

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 PMT¹ 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

¹The 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:

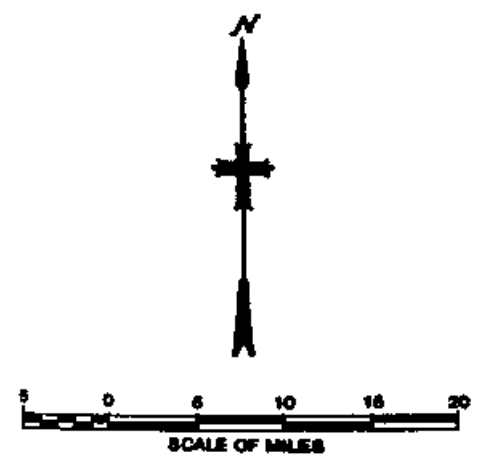
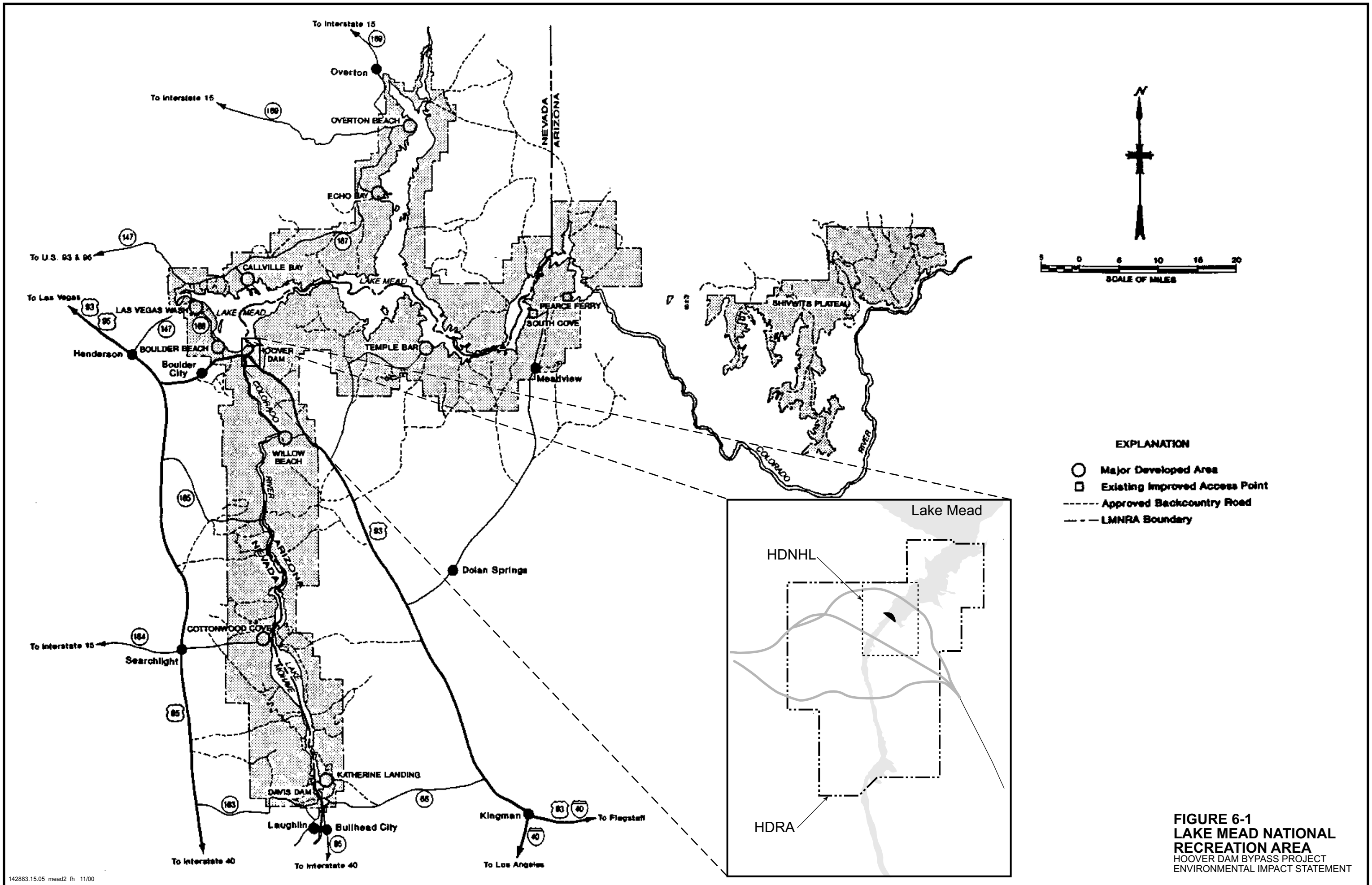
1. The approach roads to the dam have sharp switchback curves with radii less than 100 feet and grades as steep as 7 percent. Because of these existing restrictive conditions, the design criteria for a four-lane highway with a maximum 6 percent grade and a minimum curve radius of 1,500 feet could not 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.”



- EXPLANATION**
- Major Developed Area
 - Existing Improved Access Point
 - - - Approved Backcountry Road
 - - - LMNRA Boundary

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.

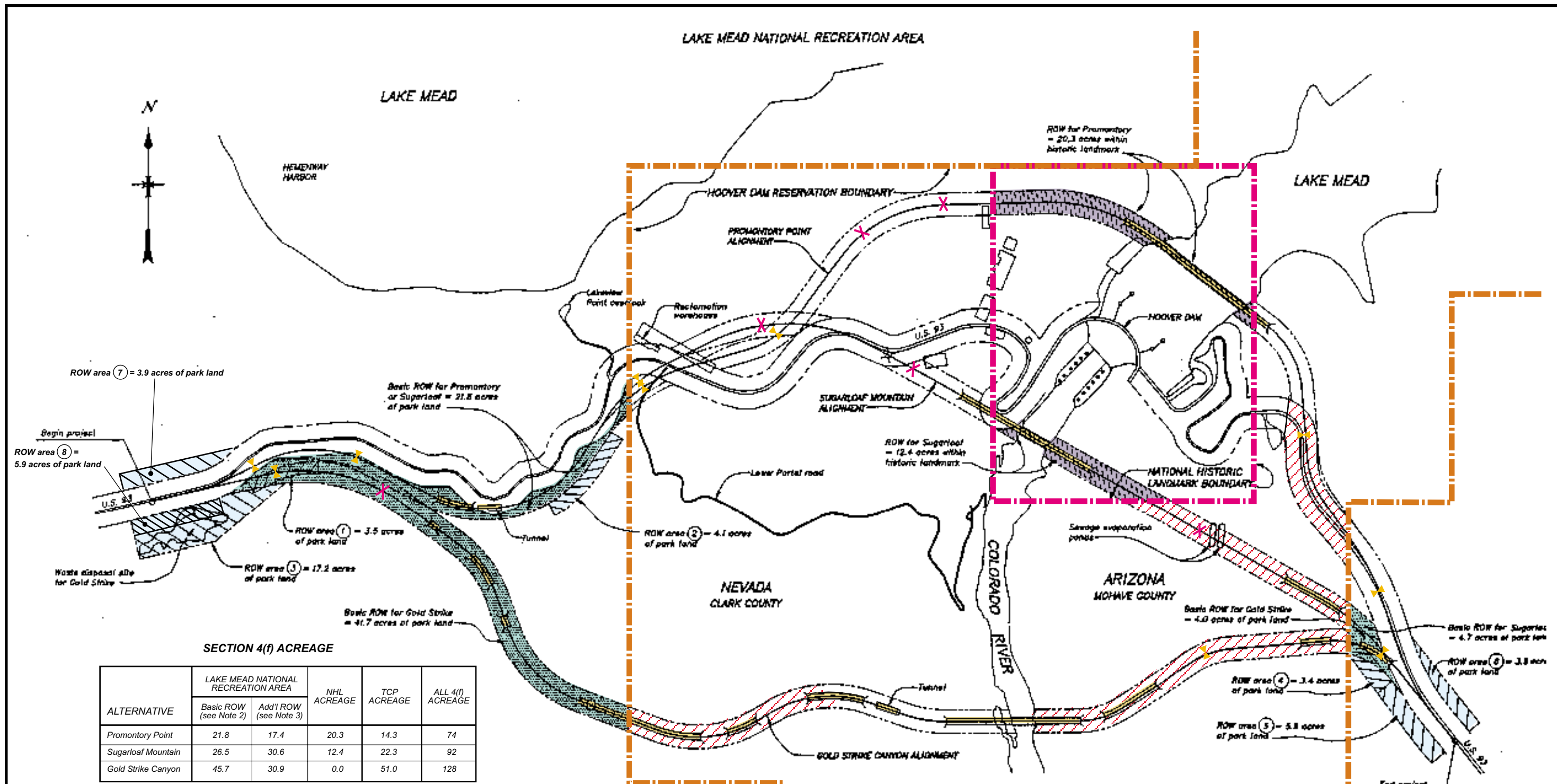
^d See Section 3.5 for specific details on impacts to cultural resources in the project area.

^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



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.

LAKE MEAD NATIONAL RECREATION AREA

LEGEND

- Bridge
- Wildlife overpass
- Wildlife overpass
- Basic ROW in LAMRA
- Additional ROW in LAMRA
- ROW in National Historic Landmark
- ROW in TCP within Hoover Dam Reservation Boundary



FIGURE 6-2
SECTION 4(f)
PUBLIC RECREATION LANDS
HOOPER 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

²The 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

^aMinimum 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.