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.

[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

	Alternative			
Resource	**Promontory Point**	**Sugarloaf Mountain**	**Gold Strike Canyon**	**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

	Alternative			
Resource	**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	Alternative: Sugarloaf Mountain	Alternative: Gold Strike Canyon	Alternative: 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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