should substantially minimize and mitigate those effects which will occur through development within the permit area and aid in recovery of the desert tortoise.

Desert tortoises collected through voluntary survey and removal under the CCDCP or picked up by the county are transported to a transfer/holding facility. Subsequently, some of these tortoises are transferred to adoption and educational programs, zoos, and research projects. Because more tortoises are collected than are needed for these programs, a translocation program was developed to allow these tortoises to live out their lives in suitable habitat in the wild. A research component has been initiated by the Biological Resources Division of the U.S. Geological Survey and the University of Nevada, Reno to determine habitat requirements of tortoises and conditions necessary for effective translocation. The translocation site is on lands managed by the BLM near Jean, Nevada, at least 10 miles from desert tortoise management areas, and are fenced adjacent to

roads. Tortoises are evaluated for URTD, and only those which are healthy are released. Approximately 1,200 desert tortoises have been released to date, as part of the translocation effort.

On July 9, 1995, CCDCP funds were used to purchase the Boulder City Conservation Easement (BCCE) as mitigation for loss of tortoise habitat under the CCDCP and incidental take permit. The BCCE provides for protection and conservation of approximately 85,000 acres of tortoise habitat, which includes a portion of the acreage conserved under the short-term HCP as described above. The BCCE is contiguous with the northern boundary of the Piute-Eldorado CHU and the southern boundary of the City of Boulder City. The project would not directly affect any conserved habitat.

Summary of Programmatic Consultations Completed in Nevada for Desert Tortoise

On September 26, 1991, the Service issued a biological opinion (File No. 1-5-91-F-112) to the BLM for implementation of their 1984 Management Framework Plan (MFP) within the boundaries of the short-term HCP. As a result of the action, approximately 42,240 acres of BLM land were authorized for disposal by sale, land exchange, mineral leases, rights-of-way leases, or recreation or public purpose leases. These lands could be developed for residential, industrial, commercial, and public infrastructure projects to accommodate rapid urban development.

On April 11, 1996, the Service issued a programmatic biological opinion (File No. 1-5-96-F-23R) to the BLM's Las Vegas District for implementation of portions of their MFP and proposed Stateline [Las Vegas District] Resource Management Plan pertaining to land sales, exchanges, leases, and rights-of-way within the Las Vegas Valley. Consultation was reinitiated on the 1991 biological opinion (File No. 1-5-91-F-112) to increase the programmatic area from 42,240 acres to 125,000 acres of BLM lands to meet the needs of development in the Las Vegas Valley and to implement BLM land use plans. As a result of urban expansion, most BLM lands within the Las Vegas Valley are highly fragmented and impacted by human activities, particularly a 4,000-acre "exclusionary" zone. The BLM delineated an exclusionary zone within the programmatic boundary which does not contain suitable desert tortoise habitat Except for lands within the exclusionary zone, the BLM will collect a remuneration fee of $587 per acre, or as indexed for inflation effective March 1, 1999, to compensate for the loss of tortoise habitat within the programmatic boundary. The fees will be used to fund management actions which are expected to provide direct and indirect benefits to the desert tortoise over time.

On November 21, 1997, the Service issued a programmatic biological opinion (File No. 1-5-97-F-251) to the BLM for implementation of multiple-use actions within their Las Vegas District, excluding desert tortoise critical habitat, proposed desert tortoise ACECs, and the area covered by the Las Vegas Valley programmatic consultation. The BLM proposes to authorize activities within the programmatic area that may result in loss of tortoises or their habitat through surface disturbance, land disposal, and fencing, for a period of 5 years. The total area covered by this programmatic biological opinion is approximately 2,636,600 acres, which includes approximately 263,900 acres of BLM-withdrawn lands in Clark County. This programmatic consultation is limited to activities which may affect up to 240 acres per project, and a cumulative total of 10,000 acres, of desert tortoise habitat excluding land exchanges and sales. Only land disposals by sale or exchange within Clark County may be covered under this consultation up to a cumulative total of 14,637 acres. Therefore, a maximum total of 24,637 acres of desert tortoise habitat may be affected by the proposed programmatic activities. As in the Las Vegas Valley programmatic, the BLM will collect a remuneration fee of $587 per acre of disturbance of desert tortoise habitat, as indexed for inflation effective March 1, 1999.

On June 18, 1998, the Service issued a programmatic biological opinion to the BLM for implementation of the Las Vegas District RMP. The project area for this consultation covers all lands managed by the BLM's Las Vegas Field Office, including desert tortoise critical habitat, proposed desert tortoise ACECs, and BLM-withdrawn land. The Las Vegas Field Office designated approximately 648 square miles of tortoise habitat as desert tortoise ACEC in the Northeastern Mojave RU, and approximately 514 square miles of tortoise habitat as desert tortoise ACEC in the Eastern Mojave RU, through the final RMP. As identified in the RMP, the BLM would manage 743,209 acres of desert tortoise habitat within four tortoise ACECs for desert tortoise recovery. To accomplish recovery of the desert tortoise in the Northeastern and Eastern Mojave RUs, the Las Vegas Field Office will implement appropriate management actions in desert tortoise ACECs through the RMP which includes:

1. Manage for zero wild horses and burros within desert tortoise ACECs.

2. Limit utility corridors to 3,000 feet in width, or less.

3. Do not authorize new landfills or military maneuvers.

4. Require reclamation for activities which result in loss or degradation of tortoise habitat, with habitat to be reclaimed so that pre-disturbance condition can be reached within a reasonable time frame.

5. Limit all motorized and mechanized vehicles to designated roads and trails within ACECs and existing roads, trails, and defined dry washes outside ACECs.

6. Allow non-speed OHV events within ACECs, subject to restrictions and monitoring determinations.

7. Prohibit OHV speed events, mountain bike races, horse endurance rides, four-wheel hill climbs, mini-events, publicity rides, high-speed testing, and similar speed based events.

8. Within ACECs, do not allow commercial collection of flora. Only allow commercial collection of fauna within ACECs upon completion of a scientifically credible study that demonstrates commercial collection of fauna does not adversely impact affected species or their habitat. This action will not affect hunting or trapping, and casual collection as permitted by the State.

EFFECTS OF THE PROPOSED ACTION ON THE LISTED SPECIES

Direct and indirect effects. Direct effects encompass the immediate, often obvious effect of the proposed action on the tortoise or its habitat. Indirect effects are caused by, or result from, the proposed action, are later in time, and are reasonably certain to occur. In contrast to direct effects, indirect effects are more subtle, and may affect tortoise populations and habitat quality over an extended period of time, long after construction activities have been completed. Indirect effects are of particular concern for long-lived species such as the tortoise because project-related effects may not become evident in individuals or populations until years later.

Construction of the Sugarloaf Mountain Alternative may result in the direct loss of 5 desert tortoises and 80 acres of desert tortoise habitat. Project personnel may illegally collect tortoises for pets, removing them from the wild population. Tortoises that are physically moved out of project areas to prevent mortality or injury could be inadvertently harmed if not handled properly. Urine and large amounts of urates are frequently voided during handling and may represent a severe water loss, particularly to juveniles (Luckenbach 1982). Overheating can occur if tortoises are not placed in the shade when ambient temperatures equal or exceed temperature maximums for the species (Desert Tortoise Council 1996). FHWA proposals to: (1) Allow only qualified tortoise biologists to handle tortoises; (2) inform workers about the desert tortoise; and (3) contribute to a fund for the conservation of desert tortoises and their habitat, should reduce these effects.

Impacts will occur from grading and removal of vegetation; digging of tunnels; deposition of spoil material; construction of new roads and bridges; and other activities requiring the use of blasting, heavy equipment, and machinery. Desert tortoises may be killed or injured by vehicles and may be harassed through removal from the construction area. The proposed project could result in the death or injury of desert tortoises that move onto the construction site and roads used by pre-construction and construction crews (Bury 1978; Luckenbach 1975; Nicholson 1978). Vehicles that stray from the construction area and roads may crush desert tortoises above ground or in their burrows. Habitat used by tortoises for foraging, breeding, and cover will be temporarily disturbed or permanently destroyed. Desert tortoises may be harmed from noise and ground vibrations produced by vehicles and heavy equipment and by blasting operations (Bondello 1976; Bondello, et al. 1979). Shock waves from blasting may collapse burrows, thereby crushing tortoises. Measures proposed by FHWA to inform workers about the desert tortoise and implement recommended measures to prevent road kills from state departments of transportation should minimize these effects.

Construction and maintenance actions associated with the project may provide food in the form of trash and litter, or water, which attract important tortoise predators such as the common raven, kit fox, and coyote (Berry 1985; BLM 1990). Natural predation in undisturbed, healthy ecosystems is generally not an issue of concern. However, predation rates may be altered when natural habitats are disturbed or modified. Common raven populations in some areas of the Mojave Desert have increased 1500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 1992). Since ravens were scarce in this area prior to 1940, the current level of raven predation on juvenile desert tortoises is considered to be an unnatural occurrence (BLM 1990).

The Service has determined that the level of effect described herein will not reduce appreciably the likelihood of survival and recovery of the Mojave population of the desert tortoise in the wild because:

(1) Desert tortoise densities within the proposed project area are very low;

(2) the proposed project does not occur within conserved habitat or an area designated for recovery of the desert tortoise;

(3) impacts to desert tortoises within the project area represent a small impact to the Mojave population of the desert tortoise when total desert tortoise population numbers and geographical extent are considered.

Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The majority of the land surrounding the proposed project is administered by Reclamation, NPS, or BLM. Any action on those lands will be subject to consultation under section 7 of the Act.

Actions on private lands within Clark County are expected to increase as the human population increases. The purpose of this project is to meet the traffic needs for travelers between Nevada and Arizona in the vicinity of Hoover Dam. The rapid growth of the human population as well as tourism has resulted in loss and degradation of habitat and loss of individual tortoises. These impacts are expected to continue. The CCDCP and associated incidental take permit addresses take of desert tortoises and destruction of their habitat from future development projects on non-Federal lands within Clark County. It is anticipated that measures in the CCDCP will continue to mitigate and minimize such effects.

Conclusion

After reviewing the current status of the desert tortoise, the environmental baseline for the action area, the effects of the proposed construction of the Sugarloaf Mountain Alternative of the Hoover Dam Bypass Project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the desert tortoise, and is not likely to destroy or adversely modify designated critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, as amended, prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking

that is incidental to, and not intended as part of the agency action, is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service hereby incorporates by reference the minimization measures proposed by FHWA into this incidental take statement as part of these terms and conditions. The following terms and conditions: (1) Restate measures proposed by FHWA, (2) modify the measures proposed by FHWA, or (3) specify additional measures considered necessary by the Service. Where these terms and conditions vary from or contradict the minimization measures proposed under the *Description of the Proposed Action*, specifications in these terms and conditions shall apply. The measures described below are nondiscretionary and must be implemented by FHWA so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply.

FHWA has a continuing duty to regulate the activity that is covered by this incidental take statement. If FHWA (1) fails to require the project proponent to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

EXTENT OF TAKE

Based on the analysis of impacts provided above, minimization measures proposed by FHWA, and anticipated project duration, the Service anticipates that the following take could occur as a result of the proposed action, in Nevada:

1. Five (5) desert tortoises may be incidentally injured or killed by project vehicles and equipment or blasting operations during construction activities.

2. All desert tortoises found in the construction area and on access roads may be harassed by capture and removal from the proposed project area. The Service estimates the number of tortoises handled in Nevada will be less than twenty (20).

3. An unknown number of desert tortoise eggs may be destroyed during construction activities.

4. An unknown number of desert tortoises may be taken in the form of indirect mortality through predation by ravens drawn to trash in the project area.

5. An unknown number of desert tortoises may be taken indirectly in the form of harm through increased noise and ground vibrations associated with construction, blasting operations, use of heavy equipment, and other project activities.

A total of 80 acres of desert tortoise habitat may be destroyed during activities associated with the proposed project, which could result in harm and/or harassment of desert tortoises.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. Construction of the Sugarloaf Mountain Alternative of the Hoover Dam Bypass Project will not impact designated critical habitat to the extent that the constituent elements are appreciably diminished and the habitat no longer serves its role in the survival and recovery of the species; therefore, the Service does not anticipate destruction or adverse modification of critical habitat as a result of the proposed action.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of desert tortoises:

1. Measures shall be taken to minimize mortality or injury of desert tortoises due to construction activities, blasting operations, and use of heavy equipment.

2. Measures shall be taken to minimize predation on tortoises by ravens drawn to the project area.

3. Measures shall be taken to minimize destruction of desert tortoise habitat, such as soil compaction, erosion, or crushed vegetation, due to construction and maintenance activities.

4. Measures shall be taken to ensure compliance with the reasonable and prudent measures, terms and conditions, reporting requirements, and reinitiation requirements contained in this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement Reasonable and Prudent Measure Number 1, FHWA shall fully implement the following measures:

   a. Prior to the initiation of construction, a desert tortoise education program will be presented to all personnel who will be onsite, including surveyors, construction engineers, employees, contractors, contractors' employees, supervisors, inspectors, sub-contractors, delivery personnel, and all visitors operating a vehicle in the project area. This program will contain information concerning the biology and distribution of the desert tortoise, its legal status and occurrence in the project area, the definition of "take" and associated penalties, the measures designed to minimize and mitigate the effects of construction activities, the means by which employees can help facilitate this process, and reporting procedures to be implemented in case of desert tortoise encounters.

   b. At least 7 days and no more than 30 days prior to the initiation of construction within rights-of-ways without tortoise-proof fencing, a qualified biologist(s) will survey the site for desert tortoises using techniques providing 100-percent coverage. Transects will be no greater than 10 meters apart. The site boundaries will be flagged prior to the biological survey.

      All burrows found in the construction zone, whether occupied or vacant, will be excavated by a qualified biologist and collapsed or blocked to prevent desert tortoise re-entry. All burrows will be excavated by hand with hand tools to allow removal of desert tortoises or desert tortoise eggs. All desert tortoise handling and burrow excavations will be conducted by a qualified desert tortoise biologist in accordance with Service-approved protocol (Desert Tortoise Council 1994, revised 1996).

   c. All desert tortoises and desert tortoise eggs located in the linear right-of-way will be relocated 300 to 1,000 feet into adjacent undisturbed habitat. Tortoises found above ground will be placed under a marked bush in the shade. A tortoise located in a burrow will be placed in an existing unoccupied burrow of the same size and

orientation as the one from which the tortoise was taken. If a suitable natural burrow is unavailable, a qualified biologist will construct one of the same size and orientation as the one from which the tortoise was removed utilizing the protocol for burrow construction in section B.5.f (Desert Tortoise Council 1994, revised 1996). Any tortoise found within 1 hour before nightfall will be placed in a separate clean cardboard box and held overnight in a cool location. The box will be covered and kept upright at all times to minimize stress to the tortoise. Each box will be used once and then disposed of properly. The tortoise will be released the following day in the same area from which it was collected and using the procedures described above. Each tortoise will be handled with a different pair of disposable latex gloves. After each use, the gloves will be properly discarded and a fresh set used for each subsequent tortoise handling.

d. Desert tortoises will be moved only by a qualified desert tortoise biologist and solely for the purpose of moving them out of harm's way. Appropriate State permits will be acquired from Nevada Division of Wildlife and Arizona Game and Fish Department prior to handling any live desert tortoise, desert tortoise carcass, or desert tortoise egg.

e. All desert tortoises observed by project workers will be reported immediately to the qualified biologist, who will move the tortoise offsite into adjacent undisturbed habitat. Tortoises will be handled only when necessary, and in accordance with guidelines provided in this biological opinion.

f. If blasting is required in desert tortoise habitat, a desert tortoise biologist will be assigned to each blasting crew or to each area in which blasting will occur. Prior to any blast, a 200-foot radius around the blast site will be surveyed for desert tortoises using techniques providing 100 percent coverage; transects will be no greater than 10 meters apart. Above-ground tortoises will be relocated at least 500 feet from the blast site. Desert tortoises located in burrows that are within 50 feet of the blast site will be relocated at least 75 feet away from the blast site to an unoccupied existing burrow of the same size and orientation. If a suitable existing burrow is unavailable, an artificial burrow of the same size and orientation will be constructed by an approved biologist utilizing Service-approved protocol (Desert Tortoise Council 1994, revised 1996). Burrows either occupied by desert tortoise or with undetermined occupancy status and located 50 feet or further

away from the blast site will be flagged and stuffed with newspaper prior to the blast. The newspaper will be removed immediately after the blast and the burrows assessed for damage.

g. Any time a vehicle is parked in desert tortoise habitat, the ground around and underneath the vehicle will be inspected for desert tortoises prior to moving the vehicle. If a desert tortoise is observed, an authorized biologist will be contacted. If possible, the tortoise will be left to move on its own. If the tortoise does not move within 15 minutes, the tortoise will be removed and relocated by the authorized biologist in accordance with the tortoise handling provisions of this biological opinion.

h. Herbicides shall not be used in the project area unless approved in writing by the Service.

i. Vehicles shall not exceed the legal speed limit (posted or unposted) of the roads used during construction activities. The Clark County speed limit for unposted roads is 25 miles per hour.

2. To implement Reasonable and Prudent Measure Number 2, FHWA shall fully implement the following measure:

Trash and food items will be disposed of promptly in predator-proof containers with resealable lids. Trash includes, but is not limited to, cigarettes, cigars, gum wrappers, tissue, cans, paper, and bags. Trash containers will be removed regularly (at least once per week). This effort will reduce the attractiveness of the area to opportunistic predators such as desert kit fox, coyotes, and common ravens. Any construction refuse, including, but not limited to, broken parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, boxes, and welding rods will be removed from the site each day and disposed of properly.

3. To implement Reasonable and Prudent Measure Number 3, FHWA shall fully implement the following measures:

a. Project vehicles will remain within designated areas or on existing roads. Off-road travel is prohibited except to complete a specific task within designated areas or emergency situations.

b. All areas to be disturbed will have boundaries flagged prior to construction, and all disturbance will be confined to the flagged areas. All employees will be instructed that their activities must be confined to locations within the flagged areas. Disturbance beyond the actual construction zone is prohibited.

c. Stockpile areas, vehicle turn-arounds, and vehicle service locations will be approved by the appropriate land manager (i.e., Reclamation or NPS) prior to the initiation of construction activities. These areas will be surveyed for desert tortoise and desert tortoise eggs. Any desert tortoises or desert tortoise eggs found within these areas will be removed in accordance with the tortoise handling provisions of this biological opinion. Whenever possible, stockpile areas, vehicle turn-arounds, and vehicle service locations will be restricted to previously disturbed areas. If not in previously disturbed sites, stockpile areas, vehicle turn-arounds, and vehicle service locations will be considered habitat disturbance for payment of remuneration fees.

d. Topsoil will be removed to a depth of 6 to 12 inches in all areas of potential seed-bearing soil where ground breaking will take place. The determination of which soils are potentially seed-bearing will be the responsibility of the tortoise biologist.

e. Removed topsoil will be stockpiled in a separate area and designated as "topsoil" to prevent contamination by or combination with other excavated soils. Reasonable measures will be taken to ensure the protection and preservation of the stockpiled topsoil to prevent loss of the seed bed from wind and rain or contamination by other soils or manmade contaminants. Stockpile areas for topsoil will be located in areas that are secure from construction traffic or flash floods.

f. Excavated tunnel material will be disposed of in designated areas previously approved by the individual Federal agency that has administration authority over the affected land.

g. Equipment and materials storage will be located in previously disturbed areas whenever possible. If not in previously disturbed sites, equipment and storage areas will be considered habitat disturbance for payment of remuneration fees.

h. Any fuel or hazardous waste leaks or spills will be stopped or repaired immediately and cleaned up at the time of occurrence. Service/maintenance vehicles will carry a bucket and pads to absorb leaks or spills.

i. Contaminated soil will be removed and disposed of at an appropriate facility. If spills occur in a maintenance yard, they will be cleaned up after construction is complete.

j. All waste and leftover materials remaining after construction of this project will be removed from the site after project completion.

k. Prior to initiation of construction, FHWA shall ensure that $587 per acre of disturbance is paid into the account administered by Clark County for the CCDCP, as offsite mitigation for destruction of desert tortoise habitat resulting from the project. This rate will be indexed for inflation based on the Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U) on January 31 of each year. The next adjustment shall occur on January 31, 2000. Fees assessed or collected for projects covered under this biological opinion after January 31st of each year will be adjusted based on the CPI-U. Information on the CPI-U can be found on the Internet at: *http://stats.bls.gov/news.release/cpi.nws.htm*.

This fee will be paid directly to the Desert Tortoise Public Lands Conservation Fund Number 730-9999-2315, administered by Clark County. The administrator serves as the banker of these funds and receives no benefit from administering these funds. These funds are independent of any other fees collected by Clark County for desert tortoise conservation planning.

The payment shall be accompanied by the *Section 7 Fee Payment Form* (enclosure), and completed by the payee. The project proponent or applicant may receive credit for payment of such fees and deduct such costs from desert tortoise impact fees charged by local government entities. Payment shall be by certified check or money order payable to Clark County, and delivered to:

Clark County
Department of Comprehensive Planning
500 South Grand Central Parkway, Third Floor
Las Vegas, Nevada 89155-1712
Attn: Christina Gibson

FHWA anticipates that 80 acres of desert tortoise habitat will be disturbed as a result of the proposed project, requiring $46,960 in remuneration fees.

4. To implement Reasonable and Prudent Measure Number 4, FHWA shall fully implement the following measures:

   a. FHWA will designate a field contact representative responsible for overseeing mitigation compliance and for coordination with the agencies.

   b. A qualified biologist(s) will be available during all phases of construction. In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise* (Service 1992), a biologist should: (1) Possess a bachelor's or graduate degree in biology, ecology, wildlife biology, herpetology, or related fields; (2) demonstrate a minimum of 60 days prior field experience using accepted resource agency techniques to survey for desert tortoises; and (3) have the ability to recognize and to accurately identify and record all types of desert tortoise sign. The Service does not endorse any individual or company with respect to their abilities to conduct satisfactory surveys.

   c. The qualified biologist(s) will be responsible for determining compliance with mitigation measures as defined by the biological opinion. If the Service-approved biologist believes that halting construction is necessary to avoid harm to the desert tortoise, he/she shall notify the FHWA Contracting Officer, who will direct the contractor to halt construction. Construction and maintenance activities will be halted only long enough to remedy the immediate situation and will apply only for the equipment and parties involved in the situation. All actions of non-compliance or conditions of threat to federally proposed or listed species will be recorded immediately by the qualified biologist(s) and reported to FHWA. FHWA will immediately report all such actions and conditions to the Service.

   d. All fuel or hazardous waste leaks, spills, or releases will be reported immediately to the FHWA and the Federal agency that administers the land where the incident occurs.

   e. Upon locating dead or injured desert tortoises, the field contact representative will notify FHWA immediately by phone and within 5 days by writing. Initial notification also must be made immediately to the Service's Division of Law Enforcement in Las Vegas, Nevada, at telephone number (702) 388-6380. Written

notification to the Service (Southern Nevada Field Office, 1510 North Decatur Boulevard, Las Vegas, Nevada 89108) will be made within 15 days of the date of the finding or incident, and will include the following information: (1) Date and time of finding or incident; (2) location of carcass or injured tortoise; (3) a photograph; (4) cause of death or injury; and (5) other pertinent information. Care will be taken in the handling of sick or injured specimens to ensure effective treatment and care, and in the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of a sick or injured desert tortoise or preservation of the biological materials from a dead desert tortoise, the finder has the responsibility to carry out instructions provided by the Service's Division of Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

f. The qualified biologist(s) will maintain a record of each observation of desert tortoise during the project. The information gathered will include the following: (1) Location; (2) date and time of observation; (3) whether tortoise was handled; (4) general health and whether it voided its bladder; (5) location tortoise moved from and location moved to; and (6) any observed unique physical characteristics of each individual.

g. FHWA and a qualified biologist will prepare a report to be distributed to NPS, Reclamation, the Service, and NDOW no later than 90 days following the completion of construction activity. The report will document the numbers and location of desert tortoises encountered, their disposition, effectiveness of mitigation measures, practicality of mitigation measures, recommendations for future mitigation measures that allow for better protection or more workable implementation, and an estimate of acreage disturbed.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these measures, the Service believes that no more than 5 desert tortoises will be killed or injured and an estimated 20 harassed in association with construction of the Sugarloaf Mountain Alternative of the Hoover Dam Bypass Project. An unquantifiable number eggs and nests may be destroyed on the project site, however the Service estimates this number to be very low. In addition, 80 acres of desert tortoise habitat may be further degraded or destroyed during construction activities associated with the proposed project. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take represents new

information requiring review of the reasonable and prudent measures provided. FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Reporting Requirements

Upon locating a dead, injured, or sick endangered or threatened species specimen, initial notification must be made to the Service's Division of Law Enforcement in Las Vegas, Nevada, at telephone number (702) 388-6380. Care should be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by the Division of Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

Sick or injured desert tortoises shall be delivered to any qualified veterinarian for appropriate treatment or disposal. Dead desert tortoises suitable for preparation as museum specimens shall be frozen immediately and provided to an institution holding appropriate Federal and State permits per their instructions. Should no institutions want the desert tortoise specimens (crushed, spoiled, etc.) for preparation as a museum specimen, then they may be buried away from the project area or cremated upon authorization of the Division of Law Enforcement. The applicant or project proponent shall bear the cost of any required treatment of injured desert tortoises, euthanasia of sick desert tortoises, or cremation of dead desert tortoises. Should sick or injured desert tortoises be treated by a veterinarian and survive, they may be transferred as directed by the Service.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

> *As a conservation recommendation, the Service urges FHWA to cooperate with ongoing and proposed efforts to minimize impacts to desert tortoise from highways such as construction of barriers and underpasses.*

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation

This concludes formal consultation on the proposed action referenced in your February 17, 1999, request. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate the assistance and cooperation of your staff throughout this consultation process. If we can be of any further assistance, please contact Michael Burroughs, in our Southern Nevada Field Office, at (702) 647-5230.

Sincerely,

For Robert D. Williams
Field Supervisor

Enclosure

cc:
Director of Public Lands, The Nature Conservancy, Las Vegas, Nevada
Desert Conservation Plan Administrator, Department of Comprehensive Planning, Clark County, Las Vegas, Nevada
Administrator, Arizona Game and Fish Department, Phoenix, Arizona
Chief, Environmental Services Division, Nevada Department of Transportation, Carson City, Nevada

Administrator, Nevada Division of Wildlife, Reno, Nevada
Regional Manager, Nevada Division of Wildlife, Las Vegas, Nevada
District Manager, Las Vegas District, Bureau of Land Management, Las Vegas, Nevada
Manager, Environmental Compliance Group, Lower Colorado Regional Office, Bureau of Reclamation, Boulder City, Nevada
Superintendent, Lake Mead National Recreation Area, National Park Service, Boulder City, Nevada
Field Supervisor, Arizona Field Office, Fish and Wildlife Service, Phoenix, Arizona
Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Portland, Oregon (Attn: Larry Salata)
Senior Resident Agent, Division of Law Enforcement, Fish and Wildlife Service, Boise, Idaho

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ENCLOSURE

SECTION 7 FEE PAYMENT FORM

Entire form is to be completed by Federal agency and project proponent

Biological Opinion File Number: 1-5-99-F-105

Species: Desert tortoise (*Gopherus agassizii*)

Location of Fish and Wildlife Service Office that Issued the Opinion: Reno, Nevada

Project: Hoover Dam Bypass Project

Amount of Payment Received: _____

Total Payment Required: $46,960.00

Date of Receipt: _____

Check or Money Order No.: _____

Number of Acres to be Disturbed: 80

Project Proponent:

Authorizing Agency: Federal Highway Administration
P.O. Box 25246
Lakewood, CO 80225

Make checks payable to: Clark County Treasurer

Deliver check to: Clark County Habitat Conservation
Department of Comprehensive Planning
Clark County Government Center, Third Floor
500 South Grand Central Parkway
Las Vegas, Nevada 89155
(702) 455-3530

If you have questions call the U.S. Fish and Wildlife Service, Southern Nevada Field Office, Las Vegas, Nevada, at (702) 647-5230.