4. Environmental Impacts and Mitigation

4.1 Introduction

Investigation and disclosure of the potential environmental impacts of federal actions is regulated under NEPA and amendments, as well as regulations published by the CEQ. CEQ defines significance of impacts as a function of both context and intensity. A potential impact must be considered in the appropriate context, such as impacts to society as a whole, the affected region, the affected interests, and the locality. Intensity refers to the severity of the impact on public health and the environment. These can include positive and negative impacts experienced on a short-term or long-term basis.

Probable adverse and beneficial social, economic, and environmental effects of Alternatives A (no-build), B (existing), C (through town) and D (Southern Bypass) are described in this chapter. The information provides a basis for evaluating the comparative merits of the alternatives. Impacts to specific resources in the natural and human environment were evaluated for each alternative, including the preferred alternative (Southern Bypass) and the No Build Alternative. This chapter also identifies possible mitigation measures to avoid, minimize, or compensate for any adverse impacts.

4.2 Air Quality

4.2.1 Environmental Impacts

Construction Impacts

Without mitigation measures, substantial short-term impacts to localized air quality could result from construction of the proposed project. These impacts would result from fugitive dust generated by clearing and grading activities and from tailpipe emissions generated from the use of construction equipment and vehicles. Dust emissions and impacts vary substantially from day to day, depending on the level of activity, the specific operation being conducted, and the prevailing meteorological conditions. Fugitive dust may adversely affect sensitive receptors (i.e., people who are more susceptible to the adverse impact of air pollutants). These include the elderly, young children, and those individuals suffering from respiratory disorders. Although human breathing passages readily filter most dusts, tiny particles can easily bypass this natural filtering system and lodge deep in the lungs. Areas near the construction site would be the most susceptible to this nuisance from construction activities. Wet dust suppression techniques, such as watering and applying chemical stabilization, will be used during construction to suppress the fine particulate from leaving the surface and becoming airborne through the action of mechanical disturbance or wind. The application of these mitigation measures will be a condition of project construction permits. Through these measures and by monitoring fugitive dust generation, exceedances will be avoided.

A mixture of construction equipment, including loaders, trucks, scrapers, backhoes, water trucks, pavers, compactors, generators, bulldozers, and other miscellaneous equipment, would be used during construction activities. Appropriate permits will be sought before any equipment, such as a Type II asphalt concrete batch plant, started operation. Most of the heavy-duty equipment would be powered by diesel fuel, which emits more nitrogen oxide (NO_X), sulfur oxide (SO_X), and PM_{10} than gasoline-powered equipment. The latter, however, emits more hydrocarbons and CO. When the equipment is initially started up, some visible emissions and possibly odorous emissions can be expected.

Operational Impacts

CO Analysis. In order to evaluate the impact of the proposed project alternatives on air quality, a dispersion modeling analysis was conducted on the two highest volume/lowest LOS intersections in the study corridor in accordance with the guidelines provided in *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (EPA, 1992). In general, CO impacts are typically localized and occur when vehicular traffic is likely to impact a roadway's LOS and, as a result, subject sensitive receptors to CO hot spots, which primarily result from the idling and acceleration of vehicles at intersections. As a result, it is necessary to consider the potential for CO hot spots at locations where traffic is congested. The modeling analysis resulted in scaled 8-hour CO concentrations that were then added to a background CO concentration of 2.5 ppm to give the total 8-hour CO concentration. The maximum 8-hour concentration from the last 3 years of monitoring was used as the 8-hour background concentration. The results of the modeling analyses for each alternative are shown below in Table 4-1.

TABLE 4-1
CO Concentrations (ppm)

Intersection	Maximum 1-hour Concentration (ppm)	Maximum 8-hour Concentration (ppm)
U.S. 93 and Railroad Pass (Alternative A)	8.7	4.6
U.S. 93 and Railroad Pass (Alternative B)	6.3	2.9
U.S. 93 and Railroad Pass (Alternative C)	6.7	3.2
U.S. 93 and Railroad Pass (Alternative D)	8.0	4.1
U.S. 93 and Buchanan Boulevard (Alternative A)	8.1	4.2
U.S. 93 and Buchanan Boulevard (Alternative B)	9.0	4.8
U.S. 93 and Buchanan Boulevard (Alternative C)	7.5	3.8
U.S. 93 and Buchanan Boulevard (Alternative D)	8.0	4.1
NAAQS	**35.0**	**9.0**

The majority of the project lies in the CO attainment area. According to the CO protocol, a "Level 7" (screening) analysis was performed for the build alternatives. The build alternatives passed the screening method, and no further analysis was required. However, in order to better quantify the CO impacts, the two intersections were modeled, rather than the suggested three intersections in the CO protocol. The more refined analysis of modeling the intersections demonstrated that the build alternatives would result in a decrease in

CO impacts at the two intersections with the worst LOS. Therefore, the project will not cause any new violations of the CO standard, nor would it increase the frequency or severity of violations.

The screening results show that the build alternatives can be compared to roads in the nonattainment area that have similar geometry, meteorology, traffic lane volumes, percentage of cold starts and heavy-duty gas truck, and the same or lower background concentration. The roads in the nonattainment area are in attainment, so it can be assumed that the project build alternatives would be in attainment. The roads in Clark County used for comparison were I-15, I-95, I-215, and Flamingo Road. This level of analysis is sufficient under the screening methodology.

CO concentrations at the U.S. 95 and Railroad Pass intersection, which is in the nonattainment area (see Chapter 3), are predicted to be well below the federal standard. The three build alternatives concentrations are less than the No Build concentration for the Railroad Pass intersection. The lower concentrations represent an improvement in CO levels for the three project build alternatives.

The CO concentrations for the U.S. 93 and Buchanan Boulevard intersection are well below the federal standards for the three build alternatives and the No Build Alternative. The highest CO concentration at the Buchanan Boulevard intersection was for Alternative B, and the increased concentration would be due to the large volume of traffic projected for this alternative. Alternative D provides for an emergency vehicle and construction equipment delivery access ramp connection from the highway to Buchanan Boulevard.

Summarizing the comparative operational impacts of the alternatives, Alternative A has the highest estimated CO concentration at the U.S. 93 and Railroad Pass intersection. Alternative B has the lowest CO concentration at the U.S. 93 and Railroad Pass intersection, but it has the highest concentration at the U.S. 93 and Buchanan Boulevard intersection. Alternative C has the lowest concentrations at the U.S. 93 and Buchanan Boulevard intersection, and it is only moderately higher than the lowest concentrations at U.S. 93 and Railroad Pass. Alternative D (the preferred alternative) is estimated to have the same CO concentrations at both intersections, which are higher than the other build alternatives at the U.S. 93 and Railroad Pass intersection and fall between the other build alternatives at the U.S. 93 and Buchanan Boulevard intersection.

PM_{10} Analysis. Vehicle traffic generates a small amount of PM_{10}. The major source of PM_{10} emissions from roadways is road silt from passing tires. There are currently no reliable models for predicting the emissions and concentrations of PM_{10} from roadways. The technique that was used to predict impacts from PM_{10} emissions was to compare the project alternatives with existing roadways. This approach is currently being used in California as an interim method while guidelines are being developed, and it was approved for use on this project by NDOT (Mike Painter, pers. comm., 2001).

Alternative B is comparable to the existing Flamingo Road in Las Vegas. Flamingo Road is a six-lane arterial that runs east-west through Las Vegas. Alternative B has similar characteristics to Flamingo Road with regards to the number of lanes, median, stoplight intersections, and surroundings of urban development. Flamingo Road has been accounted for in the PM_{10} SIP for Clark County and has not been deemed a major source of emissions

in the Clark County PM_{10} SIP; therefore, it follows that Alternative B would not have a PM_{10} impact.

Alternatives C and D are comparable to Interstate 215 (I-215) in the Green Valley/ Henderson area. This portion of I-215 has four lanes with a median barrier, and the general characteristics of I-215 and the project alternatives are similar. There has not been an exceedance of the federal standard in the I-215 area; therefore, it follows that the roadway would have no PM_{10} violations.

O_3 Analysis. Ground-level O_3 is commonly referred to as photochemical smog. O_3 itself is colorless – the brown haze associated with smog is mostly composed of the O_3 precursors, mainly NO_2. O_3 is generated during the day in a complicated set of photochemical mechanisms, but it is primarily driven by the following equation:

$NO_2 + O_2 + \text{sunlight} \rightarrow NO + O_3$

In this equation, O_3 represents ozone, a ground-level pollutant. The main precursors (required components) of O_3 production are compounds of NO_X, mainly NO_2. Precursors for O_3 are typically produced by combustion engines, including automobiles.

Although the entire project area is currently in attainment for O_3, there has been some concern that O_3 levels in Boulder City are higher than other parts of the Las Vegas Valley. This contention has led to the concern that if traffic congestion remains a problem on U.S. 93 through Boulder City, O_3 levels could rise to dangerous levels in the future. A random sample of O_3 concentrations collected at the Boulder City monitoring station throughout the course of a year indicated that Boulder City levels, though in compliance with NAAQS, are frequently similar to those collected at downtown Las Vegas (City Center) and North Las Vegas (Craig Road) monitoring stations.

Because vehicular emissions contribute to the NO_X precursors required for the production of ground-level O_3, one theory explaining why O_3 readings in Boulder City are similar to urban Las Vegas stations would be the existing high production of NO_X from vehicles traveling on U.S. 93. High traffic volumes, especially in combination with idling vehicles, produce higher levels of NO_X, which could potentially led to higher O_3 levels.

However, a greater indication of the impact of vehicle emissions on air quality would be to analyze the CO levels at the same monitoring station. It is generally accepted that high CO levels are representative of "hot spots" in congested roadways, where idling vehicles tend to release greater amounts of CO due to incomplete combustion in their engines. This draws a correlation between the production of CO and the NO_X precursors. Historically, the Boulder City station reports lower CO readings than the two urban stations in Las Vegas and North Las Vegas. In fact, it has been generally observed that CO readings at the Boulder City station remain some of the lowest in the Las Vegas Valley, consistently in the "Good" air quality index range.

Because the Boulder City monitoring station, which is relatively close to U.S. 93 as it passes through the often-congested Hemenway Wash, does not exhibit high CO readings on a normal basis, it can be concluded that emissions from vehicles do not greatly reduce air quality with respect to CO. Therefore, it is reasonable to conclude that those same idling

vehicles cannot be the primary contributor to the relatively high O_3 concentrations at the Boulder City station.

It has been demonstrated that the future CO concentrations from the project Build Alternatives will be less then the No Build Alternative, so it can be assumed that the NO_X emissions will also be less. Since the No Build Alternative does not contribute appreciably to the O_3 concentrations, then it can be assumed that the Build Alternatives will not adversely impact the O_3 levels.

It is clear from traffic projections that the No Build Alternative would increase congestion on U.S. 93. This, in turn, would tend to slightly increase precursor emissions and could increase O_3 levels in the air shed. The better traffic flow and projected future CO concentrations with the Build Alternatives, including the preferred alternative, indicate that NO_X emissions would be less than with the No Build Alternative.

4.2.2 Mitigation

Conformity Statement

A small portion of the project is in an air quality nonattainment area; therefore, the project must be included in a transportation plan that conforms to the purposes of the CAA. FHWA and the Federal Transit Administration made an air quality conformity determination on RTC's Transportation Plan and Transportation Improvement Plan (TIP), both of which include this project, on March 27, 2001. In addition, it must be demonstrated that this project does not create any new violations or increase the frequency or severity of existing violations of the NAAQS. Per the analysis included in Section 4.2.1, the project will not create any new violations of the NAAQS, nor would it increase the frequency or severity of existing violations.

Construction Mitigation

Construction emissions, if left unmitigated, would result in an adverse, but temporary, impact. However, control measures, such as a dust mitigation plan, shall be used as appropriate and the project will follow the DAQEM Best Management Practice (BMP) manual for construction activities during construction of the project alternatives. These BMPs are based on soil type and construction activity, and they are designed to decrease PM_{10} emission impacts.

I. Site Preparation
- Minimize land disturbances by initiating construction in phases, where possible
- Use watering trucks to minimize dust
- Cover trucks when hauling dirt
- Stabilize the surface of dirt piles, if not removed immediately
- Use windbreaks to prevent any accidental dust pollution
- Limit vehicular paths and stabilize these temporary roads within the temporary construction area

II. Construction
- Cover trucks when transferring materials
- Use dust suppressants on traveled paths that are not paved

- Minimize unnecessary vehicular and machinery activities
- Minimize dirt track-out by washing or cleaning trucks before leaving the construction site (alternative to this strategy is to pave a few hundred feet of the exit road just before entering the public road); and
- Excavation and grading operations will be suspended when constant wind speeds are measured to be at least 25 miles per hour (mph) or if instantaneous wind speeds (gusts) are measured to be at least 40 mph. Wind speeds shall be determined at the DAQEM air quality monitoring station in Boulder City. Suspension will continue until 1 hour after the wind speed falls below the constant or gust maximum

III. Post-Construction

- Revegetate any disturbed land not paved
- Remove unused material
- Remove dirt piles
- Revegetate all vehicular paths created during construction to avoid future off-road vehicular activities

Anticipated construction activities would be regulated under applicable DAQEM air pollution permit requirements (e.g., dust control). In addition, air quality impacts will be mitigated by maintaining appropriate tuning of construction equipment engines, avoiding excessive idle times, and assuring that all mufflers and exhaust systems meet manufacturer specifications.

Operation Mitigation

The estimated CO impacts from vehicular traffic during project operations would not exceed the 1-hour or 8-hour NAAQS for CO. Therefore, no mitigation measures are required. There will be no violations of the CO standards. The project will not cause any new violations of the CO standard or increase in the frequency or severity.

4.3 Noise

4.3.1 Environmental Impacts

The focus of this assessment is on evaluating noise impacts of Alternatives A, B, and C. Because Alternative D (the preferred alternative) is far from most noise-sensitive areas within the developed portions of the project study area, with the exception of the LMNRA, it is not evaluated in detail in this study. It is expected that Alternative D would result in reduced traffic noise levels at all noise-sensitive receptors located along the current U.S. 93 alignment, due to the redirection of approximately one-third of all traffic to the bypass alignment.

Construction Impacts

Noise from construction activities would add to the existing noise environment in the immediate project area. Activities involved in construction would generate noise levels, as indicated in Table 4-2, ranging from 88 to 92 dBA at a distance of 15 m (50 ft). Construction activities would be temporary in nature and are anticipated to occur during normal daytime

working hours. Construction noise impacts could result in annoyance or sleep disruption if nighttime operations occur or if unusually noisy equipment is used. Because of this, construction activities in developed areas rarely occur during nighttime periods.

Noise would also be generated during the construction phase by increased truck traffic associated with transport of heavy materials and equipment on area roadways. This noise increase would be of short duration and would probably occur primarily during daytime hours. Construction noise levels would be similar for Alternatives B and C in Hemenway Valley, where the two alignments are identical.

TABLE 4-2
Construction Equipment Noise

Construction Phase	Loudest Equipment	Maximum Sound Level at 15 m (50 Ft) (dBA-L_{eq})
Clearing and Grubbing	Bulldozer, backhoe	89 dBA
Earthwork	Scraper, bulldozer	91 dBA
Foundation	Backhoe, loader	88 dBA
Superstructure	Crane, loader	89 dBA
Base Preparation	Truck, bulldozer	91 dBA
Paving	Paver, truck	92 dBA

Source: U.S. Department of Transportation, 1977.

Operational Impacts

Forecast future (2027) traffic volumes on U.S. 93 and the potential new highway alignments and on- and off-ramps were obtained from the traffic studies performed for this project (NDOT, August 2001a). Truck volumes on the future roadway system were estimated based on the traffic counts obtained during the noise monitoring periods and from the project traffic forecasts. Table 4-3 summarizes future traffic noise levels at the selected receptor locations and compares them to existing peak-hour traffic noise levels (see Figure 3-1). This analysis and the table below utilize two types of noise assessment locations, as follows:

- Monitoring Location (M): An outdoor location where measurements of existing traffic and/or background noise levels are conducted.
- Receptor Location (R): An outdoor listener location chosen for analysis where frequent human use occurs and a lower noise level would be of benefit. Receptor locations typically include, but are not confined to, the monitoring locations.

TABLE 4-3
Comparison of Existing and Projected Future (2027) Peak-Hour Noise Levels – Without Mitigation (in dBA)

Receptor Location/ Land Use	Existing (1999)	Alternative A (No Build)	Alternative B (Through Town)	Alternative C (North Town)	Alternative D (Southern)
M1/Hotel	**70**	**73**	63	64	–
M2/Veterans Home	45	45	45	49	–
M3/Mobile Homes	61	63	63	55	–

TABLE 4-3
Comparison of Existing and Projected Future (2027) Peak-Hour Noise Levels – Without Mitigation (in dBA)

Receptor Location/ Land Use	Existing (1999)	Alternative A (No Build)	Alternative B (Through Town)	Alternative C (North Town)	Alternative D (Southern)
M4/Mobile Homes	65	**66**	**67**	60	–
M5/RV Park	43	43	43	**70**	–
M6/Residential	42	42	42	**62**	–
M7/Residential	63	**67**	**66**	65	–
M8/Church, School	59	63	64	60	–
M9/Residential	53	57	59	60	–
M10/Residential	63	**66**	65	65	–
M11/Residential	62	**66**	**75**	**75**	–
M12/Residential	62	**66**	**66**	**66**	–
M13/Residential	62	**66**	**72**	**72**	–
M14/Residential	62	65	**71**	**71**	–
M15/Residential	62	65	61	61	–
M16/Residential	62	65	**70**	**70**	–
M17/Hotel	**66**	**69**	64	64	–
M18/Residential	53	53	53	53	53
M19/LMNRA	41	41	41	41	56-65[1]
R20/Residential	42	42	42	**65**	–
R21/Residential	42	42	42	**67**	–
R22/Residential	58	60	61	60	–
R23/Residential	61	63	63	64	–
R24/Residential	62	65	**69**	**69**	–
R25/Residential	57	59	62	62	–

Shading indicates noise levels that approach or exceed the NAC, or substantially exceed existing noise levels.
Source: NDOT, August 2001a.

[1] Noise levels expected at 45 to 165 m (150 to 550 ft) from the Alternative D centerline, assuming a clear line-of-sight from outlying areas to the highway.

The following findings are drawn from data presented in Table 4-3:

- Existing traffic noise levels at all residential locations along U.S. 93 are below the NAC. The only locations where the NAC is currently exceeded are along U.S. 93 near the Railroad Pass Hotel and Casino and Hacienda Hotel and Casino.
- **No Build (Alternative A):** By 2027, increases in vehicular traffic on U.S. 93 would result in traffic noise levels at some residential locations that approach or exceed the NAC.

Such locations would include the mobile home park at the southeast corner of Yucca Street and U.S. 93 (M4); the first few homes located at the northeast corner of Lakeview Drive and Forest Lane (M7); the condominiums located at the northeast corner of Lake Mountain Drive and U.S. 93 (M10); portions of the new single-family homes located along the southeast side of U.S. 93 between Nevada Way and Pacifica Way (M11 and M13); and the property line of the residential vacant lots between Ville Drive and Pacifica Way (M12). The two hotels near the west and east project termini would still be exposed to high traffic noise levels.

- **Alternative B:** For this alternative, future traffic noise levels along U.S. 93 near the Railroad Pass Hotel and Casino and Hacienda Hotel and Casino would decrease well below the NAC due to the realignment of U.S. 93 away from these locations. For other noise-sensitive locations west of the Buchanan Boulevard intersection, future noise conditions under Alternative B would be very similar to those under the No Build Alternative. Alternative B would have mixed effects for residential locations in the Hemenway Wash area, compared to No Build conditions, and would result in decreased traffic noise levels at some locations and increased noise levels at others. Generally, noise levels at the first row of all residential uses southeast of U.S. 93 between Nevada Way and Pacifica Way, and some homes east of Pacifica Way, would exceed the NAC.

- **Alternative C:** Similar to Alternative B, future traffic noise levels along U.S. 93 near the Railroad Pass Hotel and Casino and Hacienda Hotel and Casino would be well below the NAC due to the realignment of U.S. 93 away from these locations. The mobile homes and the RV park located between Veterans Memorial Drive and Buchanan Boulevard would also experience noticeable decreases in traffic noise levels. The new Veterans Home (location M2) would be well shielded from the new U.S. 93 alignment, experiencing only minimal increases in noise exposure. The areas that would be the most adversely affected by the proposed Alternative C would be the Boulder Oaks RV Park and the single-family homes south of Lakeview Drive and Ridge Road along the proposed U.S. 93 alignment (the area represented by M5, M6, R18, and R19). At these locations, future noise levels would increase "substantially" and approach or exceed the 67-dBA criterion. Noise impacts on residential locations in the Hemenway Wash area would be similar to Alternative B.

- **Alternative D (Preferred Alternative):** Under this project alternative, noise-sensitive areas located along the existing U.S. 93 alignment would experience major reductions in traffic noise levels relative to existing conditions. No adverse noise effects to sensitive receptors are expected to occur anywhere in the developed portion of the study area, as the nearest noise-sensitive areas, outside of the two hotels near the project limits, would be at least 1.2 km (0.8 mile) away from the proposed alignment. Existing homes north of Georgia Avenue (southernmost homes in Boulder City) would experience future traffic noise levels of about 53 dBA during peak traffic hours. Future noise levels at this location would not exceed existing noise levels. The exterior areas of the Railroad Pass Hotel and Casino may experience peak-hour noise levels near the NAC, similar to the other two build alternatives. However, since there would be a shift in roadway alignment away from the hotel, future noise levels would decrease well below the existing levels. Within a limited area of the LMNRA, future traffic on Alternative D

would potentially result in substantial increases over existing background noise levels. Areas within a distance of approximately 165 m (550 ft) from the highway, and away from the existing U.S. 93, would experience substantial noise level increases.

The impairment analysis prepared by NPS to address impacts resulting from the implementation of Alternative D in the LMNRA is presented in Appendix D. To assess noise impacts, it uses as a baseline existing conditions rather than the proximity of sensitive receptors. Because no developed facilities currently exist within that portion of Alternative D that crosses the LMNRA, except near its eastern terminus, the NPS analysis concludes that there will be "moderate to major" impacts resulting from the implementation of the preferred alternative on LMNRA lands.

4.3.2 Mitigation

Construction Mitigation

For this project, construction equipment operating at the site will conform with contractual specifications that require the contractor to comply with all local noise control noise rules, regulations, and ordinances. If a special plan for controlling construction noise in a sensitive location is needed, a plan will be developed to be included in the contract documents. Furthermore, there are no FHWA or NDOT criteria for construction noise impacts. Although construction noise impacts would be temporary, the following standard measures would be implemented to minimize such impacts:

- Whenever possible, limit operation of heavy equipment and other noisy activities to daylight hours.
- Ensure that all engine-powered equipment has mufflers installed and maintained according to the manufacturer's specifications.
- Require all equipment to comply with applicable equipment noise standards.
- Locate stationary construction equipment and vehicle staging areas as far from nearby noise-sensitive properties as possible.
- Limit unnecessary idling of equipment.
- Reschedule construction operations to avoid periods of noise annoyance, as determined by the NDOT resident engineer and defined in special provisions.
- Notify nearby affected parties prior to extremely noisy work.
- Install temporary or portable acoustic barriers around stationary construction noise sources in noise-sensitive areas, as needed. This measure does not apply to the preferred alternative (Alternative D) because no adverse noise effects are expected to occur anywhere in the developed portion of the study area, as the nearest noise-sensitive areas, outside of the two hotels near the project limits, would be at least 1.2 km (0.8 mile) away from the proposed alignment.

Operational Mitigation

Of all potential traffic noise mitigation measures that can be used to mitigate noise impacts, the construction of noise barriers (i.e., walls, earthen berms, or a combination of berms and walls) is the most practical, reasonable, and effective choice for this project. The three project build alternatives under consideration were chosen on the basis of engineering and environmental screening studies, which included traffic noise considerations, as well as input from the public through numerous meetings and workshops.

An FHWA traffic noise computer model was used to determine the noise level reduction that would be provided by various barrier heights and locations for barriers placed either along the proposed U.S. 93 right-of-way or next to the proposed roadway pavement edge. Table 4-4 shows the results of this analysis. The following observations can be made from the noise modeling process and data presented in Table 4-4:

- Under Alternative B, a noise barrier of a height of 2 m (8 ft) above the proposed U.S. 93 pavement surface would be sufficient to reduce future peak-hour traffic noise levels within the mobile home park located at Yucca Street and U.S. 93 to levels below the NAC. Such a barrier would provide about a 9-dBA noise reduction at the first row of mobile home lots south of U.S. 93.
- Also under Alternative B, a right-of-way barrier of a height of 4 m (14 ft) above the ground would reduce the noise levels within the backyards of homes on Forest Lane, north of Lakeview Drive, to levels below the NAC. This barrier would also block the line-of-sight to the exhaust stacks of heavy trucks traveling on the roadway, which are assumed in the model to be 3.5 m (11.5 ft) above ground level.
- Under Alternative C, east of the proposed U.S. 93/Canyon Road interchange, the existing property-line wall for homes within the Boulder Oaks RV Park would have to be replaced by a barrier of a height of 3 m (10 ft) above the ground. On the north side of U.S. 93, a variable-height noise barrier between 3 and 4 m (10 to 14 ft) above the roadway surface should be considered near the north edge of the roadway to attenuate noise to the single-family homes along Ridge Road and Lakeview Drive. A right-of-way barrier would not be practical in this area because the ground elevation is below the proposed roadway grade at most locations.
- For both Alternatives B and C in the Hemenway Wash area, property-line barriers 2 m (8 ft) above residential building pads would be needed to reduce future noise levels within the backyards of existing and proposed single-family homes adjacent to U.S. 93 and east of Nevada Way below the NAC. Such barriers would be sufficient to block the view to the exhaust stack on a heavy truck traveling through the area.
- For the preferred alternative (Alternative D), in determining and abating traffic noise impacts, FHWA requires primary consideration to be given to exterior areas where "frequent human use" occurs and a lowered noise level would be of benefit. Although traffic movements on the proposed Alternative D would increase noise levels through that area of the LMNRA, such areas are not deemed to be of frequent human use. Therefore, noise abatement is not required for these areas.

TABLE 4-4
Future (2027) Peak-Hour Noise Levels - With Noise Barriers (in dBA)

Receiver Location	Noise Level with No Mitigation	Height of Noise Barrier				
		2 M (8-Ft)	3 M (10-Ft)	3.5 M (12-Ft)	4 M (14-Ft)	4.5 M (16-Ft)
Alternative B						
M4	67	58*	57	56	55	55
M7	66	63	61	59	58*	57
M11	75	63*	61	59	59	58
M13	72	60*	59	57	56	56
M14	71	59*	58	57	56	55
M16	70	58*	57	57	56	55
R24	69	58*	56	55	54	53
Alternative C						
M5	70	64	62*	61	60	59
M6	62	56	55*	54	54	53
M11	75	63*	61	59	59	58
M13	72	60*	59	57	56	56
M14	71	59*	58	57	56	55
M16	70	58*	57	57	56	55
R20	65	58	57*	57	56	56
R21	67	64	62	61	59*	58
R24	69	58*	56	55	54	53

Notes: Future noise levels at the noise receptor locations not shown in this table would comply with the NAC.
Shaded cells depict the barrier heights at which a minimum 5-dBA noise level reduction is achieved. Boxed cells show barrier heights resulting in future noise levels below "substantial" increase and below the NAC.
Noise levels marked with an asterisk (*) indicate the height at which the noise barrier begins to break the line-of-sight to the exhaust stack on a heavy truck, assumed to be 11.5 ft above the ground.
Source: NDOT, August 2001a.

NDOT noise policy provides guidance for determining the overall reasonableness of noise abatement options. Based on this policy, noise barrier reasonableness is determined by considering the amount of noise reduction provided, number of people protected, and the cost of abatement. Cost is an important factor in deciding whether a noise barrier should be recommended for mitigation. NDOT policy considers noise abatement to be "reasonable" if the cost per "benefited resident" is at or below $10,000 (1992 dollars). The average Nevada home is assumed to have 2.5 residents. A noise barrier cost of about $161 per square meter ($15 per square ft) was used in this analysis (NDOT, August 2001a).

Table 4-5 summarizes the results of noise barrier cost calculations based on the foregoing discussion and a count of existing homes or vacant lots slated to become homes within the project area. Homes were counted using field observations, aerial photos, and current maps of the project study area. Figures 4-1 and 4-2 show the noise barriers that have been evaluated in this study.

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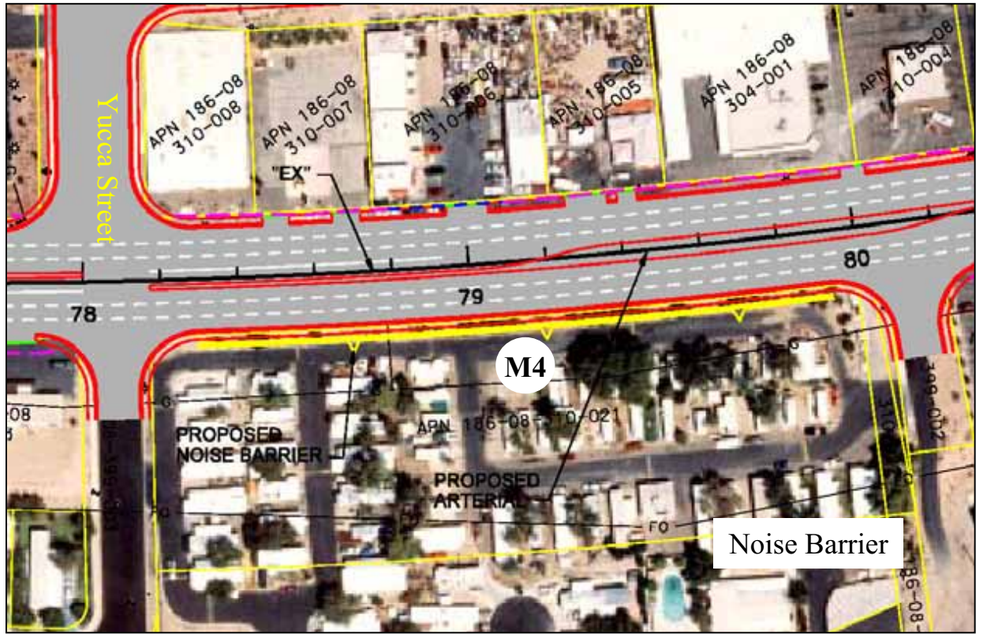
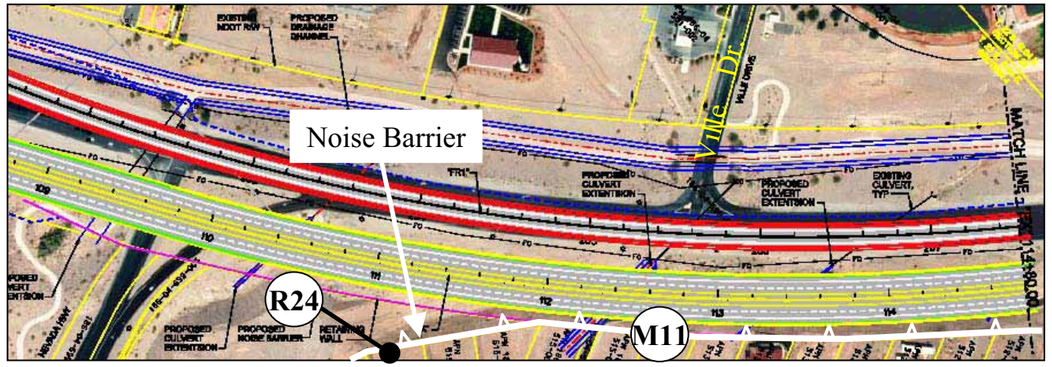
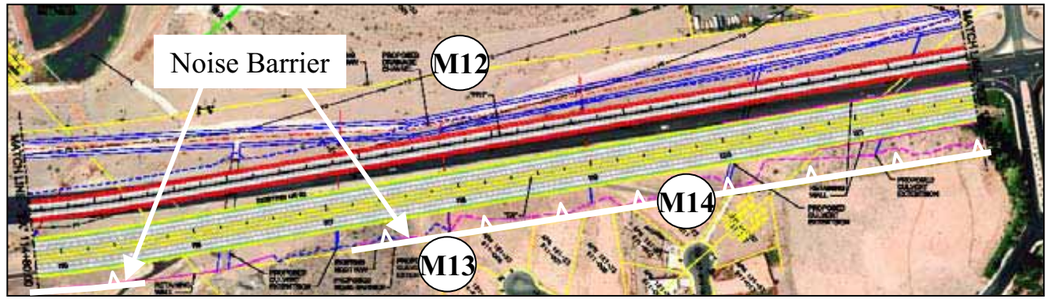
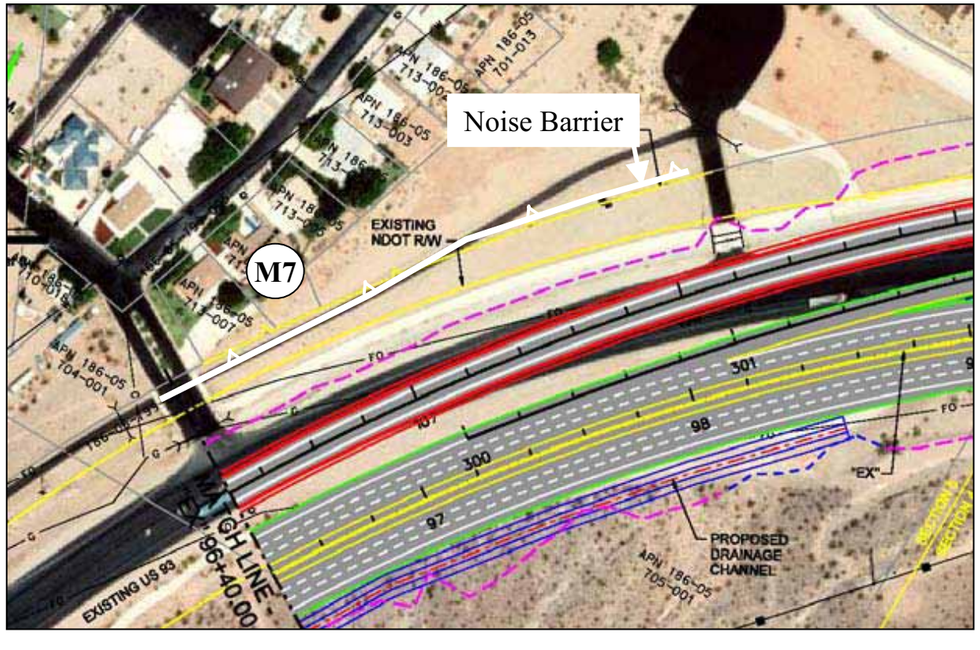








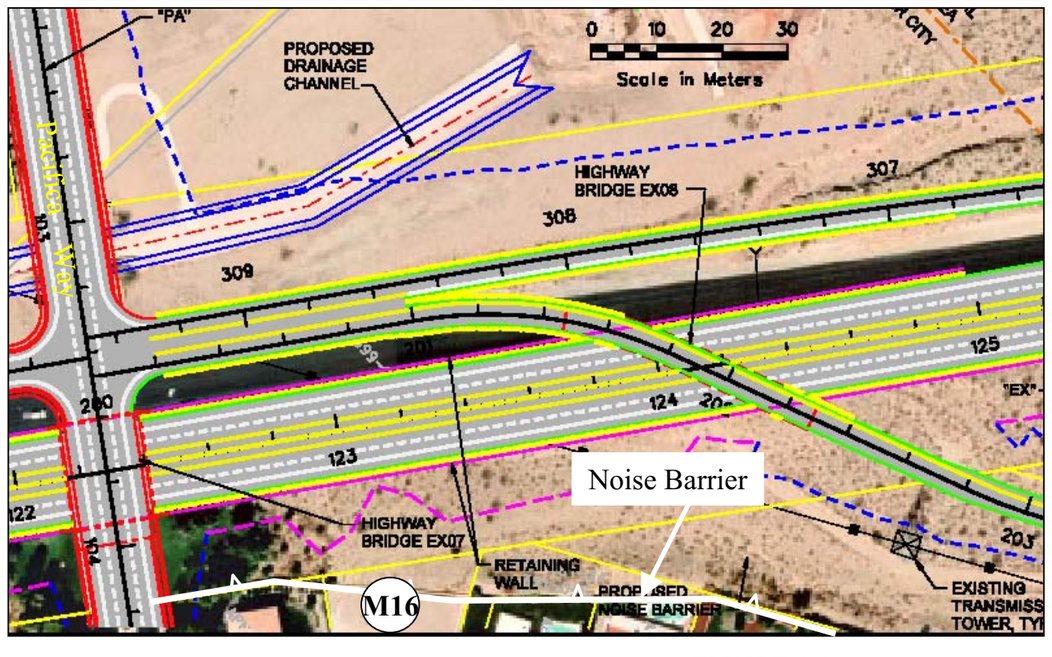
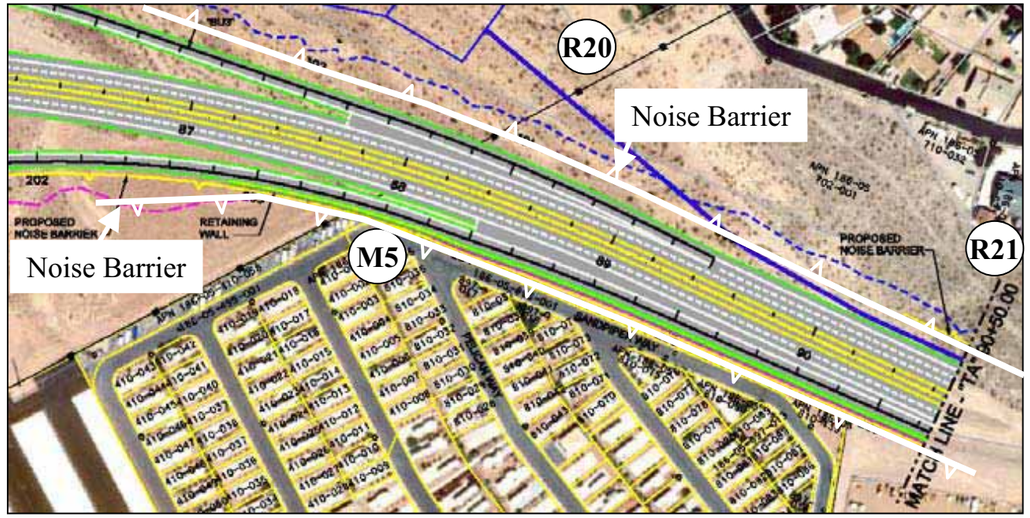
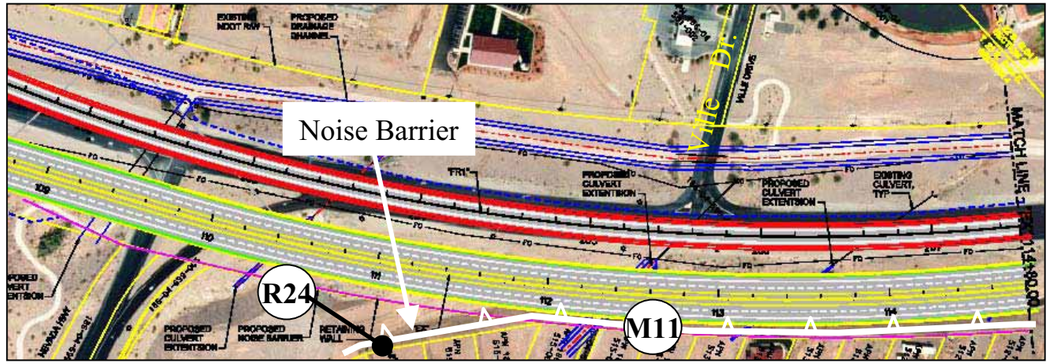
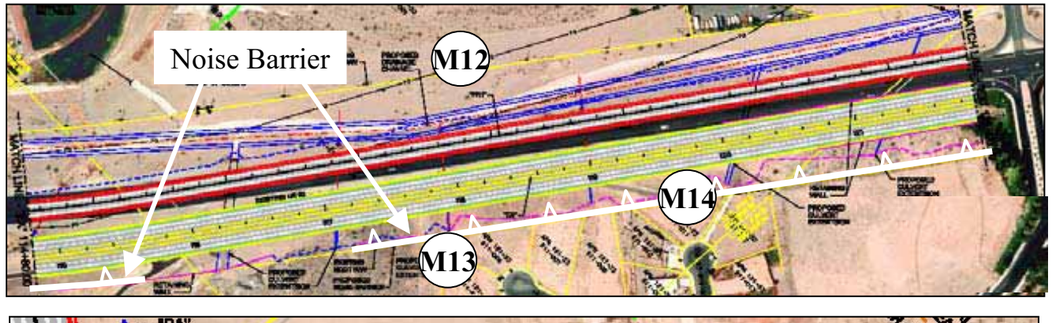
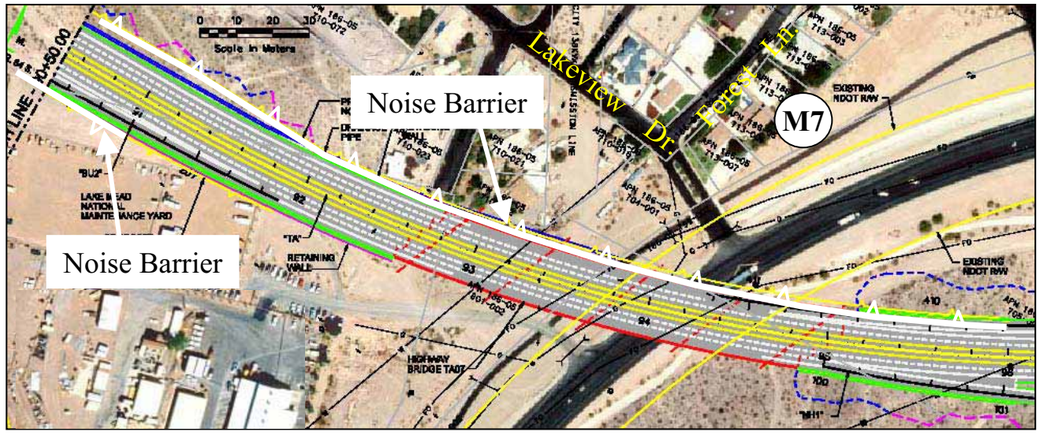


FIGURE 4-1
PRELIMINARY NOISE BARRIER LOCATIONS - ALTERNATIVE B
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT









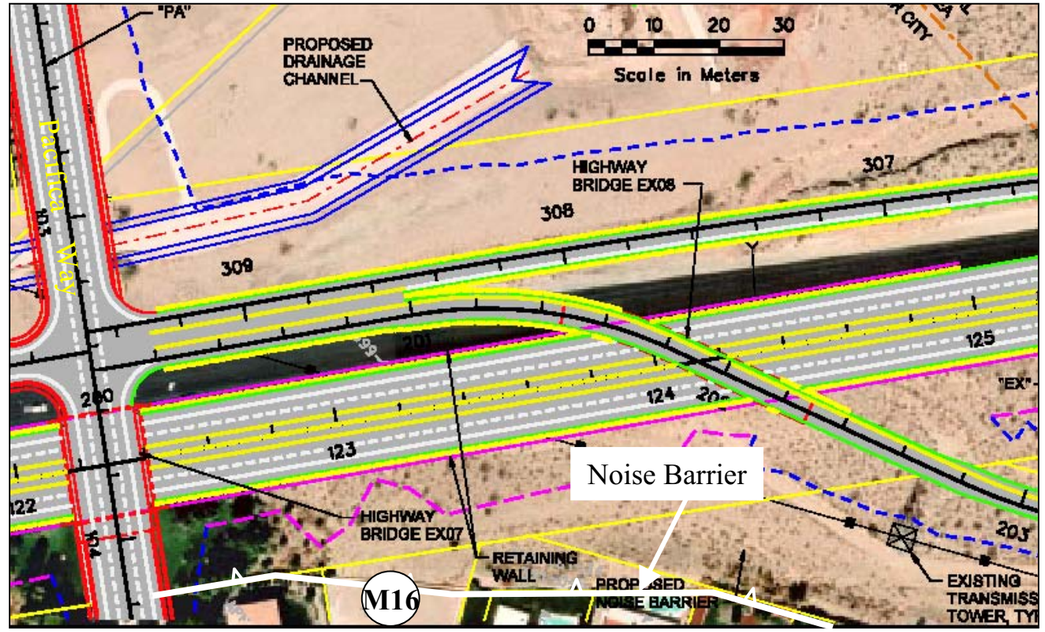


FIGURE 4-2
PRELIMINARY NOISE BARRIER LOCATIONS - ALTERNATIVE C
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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Based on the data in Table 4-5, it would be reasonable, from a cost standpoint, to construct noise barriers at all the identified noise-impacted locations to reduce future traffic noise levels below the NAC. These locations include existing residences, as well as graded residential building pads, which are assumed will be constructed before building of either Alternative B or C would begin. It should be noted that this finding is preliminary and subject to change upon availability of actual barrier cost data, detailed roadway geometry, and updated information on the number of people affected.

TABLE 4-5
Preliminary Barrier Cost Analysis

Barrier Location	Number of Benefited Residences[1]	Barrier Length (m)	Barrier Height (m)	Total Barrier Area (m^2)	Total Barrier Cost	Cost per Benefited Resident	Reasonable to Build Noise Barrier?
Barrier along the North Side of Mobile Home Park at Yucca Street and U.S. 93	10	191	2.44	467	$75,200	$3,100	Yes
Barrier along the Property Line of Boulder Oaks RV Park	20	400	3.05	1,220	$196,400	$9,800	Yes
Barrier along the North Side of U.S. 93, East of Canyon Road Interchange	22	909	3.05 to 4.27	3,258	$524,500	$9,600	Yes
Property-Line Barrier along the North Side of Homes Just East of Nevada Way	16	548	2.44	1,336	$215,100	$5,400	Yes
Property-Line Barrier along the North Side of Homes South of Pacifica Way	12	435	2.44	1,062	$171,000	$5,700	Yes
Property-Line Barrier along the North Side of Homes North of Pacifica Way	7	230	2.44	562	$90,500	$5,200	Yes
Barrier along the North Side of U.S. 93, Near Lakeview Drive	6	204	4.27	873	$140,600	$9,400	Yes

[1]A benefited residence is defined as any residential unit being provided a noise reduction of 5 dBA or more by the barrier regardless of whether the unit exceeds the NAC.

Source: NDOT, August 2001a.

4.4 Biology/Threatened Species

The No Build Alternative (Alternative A) would result in no new habitat disturbance in the project area. However, continued and anticipated increased use of the existing roadway corridor would result in a corresponding increase in the barrier that exists preventing bighorn sheep movement between the River Mountains and Eldorado Mountains bighorn herds.

4.4.1 Construction Impacts

Adverse impacts to plants and animals presently occupying the permanent construction zone would occur for all build alternatives, including the preferred alternative (Alternative D). Existing vegetation and habitat will be removed.

During the actual construction process, dust, noise generation, and other construction-related disturbances will occur, which may affect plants and wildlife. Construction may possibly fragment existing habitat patterns, leading to a reduction in quality of habitat abutting the construction zone. Modifications in the drainage characteristics stemming from placement of the new highway in alluvial areas may adversely affect existing plant community structure. Conversely, runoff draining from the new highway may foster creation of a narrow "green belt" – a strip of larger and more dense vegetation – along the shoulders of the highway, which may provide enhanced habitat values to some species.

Alternative B

Because its nucleus already exists, Alternative B would impose the least disturbance to local vegetation and wildlife of the three proposed alignments. If this alternative is built, habitat disruption will be essentially confined to land now bordering the existing U.S. 93 corridor. By virtue of proximity to a long-established, major travel route, some habitat is already disturbed and holds generally reduced habitat values to many local species. Still, additional zones of at least relatively undisturbed land that lie beyond the present shoulders now paralleling the highway will be lost if the present U.S. 93 corridor is widened to accommodate the proposed project. These losses would extend along approximately 14.5 km (9 miles) of its roughly 17.7-km (11-mile) length, excluding only the already heavily developed areas within Boulder City. Assuming a 30-m (100-ft) width for the existing U.S. 93 corridor and a 120-m (400-ft) width for the proposed project construction zone (temporary and permanent impact area), new construction will disturb an additional 90 m (300 ft) along the approximately 15 km (9 miles) of undeveloped habitat. This translates to slightly more than 327 acres of new disturbance arising from this alternative (Table 4-6).

The gross acres of habitat disturbance, as described both in the text and in Table 4-6, do not directly correlate with loss of equal habitat values to any particular species across that entire acreage. Where multiple species are concerned, neither of these acreages can be assumed to represent a loss of identical magnitude to each species being impacted. The disturbed habitat will occur in an area that has been highly impacted by existing U.S. 93 and U.S. 95, the Union Pacific Railroad (UPRR) (formerly the Boulder City Branch Railroad), and urban residential and industrial development and expansion.

Alternative C

This alternative envisions constructing between 6 and 8 km (4 and 5 miles) of completely new highway, impacting approximately 242 acres (Table 4-6) within the 120-m (400-ft) construction zone located in the western half of the project area. New disturbance will also occur along the remaining roughly 10 km (6 miles) of this route (i.e., from the western terminus to about Railroad Pass, and from about the head of Hemenway Valley to the eastern terminus of the project). In these sections, new construction will impact roughly an additional 90-m-wide (300-ft-wide) corridor (218 acres). The total estimated area impacted by Alternative C would be 460 acres (Table 4-6) upon construction of the alternative.

New construction from about Railroad Pass to the point at which Alternative C crosses U.S. 93 would traverse an area of desert tortoise habitat. Although access roads and powerlines criss-cross this area, construction here would contribute to the isolation of the remaining, undisturbed land lying between Alternative C and U.S. 93, further reducing its utility to the tortoise and many of the other species currently occupying or using it. For all practical purposes, this island of habitat would retain little value to wildlife under Alternative C . Alternative C also crosses bighorn sheep (and, probably, gila monster) habitat in both the Railroad Pass vicinity and in the area along the foot of the River Mountains, west of Boulder City. It further fragments remaining, down-slope habitat in this vicinity by creating another island between itself and U.S. 93. At the east end of the project, Alternative C would cause expansion of local disturbance from U.S. 93. Similar to Alternative B, disturbed habitat resulting from the constriction of Alternative C will occur in an area that is has previously been impacted by existing U.S. 93 and U.S. 95, the railroad, golf course development, and urban residential and industrial development and expansion.

Alternative D (Preferred Alternative)

Alternative D consists of about 20 km (14 miles) of new highway, impacting approximately 679 acres (Table 4-6). Habitat disturbance resulting from this alternative, from the point of divergence from U.S. 93/95 to the Boulder City Rifle and Pistol Club range, occurs in an area currently impacted by U.S. 93/95, UPRR, the airport, sewage treatment plant, Mead Substation, rifle range, landfill, numerous dirt roads and transmission lines, and high ORV and recreational use. South of the Alternative D alignment are major transmission line corridors and associated roads, the WAPA substation facility, and numerous dirt roads supporting heavy ORV use. That portion of the alternative occurring north of the Boulder City Rifle and Pistol Club range to its convergence with U.S. 93, across the Eldorado Mountains ridgeline (Eldorado Ridge) is less disturbed desert habitat, albeit still with numerous bladed access roads and transmission tower facilities.

Constructing Alternative D without mitigation would increase the current existing habitat impacts and degradation occurring in the northern Eldorado Valley. Currently, U.S. 95 to the west and U.S. 93 to the north impact this area.

TABLE 4-6
Comparison of Habitat Impacts Associated with Constructing Various Alternative Routes of the Proposed Boulder City Corridor Project

Alternative	Acres of Habitat Disturbance
Alternative A	0
Alternative B	327 [1]
Alternative C	460 [2]
Alternative D (Preferred Alternative)	679 [3]

[1] New construction overlies existing U.S. 93 corridor. Project will disturb an estimated 90-m-wide (300-ft-wide) corridor along 15 km (9 miles) of U.S. 93 (327 acres). There is a probability of adverse impacts to desert tortoise, desert bighorn sheep, and gila monster throughout.

[2] Primary impacts accrue from 8 km (5 miles) of all new construction (242 acres). Area desert tortoise sign indicates a low-density tortoise population north and south of U.S. 93, and there is occasional desert bighorn sheep sign north of the highway. Occasional gila monsters are also probably present. Tortoise and bighorn sign is sparse along the remaining approximately 10 km (6 miles) of corridor, which generally overlies U.S. 93/95 and U.S. 93 (218 acres). Note: the estimated width of new disturbance in these sections is 90 m [300 ft]).

[3] Desert tortoise sign indicates a low-density desert tortoise population from the alignment's point of divergence from U.S. 93/95 to just beyond the junction with U.S. 95 – about 2.5 km (1.5 miles) totaling 73 acres. Tortoise sign is very sparse to absent (sandy soils around water treatment facility) in the next 6 km (3.5 miles) totaling 169 acres, but it reappears west of Buchanan Boulevard and maintains low-density average thereafter (15 km [9 miles] totaling 436 acres). Occasional bighorn sheep sign (low density) is found in the foothills just south of Railroad Pass, but it is absent from Eldorado Valley. Bighorn sign is again apparent near the rifle range, increasing from low density around the range to high density on the ridgeline approximately 4 km (2.5 miles) north, totaling 121 acres. Bighorn sign is continuously heavy through the Eldorado Mountains (5 km [3 miles] totaling 145 acres). Gila monsters may occur along the corridor (20 km [14 miles] totaling 679 acres), particularly in more upland habitats.

Impacts to local desert tortoise, gila monster, and chuckwalla populations may occur as the alignment swings south along and through the low foothills south of Railroad Pass. These same species may also be impacted by the passage of this route through the Eldorado Mountain headwater slopes, north of the Boulder City Rifle and Pistol Club range, and the Eldorado Ridge farther north. Road cuts through the latter area will require relatively shallow angle side slopes in order to prevent undue sloughing and rock fall onto the roadway. As a result, the physical imprint of construction in these areas may possibly extend beyond the permanent road corridor.

Identifying key lambing areas with certainty is somewhat problematic. However, the almost routine presence of ewes and lambs in the Black Canyon vicinity of the Eldorado Mountains certainly indicates a high probability that the area to the east of Alternative D holds suitable lambing areas. Its rugged landscape contains numerous reasonably secluded and sheltered sites that can be used as birthing sites.

Bighorn sheep habitat in the vicinity of and on the Eldorado Ridge area will be reduced by this alternative. Recent data indicate that the ridge and slopes leading into Goldstrike Canyon are favored bighorn sheep habitat (Figure 3-4B). The rugged terrain here is preferred by these nimble animals, and is also used in the east-west movements involved in the exchange of individuals between the River Mountains and the Eldorado Mountains (Cummings, NDOW, personal communication). Positioning of a new, major highway

corridor through this area would contribute to the disruption of sheep movement patterns. From a broader view looking at bighorn populations in the different mountain ranges (Eldorado, River, and McCullough Mountains) impacts from the construction of Alternative D would be chiefly cumulative. As noted in Section 3.4, the existing U.S. 93 corridor as well as the development in the Hemenway Wash area have posed barriers to bighorn sheep migration routes since the mid-twentieth century at least. Construction of Alternative D (or Alternatives B or C) would contribute to this barrier, but would not create it.

4.4.2 Operational Impacts

Operational impacts consist primarily of those arising from using and maintaining the highway. They include changes imposed upon the project area simply by the ongoing physical presence of the highway itself, direct wildlife mortalities stemming from animal/vehicle impacts, other traffic-related disturbances (including increased traffic volumes, noise, trash, reduced air quality, and localized contamination of soil by highway runoff), drainage-related problems caused by the highway having modified previously existing hydrologic patterns, and the secondary effects associated with development of adjacent areas that probably would not be developed without the highway (Alternative C).

Initially, wildlife use of the project area will be changed if a new highway is built through it or the existing highway is expanded. Regardless of which alternative is selected, the new highway will accommodate increased average daily traffic volume and may increase existing negative highway/wildlife interactions, while decreasing interactions on existing U.S. 93. Without mitigation, species could suffer direct mortalities as a result of being hit by vehicles using the new roadway.

Desert bighorn sheep occurring within the project area in the vicinity of the Eldorado Mountains will continue to utilize the area, and therefore, are expected to attempt highway crossings at various points along the new roadway. The precipitous terrain in the vicinity of these crossing areas is consistent with the habitat requirements of desert bighorn sheep and makes them less vulnerable to predators. By the same token, however, the rugged terrain also makes these animals less visible to occupants in moving vehicles and more susceptible to vehicle collisions when attempting to cross the roadway in these areas.

As a group, reptile – and particularly snake – populations occupying habitats near roadways are frequent victims of highway mortalities. The poikilothermic (cold-blooded) metabolism of these predominantly nocturnal hunters often leads them to remain on the surface of a road longer than is necessary to simply cross it because they seek the warmth stored by the mass of the roadway.

Vehicle collisions with local wildlife and the proliferation of highway-related trash may precipitate an increased presence of scavenging predators, including ravens, along the new road corridor.

4.4.3 Mitigation

The mitigation measures identified in this section will be refined when detailed engineering plans are completed, providing the data needed to conduct the biological assessment of the preferred alternative. The surveys completed to date were primarily designed to illuminate

differences between the alternative alignments. An in-depth biological resources survey of the preferred alternative will reveal more complete wildlife-use patterns than are currently apparent. With that knowledge, and in consultation with USFWS, NDOW, and NPS, detailed mitigation measures will be developed.

Construction Mitigation

The use of fencing and other barriers that prevent animals from entering the roadway construction corridor will mitigate impacts to local wildlife. Similarly, including structures, such as bridges and culverts that permit wildlife to safely cross over or beneath the highway at points other than where traffic grade separations are already planned, will greatly reduce the extent to which wildlife movement is disrupted.

Vegetation. Agency review and assessment of project-associated impacts to vegetation may precipitate a mitigation requirement to salvage various plants found inside the construction zone. Protected or otherwise sensitive plants will be identified and removed from the construction corridor prior to onset of construction per state and federal guidelines and methodology, as required. Salvaged plants will then be held for replanting along construction zone margins, other project-affected areas (e.g., former equipment staging grounds), or alternate lands. Plant salvage activities will probably have the greatest likelihood for success if carried out in other than the spring flowering season. Vegetation and topsoil salvage and replacement, invasive plant species control, and onsite project monitoring will be conducted as stipulated by the various federal and state agencies on lands under their regulatory jurisdiction. Agency guidelines and management practices regarding project site restoration will be implemented as required. landscaping. The potential for the introduction of noxious weeds will be reduced by the institution of a noxious weed control program that calls for construction equipment to be cleaned prior to their use on this project.

Reptiles. The primary reptile of concern in the project area is the desert tortoise. Because of its federal threatened status, prior to implementation of the preferred alternative, consultation with USFWS is required under Section 7 of the Endangered Species Act (ESA) (Musgrave et al., 1998). That consultation will be pursuant to a Biological Assessment (BA) of the preferred alternative and development of measures to mitigate impacts to the tortoise. Typical mitigation includes conducting a tortoise-specific survey across the project area, including the construction zone, equipment staging areas, and access roads. This initially entails identifying and marking all tortoise burrows within the area to be disturbed no sooner than 90 days in advance of disturbance (because tortoises are highly mobile animals and frequently construct new burrows). Each burrow is examined for resident tortoise. Empty burrows are collapsed to prevent reoccupation, and tortoise found onsite are removed and released into a suitable, empty, offsite burrow. Physically clearing tortoise from a site facing disturbance is done within 24 hours of initial construction activity. A site is not considered clear of tortoise until at least two passes are made across it without finding any new tortoise sign. Mitigation will be conducted as stipulated in the Biological Opinion (BO) for the implementation of Alternative D, issued by USFWS. Proposed specific measures to mitigate impacts to desert tortoise will be developed as part of the BA process in consultation with appropriate state and federal agencies (e.g., NDOW, NPS, and USFWS). Mitigation requirements will likely include having contractor and agency biological monitors onsite during all construction activities, and installation of tortoise-proof fencing

in the construction zone. Pursuant to the Clark County MSHCP, a per-acre fee for tortoise habitat destroyed by project-associated construction will also be assessed. These fees are used to offset costs of tortoise recovery.

Avoiding these uncommonly seen lizards when they are encountered during construction can minimize gila monster losses. If the situation warrants, having them removed from the project site will prevent most avoidable lizard deaths.

Avoiding chuckwalla habitat is the best way to minimize their loss. The propensity of this lizard to hide in rock crevices and other similar shelters when approached or threatened makes it somewhat difficult to remove. However, persons trained in the habits of the animal can effectively remove them. This will be done immediately ahead of construction.

Biological monitors will greatly reduce the potential for the take of desert tortoise and species of concern on the project site.

Birds. Bird mortalities can most effectively be minimized by scheduling construction to occur outside spring and summer months in areas where resident species are found to be nesting and brooding. If such scheduling cannot be employed, then avoiding obvious nests will reduce the possibility of their being abandoned by the parent birds.

Numerous bird species are protected under the Migratory Bird Treaty Act (MBTA). It is unlawful to take, kill, or possess migratory birds as defined by the MBTA and subsequent amendments (16 U.S.C. 703-712). Potential for impacting migratory birds may occur depending on the season during which construction activities take place. Migratory birds pass through southern Nevada. Habitat for migratory birds does occur in the project area. Therefore, impacts to migratory birds may occur as a result of the proposed project. If construction occurs during the breeding season, an onsite biological monitor will survey the impacted area for nests prior to construction. If nests are encountered before or during construction, they will be avoided until the birds fledge.

Suitable burrows and other potential nesting cavities within the construction zone will be collapsed prior to the nesting season, largely preventing encounters with burrowing owls. This will be done as part of the above-described tortoise survey. If owl-occupied burrows are found during the nesting or brooding seasons (mid-March through August), they will be avoided until the young owls leave the nest or it is determined that the nesting attempt failed.

Mammals. If important bat roosts are discovered within or closely adjacent to a construction zone, they will be avoided until the animals naturally vacate the site. Bat surveys conducted prior to the start of construction activities will ensure suitable bat habitat is avoided. This may require delaying intended construction for a several-month period. Certain types of bat refuges, such as geothermally warmed sites used as winter roosts by nonhibernating California leaf-nosed bats, may be candidates for complete avoidance. Although such habitats are unusual, certain naturally occurring caves, and even some abandoned mines, can provide the necessary temperature regimes. Continued presence of such features is critical to maintaining some local bat populations.

Adequately addressing bighorn sheep movement patterns is an important biological resources issue for all build alternatives. Adverse impacts to bighorn sheep can be avoided

by are best avoided avoiding their habitat, which is not feasible under any of the build alternatives. Adverse impacts to bighorn sheep can be reduced by avoiding their habitat during late-term pregnancy, lambing, and early rearing seasons (spring and summer months).

Potential bighorn sheep crossing areas have been identified, chiefly in the Eldorado Ridge area (see Figure 3-4B), but also in the vicinity of Railroad Pass. Prior to final design and location of any potential bighorn sheep crossings, the highway section occurring in sheep habitat will be walked with NDOW, NPS, and USFWS biologists to evaluate and select appropriate construction-phase mitigation measures. Current and past agency data specific to Eldorado Mountain bighorn sheep populations, as well as on-the-ground field data and observations, will be evaluated and utilized in the selection of crossing sites and other mitigation.

Operational Mitigation

Impacts to wildlife will be mitigated through proper maintenance of wildlife fencing and crossing points. Keeping the highway free of trash through a trash collection program, and eliminating unnecessary lighting and other attractants will help prevent wildlife entry onto the highway. Signs alerting drivers to possible presence of wildlife will be installed as appropriate.

Because bighorn sheep frequently use ridges and canyons as travel routes, standard cut-and-fill construction techniques through the steep, high-relief terrain found in the eastern portion of this project area could potentially create a barrier to sheep movement. To reduce the possibility of an increase in the rate of mortalities from attempted highway crossings, and to reduce adverse population impacts from an additional highway barrier further reducing contact between bighorn populations, features allowing movement of sheep across the new highway will be included in final project design. These features will include bridges and, where appropriate, large-size culverts. In consultation with NDOW and EPA, FHWA and NDOT have identified a number of crossing locations and structures for bighorn sheep as well as other wildlife along the route of the preferred Alternative D (see Figure 4-3).

Culverts. Box-culvert crossings are to be constructed below grade to allow their floors to be filled with soils similar to those of the surrounding habitat. Each will have wildlife fencing designed to facilitate its use as a crossing by wildlife such as the desert tortoise by directing animals to its openings. Their location will include:

- The planned recreational access crossing east of the Mead Substation. A multi-use earth-fill box culvert will be constructed for recreational access and wildlife crossing to the Eldorado Valley south of the alignment.
- At waters of the U.S. crossings D-8 and D-9, earth-fill box culverts will be constructed to cross these dry arroyos.
- At waters of the U.S. crossing D-10, two earth-fill box culverts will be constructed.
- In the vicinity of the eastern project limits at the Nevada Interchange (Figure 4-3), an earth-fill box culvert will be constructed to perpetuate the crossing established as part of the Hoover Dam Bypass project. Fence materials and construction in this bighorn use area will conform to NDOW and NPS standards for ungulate fencing.

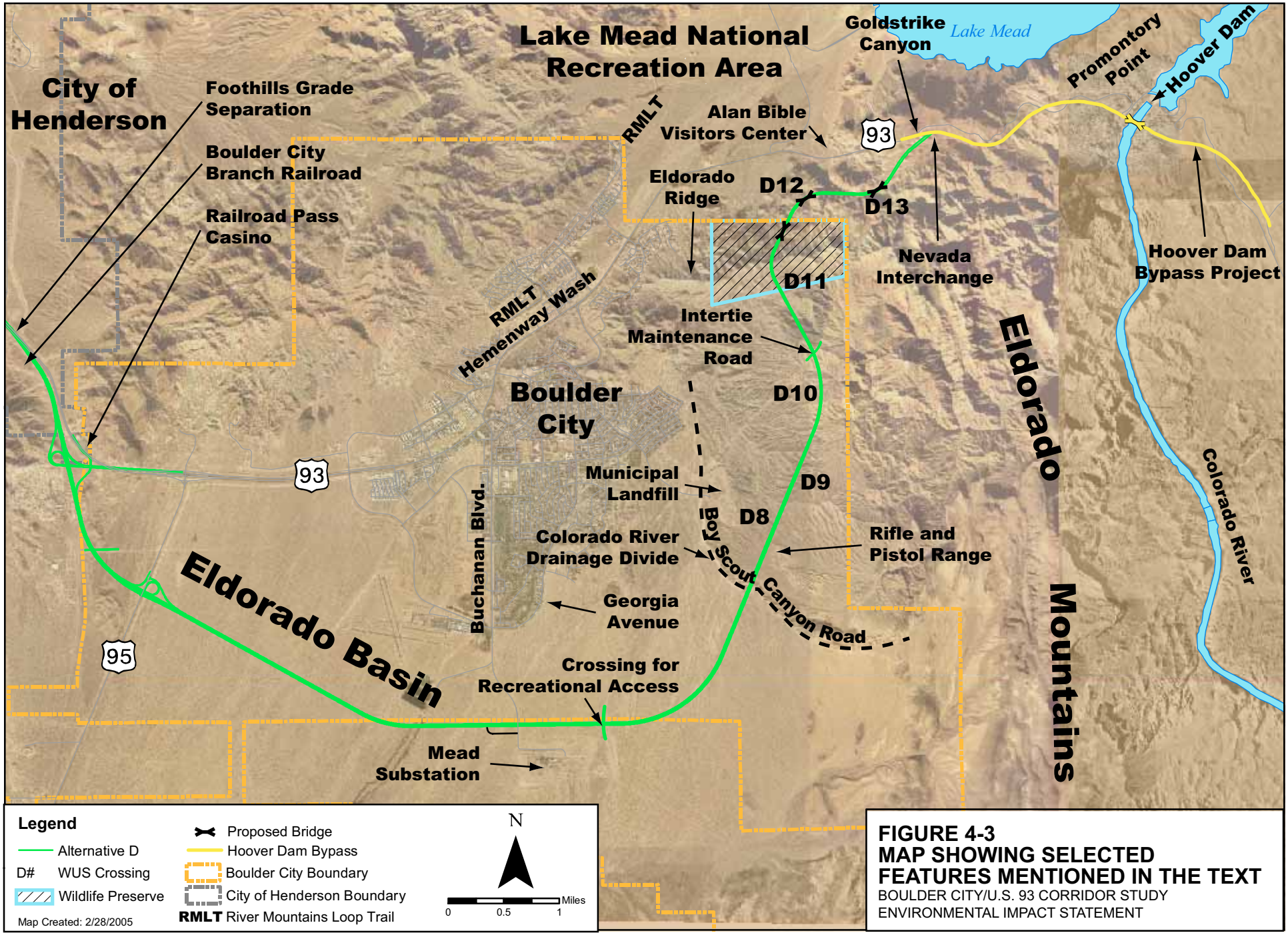

FIGURE 4-3
MAP SHOWING SELECTED FEATURES MENTIONED IN THE TEXT
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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Bridges. The ruggedness of the Eldorado Ridge vicinity is a main reason that bighorn sheep frequent the area, and it also lends itself to the construction of larger spans more suitable for bighorn crossings. Bridges are proposed for the following locations; in some cases providing wildlife crossing as well as avoidance of a tributary representing a jurisdictional water of the U.S. (see Section 4.6). Fencing in proximity to the structure will be located to direct wildlife through the structure openings. For these structures, fence materials and construction will conform to NDOW and NPS standards for ungulate fencing. Bridge under-crossing locations will include the following:

- At the Intertie Maintenance Road north of the Boulder City Rifle and Pistol Club (Figure 4-3), spanning the existing dirt road.
- At a relatively deep canyon immediately north of the Eldorado Ridge.
- At waters of the U.S. crossings D-12 and D-13.

Other Mitigation Measures. Maintaining natural lighting to the extent possible, rather than providing for excessive electrical lighting of the highway will help lessen intrusive, nighttime glare that extends into adjacent lands and interferes with routine activities of nocturnal animals. Reliance on natural lighting will also reduce the attraction of the highway to wildlife, thereby decreasing highway-related wildlife mortalities.

Highway design will incorporate sufficiently long sight distances on curves to allow drivers ample time to see and safely react to wildlife that enters the travel corridor. Design should also be flexible enough to avoid impacting, to the extent practicable, any particularly sensitive wildlife areas identified.

Use of a vegetation- and wildlife-friendly design, in concert with appropriate maintenance procedures, will continue to help reduce adverse impacts to local biota over the life of this highway. The NDOT is a responsible party under the *Clark County Multiple Species Habitat Conservation Plan* (MSHCP) and Section 2.8.9.2 of the MSHCP lists the conservation measures that NDOT is undertaking under that plan. NDOT is committed to follow-through on its conservation measures under this MSHCP, not only as they apply to species specifically noted in the MSHCP (e.g., the desert tortoise, chuckwalla, and certain bat species), but also as they apply to the ecosystem that supports wildlife. The following lists those NDOT conservation measures in the MSHCP that, when applied to this project and not duplicating actions listed above, constitute additional mitigation measures:

- Measure NDOT(6). Compile an inventory of all culvert/bridge crossings and tortoise fencing within the permit area. NDOT will include in its inventory of culvert/bridge crossings those to be constructed as part of the build-out of Alternative D, as well as tortoise fencing that may be installed.
- Measure NDOT(7). Complete the NDOT land disturbance/take form when land disturbance/takes occur. The NDOT land disturbance/take form(s) completed pursuant to the implementation of this project will be included in the regular reports supplied to the USFWS and Clark County.

- Measure NDOT(17). Ensure new roadside structures are designed and constructed to prevent animals from becoming trapped. New roadside structures erected as part of this project will be designed and constructed in such a fashion as to prevent wildlife from becoming trapped by or in them.
- Measure NDOT(23). Install movement directing devices in conjunction with highway/ roadway protective fencing. Fencing in the vicinity of wildlife crossings will be designed in such a fashion as to direct wildlife to those crossings. Other culverts and crossing will be installed with the appropriate wildlife fencing (i.e., desert tortoise fencing) to reduced the impacts of habitat fragmentation.
- Measure NDOT(24). Ameliorate existing, or install new, under-road culverts to allow passage of terrestrial species. Under-road culverts, wildlife fencing, and other measures installed during the construction of Alternative D will, to the maximum extent possible, be designed and constructed to facilitate the passage of terrestrial species.

Development and Implementation. The FHWA and NDOT will involve NPS, NDOW and other affected agencies in reviews of wildlife crossings during final design development. At that time those agencies will be afforded the opportunity to provide input regarding the efficacy of these designs to meet NDOT's MSHCP commitments. In addition, it is anticipated that other mitigation measures will be identified in consultation with these agencies and the USFWS during the preparation of the Biological Assessment (BA) for this project (see below). In addition, measures to address cumulative impacts to bighorn sheep populations will be implemented, as described in Chapter 6.

4.4.4 Agency Permits and Reviews

Because a formally listed species – desert tortoise – resides within the proposed project area, and because this project receives federal (FHWA) funds, a BA that includes data from the survey of biota and habitat values along the preferred route of the project (Alternative D) will be assembled to establish the extent to which tortoise (and other protected or sensitive species) will be subject to impact. A tortoise-specific survey will be conducted as part of the BA. As required under Section 7 of the ESA (Musgrave et al., 1998), a report of the assessment effort will be submitted to USFWS as part of the formal consultation process. Upon reviewing the BA, USFWS will issue its BO describing impacts to the tortoise expected to accrue from project construction. USFWS will also stipulate required and/or suggested mitigation designed to offset those impacts. If handling and/or moving tortoise is a mitigation measure, the BO will serve as the authorizing document.

Formal tortoise surveys incorporate a search pattern using more narrowly spaced transects (10 m [32 ft] or less) to ensure complete visual coverage of the area being examined and to facilitate identification of all tortoise sign thereon. If removal of tortoises from the survey area is required to mitigate project impacts, multiple passes across the area to be cleared are necessary to assure no tortoises are overlooked. Tortoise surveys must also be conducted within 90 days of actual construction.[1] Finally, to minimize the chance of tortoise

[1] Because of the dynamic nature of tortoise populations, USFWS, the agency charged with enforcing the ESA, typically considers results of a formal tortoise survey as valid for no more than 90 days.

reoccupying a construction site after having been removed, tortoise clearance must typically be completed within 24 hours of site disturbance (i.e., initial clearing and grubbing).

As described above, NDOT and FHWA will continue to consult with state agencies, such as NDOW, and other federal agencies, such as NPS and BLM, on mitigation for impacts to species managed by them. Necessary permits to handle and/or remove affected species will come from those agencies.

4.5 Water Resources

4.5.1 Environmental Impacts

Construction Impacts

Construction impacts of the three build alternatives center around the effects on the water quality of stormwater runoff and the potential for erosion. This section evaluates the effects of the construction of a new facility in the project area on the overall water quality, potential permitting requirements and other necessary regulatory compliance, and provides an evaluation of erosional effects.

Stormwater Runoff Quality Impacts for Build Alternatives. Water quality in the desert washes that drain the project area would be impacted, and may degrade, during construction of the build alternatives. Events such as the accidental discharge of waste products created during construction are of primary concern. Equipment that is operated in the vicinity of washes within the construction area may leak various petroleum compounds and contaminate small areas of the work site. In addition, staging areas utilized for the fueling of equipment are also subject to this risk.

Other concerns for discharge of hazardous materials that might degrade water quality include areas set aside for the cleaning of equipment over the course of the construction period. Elevated levels of phosphates, as well as suspended and dissolved solids, are water quality parameters of concern for the build alternatives. When combined with surface runoff, these compounds could be discharged to nearby receiving waters (Lake Mead or the Colorado River). The travel time for these contaminants is potentially short, on the order of minutes until reaching the terminus. Figure 4-4 shows an existing wash and crossing of existing U.S. 93 that conveys stormwater directly into Hemenway Wash and travels approximately 8 km (5 miles) before emptying into Lake Mead.

The most rapid discharge of stormwater to receiving waters (Lake Mead and/or the Colorado River) potentially poses the greatest risk, in terms of water quality degradation from unintended waste discharges. Alternatives B and C would have the same travel times and would have identical potential water quality effects on Lake Mead. The average time to reach the receiving water for both Alternatives B and C wash crossings is 3.5 minutes shorter than the average time for the Alternative D wash crossings. This is partially attributed to the fact that the Alternatives B and C drainages are shorter in distance to the receiving waters than those of Alternative D. Although the average construction slopes are steeper for Alternative D, larger average channel width and natural composition

(Alternatives B and C contain some concrete channel drainages) help in slowing down the average stormwater flows. Therefore, because Alternatives B and C retain runoff a shorter time from the receiving water, the two alternatives have a potentially greater negative impact to surface water quality.

Erosion Impacts for Build Alternatives. The erosional effects of the build alternatives would be primarily from activities such as the construction of new and temporary channels, and access roads around the new facility, as well as modifications to the landscape and grading of the soil in the vicinity of the new facility. New cut and fill slopes would erode by a combination of sheet and concentrated flow, and the eroded material would likely be transported downslope into the drainage system and eventually the receiving waters. This would potentially have negative impacts on both Lake Mead and Colorado River water quality.

Table 4-7 compares the magnitude of cuts and fills required for the build alternatives. Details of the profiles of these alternatives can be found in the *Boulder City/U.S. 93 Corridor Study Preliminary Engineering Report* (NDOT, November 2001). Based on preliminary geotechnical analysis, construction cuts in rocky areas in excess of 25 m (80 ft) in height would require the use of a "bench" or catchment area at the base of the cut to prevent falling rocks and debris from entering the roadway. Additionally, cuts in areas with suitable rock material could be constructed at a slope of 1:1 or steeper, which unless properly engineered could be more susceptible to erosion. Table 4-7 demonstrates that the preferred alternative (Alternative D) would have a substantially greater overall length of deep cuts along its alignment than Alternatives B or C.

TABLE 4-7
Comparison of Cut and Fill Depths for Build Alternatives

Build Alternative	Deepest Cut (m/ft)	Largest Fill Depth (m/ft)	Length (m/ft) along Alignment Centerline with Cut Depth > 25 m (80 ft)
Alternative B	30 m/98 ft	15 m/49 ft	30 m/98 ft
Alternative C	30 m/98 ft	15m/49 ft	30 m/98 ft
Alternative D (Preferred Alternative)	70 m/230 ft	30 m/98 ft	630 m/2,065 ft

In general, steeper grades in construction zones and of constructed facilities pose greater erosion potential. Table 4-8 compares the steepest roadway grades of each alternative and the total length of these grades. Additional details of the roadway grades for the alternatives can be found in the *Boulder City/U.S. 93 Corridor Study Preliminary Engineering Report* (NDOT, November 2001). Table 4-8 demonstrates that Alternative D has both the steepest maximum grade (6.0 percent) as well as the greatest total length of steep grades of all the alternatives in the study.

FIGURE 4-4
ALTERNATIVE C
WASH CROSSING C-1
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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TABLE 4-8
Comparison of Steepest Grades for the Project Alternatives

Alternative	Steepest Grade	Length of Steepest Grade (m/ft)
Alternative A (existing U.S. 93)	5.5%	800 m/2,625 ft
Alternative B	5.7%	1,250 m/4,100 ft
Alternative C	5.7%	1,500 m/4,920 ft
Alternative D	6.0%	4,200 m/13,780 ft

Therefore, of the three build alternatives, construction of Alternative D would have the most negative water quality impact with respect to erosion potential for the following reasons:

- The alternative would have substantially steeper grades, specifically in the eastern half of the alignment through the Eldorado Mountains
- The alternative would require a larger number of new utility access roads to maintain access to power line facilities and other utilities in the vicinity
- The alternative would have more cut and fill and continuous steep slopes along the sides of the new roadway that have a tendency to erode and deposit into drainage channels

Operational Impacts

The long-term operational effects of construction of a build alternative on the water resources of the project area consider the impact of contaminant runoff and erosion throughout the life of the new facility. This includes water quality impacts as a result of accidental contaminant material or waste discharge, the redirection of stormwater runoff (necessitated by channelization and grading of the terrain), and the continuous erosion of adjacent land areas.

Stormwater Runoff Quality Impacts for Build Alternatives. Water quality in the desert washes that drain the project area will be impacted and may degrade during operation of the build alternatives. Discharge from culverts and roadway channels will continue to flow into the Colorado River, Lake Mead, or the Dry Lake Basin and will often contain chemicals, such as greases and oils from automobiles and trucks on the new facility, and trash discarded from vehicles and along the roadside. Chemical spills resulting from vehicle accidents are also a possible source of water quality degradation.

Consistent monitoring and water quality data is not kept for the washes that flow into the receiving waters in the project area. Nevertheless, it can safely be assumed that the water quality of existing stormwater runoff is somewhat degraded due to the existence of urban development in the project area and potential contaminants resulting from highway runoff. However, the short-term impacts to water quality of the Colorado River and Lake Mead are expected to be minimal during the operation of the facility than during construction, assuming proper mitigation measures are implemented in the design and construction of the facility.

In general, Alternatives B and C would have a slightly greater impact than Alternative D due to their closer proximity to receiving waters and the shorter travel times of contaminants carried in the surface runoff. However, Alternative D would result in greater impacts to water quality with respect to bridge-generated runoff. If this alternative were identified as the preferred alternative, further design would determine bridge runoff mitigation measures. In the eastern end of the alignment, there are a number of large bridge structures along the alternative that cross wide canyons, where stormwater runoff eventually reaches either the Colorado River or Lake Mead.

Erosion Impacts for Build Alternatives. The erosional effects of the build alternatives do not have as widespread an impact when considering only permanent, postconstruction effects on water quality, as the temporary facilities that can lead to short-term erosion are no longer in place. Similar to construction impacts, however, Alternative D would result in potentially greater impact on water quality due to erosion.

The continuous steep slopes associated with the roadway profile of the eastern portion of Alternative D would generate sedimentation from those slopes and the associated channels and culvert crossings of the new roadway, without mitigation measures for erosion prevention. In general, exposed cut and fill slopes would continue to erode throughout the life of a facility in the absence of stabilization by vegetative or mechanical means, and the degree of sediment production would be highest for Alternative D because of the substantially greater slope area.

No Build Alternative. The No Build Alternative (Alternative A) would also have an operational impact on the overall water quality of the project area. The deterioration of water quality would be attributed to natural conditions of erosion and drainage of contaminants along the existing roadway, exacerbated by a forecasted increase in traffic in the design year.

4.5.2 Mitigation Measures

Construction Mitigation

Construction of any of the build alternatives, including the preferred alternative, will require acquisition of a National Pollutant Discharge Elimination System (NPDES) Construction General Permit from the State of Nevada (assuming that greater than 5 acres of existing drainage is disturbed), to outline requirements for monitoring and maintaining water quality in surface runoff to the affected environment. The terms and conditions written in the permits will limit discharge of pollutants and set water quality standards that will be implemented and enforced throughout construction of the project. Additionally, periodic inspection for compliance with these standards will be required as a condition of this permit.

Stormwater Pollution Prevention Plan. As part of the NPDES permit requirements, a site-specific Stormwater Pollution Prevention Plan (SWPPP) will be needed for the project. The SWPPP is the tool used to control the discharge of pollutants into the stormwater runoff and is geared toward the requirements of the Nevada general stormwater permit. It will include, at a minimum, the following items:

- A detailed site description, which includes a description of the nature of the construction activities
- A description of the sequence of intended major soil disturbing activities
- Estimates of total area of the site and total area of the site to be disturbed
- An estimate of the runoff coefficient of the site during both pre- and postconstruction phases, as well as data describing the soil or quality of any discharge leaving the site
- A general location map and a site map showing the following:
  - Drainage patterns and approximate slopes expected after major grading operations
  - Locations of major structural and nonstructural controls
  - Locations of stabilization practices
  - Locations of offsite materials, waste, borrow, or equipment storage areas
  - Location of surface waters and where stormwater discharges to those surface waters
- The location and description of any discharge associated with industrial activity other than construction
- A description of measures that will be implemented as part of the construction activity to control pollutants in stormwater discharges
- A description of specific stormwater controls, such as detention basins, infiltration basins, swales, rip-rap, or retaining walls.
- A description of planned maintenance activities that will be necessary to keep erosion and sediment control measures identified in the SWPPP in effective operating condition
- A description and record of the inspection of erosion and sediment control devices, the disturbed areas of the construction site, equipment and material storage areas, and the construction entrance and exit points
- A description of all nonstormwater-related discharges associated with construction activity, such as dewatering, and a description of the pollution prevention measures to control these discharges

Best Management Practices. Construction mitigation will require the adoption of BMPs for improvements with respect to water quality at the construction site. The State of Nevada's Handbook of Best Management Practices (State Conservation Commission, not dated) shall be utilized as a guidance document for implementing appropriate BMPs. In addition, the Las Vegas Valley 208 Water Quality Management Plan, as amended (Watson, 1997), shall also be consulted to identify appropriate BMPs for implementation. The SWPPP will include a commitment to revise the BMPs whenever they are found to be deficient.

Following are BMPs for maintenance of water quality during construction of the build alternatives.

- Construction equipment must be cleaned on a regular basis to minimize potential deposition and runoff contamination from petroleum-based chemicals. To accomplish

this BMP, the equipment must be inspected daily for leaks and repaired immediately upon discovery of a leak.

- Designated locations shall be provided for servicing, washing, and refueling of equipment, away from temporary channels or swales that would quickly convey runoff to the drainage system and into a receiving water.
- Contaminated material shall be kept at a safe distance (a minimum of 30 m [100 ft]) from an entry into the drainage system. Temporary barriers and containers are required to confine the contaminated materials. Upon completion of construction, all contaminated material on the construction site must be removed and disposed of in accordance to federal, regional, and local regulations. A spill response, containment, and cleanup plan will be developed and implemented
- A temporary spill containment system shall be installed and maintained directly north of the Alternative B or C alignments within Hemenway Wash, east of Lakeshore Road to approximately the Hacienda Hotel and Casino. At this point, the northern limits of cut and fill are the closest to a receiving water of any alignment at any other location (approximately 300 m [1,000 ft]). In addition, the slope continuously descends to the lake from this area.
- If construction of temporary access roads produces a channel that contains a path of least resistance to a major drainage, a silt barrier shall be placed and maintained to trap sediment before it flows with surface runoff to offsite channels. Trapped sediment and debris that accompanies it shall be taken offsite before the barrier is removed after completion of construction. Where needed, small basins to trap sediment with surface runoff and to detain it during the construction period will be installed.
- Fugitive dust from construction activities, unpaved and paved roads, wind erosion of disturbed surfaces, etc., shall be controlled by implementing the following, or similar, BMPs:
  - Apply EPA-approved nontoxic chemical soil stabilizers to all inactive construction areas (i.e., previously graded areas inactive for more than 5 days).
  - Water active grading areas at least twice daily during the dry season.
  - Suspend all excavation and grading operations when constant wind speeds are measured to be at least 40 km/h (25 mph) or if instantaneous wind speeds (gusts) are measured to be at least 64 km/h (40 mph). Wind speeds shall be determined at the DAQEM air quality monitoring station in Boulder City. Suspension shall be ongoing until 1 hour after the wind speed falls below the constant or gust maximum.

Operational Mitigation

Operational mitigation will minimize the effects of erosion and sedimentation that are likely to result from changes to the terrain upon completion of any of the proposed build alternatives, including the preferred alternative. In addition, mitigation measures will be required to protect against surface runoff contamination from spills on the new road, requiring treatment of possible contamination to maintain current levels of water quality.

One BMP required for the build alternatives consists of stabilizing soil along the banks of drainage channels at roadway crossings to prevent erosion and sediment deposition.

Soil stabilization may be accomplished using measures such as erosion-control blankets, which are effective in reducing erosion that occurs upon heavy precipitation. Erosion-control blankets are installed to cover bare soil. The blanket stabilizes the soil and protects it from wind erosion, thereby reducing the potential for the introduction of sediment into stormwater runoff. The blanket shall be composed of natural material, such as straw, wood excelsior, or coconut fiber for biodegradability in the desert environment.

The following specifications apply for an erosion-control blanket:

- All rocks, clods, debris, and vegetation shall be removed to ensure full contact between the blanket and the soil surface
- The blanket shall be anchored to the soil using metal wire staples as specified in the special provisions or recommended by the manufacturer

Other soil stabilization and offsite water quality controls will be developed during the design phase, consisting of plans and specifications for:

- Stabilization of cut-and-fill slopes through replacement of conserved topsoil, boulders, and vegetation previously stripped from cuts
- Permanent sediment basins to treat runoff before discharge and for containment of hazardous material spills
- Retaining walls and other structures, rather than cut-and-fill slopes, at specific locations depending on hydraulic analysis to reduce runoff velocities and erosion potential
- Erosion-resistant drainage channels and energy-dissipating structures at all culverts where discharge velocity will cause downstream erosion

Unavoidable Adverse Impacts

Constructing the roadway will increase both short-term and long-term sediment yields over existing conditions. Removing existing vegetative and rock cover will disturb existing conditions, increasing the sediment yield and impacting local, and to a lesser extent, regional water quality. However, implementation of the measures outlined in the SWPPP, in accordance with the NPDES Construction General Permit, coupled with an effective program to implement and monitor BMPs and other measures to minimize harm, is expected to reduce the long-term impacts to water quality.

4.5.3 Agency Permits and Reviews

Prior to obtaining an NPDES Construction General Permit for the project, a NOI will be filed with the BWQP. A SWPPP will accompany the NOI. A copy of the project FEIS will also be provided to facilitate agency review and processing of the permit.

4.6 Wetlands/Waters of the U.S.

Following verification and delineation of the waters of the U.S. crossings, an estimate of impacted area was produced for each of the crossings. Figure 4-5 shows a sketch of wash crossing C-7 (see Figure 3-7), a crossing consisting of two distinct channels separated by a raised natural "island," both conveying surface runoff into a culvert that passes under existing U.S. 93. Approximate limits of cut and fill for Alternative C are shown in this figure, and the area of impact is calculated from the dimensions shown.

Some of the wash crossings on Alternative D (the preferred alternative) were not accessible during the field investigation for delineation due to exceptionally rugged terrain. For these crossings, a mapping evaluation of the impacted area was performed, using the contours generated during the detailed mapping phase of the project and a similar estimation of limits of cut and fill for each crossing. Figure 4-6 depicts a sample mapping evaluation of wash crossing D-11. In addition, some of the wash crossings of Alternatives B and C, in the alluvial fan area, were map-delineated.

4.6.1 Construction Impacts

Without mitigation, construction impacts could include disturbance of soils in areas where roadways, culverts and bridges are built; where access roads are needed; in construction staging areas; and in areas where material stockpiling will occur. Siting these construction areas near waters of the U.S. could cause discharge of hazardous materials into the washes or accelerate erosion. It is assumed that all stockpiled material would be removed following construction. Permanent impacts to waters of the U.S. result from the roadway, bridge and drainage structures (including limits of cuts and fills) constructed within the NDOT right-of-way.

An offset line located 60 m (200 ft) from the centerline on each side of the alignments is used to quantify construction (temporary and permanent) impacts for most of the crossings. In most cases, this offset line extends beyond the limits of cut and fill, which is used to quantify operational (permanent) impacts. However, in some sections along the proposed alignments, there are larger areas of cut or fill (such as Alternative D through the Eldorado Mountains). At wash crossings within those areas, the limit of construction impact would extend beyond the 60-m (200-ft) allowance to the actual cut or fill limit, and the construction impact area would be equal to the operational impact areas.

Figures 3-6 and 3-7 show the impact of the three build alternatives on blue line streams denoted as waters of the U.S. Tables 4-9, 4-10, and 4-11 identify the potential acreage of fill area required for these waters at the crossings of Alternatives B, C, and D, respectively.

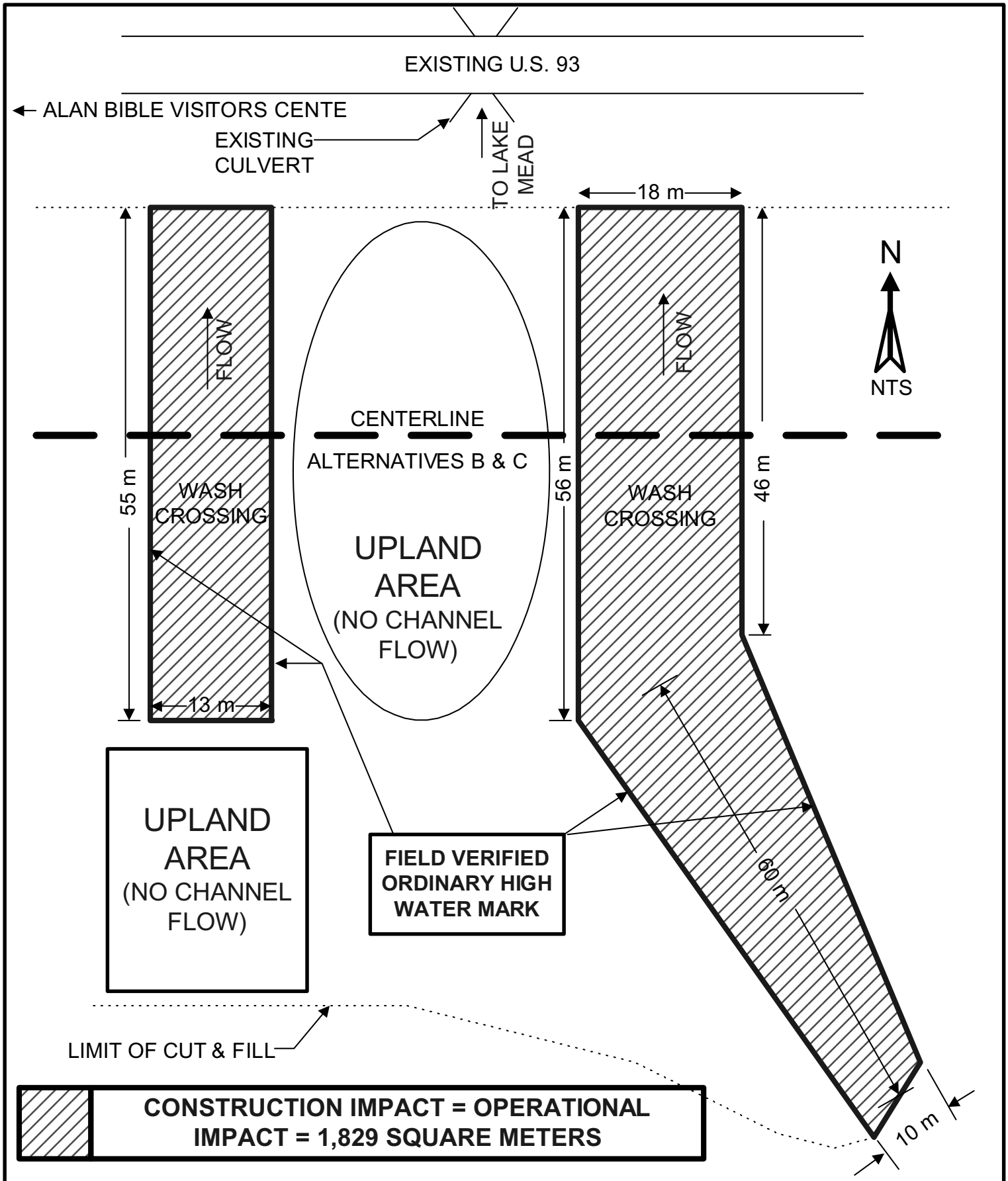

FIGURE 4-5
URISDICTIONAL WATERS OF THE U S
FIELD DELINEATION WASH CROSSING C-
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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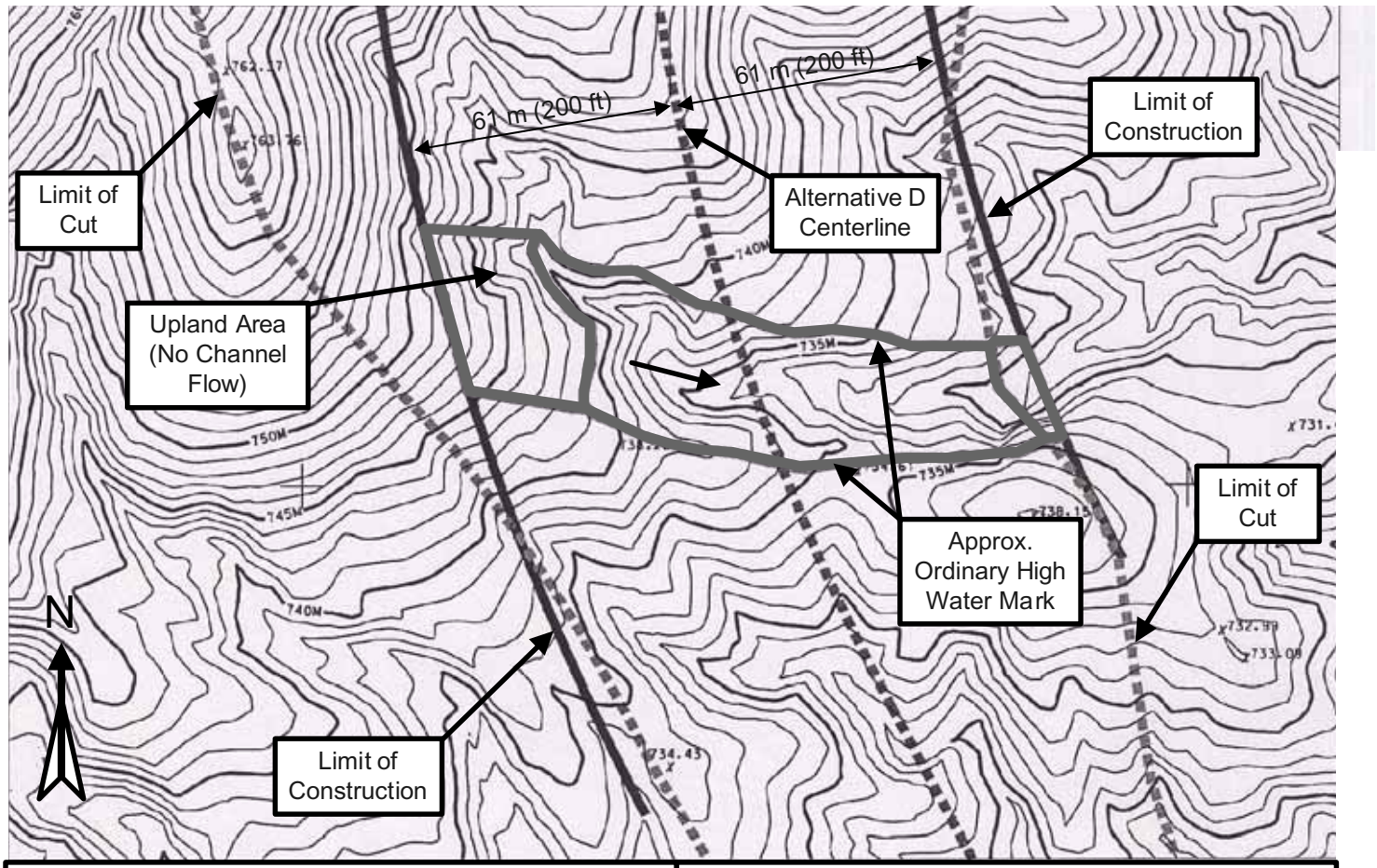

Construction Impact Area = 3,950 m^2	Operational Impact Area = 2,971 m^2
Calculation Process 1. Western boundary is the 61-meter (200-foot) offset from the Alternative D centerline (limit of construction). 2. Northern and southern boundaries are the approximate ordinary high water marks (estimated usin g contours). 3. Eastern boundary is the 61-meter (200-foot) offset from the Alternative D centerline (limit of construction).	Calculation Process 1. Western boundary is the beginning of the upland area where there is no channel flow. 2. Northern and southern boundaries are the approximate ordinary high water marks (estimated usin g contours). 3. Eastern boundary is the limit of cut.

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Alternative B

As shown in Figures 3-6 and 3-7, the Alternative B centerline is approximately within the existing U.S. 93 corridor as it pertains to impacts to waters of the U.S. Because the drainages along the alignment west of Buchanan Boulevard (Figure 3-6) all convey stormwater to the Dry Lake Basin south of Boulder City (not a navigable water), the impacts to waters of the U.S. are limited to the "disjunct" jurisdictional waters (see Section 3.6). East of Buchanan Boulevard, all waters of the U.S. drain to the navigable Lake Mead.

Table 4-9 depicts the potential construction-related impacts on waters of the U.S. (separated into isolated and navigable water tributaries) at the various crossings of Alternative B. Wash crossings that are closer to existing U.S. 93 tend to have a smaller degree of impact than those that are further away from the existing alignment and into steeper and more rugged terrain. Without use of BMPs, discarded materials, such as waste byproducts of construction activities and sediment from construction disturbance, may be washed into these drainages, impacting the overall system.

TABLE 4-9
Construction Impact Area for Waters of the U.S. Crossings – Alternative B

Water of the U.S. Crossing	Method of Delineation	Designation	Construction Impacts Affected Area (m^2)	Construction Impacts Affected Area (acres)
B-1	Mapping	Isolated	5,254	1.30
B-2	Mapping	Isolated	1,300	0.32
B-3	Field	Jurisdictional	2,304	0.57
B-4	Field	Jurisdictional	915	0.23
B-5	Field	Jurisdictional	8,166	2.02
B-6	Field	Jurisdictional	2,502	0.62
B-7	Field	Jurisdictional	297	0.07
B-8	Field	Jurisdictional	297	0.07
B-9	Field	–	Wash obstructed[1]	Wash obstructed
Total Impact			21,035	5.20
Total Jurisdictional Waters Impacted	–	–	14,481	3.58

[1]Wash B-9 has been obstructed due to construction of the wastewater treatment facility and no longer conveys stormwater in the path of the blue line stream.
m^2 – square meters

Because this alternative would widen the existing facility, a fully lined concrete channel on the north side of U.S. 93 through Hemenway Wash from Lakeview Drive to Pacifica Way would require relocation a few meters to the north. Relocation of portions of this channel for widening U.S. 93 would not result in placement of fill in the channel; thus, the constructed channels are not included with the desert washes impacted.

Note that Wash B-9 (see Figure 3-7) has not been considered in the analysis of potential impacts to waters of the U.S. in the calculations of construction impacts in Table 4-9. This is

because the wash has been cut off by construction of a small wastewater treatment facility, which services the Hacienda Hotel and Casino to the north of existing U.S. 93 (Figure 4-7). Stormwater flows off the mountains to the south and runs by sheet flow through the treatment facility area. No outlet was found for the stormwater in this area; therefore, a determination of "no impact" was made.

Alternative C

The washes impacted by Alternative C are the same as those of Alternative B, as the alignments share the same centerline through most of Hemenway Wash to the eastern study limits. Table 4-10 displays the impact area for Alternative C, for both isolated and navigable waters. (See Figures 3-6 and 3-7 for locations of Alternative C wash crossings.)

Alternative D (Preferred Alternative)

Impacts during construction of Alternative D would cover a larger area and produce a greater amount of potential fill into waters of the U.S. (see Table 4-11) than Alternatives B or C. This is because as the alternative passes through the southern foothills and into the Eldorado Mountains, there will be a need for larger cuts and fills in the vicinity of the major wash crossings (and greater limits of cut and fill – some in excess of the 60 m (200 ft) of assumed construction impacts). These larger cut-and-fill areas were included in the analysis of construction impacts. Note that Crossing D-1 runs parallel to an existing wash for approximately 500 m (1,600 ft), producing a large impact on this isolated drainage.

TABLE 4-10
Construction Impact Area for Waters of the U.S. Crossings – Alternative C

Water of the U.S. Crossing	Method of Delineation	Designation	Construction Impacts Affected Area (m^2)	Construction Impacts Affected Area (acres)
C-1	Mapping	Isolated	6,789	1.68
C-2	Field	Isolated	1,300	0.32
C-3	Field	Jurisdictional	985	0.24
C-4	Field	Jurisdictional	2,304	0.57
C-5	Field	Jurisdictional	915	0.23
C-6	Field	Jurisdictional	8,166	2.02
C-7	Field	Jurisdictional	2,502	0.62
C-8	Field	Jurisdictional	297	0.07
C-9	Field	Jurisdictional	297	0.07
C-10	Field	–	Wash obstructed[1]	Wash obstructed
Total Impact			23,555	5.82
Total Jurisdictional Waters Impacted	–	–	15,466	3.82

[1]Wash C-10, also designated as Wash B-9 for Alternative B, has been obstructed due to construction of the wastewater treatment facility and no longer conveys stormwater in the path of the blue line stream.

FIGURE 4-7
WASH CROSSING B-9 (CUTOFF AT WASTEWATER TREATMENT FACILITY) LOOKING NORTH - ALTERNATIVES B AND C
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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Several of the crossings for the southern alignment will require bridges over canyon washes that convey stormwater through the Eldorado Mountains. It is assumed in this study that bridge construction will also result in construction impacts and permanent fill into waters of the U.S. Structural piers, retaining walls, and abutment excavation associated with bridge construction will produce these impacts. The United States Army Corps of Engineers (USACE) has visited the project area, has reviewed the EIS technical studies, and has concurred with the designation of jurisdictional waters of the U.S. (See comment letter A6, Volume II). Drainages of the Eldorado Valley that terminate in the dry lake to the south of the study area are not jurisdictional waters of the U.S. Those generally to the southeast and east of Boulder City and that drain to either Lake Mead or to the Colorado River are waters of the U.S. In addition, the wetlands below the Boulder City wastewater treatment plant are not self-supporting; therefore, they are not jurisdictional wetlands.

TABLE 4-11
Construction Impact Area for Waters of the U.S. Crossings – Alternative D (Preferred Alternative)

Water of the U.S. Crossing	Method of Delineation	Designation	Construction Impacts Affected Area (m^2)	Construction Impacts Affected Area (acres)
D-1	Mapping	Isolated	21,139	5.22
D-2	Field	Isolated	937	0.23
D-3	Mapping	Isolated	2,114	0.52
D-4	Mapping	Isolated	2,842	0.70
D-5	Mapping	Isolated	2,684	0.66
D-6	Field	Isolated	1,300	0.32
D-7	Field	Isolated	817	0.20
D-8	Field	Jurisdictional	2,861	0.71
D-9	Field	Jurisdictional	3,270	0.81
D-10	Mapping	Jurisdictional	5,945	1.47
D-11	Mapping	Jurisdictional	3,950	0.98
D-12[1]	Mapping	Jurisdictional	0	0.00
D-13	Mapping	Jurisdictional	6,968	1.72
Total Impact	–	–	54,827	13.54
Total Jurisdictional Waters Impacted	–	–	22,994	5.68

(1) Originally identified in the DEIS as a crossing where fill would be required, subsequent engineering analysis has led to the conclusion that a bridge will be placed here, resulting in a spanning of the wash crossing and no construction impact to jurisdictional waters.

No Build Alternative

The No Build Alternative (Alternative A) would have no impact on existing waters of the U.S. The drainage system along existing U.S. 93 would remain the same and only naturally occurring modifications to drainage systems (due to erosion and other minor earthen modifications) would occur.

Overall Evaluation of Construction Impacts

Table 4-12 compares the alternatives with respect to construction impacts on jurisdictional waters of the U.S. Alternative D would have greater temporary, construction-phase impact on waters of the U.S. crossings than Alternatives B or C, although the difference would be less than 2.1 acres.

TABLE 4-12
Construction Impact Area for Waters of the U.S. Crossings – Comparison of Build Alternatives

Build Alternative	Jurisdictional Waters of the U.S. Construction Impacts Affected Area (acres)	Total Waters Construction Impacts Affected Area (acres)[1]
Alternative B	3.58	5.20
Alternative C	3.82	5.82
Alternative D	5.68	13.54

[1] Includes isolated, non-jurisdictional waters.

4.6.2 Operational Impacts

Build Alternatives

Waters of the U.S. impacts during operation of the three build alternatives are shown in Tables 4-13 through 4-15. The impacted areas are smaller for most of the crossings because the limits of impact do not include construction areas for access, staging, and material stockpiling. Waters of the U.S. impacts are measured using the OHWM and the limits of cut and fill at the individual crossings.

TABLE 4-13
Operational Impact Area for Waters of the U.S. Crossings – Alternative B

Water of the U.S. Crossing	Method of Delineation	Designation	Operational Impacts Affected Area (m^2)	Operational Impacts Affected Area (acres)
B-1	Mapping	Isolated	5,254	1.30
B-2	Mapping	Isolated	780	0.19
B-3	Field	Jurisdictional	187	0.05
B-4	Field	Jurisdictional	449	0.11
B-5	Field	Jurisdictional	4,083	1.01
B-6	Field	Jurisdictional	1,829	0.45
B-7	Field	Jurisdictional	149	0.04
B-8	Field	Jurisdictional	149	0.04
B-9	Field	–	Wash obstructed	Wash obstructed
Total Impact	–	–	12,880	3.18
Total Jurisdictional Waters Impacted	–	–	6,846	1.70

TABLE 4-14
Operational Impact Area for Waters of the U.S. Crossings – Alternative C

Water of the U.S. Crossing	Method of Delineation	Designation	Operational Impacts Affected Area (m^2)	Operational Impacts Affected Area (acres)
C-1	Mapping	Isolated	5,682	1.40
C-2	Field	Isolated	780	0.19
C-3	Field	Jurisdictional	123	0.03
C-4	Field	Jurisdictional	187	0.05
C-5	Field	Jurisdictional	449	0.11
C-6	Field	Jurisdictional	4,083	1.01
C-7	Field	Jurisdictional	1,829	0.45
C-8	Field	Jurisdictional	149	0.04
C-9	Field	Jurisdictional	149	0.04
C-10	Field	–	Wash obstructed[1]	Wash obstructed
Total Impact	–	–	13,431	3.32
Total Jurisdictional Waters Impacted	–	–	6,969	1.72

[1] Wash C-10, also designated as Wash B-9 for Alternative B (see Figure 3-7), has been obstructed due to construction of the wastewater treatment facility and no longer conveys stormwater in the path of the blue line stream.

TABLE 4-15
Operational Impact Area for Waters of the U.S. Crossings – Alternative D (Preferred Alternative)

Water of the U.S. Crossing	Method of Delineation	Designation	Operational Impacts Affected Area (m^2)	Operational Impacts Affected Area (acres)
D-1	Mapping	Isolated	21,139	5.22
D-2	Field	Isolated	937	0.23
D-3	Mapping	Isolated	2,114	0.52
D-4	Mapping	Isolated	2,842	0.70
D-5	Mapping	Isolated	2,684	0.66
D-6	Field	Isolated	1,300	0.32
D-7	Field	Isolated	817	0.20
D-8	Field	Jurisdictional	1,245	0.31
D-9	Field	Jurisdictional	2,453	0.61
D-10	Mapping	Jurisdictional	5,945	1.47
D-11	Mapping	Jurisdictional	2,971	0.73
D-12[1]	Mapping	Jurisdictional	0	0.00
D-13[1]	Mapping	Jurisdictional	6,968	0.00
Total Impact	–	–	51,415	10.98
Total Jurisdictional Waters Impacted	–	–	19,582	3.12

[1] Originally identified in the DEIS as a crossing where fill would be required, subsequent engineering analysis has led to the conclusion that a bridge will be placed here, resulting in a spanning of the wash crossing and no operational impact to jurisdictional waters.

No Build Alternative

The No Build Alternative (Alternative A) would have no impact on existing waters of the U.S. The drainage system along existing U.S. 93 would remain the same, and only naturally occurring modifications to drainage systems (due to erosion and other minor earthen modifications) would occur.

Overall Evaluation of Operational Impacts

Table 4-16 presents a comparative evaluation of the alternatives with respect to operational impacts on waters of the U.S. Construction of Alternative D would result in overall potential impacts on jurisdictional waters of the U.S. three times greater than Alternatives B or C. The discrepancy between the build alternatives is greater in operational impacts than for construction impacts because of the generally larger limits of cut and fill required in the construction of Alternative D.

TABLE 4-16
Operational Impact Area for Waters of the U.S. Crossings – Comparison of Build Alternatives

Build Alternative	Jurisdictional Waters of the U.S. Operational Impacts Affected Area (acres)	Total Waters Operational Impacts Affected Area (acres) [1]
Alternative B U.S. 93 Improved Alignment	1.70	3.18
Alternative C Through-Town Alignment	1.72	3.32
Alternative D (Preferred Alternative) Southern Alignment	3.12	10.98

[1] Includes isolated waters.

40CFR230 provides the statutory guidelines for compliance with Section 404(b)(1) of the Clean Water Act. The preamble to 40CFR230.10, "Restrictions on discharge", notes that

> "Although all requirements in 230.10 must be met, the compliance evaluation procedures will vary to reflect the *seriousness of the potential for adverse impacts on the aquatic ecosystems* posed by specific dredged or fill material discharge activities." (emphasis added)

In light of this overarching guideline for impact evaluation, the following facts are taken into consideration:

- The drainages crossed by the build alternatives are ephemeral desert washes in which there is approximately 3.25 to 3.30 inches of rainfall per a 100-yr six-hour storm event. Annual precipitation is approximately 5.8 inches in this area. This is borne out by the total absence of wet-ground plants or soils in the vicinity.
- These washes are in part incised into permeable alluvium with high infiltration capacity. Therefore any water that they do carry reaches the Colorado River or Lake Mead even less frequently than run-off events occur in the headwaters.

- Only half of average annual rainfall occurs during the warm season when torrential rains typically cause arroyo flow. Again, this indicates that runoff events are even less frequent than the annual average total of 5.8 inches would imply.
- The area supports sparse desert scrub. The poorly vegetated landscape, combined with the unconsolidated bedrock, leads to higher sediment yields compared to less arid portions of the country. Therefore, placing fill within the washes would add minimal sediment impacts relative to the existing conditions.
- Given the above, changes (increase *or* decrease) in sediment yield resulting from the construction of any of the build alternatives would be insignificantly small relative to the norm for any of these drainages.
- Construction of the preferred Alternative D, or any of the other build alternatives, would have no direct impact to any aquatic ecosystem.
- Any indirect impact to the aquatic ecosystems of Lake Mead or the Colorado River from the construction of Alternative D, or any of the other build alternatives, would be immeasurable and small.

Based on these considerations, then, there would be no adverse impacts to aquatic ecosystems resulting from any of the build alternatives.

4.6.3 Mitigation

By the construction of bridge spans avoidance of operational impacts to jurisdictional waters will be achieved at crossings D-12 and D-13 (Table 4-15). This section describes the additional measures that will be applied during construction and operation to minimize or mitigate impacts on waters of the U.S. The BMPs to be utilized are detailed in the Water Resources section of this FEIS (Section 4.5.2).

Construction Mitigation

Construction (temporary) impacts shall be avoided or minimized for all build alternatives by designating construction access, material stockpiling, and construction staging areas outside of the limits of waters of the U.S. (whose boundary exists at approximately the OHWM).

Construction of any of the build alternatives, including the preferred alternative, will require the removal of large amounts of rock in order to excavate the road base. This process will produce a considerable amount of soil and rock debris, which may be used as road fill on the project. As a mitigation measure, effective temporary barriers, such as silt screen fences and sediment traps, shall be installed to restrict debris from entering adjacent desert washes and waters of the U.S. Another measure that shall be applied is the restriction of construction activity within the washes during rainfall events. This restriction will minimize adverse impacts to jurisdictional waters from potential construction-related erosion and sediment runoff.

These and other BMPs, will be implemented to avoid and minimize impacts to waters of the U.S. and maintain the highest degree of water quality and maintenance of the natural landscape in the project area. A full description of BMPs is provided in Section 4.5.2 and in

the Water Quality Technical Study for the Boulder City/U.S. 93 Corridor Study (NDOT, July 2001a).

Operational Mitigation

Bridges and culverts will be designed to minimize and mitigate the operational effects of these structures on washes containing waters of the U.S. Structural piers and retaining walls shall be protected to prevent erosion and deposition of material into the washes. Energy dissipaters, rip-rap, and detention/retention basins may be installed at the crossings to reduce the energy of floodwaters at the crossings and minimize changes in erosional characteristics in the wash crossings throughout the life of the facility. The bottoms of culverts will be placed below the grade of the washes and will be earth floored. Related operational water quality mitigation measures are described in Section 4.5.2.

4.6.4 Agency Permits and Review

Initial Consultations with USACE

As noted above, subsequent to field review of the preferred alternative, as well as the other build alternatives, the St. George Regulatory office of USACE issued a letter (Comment A6, Volume II) concurring that the drainages within the Eldorado Valley are not jurisdictional waters of the U.S. This is due chiefly to the fact that they are disjunct from other jurisdictional waters, being part of an internally drained dry-lake basin. USACE also concurred with the finding that drainages leading to the Colorado River or Lake Mead do represent jurisdictional waters (approximately north and west of the Boulder City Rifle and Pistol Club) by virtue of the fact that they do lead to waters used in interstate commerce and recreation.

Consultations with EPA

The EPA has been consulted regarding the selection of the least "Least Environmentally Damaging Practicable Alternative" (LEDPA) pursuant to their review authority as described in *The Memorandum of Agreement between the Environmental Protection Agency and the Department of The Army Concerning The Determination of Mitigation Under The Clean Water Act Section 404(b)(1) Guidelines* (February 6, 1990) (MOA). This MOA was executed to:

> "….articulate the policy and procedures to be used in the determination of the type and level of mitigation necessary to demonstrate compliance with the Clean Water Act (CWA) Section 404(b)(1) Guidelines."

In Section II(B) of the MOA it is noted that:

> "All waters of the United States …..will be accorded the full measure of protection under the Guidelines, including the requirements for appropriate and practicable mitigation. The determination of what level of mitigation constitutes 'appropriate' mitigation is based solely on the values and functions of the aquatic resource that will be impacted."

As noted above, the waters of the U.S. affected by this project consist of ephemeral desert washes that are dry in all except the most pronounced storm events. The aquatic resources associated with these washes lie downstream in the Colorado River and Lake Mead.

"Practicable" is defined in Section 230.3(q) of the Guidelines as

> "…. available and capable of being done after taking into consideration cost, existing technology, and logistics *in light of over all project purposes*" (emphasis added).

Among other components, Section 1.2 of this FEIS notes that the purpose of this project includes:

- Resolving traffic problems in the vicinity of Boulder City
- Creating a safer transportation corridor
- Accommodating future transportation demand
- Improving system linkage on U.S. 93

The practicability of a given alternative is assessed, therefore, in light of its capacity to meet the overall purpose of this project as articulated by the above goals. Hence, the LEDPA is identified in light of impacts to the resources and issues described in Chapters 3 through 7 of this FEIS, *and* its capacity to address overall project purposes, taking into consideration cost, existing technology, and logistics.

Alternative D (the southern bypass, preferred alternative) would remove through-traffic from the vicinity of Boulder City, and has the greatest capacity to resolve traffic problems as well as creating a safer transportation corridor of all the alternatives (including the No Build Alternative). It would most effectively accommodate future transportation demands and offer the greatest improvement to system linkage of all the alternatives as well. Therefore, Alternative D is the most practicable of the alternatives evaluated in light of the purpose and need of this project, as well as from the point of view of minimizing negative impacts to the environment of the City of Boulder City resulting from project implementation.

In terms restricted to construction and operational impacts to the environment of Boulder City from traffic, air quality effects, the relative contribution to, or detraction from, the visual and social context of Boulder City, and the capacity to meet the purpose and need, Alternative D, the Southern Alternative, represents the LEDPA. In addition, Alternatives B, and C would conflict with several key elements of Boulder City's newly adopted Master Plan, including:

- Protect Historic Structures - More historic structures would be affected by the implementation of Alternatives B and C,
- Preserve and enhance the air, water, and lands of the community - A highway through or near town would not promote these objectives,
- Promote strong community identity - Similarly, the distinct character and identity of Boulder City would be negatively impacted by the construction of either Alternatives B or C.

Section 2.8 presents a summary of the advantages of Alternative D, relative to the other alternatives, including the following:

- It will enhance the quality of life of the residents of Boulder City by, among other things,
  - Substantially reducing heavy truck and through-town traffic
  - Improving safety and air quality along the existing U.S. 93 roadway through the City
  - Avoiding the community disruption and segmentation of the City that a through-town or near-town alternative may cause
  - Minimizing disruption of the existing corridor, and disruption within the City, during construction (this also affects the logistical feasibility of an alternative; see below)
- Implementation of this alternative would result in the least visual impacts to Boulder City compared to the other build alternatives
- Public comments indicate a broad public acceptance of Alternative D and substantive concerns regarding impacts to the City from the other alternatives

As of the time of the final preparation of this document, consultations are still on-going between the FHWA, NDOT, and EPA regarding EPA's concurrence on the selection of the LEDPA.

The Section 404 Permit

As a result of their review of the data provided on the extent of impacts of waters of the U.S. that would result from the construction of the preferred Alternative D, the USACE recommended review of the conditions for a nationwide general permit number 14, and the Nevada Letter of Permission Procedures (LOP; Volume II, Letter A6). An LOP is a type of Individual Permit issued through an abbreviated process, which includes coordination with federal and state fish and wildlife agencies, as required by the Fish and Wildlife Coordination Act, and a public interest evaluation, but without publishing of an individual public notice. LOPs are usually applicable for projects with minor fill impacts, such as projects with minimal impacts to dry washes and lacking any wetlands. Processing time is normally 45 days or less.

Under Section 404 (b)(1) guidelines, a Section 404 permit will require justification that the proposed fill into the waters of the U.S. is unavoidable, and alternatives analysis to demonstrate that the proposed action achieves the basic purpose of the project. For unavoidable impacts, the guidelines also require appropriate and practicable mitigation.

Coordination and request for appropriate permits will be reinitiated during the preliminary and final design development of the preferred alternative. To facilitate the permitting process, it is anticipated that a pre-application consultation meeting with USACE, applicants, and interested agencies will occur. The following is a list of some of the key information needed by USACE for processing a Section 404 permit:

- A completed USACE form – *Eng Form 4345*
- A complete project description, including preconstruction photographs of the project site; locations and acreage to be to be impacted; volume and type of materials to be

placed into waters of the U.S.; a verified waters of the U.S. delineation report; description of the methods to avoid, minimize, or mitigate adverse impacts; BMPs, such as erosion control measures (see above); and proposed construction schedule

- Final Section 404(b) (1) Guidelines alternatives analysis
- A final mitigation plan that effectively addresses the unavoidable impacts to waters of the U.S.
- Applicable surveys, reports, and inventories that comply with the ESA and NHPA

For this project, a certification or a waiver must be obtained from NDEP, Bureau of Water Quality Planning, certifying that the proposed activity under which the Section 404 permit is sought will not violate state and federal water quality standards. NDEP may certify with specific conditions, which will be incorporated into the requirements of the Section 404 permit.

4.7 Floodplains

Degree of Impact to Floodplains

A floodplain evaluation estimates a level of risk or environmental impact with respect to encroachment on base floodplains. The following items are considered in the evaluation of floodplain impact:

- Flooding risks
- Impacts on natural and beneficial floodplain values
- Support of probable incompatible floodplain development
- Measures to minimize floodplain impacts
- Measures to restore and preserve the natural and beneficial floodplain values

There are also environmental, cultural, and aesthetic aspects to floodplains that must be considered when evaluating impacts from roadway construction. In many instances, undeveloped floodplains contain areas that are vital to a diverse ecosystem, including vegetation that provides crucial resting, feeding, and nesting areas for waterfowl and other biological species. In addition, water quality can be improved through a natural floodplain area, as floodplain vegetation often serves as a water filter for stormwater runoff, removing excess nutrients and pollutants from the water. Water quality is also often improved by the removal of eroded sediment runoff within the floodplain areas. Finally, natural undeveloped floodplains provide benefits to humans by providing a location for outdoor education and scientific study, recreational opportunities, and aesthetic values (Floodplain Management Association, 1996).

Floodplain Impact Delineation

To determine the impact of the build alternatives on the floodplains and floodways in the study area, the alignments were electronically overlaid onto the FEMA flood zones. This information was translated to GIS data files, which allowed acreages to be determined by electronic calculations.

A construction impact was noted if any portion of the flood zone intersected with the assumed area of construction access for a given build alternative. Flood zone impact areas were documented based on encroachments of drainage facilities in the project area, such as a detention basin or stormwater channel. The acreage of encroachment was determined at each site to assess the total degree of impact for a given alternative.

An operational (permanent) impact was noted if any portion of the alternatives intersected a flood zone. Typically, the operational impacts are less than the construction impacts because the area of impact is, for most cases, less.

4.7.1 Construction Impacts

Floodplains within the study area are located in and around detention basins and washes that drain surface runoff to either Lake Mead to the north or to the Dry Lake Basin through the alluvial fan south of Boulder City. The major drainages that would be impacted by at least one of the proposed build alternatives consist of the following (see Figures 3-10, 3-11, and 3-13):

- Hemenway Wash channel along U.S. 93 (impacted by Alternatives B and C)
- Wash "B," along the northeastern side of Nevada Way as it intersects U.S. 93 (impacted by Alternatives B and C)
- Wash "C," a north-south desert wash that drains Boulder City runoff into the alluvial fan, just east of Mead Substation (impacted by Alternative D)
- Wash "D," a small wash crossing existing U.S. 93 near Veterans Memorial Drive (impacted by Alternative B)
- Georgia Avenue Wash, a north-south desert wash that drains Boulder City runoff into the alluvial fan, just west of Mead Substation (impacted by Alternative D)

Construction impacts were generally determined by calculating the area of flood zone impacted within a 120-m (400-ft) construction corridor for each alternative alignment encroachment.

Alternative B

Alternative B would result in construction impacts totaling 19.9 acres, including the Hemenway Wash flood zone (Figure 3-13) and individual flood zones shown in Figure 3-10.

Alternative B would also impact the regulatory floodway in the Hemenway Wash area, at and immediately north of Pacifica Way (see Figure 3-13). Construction impacts in this area would total 0.4 acres. However, because there would be no permanent structures built as part of the construction activities (i.e., access, material stockpiling, and staging), this impact alone would not require either coordination with FEMA or the remapping of the floodway.

Alternative C

Alternative C would result in construction impacts totaling 18.8 acres, including the Hemenway Wash flood zones (see Figure 3-13 and individual flood zones shown in Figure 3-10. Alternative C would have similar construction impacts as Alternative B, with

the exception of the avoidance of the Wash "B" impact at existing U.S. 93 near Veterans Memorial Drive.

Alternative C would also impact the regulatory floodway in the Hemenway Wash area, at and immediately north of Pacifica Way (see Figure 3-13). Construction impacts in this area would total 0.3 acres, which is less of an encroachment than Alternative B.

Alternative D (Preferred Alternative)

Current FEMA maps end at the Boulder City corporate limits (National Flood Insurance Program, 1995a, 1995b, and 1995c), and no flood zone designations have been assigned for the area through which Alternative D is located.

This lack of a floodplain designation in the southern alignment corridor is the result of limited hydraulic data on these desert washes, and not because of a discontinuation of the flood zone. Therefore, to delineate the floodplain impacts resulting from Alternative D, a theoretical flood zone continuation line was drawn for the washes that impact Alternative D, connecting the existing Zone A floodplains. These lines are shown in Figure 3-11, along with the limits of construction and operational impacts (cut and fill dotted lines) for Alternative D. Based on this information, Alternative D would result in impacts to 6.3 acres of floodplain.

Overall Evaluation of Construction Impacts

Table 4-17 presents a comparative evaluation of the proposed build alternatives with respect to the calculated construction-related impacts to 100-year floodplains and floodways. Alternatives B and C would have approximately three times the impact to floodplains as Alternative D, and both would impact the regulatory floodway in Hemenway Wash, while Alternative D would not.

TABLE 4-17
Construction Impact Area for Floodplain Encroachment - Comparison of Build Alternatives

Build Alternative	Floodplain Affected Area (acres)	Floodway Affected Area (acres)
Alternative A (No Build)	0.0	0.0
Alternative B (U.S. 93 Improved)	21.7	0.4
Alternative C (Through Town)	18.8	0.3
Alternative D (Southern)	6.3	0.0

4.7.2 Operational Impacts

Operational impacts are determined by adding the area of flood zone impact within the general limits of cut and fill for the individual alignments. It is assumed in this evaluation that the fill into the floodplain or regulatory floodway would be a permanent encroachment. The number of acres of floodplain that would be impacted by each of the three build alternatives within the project area is presented below.

Alternative B

Alternative B would result in operational impacts totaling 10 acres. The Hemenway Wash flood zones are shown in Figure 3-13, and the individual flood zones that would be impacted by this alternative are shown in Figure 3-10.

Alternative B would also impact the regulatory floodway in the Hemenway Wash area, at and immediately north of Pacifica Way (see Figure 3-13). Operational impacts in this area would total 0.4 acres. Because these would be considered permanent impacts to the regulatory floodway, mitigation measures will be required.

Alternative C

Alternative C would result in operational impacts totaling 5.9 acres. The Hemenway Wash flood zones are shown in Figure 3-13, and the individual flood zones that would be impacted by this alternative are shown in Figure 3-10. The impact to flood zones is approximately 40 percent less for Alternative C than for Alternative B because the proposed layout of the new freeway would result in narrower limits of cut and fill along the alignment.

Alternative C would also impact the regulatory floodway in the Hemenway Wash area, at and immediately north of Pacifica Way (see Figure 3-13). Operational impacts in this area would total 0.3 acres. Because these would be considered permanent impacts to the regulatory floodway, mitigation measures will be required.

Alternative D (Preferred Alternative)

The theoretical flood zone continuation line connecting the existing Zone A floodplains depicted in Figure 3-11 was used to determine operational impacts for construction of Alternative D. Limits of cut and fill were used as the boundary of impact for the three floodplain crossings. The total area of operational impact to the floodplains would total 4.1 acres. There would be no impacts to any regulatory floodways.

Overall Evaluation of Operational Impacts

Table 4-18 presents a comparative evaluation of the proposed build alternatives with respect to the operational (permanent) impacts to 100-year floodplains and regulatory floodways. Alternative B would have the greatest impact to floodplains, with larger areas of cut and fill than Alternative C. Both Alternatives B and C would impact the regulatory floodway in Hemenway Wash, while Alternative D would not.

TABLE 4-18
Operational Impact Area for Floodplain Encroachment - Comparison of Build Alternatives

Build Alternative	Operational Impacts Floodplain Affected Area (acres)	Operational Impacts Floodway Affected Area (acres)
Alternative A (No Build)	0.0	0.0
Alternative B (U.S. 93 Improved)	10.0	0.4
Alternative C (Through Town)	5.9	0.3
Alternative D (Southern) (Preferred)	4.1	0.0

4.7.3 Mitigation

Construction Mitigation

Should the preferred alternative be selected for construction, construction mitigation will require the adoption of BMPs for improvements with respect to maintaining the integrity of the floodplains located in the vicinity of the construction site. The State of Nevada's Handbook of Best Management Practices (State Conservation Commission, not dated) shall be utilized as a guidance document for implementing appropriate BMPs.

Following are BMP improvements to be applied, as appropriate, during construction of the selected alternative:

- Construction staging, access points, and material stockpiling shall be kept away from regulatory flood zones where possible.
- Temporary construction berms and other means of redirecting stormwater shall be constructed in such a way as to not expand an area with the potential for flooding.
- Designated locations shall be provided for servicing, washing, and refueling of equipment, away from channels or swales that would quickly convey runoff to the regulatory flood zones.
- Contaminated material shall be kept at a safe distance from entry into the flood zones. Temporary barriers and containers to confine the materials shall be used.

Operational Mitigation

Operational mitigation for the build alternatives shall be incorporated into the drainage appurtenances of the new facility. Desert wash crossings shall be preserved, when feasible, and stormwater shall be conveyed in a safe and effective way, with capacity for intense storm runoff such as in a 100-year flood.

Alternative B. Alternative B would widen the existing U.S. 93 through Hemenway Wash. This crossing would be the major floodplain impact for this alternative and would include an impact to the regulatory floodway. Limits of cut and fill extend out on the north side of the roadway across the existing Hemenway Wash channel. Upon construction of the alternative, this channel will be relocated to the shoulder of the new roadway, and the flood zone will be redrawn under the approval of FEMA.

Impacts to the Hemenway Wash resulting from Alternative B will require the redrawing of the flood zone. As a result, a Letter of Map Revision (LOMR) shall be applied for, which entails hydrologic and hydraulic modeling of the Hemenway Wash channel and its tributary contributing flows. The modeling process will result in the determination of base flood elevations (BFEs) for the channel within the new Flood Zone AE. The roadway design will include a system of bridges and culverts passing under new U.S. 93 that will best expedite stormwater through the wash system to Lake Mead, thus keeping the flood zone to a minimum and not affecting residential or commercial structures in the area.

Coordination with FEMA will be required for this alternative, and approval by FEMA will be required before construction. A possible exception to this requirement would be if stormwater modeling demonstrates that a "no-rise" situation would exist after the new

roadway is constructed. For a "no-rise" to be applicable, it must be shown that the BFEs will not increase throughout the entire flood zone, and the width of the floodway must remain the same. If this is demonstrated, then typically all that is required is notification to the local community and approval by the city council.

Furthermore, mitigation requirements could be minimized if the flood zone impact is reduced with the construction of retaining walls along the north side of the alignment through Hemenway Wash. This is especially applicable for impacts to the floodway north of Pacifica Way. A retaining wall in this location would avoid impacts to the floodway altogether.

Alternative C. Because the limits of cuts and fills are narrower for Alternative C, the redrawing of the flood zone through Hemenway Wash will be simplified. However, the stormwater modeling process necessary for Alternative B will apply for Alternative C as well.

Alternative D (Preferred Alternative). Mitigation efforts will be simplest for Alternative D of all the proposed build alternatives. The alternative crosses three drainages that have FEMA-mapped floodways in the vicinity of the alignment, near the Mead Substation. The drainage design will comply with FEMA criteria. The drainage channels within the vicinity of Alternative D will be considered and perpetuated in the final design.

4.7.4 Agency Reviews

Should an alternative contain a severe impact on an established FEMA-mapped floodplain, coordination with FEMA to investigate the degree of the impact and possible means of mitigation will be required.

A severe floodplain impact would likely require an LOMR from FEMA for the flood zone impacted by construction. The LOMR requires new hydrologic and hydraulic modeling for the contributing hydrologic basin and a possible determination of new base flood elevations and a new flood zone SFHA.

4.8 Cultural Resources

The NHPA requires federal agencies to take into account the effect of any federal undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. Further, the federal agency is required to afford the ACHP an opportunity to comment on the undertaking. The ACHP has promulgated 36 CFR 800 as a set of regulations for federal agencies to follow in fulfilling the historic properties consultation and compliance process. The regulations provide a step-by-step procedure for the entire compliance process, from initial identification of a cultural resource, through its evaluation, and to final treatment (mitigation) measures, if required, for historic properties. Compliance with Section 106 of the NHPA, as well as with other regulatory requirements, includes consultations with concerned Native American groups and other interested parties.

Adverse effects to historic properties could occur if (1) highway and related construction would cause damage, destruction, or removal of sites or structures that are listed on or are eligible for listing on the NRHP, or (2) if the project would destroy or degrade the setting

of registered or eligible archaeological sites, structures or TCPs when the setting is an important element in the significance of the property (see Section 4.9). While it is federal policy to avoid or minimize adverse effects to historic properties when planning, constructing, and/or assisting federal projects, in some cases it is impossible to avoid disturbing or destroying some significant sites or structures if an authorized development is to be implemented. In such instances, it is federal policy to recover the information embodied in those resources through archaeological or historical study before the project begins, realizing the data recovery potential of a cultural resource is a means of mitigating impacts to that resource.

As noted in Section 3.8, above, in order to most effectively address cultural resources within the study area, archaeological sites, historic structures, and TCPs were addressed separately in the resource-specific inventories, and that approach is preserved herein.

4.8.1 Archaeological Resource Impacts

Archaeological Resources Potentially Impacted

A total of nine NRHP-eligible prehistoric and historic archaeological sites have been field-verified to be located within the 300-m (1,000-ft) APE, which is the potential construction impact zone, defined individually for each of the build alternatives under consideration in this EIS. The APE was defined to include potential locations of interchanges, construction easements, utility easements, and hydraulic improvements and/or impact areas. Those NRHP-eligible sites potentially impacted by the proposed undertaking are listed in Table 4-19.

TABLE 4-19
Total NRHP Recommended Eligible Archaeological Sites Located within the APE of One or More of the Project Build Alternatives

Site Number	Site Type	Project Alternative	Land Management Agency or Ownership	NRHP Recommendation
26CK1169/3024/5413	Squatters' Camp	B, C, D	Reclamation	Eligible
26CK5389	Camp Alunite	C	Boulder City	Eligible
26CK5473	Mine Shaft	B	Rail Road Pass Hotel and Casino (Private)	Eligible
26CK5256	Grey Eagle Mine	C	Boulder City	Eligible
26CK6270	Prehistoric Lithic Reduction	D	Boulder City	Eligible
26CK6274	McKeeversville Townsite	C	Boulder City	Eligible
26CK6277	Historic Mining Camp	D	Boulder City	Eligible
26CK6282	Historic Habitation	C	NPS	Eligible
26CK6286	Prehistoric Rockshelters	B	NPS	Eligible

Bold Site Number indicates site is within the APE of the preferred Alternative D.

4.8.2 Mitigation of Impacts to Archaeological Resources

All of the NRHP-eligible archaeological sites determined to be adversely affected by construction of the preferred alternative will require mitigation if they cannot be avoided. Measures to mitigate adverse effects will likely include documentation, including excavation, artifact analysis and curation, and exhaustive archive research. Specific mitigation requirements will be determined upon completion of an effects assessment in consultation with SHPO, the ACHP, concerned Native American groups, and other interested parties. This assessment will commence subsequent to the completion of more detailed, preliminary engineering of the preferred alternative. These measures, as well as others, are stipulated in the Programmatic Agreement (PA). The PA also stipulates that pursuant to the completion of the effects assessment, a Treatment Plan will be developed in consultation with the appropriate land management agencies, SHPO, the ACHP, and any interested Native American groups (see Section 4.9.3). No mitigation is required for those archaeological sites and isolated finds investigated, either as part of this corridor study or previously recorded by others, determined to not meet the eligibility criteria for inclusion in the NRHP.

Subject to the findings of the effects assessment and additional consultations noted above, the following sites were recommended for mitigation, depending on the selected alternative:

- Squatters' Camp (26CK1169/3024/5413)
- Camp Alunite (26CK5389)
- Mine Shaft (26CK5473)
- Grey Eagle Mine (26CK5626)
- Prehistoric Lithic Reduction Site (26CK6270)
- McKeeversville Townsite (26CK6274)
- Historic Mining Camp (26CK6277)
- Historic Habitation Site (26CK6282)
- Prehistoric Rockshelters (26CK6286)

In total, Alternative B has three eligible archaeological sites within its APE, Alternative C has five eligible sites, and Alternative D has three recorded eligible sites. Alternative A, the no action alternative, would not affect any archaeological sites.

Prior to the implementation of the preferred alternative, stipulations of the PA will be carried out as described above, and they will include an assessment of effects and development of a treatment plan, as appropriate and in consultation with the affected agency, the SHPO, and the ACHP, for the following archaeological sites within the APE of preferred Alternative D:

- Squatters' Camp (26CK1169/3024/5413)
- Prehistoric Lithic Reduction Site (26CK6270
- Historic Mining Camp (26CK6277)

A Memorandum of Agreement (MOA) was signed on January 25, 2002, among FHWA, NDOT, Reclamation, BLM, and SHPO stipulating mitigation measures to be completed for the Railroad Pass Squatters' Camp (26CK1169/3024/5413), an eligible site on land managed by Reclamation and the BLM. These mitigation measures will be followed prior to the commencement of construction in that area.

A Native American consultation plan (Blair and Lawrence, 2000) has been written and implemented between FHWA and the appropriate Native American representatives. Consultation and the assessment of effects resulting from the implementation of the preferred alternative, as described above, are a continuing process as stipulated in the PA. This consultation process is addressing Native American concerns, including the assessment of effects to any potential TCPs, as detailed engineering design is developed to adequately address those potential effects.

4.8.3 Historic Structures Impacts

In a letter dated November 21, 2002 (Appendix A), the SHPO concurred that 26 structures or groups of structures within the APE of the three build alternatives are eligible for listing in the NRHP. As described in Section 3.8, the APE for historic structures includes both a 300-m-wide (1,000-ft-wide) survey area centered on the proposed alternative centerline, and the usually wider potential visual impact zone. The APEs for historic structures used for this corridor study are shown in Figure 3-14.

The APE for Alternative B contains 26 historic structures that are eligible for the NRHP. The APE for Alternative C contains 25 of the same historic structures or groups of structures; however, Alternative C includes a different proposed route of U.S. 93 in some areas, different interchanges, and different ancillary road and street elements. Therefore, the location and nature of impacts of Alternative C are different in some cases than those of Alternative B on the same 25 NRHP-eligible properties. The APE for the preferred alternative (Alternative D) contains nine structures that are eligible for the NRHP, all of which are also found in the APE of Alternatives B and C.

Table 4-20 summarizes the potential impacts/adverse effects to historic structures for all three build alternatives under consideration. These data were compiled from information provided in the *Boulder City/U.S. 93 Corridor Study Historic Structures Survey* (ACRE, September 2002), and refined in subsequent analyses to finalize the assessment of impacts to Section 4(f) resources (see Chapter 7, below). Alternative A, the no action alternative, would affect no historic structures. (ACRE, September 2002). Although NDOT and FHWA have yet to consult with the Nevada SHPO on a Determination of Adverse Effects pursuant to Section 106 procedures (36 CFR 800.5) as stipulated in the PA, the findings from NDOT's historic structures survey provide a reliable indication of those historic properties likely to be adversely affected due to direct or indirect impacts from the project.

TABLE 4-20
NRHP-Eligible or NRHP-Listed Historic Structures within the APE of the Build Alternatives

Site Number	Name	Type of Resource	Potential Impacts	Build Alternative	Adverse Effect
26CK3917	Boulder City Historic District	Historic district	Minor visual	B and C	No
26CK4046a	U.S. Construction Railroad	Railroad grade	Minor visual, setting encroachment	B and C	No
26CK4046b, c	Six Companies, Inc. Railroad	Railroad grade	Minor visual, setting encroachment	B and C	No

TABLE 4-20
NRHP-Eligible or NRHP-Listed Historic Structures within the APE of the Build Alternatives

Site Number	Name	Type of Resource	Potential Impacts	Build Alternative	Adverse Effect
26CK5414	Boulder City Branch Railroad	Railroad	Damage, visual	B, C, and D	Yes
26CK6202	12 Valley View Lane	Residence	Minor visual – Alternative B Damage – Alternative C	B and C	Yes[1]
26CK6204	14 Valley View Lane	Residence	Minor visual – Alternative B Major visual – Alternative C	B and C	Yes[1]
26CK6206	200 Donner Way	Residence	Minor visual	B and C	No
26CK6211	205 Donner Way	Residence	Minor visual	B and C	No
26CK6215	303 Lakeview Drive	Residence	Minor visual	B and C	No
26CK6216	305 Lakeview Drive	Residence	Minor visual	B and C	No
26CK6220	307 Ridge Road	Residence	Minor visual	B and C	No
26CK6221	205 Lakeview Drive	Residence	Minor visual	B and C	No
26CK6233	Boulder City Pumping Station No. 2	Utilities facility	None	B and C	No
26CK6236	Old Lakeshore Road	Abandoned road	Destruction	B and C	Yes
26CK6237	LABPL Transmission Line 2	Electrical transmission line	Minor visual – Alternatives B and C Tower relocation or removal – Alternative D	B, C, and D	Yes[2]
26CK6238	LABPL Transmission Line 1	Electrical transmission line	Minor visual – Alternatives B, C and D	B, C, and D	No
26CK6240	Metropolitan Water District Line 1	Electrical transmission line	Minor visual – Alternatives B and C Tower relocation or removal – Alternative D	B, C, and D	Yes[2]
26CK6242	LABPL Transmission Line 3	Electrical transmission line	Minor relocation or reconstruction – Alternatives B, C and D	B, C, and D	No
26CK6244	Old Airport Hangar	Hangar	Minor visual	B	No
26CK6245	Old State Highway 4193	Road	Cavation/removal	B and C	Yes
26CK6246	Old Highway 95	Road	Minor visual – Alternative B Partial damage – Alternatives C and D	B, C, and D	Yes[3]
26CK6248	LMNRA Maintenance Warehouse	Government building	Minor visual	B and C	No
26CK6249	SCE North Transmission Line	Electrical transmission line	Tower relocation or removal – Alternatives B and C Minor visual – Alternative D	B, C, and D	Yes[4]
26CK6250	SCE South Transmission Line	Electrical transmission line	Minor visual – Alternatives B D and D Tower relocation or removal – Alternatives B and C	B, C, and D	Yes[4]

TABLE 4-20
NRHP-Eligible or NRHP-Listed Historic Structures within the APE of the Build Alternatives

Site Number	Name	Type of Resource	Potential Impacts	Build Alternative	Adverse Effect
26CK6251	Hoover-Basic South Transmission Line	Electrical transmission line	Tower or removal	B, C, and D	Yes
26CK6259	200 Lakeview Drive	Residence	Minor visual	B and C	No

[1] Alternative C only.
[2] Alternative D only.
[3] Alternatives C and D only.
[4] Alternatives B and C only.

4.8.4 Mitigation of Impacts to Historic Structures

Chapter 7, Section 4(f) Evaluation, contains descriptions of the recommended measures to mitigate unavoidable impacts to those historic structures that constitute Section 4(f) resources. Table 4-21 provides a summary of measures for the historic structures identified that may be adversely affected by implementation of the preferred alternative per Section 106 of the NHPA. However, if the SHPO concurs in a "no effect" or "no adverse effect" determination, mitigation may not be required in those cases (see Sections 4.8.3 and 4.8.5). An important part of mitigation for most structures is documentation of the structures in accordance with the standards of HAER, the Historic American Engineering Record, administered by NPS.

TABLE 4-21
Recommended Mitigation Measures for Historic Structures within the APE of the Preferred Alternative

Site Number	Name	Recommended Mitigation
26CK5414	Boulder City Branch Railroad	Documentation; construction to maintain railroad route
26CK6237	LABPL Transmission Line 2	Replace with towers of historic design or HAER documentation
26CK6238	LABPL Transmission Line 1	Replace with towers of historic design or HAER documentation
26CK6240	Metropolitan Water District Line 1	Replace with towers of historic design or HAER documentation
26CK6242	LABPL Transmission Line 3	Replace with towers of historic design or HAER documentation
26CK6246	Old Highway 95	HAER documentation
26CK6249	SCE North Transmission Line	Replace with towers of historic design or HAER documentation
26CK6250	SCE South Transmission Line	Replace with towers of historic design or HAER documentation
26CK6251	Hoover-Basic South Transmission Line	Replace with towers of historic design or HAER documentation

4.8.5 Agency Reviews

Investigations of cultural resources within the APE of the project alternatives, and the assessment of impacts presented in this section have, as their primary purpose, the analysis of impacts of the different alternatives to inform the selection of the preferred alternative, and 2) to disclose potential impacts resulting from the implementation of any of the alternatives. With the issuance of the ROD for this project, NEPA-mandated review of the Boulder City/U.S. 93 Corridor Study will be completed.

As noted above, a PA has been prepared stipulating ongoing consultations, effects assessment, and the development of treatment measures for historic properties pursuant to the implementation of the preferred alternative. The PA commits FHWA and SHPO, and other agencies as appropriate, to evaluate impacts and then develop and implement an agreed-upon Treatment Plan that will include specific mitigation measures to address adverse effects to historic properties (the archaeological sites, historic structures, and TCPs discussed herein). Consultation with agencies, as well as with concerned Native American groups and other interested parties, and implementation of the Treatment Plan will be completed prior to construction of the preferred alternative.

In addition, an MOA was signed on January 25, 2002, among FHWA, NDOT, Reclamation, BLM, and SHPO stipulating mitigation measures to be completed for the Railroad Pass Squatters' Camp (26CK1169/3024/5413), an eligible site on Reclamation- and BLM-managed land. These mitigation measures will be followed prior to the commencement of construction in that area.

Finally, consultations between NDOT, FHWA and Native American tribes/groups will be ongoing throughout the process involved in finalizing the detailed engineering design of the preferred alternative, and during subsequent effects assessments as stipulated in the PA.

4.9 Land Use

4.9.1 Construction Impacts

Construction staging areas, borrow pits, and batch plants have not yet been designated for any of the three build alternatives. Appropriate sites can be specified for use by the contractor during the final design stage. Construction impacts on commercial, industrial, and residential land uses are described below. Sections 4.12 and 4.17, Chapter 7, and Appendix D provide additional details on construction impacts on lands affected by the build alternatives, including NPS-administered lands.

Alternative A

The No Build Alternative would not involve any construction activity, and no construction-related impacts would result. See Chapter 6 for a discussion of cumulative impacts from other projects and programs affecting the local environment.

Alternative B

Implementation of Alternative B would result in displacement of several commercial buildings along the north side of U.S. 93, west of the intersection with Buchanan Boulevard. Five structures, which are part of the redevelopment district, would be demolished to

provide the right-of-way needed for improvements associated with this alternative. Reconstruction of these buildings at their current locations would not be feasible. This is considered an unavoidable adverse impact of project implementation.

Commercial land uses adjacent to U.S. 93 may experience temporary access changes or restrictions during construction activities. Potentially affected land uses include the Railroad Pass Hotel and Casino, the Hacienda Hotel and Casino, and commercial land use west of Buchanan Boulevard. Any temporary access restrictions would conflict with existing commercial land uses and result in a short-term impact. Short term impacts to access to the Boulder Ridge Golf Course north of the project corridor and west of Boulder City proper would also occur.

Residential areas within Boulder City may be subject to detours due to construction activity. These areas include the mobile home development directly south of U.S. 93 and west of Buchanan Boulevard, as well as single-family and multi-family development within Hemenway Wash. Despite these temporary detours, ingress and egress would be available at all times during construction. In addition, emergency vehicle access would be maintained at all times. Therefore, construction activities would be compatible with residential land uses, and adverse impacts would not result.

Alternative C

Impacts resulting from construction of Alternative C would be similar to those described above for Alternative B. Specifically, this alternative has the potential to affect access to and from the hotel and casino land uses located proximate to either project terminus. However, Alternative C is located north of businesses along existing U.S. 93 and west of Buchanan Boulevard, so no impact would occur to these commercial land uses. While there would be potential impact to commercial uses outside of Boulder City, the intensity of the impact would be less than for Alternative B.

Because Alternative C is located north of U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard, the mobile home development south of existing U.S. 93 would not be affected by construction activities. However, Alternative C would be constructed directly adjacent to residential and RV developments east of the planned interchange with Canyon Road. During construction activities, ingress and egress from existing U.S. 93 would be maintained. At a minimum, sufficient emergency access would be provided at all times, which would ensure access for local residents. Any possible construction detours would be designed to accommodate the passage of large trucks; therefore, negligible conflict with these residential land uses would result.

Alternative D (Preferred Alternative)

As with Alternatives B and C, construction of Alternative D would have the potential to affect the existing hotel and casino land uses near the eastern and western project limits. Any restriction of access to these uses would represent a short-term impact. However, Alternative D is located south of developed lands within Boulder City. No impact to commercial or residential land uses in the city would occur during construction.

Construction of Alternative D would occur in proximity to several large institutional and industrial land uses. Both the airport and sewage treatment plant are anticipated to be

unaffected by construction activities. Access to the Mead Substation could be affected by construction of the Alternative D alignment along the southernmost section, south of Buchanan Boulevard. However, construction planning would ensure that employees of the substation and large service vehicles are able to maintain access at all times. Therefore, negligible impact would be anticipated.

4.9.2 Operational Impacts

Alternative A

Alternative A would result in no change to the existing configuration of the U.S. 93 alignment. Therefore, no direct impacts to existing or planned land uses would result from this alternative. Given the increased traffic volume forecast for U.S. 93 over the next 20 years, indirect land use compatibility impacts related to noise, air quality, and traffic congestion would result.

Alternative B

Direct Impacts. Seven commercial structures and a church along U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard would lose some parking and/or frontage and signage. This is not anticipated to interfere with the continuation of current activities at these establishments. This is a potentially adverse impact of project implementation.

Improvement of the existing U.S. 93 alignment would expand the existing roadway west of Buchanan Boulevard by approximately 6 m (20 ft). The roadway widening would result in the partial loss of landscaping along the north and south side of the roadway for approximately 0.8 km (0.5 mile) between Gingerwood Street and Juniper Way. These areas are located within the existing right-of-way of U.S. 93 and do not represent a direct loss of land to adjacent landowners. Upon completion, U.S. 93 would be improved in this area with new sidewalks, landscaping would be replaced per NDOT policy, and no conflict would result with adjacent land uses.

No direct conflicts between Alternative B and existing residential land uses would be expected. However, a short retaining wall would be installed along the rear property line of several single-family residential units adjacent to Pacifica Way. Because the roadway would be elevated relative to these homes, the wall would be visible from within each residence, resulting in some loss of views of Lake Mead.

Approximately 8 acres of right-of-way will be required within the historic BCBRR. The right-of-way will provide additional “backside” access to businesses north of U.S. 93.

Approximately 48 acres of recreational land within the LMNRA would be required for use south of the Hacienda Hotel and Casino. Constituting use of about 0.0031 percent of the recreation area, the LMNRA would not be substantially impacted by this loss of open space/recreation area; however, the impact is inconsistent with existing land use plans for the LMNRA. Portions of the River Mountains Loop Trail in the Hemenway Wash and a section of trail west of Lake Mountain Road would be in direct conflict with this alternative. This unavoidable impact would constitute a use of about 2 acres of this recreational resource, with the LMNRA also subject to provisions of Section 4(f) of the Department of Transportation Act of 1966, as amended (see Chapter 7).

Because no existing or planned agricultural areas occur within the project vicinity, no impact to farmlands would result from project implementation.

Land Use Plans and Policies. Realignment of U.S. 93 within Clark County and the City of Henderson would have the potential to conflict with planned land uses in this area. These include residential, commercial, and industrial land use designations. However, this would not represent a substantial loss of future land uses in this area.

Expansion and partial realignment of the existing U.S. 93 corridor would conflict with a portion of the designated land uses on the Boulder City Future Land Use Map. Specifically, realignment west of the intersection with Buchanan Boulevard would preclude the development of approximately 6 acres of designated commercial and manufacturing land uses within an area approximately several hundred acres in size. Given the availability of adjacent or nearby land, the loss of 6 acres would not cause an adverse land use impact. Additionally, the proposed alignment would provide better access to these commercial and manufacturing areas.

The proposed improvements under Alternative B otherwise would not preclude the development of planned land uses along U.S. 93. Further, implementation of this alternative is not anticipated to shift existing or planned land use patterns. The proposed alignment would traverse portions of the designated redevelopment area (Figure 3-15). With the exception of the displaced businesses near Buchanan Boulevard, potential changes to existing land use patterns are anticipated to be minimal. Therefore, future redevelopment plans are not expected to be adversely impacted.

Alternative B would, however, be inconsistent with both the Vision Statement and several key Guiding Principles contained in the adopted Boulder City Master Plan (Section 3.9.3). The vision statement emphasizes the goal of preserving a small-town atmosphere while enhancing quality of life, and a major through-town transportation corridor would be inconsistent with these objectives. The Guiding Principles of the Master Plan that would not be supported by construction of Alternative B include those directed at historic preservation, enhancing the natural resources of the community, promoting a strong community identity, maintaining sustainable growth management that would minimize negative impacts on residential areas, and promoting a multi-modal transportation system including safe and efficient facilities for bicycles and pedestrians. These conflicts with the Master Plan Guiding Principles are considered to be a non-mitigatable adverse impact.

The affect to the use of recreational lands within the LMNRA resulting from the construction of Alternative B would be minimal, and not conflict with existing NPS land use plans for the area because it would occupy the existing U.S. 93 corridor. Therefore, no adverse land-use impact within the LMNRA would be expected.

Indirect Impacts. Driveways off of U.S. 93 providing direct access to adjacent commercial land uses would be maintained. However, proposed median islands along U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard would alter existing access, such that ingress and egress would be limited primarily to right turns only. Access would be available only at designated left- and U-turn areas. By implementing NDOT's Access Control Policy through the installation of raised medians, traffic and pedestrian safety in the area is expected to improve. This change is not anticipated to substantially affect the level of

business activity along U.S. 93; the viability of existing businesses would be maintained, and no adverse effects to commercial land use patterns are anticipated.

Although it is not one of the proposed project's improvements, the planned extension of Elm Street is expected to moderately improve access to downtown Boulder City from the residential development south of U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard. This extension would allow local residents to partly avoid traffic along U.S. 93. Several Alternative B improvements along the Hemenway Wash are anticipated to enhance local circulation in this area. Grade-separated crossings of U.S. 93 would reduce conflicts with traffic along U.S. 93 for residents of Hemenway Wash traveling to and from downtown Boulder City. In addition, a frontage road between Industrial Road and Pacifica Way would provide improved local east-west circulation, while avoiding travel on U.S. 93. Regional access would be maintained, and a reduction in conflicts with through-traffic on U.S. 93 would be a beneficial effect of this alternative.

Negative impacts resulting from incompatibility with the adopted Boulder City Master Plan/Land Use Plan would be indirect as well as direct. Indirect effects would include the deleterious impacts to community land use plans resulting from the presence of a major transportation corridor through the center of town. The community's goals of maintaining an attractive, small town ambience and a favorable environmental setting within the town would be compromised, and negative impacts on its ability to further these goals after construction of Alternative B would be substantial.

Alternative C

Direct Impacts. If Alternative C were implemented, the Railroad Pass Hotel and Casino would maintain access to U.S. 93 and would not be affected by new right-of-way acquisition. However, the alignment would intersect the BCBRR tracks in two places. The project design would include grade separations so that no conflict would occur.

North of existing U.S. 93, the alignment would directly affect the Boulder Ridge Golf Course and, while it would not conflict with the continued use of this facility, the total acreage available for recreational use would be reduced. Immediately east of the planned intersection with Canyon Road, the alignment would be located between an RV park to the west and a residential development to the east but would not physically encroach onto these areas. Therefore, no direct conflict with these existing uses would result. West of Lake Mountain Drive, Alternative C would conflict with the River Mountains Loop Trail, affecting about 2 acres, an impact similar to Alternative B. East of Lake Mountain Drive to the eastern terminus of the project, other impacts would be much the same as those described for Alternative B above, including use of about 41 acres, or about 0.0027 percent, of LMNRA land.

Because no existing or planned agricultural areas occur within the project vicinity, no impact to farmlands would result from project implementation.

Land Use Plans and Policies. Similar to Alternative B, Alternative C would not be entirely consistent with the land use plans set forth by the City of Henderson and Clark County. However, as noted for Alternative B, the relative acreage affected would not be substantial.

The proposed realignment of U.S. 93 north of the existing highway and adjacent commercial land uses is not consistent with the future land use plans of Boulder City. Land designated for Public Recreational and Public/Quasi-Public uses would be dedicated to the alignment right-of-way. The land use effects for Alternative C would extend to the portion of the Boulder Ridge Golf Course that would be isolated south of the alignment, therefore rendering approximately 37 acres of Public Recreational Land unusable for that purpose. This would result in a potential unavoidable adverse impact to planned public Boulder Ridge Golf Course. The alternative would also potentially affect a future phase of the planned private membership Park Place Golf Course. Further to the west, as Alternative C enters Hemenway Wash impacts to land designated for medium density residential development would be greater than those resulting from Alternative B in the area west of Pacifica Way (Figure 3-16).

Similar to Alternative B, impacts related to the goals, objectives, and policies of the Boulder City Master Plan would be largely adverse for Alternative C. As noted in the DEIS, however, this alternative would be consistent with the promotion of bicycle routes. Specifically, Alternative C would facilitate bicycle use along existing U.S. 93 west of Buchanan Boulevard by reducing existing traffic levels along this section and through incorporation of grade-separated pedestrian and bicycle access points. Because Alternative C would function as a full access-controlled freeway, bicycles would not be allowed access to this new facility.

Alternative C would traverse the established redevelopment boundaries in Boulder City. As noted previously for Alternative B, no specific redevelopment plans have been adopted so potential impacts cannot be precisely identified. Given the substantial acreage within the redevelopment area relative to the proposed alignment, sufficient flexibility should be provided to future development plans such that adverse impacts would not result from project implementation.

Indirect Impacts. Due to an anticipated decrease in through-traffic related business activity along existing U.S. 93 west of Buchanan Boulevard, future land use development patterns within Boulder City may be affected by construction of Alternative C. Under this alternative, it is likely that the retail district along U.S. 93 between Veterans Memorial Drive and Canyon Road would experience lower sales, employment, and tax revenue than would be the case under Alternative A or B. However, there would be potential for redevelopment that could offset some of those losses at the new U.S. 93 interchange at the Canyon Road extension. The course of future development would rest with Boulder City and leases of city-owned land for development at the new interchange or between the interchange and the Buchanan Boulevard/U.S. 93 intersection. Therefore, west of Buchanan Boulevard traffic-dependent land uses along existing U.S. 93 may be replaced by locally oriented commercial land uses. To the extent this occurs, it would not result in an adverse land use impact.

Commercial development dependent on through-traffic may shift geographically toward the new alignment. Because Alternative C would not provide direct access to adjacent land uses, future development along the alignment would be limited to the area zoned for manufacturing in the vicinity of the proposed interchange at Canyon Road. Additionally, because Boulder City owns the land in this area, any transfer of land greater than 1 acre would require approval through a citywide vote (Susan Danielewicz, pers. comm., 2001).

Residential uses located south of the existing U.S. 93 alignment between Veterans Memorial Drive and Buchanan Boulevard, as well as within the Hemenway Wash area, would generally benefit from improved local circulation provided by Alternative C. The increased accessibility to surrounding areas is also considered a beneficial effect of this alternative, although these generally neutral or beneficial impacts would be restricted to lands west of Buchanan Boulevard.

Implementation of Alternative C would require the relocation of several electrical utility towers and lines within the existing utility corridor located near the planned interchange with an extension of Buchanan Boulevard. While a utility realignment plan has not been established, there is potential that electrical towers could be placed closer to existing residential uses within the existing RV development and/or residential development along Lakeview Drive. While this change is not anticipated to result in a direct land use conflict, an adverse visual impact may occur from these land uses. It is not anticipated that these high-voltage utilities could be buried to avoid this impact.

As for Alternative B, negative impacts resulting from the incompatibility of Alternative C with the adopted Boulder City Master Plan/Land Use Plan would be indirect as well as direct. Indirect effects would include the deleterious effect to community land use management resulting from the presence of a major transportation corridor near (and, west of Buchanan Boulevard) through the center of town. The community's goals of maintaining an attractive, small town ambience and a favorable environmental setting within the town would be compromised, negatively affecting its ability to further these goals after construction of Alternative C.

Alternative D (Preferred Alternative)

Direct Impacts. Alternative D, the preferred alternative, would only provide interchanges near the hotel and casino developments located at the eastern and western project limits, and at U.S. 95, with the exception of a restricted access ramp at Buchanan Boulevard for emergency vehicles, and for use by construction vehicles bound for WAPA's Mead Substation. Access to the hotel and casino developments located at the eastern and western project limits would be maintained or enhanced, and no physical conflict between the proposed project and these land uses would result. No impacts to the developed portion of the City of Boulder City would result from implementation of this, the preferred alternative.

Operation of the proposed alignment would bypass the majority of land uses within Boulder City. The project alignment would traverse undeveloped open space located south and east of the developed portion of the city. Toward the southernmost portion, the alignment would operate directly south of the municipal sewage treatment facility and north of the Mead Substation. Sufficient buffer space has been provided between these facilities and the project alignment, such that no impact would result. Alternative D is located 0.8 km (0.5 mile) south of the Boulder City Municipal Airport. Based on the vertical profile of the proposed alignment, no potential exists for conflicts with existing air traffic. The alignment would also cross several roads used as recreational and equestrian trails with access to the LMNRA east of Boulder City. These roads are anticipated to be unaffected or realigned, such that recreational use would not be impacted.

The southeast portion of the alignment would operate directly north of the Boulder City Rifle and Pistol Club range and east of a municipal landfill. The proposed alignment would not encroach onto the existing or future landfill operations area. Further, existing access to the landfill facility would be maintained. Therefore, the landfill would not be affected by project operations.

Subsequent to the release of the DEIS to the public in March 2002, the Boulder City Rifle and Pistol Club contacted NDOT regarding the proximity of Alternative D to their leasehold with the City of Boulder City (see letters in Volume II). NDOT met with members of the Rifle and Pistol Club and a member of the National Rifle Association (NRA) during the comment period to address their concerns, which included:

- Concern that the proposed Alternative D would close the operations of the range.
- Concern that Alternative D would be a safety hazard to the private and public shooting range. The NRA prepared a safety assessment of the range compared to similar ranges across the nation (see letter, Volume II).
- Concern that Alternative D would encroach on future construction of this private shooting facility within the leasehold.

The PMT considered the concerns of the Boulder City Rifle and Pistol Club, as well as the report of the NRA. It was determined by FHWA that the portion of the leasehold that Alternative D traverses through is not Section 4(f) land because it is being using by private club members and not open to the public. Negotiations with the lease holders for the Boulder City Rifle and Pistol Club are on-going.

Implementation of the preferred alternative would require the use of an estimated 59 acres of NPS (Section 4[f]) land near the eastern project limits within the LMNRA. This represents approximately 0.0039 percent of the LMNRA. Impacts to land use in the LMNRA resulting from the preferred alternative are addressed in more detail in Chapter 7 and Appendix D. Land use impacts would be greater than those resulting from Alternative A (no build) or from the implementation of the other two build alternatives. However, and impairment analysis prepared by the NPS finds that much of the LMNRA acreage that would be utilized by Alternative D has been previously impacted by existing utility corridor and the value of the lands is low from a perspective of LMNRA goals and objectives. Therefore "the impacts associated with alternative D (sic) would not likely constitute an impairment to land use" (Appendix D).

Because no existing or planned agricultural areas occur within the project vicinity, no impact to farmlands would result from Alternative D implementation.

Land Use Plans and Policies. Similar to Alternatives B and C, Alternative D would not be completely consistent with existing land use plans set forth by the City of Henderson, Clark County, NPS, or BLM. In contrast to Alternatives B and C, the effect of Alternative D on the relevant goals, objectives, and policies of the Boulder City Master Plan would be negligible, rather than largely adverse. Alternative D also provides a higher level of support for the establishment of bicycle routes than both Alternatives B and C, due to the predicted substantial diversion of through-traffic away from Boulder City, which would reduce traffic levels and the potential for conflict with bicyclists in central Boulder City.

Alternative D would traverse primarily open space within Boulder City and the LMNRA. The loss of open space relative to remaining open space in Boulder City, including approximately 435 km² (168 square miles) within the Eldorado Valley Transfer Area, would be relatively minor and would not represent an adverse impact. The use of recreational lands within the LMNRA resulting from the implementation of this, the preferred alternative, represents a conflict with NPS land use plans for this area, but is unlikely to constitute an impairment of land use, as discussed in Chapter 7 and Appendix D. Therefore, construction of the preferred alternative would not represent an adverse land-use impact within the LMNRA.

Indirect Impacts. Alternative D would traverse predominantly undeveloped open space within Boulder City. Because the city is the adjoining landowner, Boulder City has full control over whether adjoining development would occur. WAPA owns and maintains the Buchanan Boulevard access from Georgia Avenue to the Mead substation, which would be perpetuated with a grade separation.

Residential development within Boulder City would generally benefit from implementation of Alternative D. The diversion of traffic away from developed land uses within Boulder City would facilitate improved local access and public safety along existing roadways. The reduction in traffic conflicts among land uses within Boulder City is considered a beneficial project effect.

Existing commercial land uses along the U.S. 93 corridor would be affected by implementation of the preferred alternative. The large reduction in traffic volume in this area, due to diversion to the new highway, is likely to have an adverse impact on the existing land uses along the corridor that are highly dependent on drive-through traffic (e.g., fast-food establishments, gas stations, and motels). The land uses along the corridor and elsewhere in Boulder City would be expected to change over time, depending on the business climate, toward more service-oriented establishments, destination tourism, or small-scale manufacturing (see Section 4.11). However, because no local access would be available along Alternative D, a shift in traffic-related commercial development would not be anticipated. Construction of Alternative D would also be consistent with the Guiding Principles of the Boulder City Master Plan/Land Use Plan that address historic preservation, quality of life, community identity, multi-modal transportation, and environmental quality of the community. Therefore, land use impacts to Boulder City resulting from Alternative D are expected to be largely beneficial.

4.9.3 Mitigation

Construction Mitigation

To reduce the potential adverse impacts associated with the temporary change or restriction of access to commercial land uses along the existing U.S. 93 corridor, a Traffic Control Plan will be prepared prior to commencement of construction activity. Features of this plan may include, but would not be limited to, a public awareness campaign and the use of flagmen, signage, detours, alternative access points, and phasing of construction activities to reduce conflicts with existing land uses. Implementation of this plan will serve to ensure that potential adverse impacts are minimized.

Operational Mitigation

Implementation of Alternative B would require the acquisition of approximately five commercial properties to provide the required right-of-way. Fair market value will be provided to the property/business owners. In addition, relocation support services will be provided to assist displaced businesses in finding other suitable locations, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. This form of compensation is described in the NDOT brochure, *Relocation Assistance in Nevada* (NDOT, no date). Relocation resources will be made available to all residential (if any) and business relocatees without discrimination.

Several other businesses would be partially affected by implementation of Alternative B, resulting in a loss of signage, landscaping features, or parking area. If right-of-way is needed, the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 will govern the acquisition of any right-of-way necessary for this project.

Implementation of Alternative C would have the potential to adversely impact the planned golf courses north of existing U.S. 93. Purchase of the affected property at fair market value or replacement of land in kind would serve to reduce the severity of this impact.

Mitigation of the potential conflict with the Mitigation relating to public parklands within the LMNRA is addressed separately in the Section 4(f) analysis of the EIS (Chapter 7).

4.9.4 Agency Permits and Reviews

The Land and Water Conservation Fund Act (16 U.S.C. 4601-4608, Section 6[f] Requirements) prohibits the conversion of property acquired or developed with grants obtained from this Act to a nonrecreational purpose without the approval of the DOI NPS. Section 6(f) directs DOI to assure that replacement lands of equal value, location, and usefulness are provided as conditions to such conversions. Consequently, where conversions of Section 6(f) lands are proposed for highway projects, replacement lands will be necessary.

None of the hiking or bicycle trails in the project area, such as the Hemenway Wash trail, were purchased or improved using Land and Water Conservation Fund monies (see Appendix A). However, should there be any impacts to these trails during the construction of a build alternative, the trails will be replaced in-kind during the design and construction phase of the project. These lands will not be converted away from their original intended use.

As discussed in Section 1.3.6, consent of the Boulder City Council will be required prior to the implementation of any of the build alternatives per NRS 408.397. Section 1.3.5 describes the initiative passed by the voters of Boulder City charging the Council with approval should the build alternative bear the salient characteristics of Alternative D.

4.10 Visual Impacts

The visual impact assessment addresses the short-term impacts from constructing the three build alternatives and the long-term impacts expected as a result of operation of the three build alternatives. In addition, visual impacts of Alternative A, No Build Alternative, are discussed.

4.10.1 Construction Impacts

Impacts Common to all Build Alternatives

The visual impacts from constructing any of the three build alternatives depend on the degree of change to the visual resource and the viewers' response to that change. Impacts on visual resources during construction of the proposed action that are common to the three build alternatives include the following:

- The dust that would be generated – Dust would be emitted from earthmoving activities, construction vehicles and equipment, construction worker vehicles, materials delivery vehicles, and from areas within the construction zone that have been disturbed or where excavated material is stockpiled. Fugitive dust, if emitted in sufficient quantities and if adverse weather conditions persist, could impair or degrade existing views.
- The presence of the construction equipment – Depending on their values, interests, and preconceived notions and expectations, for some residents viewing the area, the presence of the construction equipment and its associated activities would detract from the views currently experienced. This could be particularly true of Alternative D, where most of the alignment is in an undeveloped area, or along Alternative C near the Boulder Oaks RV Park, where the new alignment would be elevated.
- Increased light emitted from construction areas if nighttime construction is conducted – Depending on their values and expectations, residents may not like the visual intrusion caused by construction night lighting. This would be applicable to residential locations along Alternatives B and C. Tourists' views at the Alan Bible Visitors Center would not be affected by nighttime construction lighting of any of the build alternatives because the visitors' center closes before dark and because of the distance between the construction area and the visitors' center.

Impacts specific to the three build alternatives and the No Build Alternative are described below.

No Build Alternative

Because Alternative A would result in the proposed action not being constructed, no construction-related impacts on existing visual resources are expected.

Alternative B

Less dust would likely be generated from the construction of Alternative B than the other two build alternatives because Alternative B is mostly composed of improvements to an already developed and paved area when near residences.

Construction work along the portion of the alignment that follows existing U.S. 93 would consist of minor earthmoving; roadway widening and restriping; and installation of new medians, curbs, gutters, sidewalks, retaining walls, and noise barriers. These activities would generate some dust, but to a lesser degree than that expected for Alternatives C and D. The exceptions include the following areas where more dust is expected to be generated: (1) from the western terminus to approximately 0.6 km (0.4 mile) east of the U.S. 93/95 interchange because the alignment would deviate from the existing roadway and

would require cuts and fills through hilly terrain; (2) where up to five buildings would be demolished west of Buchanan Boulevard to allow for roadway realignment; (3) where larger cuts and fills would be required between Buchanan Boulevard and Pacifica Way; and (4) where Pacifica Way would be elevated over U.S. 93. However, there are not sensitive receptors in all of these areas, so they would not experience view degradation.

Roadway widening of Lake Mountain Drive and construction of a frontage road in that area that would be closer to the residences than existing U.S. 93 would generate dust at the single- and multi-family residences along both sides of this street. Near the Hacienda Hotel and Casino, construction work would also generate dust. However, similar to that for the Railroad Pass Hotel and Casino, because Alternative B would not pass directly in front of the Hacienda Hotel and Casino, patrons at that establishment would not experience view degradation.

In addition to the generation of fugitive dust during the construction period for this alternative, the landscape along the alignment would change as improvements to the roadway are being installed. Changes to the visual environment along the alternative would be noticeable during construction and when complete, but they would not adversely impact the overall visual experience of the Boulder City area. The changes to the landscape from construction activities may be offensive to some viewers, but they would be interesting to others. Because the improvements could be spread over an 11-year period, the total change to the landscape from the project would also be spread over that period, so the area would reflect gradual changes.

Alternative C

More dust would likely be generated from the construction of Alternative C than Alternative B, but implementation of Alternative C would likely generate less dust during construction than Alternative D due to the amount of undeveloped area along each alignment.

Similar to that for Alternative B, construction of Alternative C would generate dust from the western terminus to approximately 0.6 km (0.4 mile) east of the U.S. 95 intersection with U.S. 93 because the alignment would deviate from the existing U.S. 93 to the south and would require cuts and fills through hilly terrain. However, there are not sensitive receptors (residences) in this area, and Alternative C would not pass directly in front of the Railroad Pass Hotel and Casino, so those patrons would not experience view degradation.

Construction of Alternative C would also generate dust where it would deviate from existing U.S. 93 to the north (approximately 0.6 km [0.4 mile] east of the U.S. 95 intersection to Lakeview Drive) because the alignment would cross some undeveloped hilly areas, such as north of the new State Veterans Home and between the Boulder Oaks RV Park and the residential subdivision that includes Lakeview Drive, Valley View Lane, and Ridge Road. The alignment in these areas would require cut and fill. Because the construction activities associated with this alignment would be near residences, an adverse short-term impact on these residents' views would occur.

Similar to that for Alternative B, Alternative C roadway widening of Lake Mountain Drive and construction of a frontage road in that area that would be closer to the residences than existing U.S. 93 would generate dust at the single- and multi-family residences along both sides of this street. Residents along Temple Rock Road would also experience a short-term impact on the views from their back yards due to construction dust.

Near the Hacienda Hotel and Casino, construction work would also generate dust. However, as for Alternative B, because Alternative C would not pass directly in front of the Hacienda Hotel and Casino, patrons at that establishment would not experience view degradation.

In addition to the generation of fugitive dust during the construction period for this alternative, the landscape along the alignment would change as improvements to the roadway are being installed. Changes to the visual environment along the alternative would be noticeable while in progress and when complete, but would not adversely impact the overall visual experience of the Boulder City area. The changes to the landscape from construction activities may be offensive to some viewers, but they would be interesting to others. Because the improvements could be spread over an 11-year period, the total change to the landscape from the project would also be spread over that period, so the area would reflect gradual changes.

Alternative D (Preferred Alternative)

Construction of Alternative D would likely generate the most dust of the three build alternatives due to the amount of undeveloped area along this alignment. Although it would generate more dust, there are far fewer sensitive receptors along the Alternative D alignment that could have their views affected, relative to the other two build alternatives. The nearest residential receptors are approximately 2.5 km (1.5 miles) from the Alternative D alignment, in the residential subdivision on this hill that includes San Felipe Drive.

Similar to that for Alternatives B and C, construction of Alternative D would generate dust along the western portion of the alignment in the area near the Railroad Pass Hotel and Casino due to the cuts and fills through the hilly terrain. However, there are not sensitive receptors (residences) in this area, and Alternative D would not pass directly in front of the Railroad Pass Hotel and Casino, so those patrons would not experience view degradation.

Construction of the alignment between the U.S. 93/95 interchange and the Hacienda Hotel and Casino would route the alignment across undeveloped land approximately 0.4 km (0.25 mile) north of the Mead Substation and the Reclamation Lower Colorado Region Office.

Near the Hacienda Hotel and Casino, construction work for the preferred alternative would also generate dust. However, similar to that for Alternatives B and C, because Alternative D would not pass directly in front of the Hacienda Hotel and Casino, patrons at that establishment would not experience view degradation.

In addition to the generation of fugitive dust during the construction period for this alternative, the landscape along the alignment of Alternative D would change as improvements to the roadway are being installed. Changes to the visual environment along the alternative would be noticeable while in progress and when complete, but they would not likely degrade the overall visual experience of the Boulder City area. The changes to the landscape from construction activities may be offensive to some viewers, but they would be interesting to others. Because the improvements could be spread over an 11-year period, the total change to the landscape from the project would also be spread over that period, so the area would reflect gradual changes.

4.10.2 Operational Impacts

Assessment Methodology

The visual impact from implementing any of the three build alternatives depends on the degree of change to the visual resource and the viewers' response to that change. The visual character of the build alternatives includes the pattern elements (form, line, color, and texture) and pattern character (dominance, scale, diversity, and continuity) of the area. The quality of the visual environment is demonstrated by its vividness, intactness, and unity. The visible structural features of the three build alternatives have been assessed and compared with the pattern elements and character, and its vividness, intactness, and unity to determine the compatibility of the proposed features with the existing landscape.

Field observations were made in August 2001 to determine the locations of the sensitive residential and tourist receptors and to document their existing views of U.S. 93 and the areas where the build alternatives would be aligned. In addition, "views from the road" were identified and documented in photos. To show what is currently seen from the five viewpoints in the study area, a photograph was taken at each of the five locations. These photographs serve as the "existing condition view" and provide the basis for comparing the various roadway alignments that are being considered. To show what would be seen from those same five viewpoints, the alternative roadway designs or their resulting cut and fill have been superimposed onto the photographs in visual simulations. Figure 3-17 shows the locations where these five viewpoint photos were taken and indicates the direction that the camera was focused.

The viewpoints selected are:

- Looking south along U.S. 95 from the U.S. 93/95 interchange—this is a "view from the road" (i.e., from the driver's perspective) (Viewpoint 1) (Figure 4-8)
- Looking east along U.S. 93 toward the commercial corridor from near the Madrone Street intersection—this is a "view from the road" (Viewpoint 2) (Figure 4-9)
- Looking northwest toward the Boulder Oaks RV Park vicinity from atop a hill to the southeast of the park (Viewpoint 3) (Figure 4-10)
- Looking south toward the Eldorado Mountains from the Alan Bible Visitors Center (Viewpoint 4) (Figure 4-11)

- Looking south toward Alternative D from a residence near the Buchanan Boulevard/ Georgia Avenue intersection (Viewpoint 5) (Figure 4-12)

Viewpoint 1 was selected to show the expected change to the landscape from the elevated U.S. 93 as part of Alternative D. Viewpoint 2 was selected to show a driver's view from the road and shows the landscape change from widening the road to six lanes. Viewpoint 3 was selected to show the elevated roadway (Alternative C) aligned between the Boulder Oaks RV Park and the Lakeview Drive residential subdivision. Viewpoint 4 was selected because it shows a tourist view from a locally well known tourist attraction (LMNRA visitor center). Viewpoint 5 shows the view of Alternative D from residences at the south end of Boulder City.

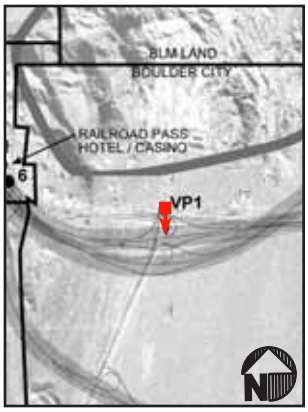
Impacts on Residents' Existing Views

Alternative A. Implementation of Alternative A would result in no additional or new roadway being constructed, and it would result in no physical changes to the existing roadway. Therefore, Alternative A would not directly alter any visual resources. Future traffic increases will, however, make it more difficult for drivers to enjoy the views currently experienced.

Alternative B. Views of Alternative B are available from several residential areas. Table 4-22 identifies the residential areas and discusses what the expected changes to the landscape would be with implementation of this alternative.

Alternative C. As shown in Table 4-23, views of Alternative C are available from several residential areas. Table 4-23 identifies the residential areas and discusses what the expected changes to the landscape would be with implementation of this alternative.

The simulation of Viewpoint 3 (Figure 4-10) shows the elevated Alternative C highway passing between the Boulder Oaks RV Park and the Lakeview Drive residential subdivision. As shown in the existing condition photo, the residences in the Lakeview Drive subdivision would not have a clear view of Alternative C because of the hill between the subdivision and the RV park. Alternative C would become visible to the Lakeview Drive residents when it passes east of the hill and nears existing U.S. 93. Residents in this area are likely accustomed to seeing a highway nearby (existing U.S. 93), but the view looking east would be changed because of the elevated roadway. For some viewers, this change would detract from the existing view. This viewer group expects the views to be unchanged from existing conditions, or expects the changes to be unnoticeable or unobtrusive. For others, the elevated roadway would be acknowledged as serving a utilitarian purpose (improve traffic circulation); thus, it would add variety to the existing view. This viewer group would notice the visual change, but they would not be offended by the change to the view.



Existing condition view looking south toward U.S. 95 near its intersection with U.S. 93.

Simulated view looking south toward U.S. 95 near its intersection with U.S. 93. As shown, U.S. 93 would be an elevated crossing over U.S. 95.

FIGURE 4-8
ALTERNATIVE D: VIEWPOINT 1 EXISTING CONDITION AND VISUAL SIMULATION
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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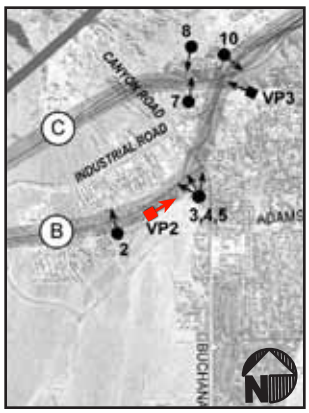

Existing condition view of the commercial corridor looking east along U.S. 93 near the Madrone Street intersection. This is a "view from the road", (i.e., from the driver's perspective).

Simulated view of the commercial corridor looking east along U.S. 93 near the Madrone Street intersection. As shown, the roadway would be widened from its current four lanes to six lanes.

FIGURE 4-9
ALTERNATIVE B: VIEWPOINT 2 EXISTING CONDITION AND VISUAL SIMULATION
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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Existing condition view of the Boulder Oaks RV Park vicinity from atop a hill to the southeast of the resort. The RV Park is located to the left of photo center, and the Lakeview Drive residential subdivision is located to the right of photo center.

Simulated view of Alternative C and the Boulder Oaks RV Park vicinity from atop a hill to the southeast of the park. As shown, the elevated highway would alter views from both sides of the road.

FIGURE 4-10
ALTERNATIVE C: VIEWPOINT 3 EXISTING CONDITION AND VISUAL SIMULATION
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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Existing conditions view of the Eldorado Mountains from the Alan Bible Visitors Center.

Simulated view of the Alternative D Eldorado Mountains cuts (see arrows pointing to them) from the Alan Bible Visitors Center.

FIGURE 4-11
ALTERNATIVE D: VIEWPOINT 4 EXISTING CONDITION AND VISUAL SIMULATION
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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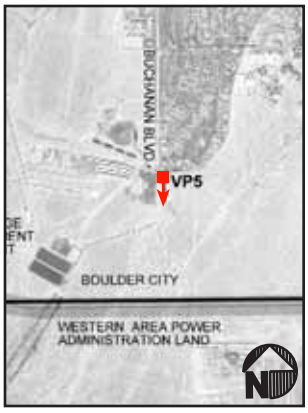

Existing condition view of Alternative D from a residence located approximately 45 to 60 m (150-200 ft) east of the Buchanan Boulevard/Georgia Avenue intersection.

Simulated view of Alternative D from a residence located approximately45 to 60 m (150 to 200 ft) east of the Buchanan Boulevard/Georgia Avenue intersection (see arrow pointing to semi truck on the Alternative D alignment).

FIGURE 4-12
ALTERNATIVE D: VIEWPOINT 5 EXISTING CONDITION AND VISUAL SIMULATION

BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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TABLE 4-22
Potentially Sensitive Residential Receptors along Alternative B

Gingerwood Mobile Home Senior Park – Mobile homes within the Gingerwood Mobile Home Senior Park located south of U.S. 93 off of Gingerwood Street currently have a view of U.S. 93. They would continue to have a view of U.S. 93.
Boulder City Trailer Park – Trailers within the Boulder City Trailer Park, located south of U.S. 93 east of Yucca Street, currently have a view of U.S. 93. The vegetation that buffers the trailer park from U.S. 93 would be removed, and a 2-m-high (8-ft-high) noise barrier would be installed adjacent to the widened roadway. Alternative B would change the view from these trailers.
Valley View Lane and Forest Lane – Residences on Valley View Lane and Forest Lane off of Lakeview Drive currently have a view of U.S. 93. Alternative B would move U.S. 93 away from these residences, but it would add a frontage road along the same alignment as existing U.S. 93 in this area.
St. Jude's Ranch for Children – The St. Jude's Ranch for Children, located between Lakeview Drive and Lake Mountain Drive, currently has a view of U.S. 93. Alternative B would move U.S. 93 away from these residences, but it would add a frontage road closer than the existing U.S. 93 alignment in this area.
Lake Mountain Drive Area – Single- and multi-family residences on both sides of Lake Mountain Drive currently have a view of U.S. 93. Alternative B would move U.S. 93 away from these residences and would elevate U.S. 93 over Lake Mountain Drive. It would also add a frontage road along the same alignment as existing U.S. 93 in this area. In addition, Lake Mountain Drive would be widened as part of Alternative B. Adding an elevated highway in this area would change the views from the residences on Lake Mountain Drive.
Temple Rock Road Area – Single-family residences located on Temple Rock Road, Lava Court, Temple Rock Court, and Red Rock Road have a view of U.S. 93. Realigning U.S. 93 to the south would move the roadway closer to these residences. A 2-m-high (8-ft-high) noise barrier would be installed adjacent to the new roadway on its north side. Alternative B would change the view from these residences.
Ville Drive – Multi-family residences located on Ville Drive have a view of U.S. 93. Realigning U.S. 93 to the south would move the roadway away from these residences, but it would add a frontage road along the same alignment as existing U.S. 93 in this area.
Laguna Lane Area – Single-family residences on the north side of Laguna Lane south of and overlooking Pacifica Way have a partially obstructed view of Lake Mead and U.S. 93 from their back yards (due to a wrought iron fence). These residences are at a higher elevation than Pacifica Way, and views from the back yards of these residences do not include the road. Alternative B would elevate Pacifica Way over U.S. 93 so that the view of the lake would be blocked. This would be an unavoidable impact of implementing this alternative. Alternative B would also move U.S. 93 away from these residences, but it would add a frontage road closer than the existing U.S. 93 in this area. Certain single-family residences on the south side of Laguna Lane, on both sides of Sea Breeze Lane, and on both sides of Ocean Mist Lane have a view of U.S. 93 and would have a view of Alternative B, which would be moved away from these residences. This alternative would add a frontage road closer to the residences than the existing U.S. 93 in this area.

TABLE 4-23
Potentially Sensitive Residential Receptors along Alternative C

Boulder Oaks RV Park – Certain RV residences within the Boulder Oaks RV Park located west of U.S. 93 off of Industrial Road have a view of existing U.S. 93. Alternative C would be aligned immediately north of this community. A 3-m-high (10-ft-high) noise barrier would be installed adjacent to the new roadway on its south side. Alternative C would change the view from these RVs.
Ridge Road – Residences on Ridge Road do not have a clear view of U.S. 93. Alternative C would be aligned immediately south of this street. A 3- to 4-m-high (10- to 14-ft-high) noise barrier would be installed adjacent to the new roadway on its north side. Alternative C would change the view from these residences.
Valley View Lane and Forest Lane – Residences on Valley View Lane and Forest Lane off of Lakeview Drive currently have a view of U.S. 93. Alternative C would align U.S. 93 closer to Valley View Lane and away from Forest Lane.
St. Jude's Ranch for Children – The St. Jude's Ranch for Children, located between Lakeview Drive and Lake Mountain Drive, currently has a view of U.S. 93. Alternative C would move U.S. 93 away from these residences. Existing U.S. 93 would become a frontage road in this area.
Lake Mountain Drive Area – Single- and multi-family residences on both sides of Lake Mountain Drive currently have a view of U.S. 93. Alternative C would move U.S. 93 away from these residences and would elevate U.S. 93 over Lake Mountain Drive. It would also add a frontage road along the same alignment as existing U.S. 93 in this area. In addition, Lake Mountain Drive would be widened, as part of Alternative C. Adding an elevated highway in this area would change the views from the residences on Lake Mountain Drive.
Temple Rock Road Area – Single-family residences located on Temple Rock Road, Lava Court, Temple Rock Court, and Red Rock Road have a view of U.S. 93. Realigning U.S. 93 to the south would move the roadway closer to these residences. A 2-m-high (8-ft-high) noise barrier would be installed adjacent to the new roadway on its north side. Alternative C would change the view from these residences.
Ville Drive – Multi-family residences located on Ville Drive have a view of U.S. 93. Realigning U.S. 93 to the south would move the roadway away from these residences, but it would add a frontage road along the same alignment as existing U.S. 93 in this area.
Laguna Lane Area – Single-family residences on the north side of Laguna Lane south of and overlooking Pacifica Way have a partially obstructed view of Lake Mead and U.S. 93 from their back yards (due to a wrought iron fence). These residences are at a higher elevation than Pacifica Way, and views from the back yards of these residences do not include the road. Alternative C would elevate Pacifica Way over U.S. 93 so that the view of the lake would be blocked. This would be an unavoidable impact of implementing this alternative. Alternative C would also move U.S. 93 away from these residences, but it would add a frontage road closer than the existing U.S. 93 in this area. Certain single-family residences on the south side of Laguna Lane, on both sides of Sea Breeze Lane, and on both sides of Ocean Mist Lane have a view of U.S. 93 and would have a view of Alternative C, which would be moved away from these residences. This alternative would add a frontage road closer to the residences than the existing U.S. 93 in this area.

Alternative D (Preferred Alternative). Views of Alternative D are available from certain residential areas located to the north of the Alternative D alignment. Table 4-24 discusses what the expected changes to the landscape would be with implementation of this alternative.

TABLE 4-24
Potentially Sensitive Residential Receptors along Alternative D (Preferred Alternative)

Buchanan Boulevard/Georgia Avenue Area – Single-family residences are located near the Buchanan Boulevard/Georgia Avenue intersection. Looking south, these residences have a view of the valley and the mountains in the distance. Also in the distance are several transmission line towers and the Mead Substation. These residences would have a distant view of Alternative D, located 1.3 km (0.8 mile) to the south.
San Felipe Drive Area – Single-family residences located on a hill that includes San Felipe Drive. Looking southeast, these residences have a view of the valley, the Boulder City Horsemen's Association, transmission lines, and the mountains in the distance. These residences would have a distant view of Alternative D, located 2.5 km (1.5 miles) to the east.

The simulation of Viewpoint 5 (Figure 4-12) shows the view of Alternative D from residences about 45 to 60 m (150 to 200 ft) east of the Buchanan Boulevard/Georgia Avenue intersection. As shown in the existing condition photo, the residences in this area have an unobstructed foreground view of Georgia Avenue and its associated street landscaping. They also have an unobstructed distant view of several transmission line towers, the WAPA substation, and the mountains. As shown in the visual simulation, Alternative D would become visible to these residences, but the view would be very distant. This photo shows that the view from these residences would not substantially change with implementation of Alternative D. An arrow placed on the visual simulation makes the highway and vehicles traveling on it more visible by pointing to a semi-truck. Viewers may notice the change to the visual landscape but would not likely be adversely affected.

Affected Residential Views Identified by Historic Structures Survey

In addition to the potentially sensitive receptors identified in Tables 4-22 to 4-24 above, the *Boulder City/U.S. 93 Corridor Study Historic Structures Survey* (ACRE, 2001) identified several historic residences that would experience visual impacts as a result of implementing the project. Table 4-25 lists the residences identified by that report that would be affected by each alternative, the degree of potential impact, and the recommended mitigation. As shown in Table 4-25, these residences would not experience visual impacts from implementation of Alternative D. No other sensitive visual receptors were identified for Alternative D by the historic structures report.

TABLE 4-25
Residences Identified by the Historic Structures Survey as Expected to Experience Visual Impacts

Residence	Alternative B	Alternative C	Alternative D
12 Valley View Lane	Minor visual potential impact; no mitigation recommended	Damage or destruction; mitigate by relocating house and documenting local history	No impact
14 Valley View Lane	Minor visual potential impact; no mitigation recommended	Major visual potential impact; mitigate by documenting local history	No impact
200 Donner Way	Minor visual potential impact; no mitigation recommended	Minor visual potential impact; mitigate by documenting local history	No impact
205 Donner Way	Minor visual potential impact; no mitigation recommended	Minor visual potential impact; mitigate by documenting local history	No impact
305 Lakeview Drive	Minor visual potential impact; no mitigation recommended	Minor visual potential impact; mitigate by documenting local history	No impact

Source: ACRE, 2001.

These residences were reviewed in the field for this analysis. The Valley View residences would experience the greatest visual impact of those listed in Table 4-25. As indicated in Table 4-25, Alternative C would result not only in effects on views from 12 Valley View Lane, but it would result in damage or destruction to it due to the proximity of the elevated roadway to the residence. The Donner Way residences would be subject to very minor visual impacts. In the field, it did not appear that the 305 Lakeview Drive residence would experience visual impacts from implementation of Alternative C due to certain residences and the hill behind it that would obstruct the view from this residence.

Impacts on Tourists' Existing Views

Alternative A. Implementation of Alternative A would result in no additional or new roadway being constructed, and it would result in no physical changes to the existing roadway. Therefore, no change to the views currently experienced by tourists is expected with implementation of this alternative.

Alternative B. Views of existing U.S. 93 are currently available from the tourist areas along Alternative B. Table 4-26 discusses what the expected changes to the landscape would be with implementation of Alternative B.

TABLE 4-26
Potentially Sensitive Tourist Receptors along Alternative B

Railroad Pass Hotel/Casino – The Railroad Pass Hotel and Casino fronts on U.S. 93, and an entrance to it is provided from U.S. 93. Its visibility from the roadway and direct access provide drive-by visitors the opportunity to make a decision to turn in to its parking lot. Access to the hotel/casino from Alternative B would be less direct than from the existing U.S. 93. The Alternative B alignment may change hotel patrons' view of the mountains to the southwest.
Alan Bible Visitors Center – The Alan Bible Visitors Center is a tourist attraction that currently provides a view of U.S. 93. It would not have a view of Alternative B. This alternative would add a frontage road in the same alignment as the existing U.S. 93 in this area.
Hacienda Hotel and Casino – The Hacienda Hotel and Casino fronts on U.S. 93, and an entrance to it is provided from U.S. 93. Its visibility from the roadway and direct access provide drive-by visitors the opportunity to make a decision to turn in to its parking lot. Access to the hotel/casino from Alternative B would be less direct than from the existing U.S. 93. The Alternative B alignment may change hotel patrons' view of the mountains to the south and southeast.

Alternative C. Views of existing U.S. 93 are currently available from the tourist areas along Alternative C. Table 4-27 discusses what the expected changes to the landscape would be with implementation of Alternative C.

TABLE 4-27
Potentially Sensitive Tourist Receptors along Alternative C

Railroad Pass Hotel and Casino – The Railroad Pass Hotel and Casino fronts on U.S. 93, and an entrance to it is provided from U.S. 93. Its visibility from the roadway and direct access provide drive-by visitors the opportunity to make a decision to turn in to its parking lot. Access to the hotel/casino from Alternative C would be less direct than from the existing U.S. 93. The Alternative C alignment may change hotel patrons' view of the mountains to the southwest.
Alan Bible Visitors Center – The Alan Bible Visitors Center is a tourist attraction that currently provides a view of U.S. 93. It would not have a view of Alternative C. This alternative would add a frontage road in the same alignment as the existing U.S. 93 in this area.

TABLE 4-27
Potentially Sensitive Tourist Receptors along Alternative C

Hacienda Hotel and Casino – The Hacienda Hotel and Casino fronts on U.S. 93, and an entrance to it is provided from U.S. 93. Its visibility from the roadway and direct access provide drive-by visitors the opportunity to make a decision to turn in to its parking lot. Access to the hotel/casino from Alternative C would be less direct than from the existing U.S. 93. The Alternative C alignment may change hotel patrons' view of the mountains to the south and southeast.

Alternative D (Preferred Alternative)

Views of existing U.S. 93 are currently available from the tourist areas identified in the proposed study area. Table 4-28 discusses what the expected changes to the landscape would be with implementation of Alternative D.

TABLE 4-28
Potentially Sensitive Tourist Receptors along Alternative D (Preferred Alternative)

Railroad Pass Hotel and Casino – The Railroad Pass Hotel and Casino fronts on U.S. 93, and an entrance to it is provided from U.S. 93. Its visibility from the roadway and direct access provide drive-by visitors the opportunity to make a decision to turn in to its parking lot. Access to the hotel/casino from Alternative D would be less direct than from the existing U.S. 93. The Alternative D alignment may change hotel patrons' view of the mountains to the southwest.
Alan Bible Visitors Center – The Alan Bible Visitors Center is a tourist attraction that currently provides a view of U.S. 93. Alternative D would not be visible from the Alan Bible Visitors Center. Cuts in the Eldorado Mountains for Alternative D would be visible from the visitors' center but would not be noticeable to a viewer who is not very familiar with the terrain to the south.
Hacienda Hotel and Casino – The Hacienda Hotel and Casino fronts on U.S. 93, and an entrance to it is provided from U.S. 93. Its visibility from the roadway and direct access provide drive-by visitors the opportunity to make a decision to turn in to its parking lot. Access to the hotel/casino from Alternative D would be less direct than from the existing U.S. 93. The Alternative D alignment may change hotel patrons' view of the mountains to the south and southeast.
LMNRA – Recreationists hiking in the mountains to the east of the project have views of the Eldorado Valley when looking west and Lake Mead looking north. These views vary and range from clear views to partially obstructed, depending on the location of the viewer, the vegetation, and the intervening topography. These views would not be obstructed by the Alternative D alignment. However, the existing views would be altered by the introduction of a new highway and bridges through the valley and descending the ridge toward U.S. 93 near the Hacienda Hotel and Casino. Nonetheless, the overall visual quality would not be compromised.

The simulation of Viewpoint 4 (Figure 4-11) shows the view from the Alan Bible Visitors Center looking south toward the Eldorado Mountains. The simulation shows the cuts in the mountains that would be required for the construction of Alternative D. To the casual viewer, the change in landscape from construction of Alternative D would not be noticeable. To the viewer who is very familiar with the terrain and this view, the cuts may be noticed, but they would not be considered offensive. The simulated view shows that the view from this location would not be degraded.

Impacts on Drivers' and Passengers' Existing Views

Alternative A. Implementation of Alternative A would result in no additional or new roadway being constructed, and it would result in no physical changes to the existing

roadway. Therefore, no change to the views from the road currently experienced by drivers and passengers is expected with implementation of this alternative.

Alternative B. The simulation of Viewpoint 2 (Figure 4-9) shows the view of a widened U.S. 93 looking east from near the Madrone Street intersection. As shown, the roadway would change from four lanes to six lanes, and a raised median and street lighting would be installed. The streetscape would not change appreciably. This roadway view is not particularly sensitive, but it is typical of an urban street.

Currently, motorists traveling on U.S. 93 pass in front of the Railroad Pass Hotel and Casino near the western end of the project and the Hacienda Hotel and Casino near the eastern end of the project. The proposed realigned U.S. 93 would move the highway away from the Hotels/Casinos. Traveling westbound on U.S. 93, views of the Railroad Pass Hotel and Casino are expected to improve, when compared to existing conditions. Traveling eastbound on U.S. 93, views of the Railroad Pass Hotel and Casino signs would still be visible to motorists.

In addition, views along the realigned U.S. 93 would change in areas where the alignments would deviate from the existing U.S. 93. Most of the deviations would route the road through undeveloped areas.

Other improvements to surface streets, as part of this alternative, would result in minor changes to the landscape. The exceptions include the new road that would intersect with Yucca Street on the north side of U.S. 93, the extension of Adams Boulevard/Veterans Memorial Drive, and the realignment of U.S. 93 to the north just west of Buchanan Boulevard. These improvements would result in major modifications to the local landscape, the most notable being the demolition of up to five commercial buildings to the west of Buchanan Boulevard on the north side of existing U.S. 93. Implementation of this alternative would change the view by demolishing the building and creating an "island" between the existing U.S. 93 and the realigned U.S. 93. Within the island, the Boulder City Assembly of God Church could remain.

Other changes to views from the road include the altered view from the realigned U.S. 93 where it would cross over Lake Mountain Drive, which is currently an at-grade intersection. Motorists traveling on both U.S. 93 in that area and on Lake Mountain Drive would have their views modified.

Pacifica Way is currently an at-grade intersection with U.S. 93. Its proposed overcrossing of realigned U.S. 93 would change the view from both Pacifica Way and U.S. 93 in this area. Motorists traveling on U.S. 93 toward Lake Mead, when west of the proposed overcrossing, would have lake views blocked. East of the proposed overcrossing, views of the lake would remain. The proposed Lakeshore Road overcrossing of U.S. 93 would also change the view from both roadways.

No adverse impacts on existing views from the road are expected from implementation of Alternative B; however, the expected changes in views are acknowledged as different views provided to drivers and passengers.

Alternative C. Similar to Alternative B, motorists currently traveling on U.S. 93 pass in front of the Railroad Pass Hotel and Casino near the western end of the project and the

Hacienda Hotel and Casino near the eastern end of the project. The proposed realigned U.S. 93 would move the highway away from the hotels/casinos. Traveling westbound on U.S. 93, views of the Railroad Pass Hotel and Casino are expected to improve, when compared to existing conditions. Traveling eastbound on U.S. 93, views of the Railroad Pass Hotel and Casino signs would still be visible to motorists.

In addition, views along the realigned U.S. 93 would change in areas where the alignments would deviate from the existing U.S. 93. Most of the deviations would route the road through undeveloped areas.

Alternative C, between the Boulder Oaks RV Park and the Lakeview Drive subdivision, would provide an elevated view from a road in an area where a roadway does not currently exist. The elevated portion of the roadway may provide views of Lake Mead that currently do not exist.

Other changes to views from the road include the altered view from the realigned U.S. 93 where it would cross over Lake Mountain Drive, which is currently an at-grade intersection. Motorists traveling on both U.S. 93 in that area and on Lake Mountain Drive would have their views modified.

Pacifica Way is currently an at-grade intersection with U.S. 93. Its proposed overcrossing of realigned U.S. 93 would change the view from both Pacifica Way and U.S. 93 in this area. Motorists traveling on U.S. 93 toward Lake Mead, when west of the proposed overcrossing, would have lake views blocked. East of the proposed overcrossing, views of the lake would remain. The proposed Lakeshore Road overcrossing of U.S. 93 would also change the view from both roadways. Implementation of Alternative C would not result in adverse impacts on views from the road. However, the expected changes in views are acknowledged as different views provided to drivers and passengers.

Alternative D (Preferred Alternative). The simulation of Viewpoint 1 (Figure 4-8) shows the view from the U.S. 93/95 interchange looking south along U.S. 95. Also seen is the simulated grade-separated crossing of U.S. 95 by an elevated U.S. 93, as part of Alternative D. Due to the proposed architectural treatment of the overcrossing, it blends well with the landscape. This "view from the road" is not considered a sensitive view, and implementation of Alternative D would likely not be considered offensive. The simulated view shows that the view from this location would not be degraded.

Most of Alternative D would pass through undeveloped land south of Boulder City. This would be a substantial change in the views afforded to drivers and passengers who currently travel on U.S. 93.

Similar to Alternatives B and C, motorists currently traveling on U.S. 93 pass in front of the Railroad Pass Hotel and Casino near the western end of the project and the Hacienda Hotel and Casino near the eastern end of the project. The realigned U.S. 93, proposed as part of Alternative D, would move the highway away from the Hotels/Casinos.

Alternative D would also provide a view of Lake Mead from the roadway from atop Eldorado Ridge. This view is not currently available, and it is considered a benefit to motorists.

These changes in views are not considered adverse, but they are acknowledged as different views provided to drivers and passengers.

4.10.3 Mitigation

Construction Mitigation

Regardless of the alternative selected, certain views during the construction period would be altered by the presence of construction vehicles, equipment, personnel, and activities. This impact is expected to be important to some viewers and is an unavoidable consequence of project construction.

Dust emissions during project construction, and the associated impact on views would vary from day to day, depending on the level of activity, the specific operation being conducted, and the prevailing meteorological conditions. The impacts on visual resources are not considered adverse because (1) construction activities could occur intermittently over an 11-year construction period; (2) dust suppression techniques, such as watering and applying chemicals, would be used during project construction to prevent (or suppress) the dust; and (3) a dust mitigation plan would be implemented. Other dust suppression mitigation identified in the *Air Quality Technical Study* for this project (NDOT, July 2001c) would also reduce impacts on views from fugitive dust emissions.

If nighttime construction occurs, construction night lighting may encroach on nearby sensitive receptors. If nighttime construction is necessary, lighting should be directed away from residences and should be shielded so that light is not emitted from the construction site.

Operational Mitigation

Alternatives B and C would result in an unavoidable adverse impact on the existing view of Lake Mead from the Laguna Lane residences. No other adverse impacts on views would be expected from implementation of Alternatives B and C. Impacts on adjacent residences from new freeway lighting sources at interchange areas will be mitigated by installing glare shields around the light element to direct the glare away from the residences.

No adverse impact to the viewshed of sensitive receptors in the Eldorado Valley and Hemenway Wash areas is expected from implementation of Alternative D. However, as discussed in Chapter 7 and in Appendix D, adverse visual impacts would result from its implementation within the LMNRA based on the conflict with NPS land management plans for that area.

To mitigate the potential visual impact on businesses from loss of drive-by patrons due to reduced visibility from the realigned U.S. 93, signage will be provided prior to each highway off-ramp alerting drivers to the availability of food, gas, and lodging services.

In areas where noise barriers would be installed, the barriers should be designed to provide an aesthetically pleasing appearance. In addition, the color of the noise barriers should blend with the surrounding environment.

In areas where bridges would be constructed, the embankments will be treated to minimize erosion and planted, as appropriate, with suitable xeriscape vegetation.

Regardless of the alternative selected, the proposed project would directly alter the landscape within and south of Boulder City. Alternative D would result in the most new roadway development through undeveloped area, resulting in the greatest landscape modification. Alternative B would result in the least amount of landscape alteration. As part of the design process, corridor landscaping will be addressed, and the desires of the stakeholders will be considered. NDOT is developing a landscape policy that, when in place, will outline a cost allocation (as a percentage of total construction estimate), a treatment method depending on the project setting (urban, rural, new construction, or reconstruction), and type of roadway (freeway, arterial, collector, or local). This policy is planned to be in place mid 2002. This policy will describe a landscaping minimum. The local agency (city, county, or RTC) may enhance the landscape design at any time, while staying within the policy guidelines, including the plant list and safety standards. The local entity will be expected to fund and maintain any enhancements.

Where the new motorists' view of Lake Mead is created atop Eldorado Ridge, as part of Alternative D, a roadway pull-out and vista point lookout will be developed within the planned right-of-way to (1) provide views of longer duration of the lake, and (2) mitigate the potential public safety impact caused by drivers viewing scenery while attempting to maneuver vehicles at a safe speed.

A secondary impact on visual resources along the new or realigned highway that could be expected is the trash and other highway-related debris that accumulates along highway margins. This would result in a visual impact and would be mitigated by implementing a periodic, but regular, trash collection program along the highway.

4.11 Economic Impacts

4.11.1 Construction Impacts

The construction phase of any of the build alternatives would have a positive impact on employment, sales tax revenues, and overall economic activity in the project area. While it is likely that many construction jobs would be filled by residents from places other than Boulder City, new jobs could be created within Boulder City limits in businesses and industries that provide goods and services used during construction and in businesses that sell goods and services to workers on the project. The actual impact would be a function of where equipment and material needed for construction would be purchased.

Construction Employment and Material Purchase Impacts. For the purposes of this analysis of construction impacts, "the region" refers to Clark County, Nevada. As a result of construction of the proposed Boulder City/U.S. 93 Corridor build alternatives, economic impacts in the region would be generated by material purchases, construction payrolls, and related indirect and induced spending, or "multiplier impacts." In assessing the economic impacts of the project, it is important to recognize that economic benefits associated with the construction phase would occur only during the construction period.

Methodology. An input-output model developed by the Minnesota IMPLAN Group has been used to quantify the economic effects of the proposed project. The model provides the basic methodology for the assessment of the potential economic impacts, with modifications to produce multipliers specific to Clark County. Quantification of the effects of material

purchases, during both the construction and operational phases of the project, relies upon the following:

- Projected material expenditures are derived from the preliminary engineering estimates.
- The particular goods and services needed for construction of the proposed roadway improvements are evaluated through analysis of "use" vectors for roadway improvements in the region.
- The degree to which materials are likely to be purchased in the region is projected using a location quotient analysis, which measures the concentration of local activity in each major industrial sector. The location quotients are calculated to reflect the degree to which particular goods are likely to be available within a given region.
- Output multipliers derived from the model are used to evaluate indirect and induced impacts on the local economy. These output multipliers indicate the total increase in output that would occur in the local economy with each dollar of project expenditures, including respending of income derived by local businesses and individuals from direct project-related purchases. Similar employment multipliers are applied to analyze total job creation in the region resulting from project-related expenditures.
- Quantification of the effects of payroll-related impacts relies upon the following:
  - Estimates of the payroll expenditures are based on payroll multipliers that convert output to payroll, based on estimates for the road construction industry in Clark County. Estimates reflect current wage rates and may be different when construction commences.
  - Adjustments for Fringe Benefits, Taxes, and Other Payroll Deductions for road construction workers in the project area are determined by using Bureau of Labor Statistics data.
  - The percentage of construction employees likely to be hired in the region is estimated based on an analysis of journey to work data. It is assumed that only construction employees living permanently in the region would contribute to the local economy. Construction workers temporarily relocated into the region are assumed to continue making their major purchases in their home communities. Although they would make contributions to the local community through expenditures for temporary housing, meals, and other related living expenses, these expenditures are relatively small and are anticipated to be short-lived.
- As discussed, multipliers applied in this aspect of the analysis are derived from the IMPLAN model. They have been modified to generate regional multipliers relevant to Clark County. Direct impacts represent expenditures related to the construction project itself. Indirect and induced impacts are combined to make up the local multiplier effects. The sum of the direct impacts and the local multiplier effects is equal to the total impact.

Impact Area. The impacts of material purchases and payrolls would occur primarily within Clark County. Payroll impacts, in particular, are likely to be centered within Clark County, given the county's size and the proposed project's location within the county. It is likely that some materials would be purchased within Boulder City. For example, there are several

local borrow pits that might be used as a material source by the contractor during project construction.

Employment and Output Impacts. In determining the economic impacts of the proposed project's construction budget, the following assumptions were made:

- The model was run for three U.S. 93 alternative alignments (Alternatives B, C, and D). It considered the differences in the amount of labor and materials purchased connected with the construction of each alternative.
- A construction budget of approximately $189.1 million for Alternative B, $195.7 million for Alternative C and $312.3 million for Alternative D, excluding right-of-way acquisition, expended over a multiyear period. This assumption is based on comparative, preliminary engineering estimates.

The rapid growth of the Las Vegas economy has necessitated the development of a sophisticated building industry and a labor market that has the managerial, supervisory, and technical experience required for a construction project of the proposed project's size and complexity. Accordingly, nearly all of the labor necessary, including high-level management, is expected to be recruited locally. Ninety-five percent of workers are assumed to be local (i.e., Clark County residents) given the size of the local construction industry and the journey-to-work patterns of Clark County employees. The high percentage will mean that most of the positive employment and purchase impacts from the proposed project will benefit the county. These benefits are described below.

Alternative B. Application of the appropriate multipliers to both the direct labor and direct project costs for Alternative B results in multiplier impacts of just under $87.9 million in sales in the region. Of this total, an estimated $78.2 million of the impact would be for intermediate materials purchases. The remaining $9.7 million would be the result of direct labor expenditures in the county after taxes, benefits, and savings.

In addition, construction of the proposed project would require approximately 2,721 person-years of direct, indirect, and induced employment, generating $112.9 million in earnings. The total impact includes 1,599 person-years of employment directly required for construction of the road improvements, as well as 1,122 person-years of employment generated by the consumer expenditures resulting from direct employment and from material expenditures (the direct as well as intermediate purchase of goods) for the proposed project. Table 4-29 presents the economic impacts associated with Alternative B.

Alternative C. Construction of the proposed project under Alternative C would result in similar sales, employment, and earnings impacts. The local multiplier impact of this construction alternative is expected to be approximately $90.7 million. This multiplier impact consists of $10.0 million in purchases generated from $38.7 million in take-home wages paid to construction employees (after taxes, benefits, and savings); and $80.7 million in intermediate material purchases generated from the direct purchases of materials required for the proposed project.

This alternative is expected to generate total employment impacts of approximately 2,810 person-years and $116.6 million in earnings paid to these workers. The total employment impacts consist of approximately 1,653 person-years of employment hired to construct the proposed project and an additional 1,157 person-years of employment

generated from the respending of $38.7 million in spendable earnings paid to employees hired for construction; and $35.6 million in gross wages paid to other employees hired to produce intermediate and final products required for construction. The economic impacts of Alternative C are presented in Table 4-29.

Alternative D (Preferred Alternative). Construction of the proposed project under the preferred Alternative D would result in a higher level of sales, employment, and earnings impacts due to the larger amount of direct construction expenditures. The local multiplier impact of this construction alternative is expected to be approximately $144.7 million. This multiplier impact consists of $15.9 million in purchases generated from $61.9 million in take-home wages paid to construction employees (after taxes, benefits, and savings); and $128.8 million in intermediate material purchases generated from the direct purchases of materials required for the proposed project.

This alternative is expected to generate total employment impacts of approximately 4,481 person-years and $186.3 million in earnings paid to these workers. The total employment impacts consist of approximately 2,635 person-years of employment hired to construct the proposed project, and an additional 1,846 person-years of employment generated from the respending of $61.9 million in spendable earnings paid to employees hired for construction; and $56.9 million in gross wages paid to other employees hired to produce intermediate and final products required for construction. The economic impacts of Alternative D are presented in Table 4-29.

TABLE 4-29
Construction, Employment, and Income Generation Associated with the Construction of the Boulder City/U.S. 93 Corridor

	Alternative B	Alternative C	Alternative D
Direct Impacts			
Total Project Budget (excluding ROW acquisition)	$189,117,968	$195,746,810	$312,315,946
Direct Payroll Expenditures	$78,398,410	$81,031,071	$129,425,626
Local Net Take-Home Wages	$37,474,440	$38,732,852	$61,865,449
Direct Employment (person-years)	1,599	1,653	2,635
Local Employment Capture (person-years)	1,519	1,570	2,504
Local Multiplier Impacts (Indirect and Induced Impacts)			
Sales (Output) Multiplier Impacts	$87,857,266	$90,656,139	$144,697,203
Labor Spending Impacts	$9,664,299	$9,972,175	$15,916,692
Material Purchase Sales Impacts	$78,192,967	$80,683,964	$128,780,511
Employment Multiplier Impacts (person years)	1,122	1,157	1,846
Payroll Expenditure Multiplier Impacts	$34,490,186	$35,594,185	$56,875,196
Total Impacts (Direct, Indirect and Induced Impacts)			
Total Sales (Output) Impacts	$276,975,234	$286,402,949	$457,013,149
Total Employment (person years)	2,721	2,810	4,481
Total Payroll Expenditures	$112,888,597	$116,625,256	$186,300,822

Estimates prepared by Applied Economics, 2001.
Note: Alternative A is the no-build scenario and would have no economic impact.

Local Business Impacts. Construction activities would be likely to result in reductions in revenue for some local businesses. Local business impacts may include one or more of the following:

- Real or perceived loss of access or substantial changes in access
- Increased traffic congestion
- Reduced or eliminated adjacent parking
- Reduced visibility of businesses from the street
- The creation of a disruptive and/or unpleasant environment (noise, dust, vibration)
- Disrupted utility services

Alternative A. Alternative A would not have any construction activity or related impacts.

Alternative B. Impacts to businesses along U.S. 93 during construction of Alternative B may include temporarily increased congestion, noise, dust, and possibly interrupted or reduced access. Real or perceived loss of access or substantial changes in access can result in reductions in revenue for local businesses. Small businesses and businesses depending on location or drive-by customers are the most likely to be adversely impacted.

The most substantial impacts are likely to occur along U.S. 93 west of Canyon Road. A retail-oriented stretch of businesses is located along both sides of the highway, and approximately 50 percent of Boulder City's retail sales and 15 percent of its total sales are generated from this area. Thus, construction along this section of the alignment has the potential to impact many retail businesses that depend on good visibility and access. Temporary detours and access points would be established during construction to allow customer access to these businesses. It is estimated that the duration of construction impacts on these businesses could be from 12 to 18 months.

Two major employers, the Railroad Pass Hotel and Casino and the Hacienda Hotel and Casino, located at the western and eastern project limits, may experience decreased access during construction of Alternative B. The construction impacts are expected to be short-term. The separate Hoover Dam Bypass bridge crossing (see Section 2.1), being developed by FHWA, terminates east of the Hacienda Hotel and Casino and could have no impact on the Hacienda Hotel and Casino, as there would be no change to the existing U.S. 93 alignment or access along the hotel frontage.

Commercial truck and automobile traffic would experience delays during the construction of Alternative B. The improvement of the existing highway, construction of overpasses at Lakeshore Road and Pacifica Way, and completion of the frontage road would cause intermittent delays to traffic traveling on the existing roadways. Businesses that rely on the existing roadways for the delivery of goods and services may experience a temporary increase in transportation costs due to the traffic delays. The costs associated with the increased travel time are expected to be minor.

The current engineering plans for Alternative B would expand the existing highway by approximately 6 m (20 ft) west of Buchanan Boulevard and would require full displacement of approximately five businesses along U.S. 93. The five businesses combined employ between 10 and 20 employees and generate annual sales of $1.0 to $1.5 million, which represents about 0.4 percent of the estimated $337 million in total sales in Boulder City. The number of businesses and employees displaced by Alternative B would represent less than

one percent of the total businesses and employees in Boulder City. The displaced businesses may be able relocate to another site along U.S. 93 or to another location within Boulder City limits. Thus, the impact to the local economy of the displacement of five businesses is expected to be negligible.

Approximately seven additional businesses are located on property within the planned right-of-way limits and could experience partial displacements but remain open for business. Some of the businesses could lose parking stalls and/or property used for displaying products and signage.

Alternative C. The current design plan for Alternative C would not result in any business displacements along the existing or proposed roadways. Because this alignment is located north of U.S. 93 west of Buchanan Boulevard, construction is not likely to have much effect on the businesses located along existing U.S. 93.

The hotel and casino establishments at either project terminus may experience similar accessibility issues as Alternative B. The impacts, however, are expected to be short-term.

Commercial truck and automobile traffic would experience delays during the construction of Alternative C. The improvement to the existing highway east of Buchanan Boulevard and construction of the interchange at Lakeshore Road, the overpass at Pacifica Way and Railroad Pass, and the frontage road would cause intermittent delays to traffic traveling on the existing roadways.

The current alignment for Alternative C could also impact the planned Park Place and Boulder Ridge golf courses. If this alternative were chosen, construction of the highway would pass through part of the land planned for the Boulder Ridge Golf Course and along the boundary of the planned Park Place Golf Course.

Alternative D (Preferred Alternative). Alternative D would have the fewest construction impacts of all of the build alternatives because the alignment is south of the developed portion of Boulder City and would not impact businesses or residents along the existing highway. Commercial trucks and vehicular traffic may experience delays during the construction of the interchanges at the western and eastern project limits. Existing hotel and casino establishments located near the interchanges may experience short-term access limitations; however, the impacts are expected to be negligible.

4.11.2 Operational Impacts

There are three main types of operational impacts that may result from the project:

- Permanent changes in access to businesses along U.S. 93
- Long-term effects to the overall economy of Boulder City from changes in travel patterns, including changes in travel times and accident rates
- Potential fiscal impacts to Boulder City

Alternative A. Under Alternative A, no businesses would be displaced by right-of-way acquisition, and there would be no resulting decrease in property or sales tax revenues or jobs lost. Compared to the build alternatives, Alternative A would likely result in increased congestion, an overall reduction in mobility in the project area, and increased risk of

accidents. Some businesses may experience a reduction in sales revenues as local residents avoid shopping in the congested business district. At the same time, other businesses may experience an increase in sales if their businesses depend on impulse purchases.

Alternative B. For Alternative B, the proposed median islands between Veterans Memorial Drive and Buchanan Boulevard would make access to some businesses more difficult than currently exists. This could result in lower revenues for affected businesses whose customers choose to avoid the additional driving time and shop elsewhere. However, the impacts are not likely to be substantial because left turns are currently difficult to make at many times of day, and U-turns would be possible at median openings. In fact, the improved mobility from this alternative would probably result in overall improved sales for many businesses above what might be expected under Alternative A.

Compared to the other build alternatives, this alternative would have very little impact to the existing retail district along U.S. 93 west of Buchanan Boulevard, but it would not provide a measurable boost to Boulder City's prospects for improving tourism-related business.

Revenues at the hotel/casino properties at either end of the project area would be likely to change, depending on the extent to which the visibility and ease of access to the properties is changed. For all of the build alternatives, the visibility of the Railroad Pass Hotel and Casino will change minimally; there may be a slight reduction in the visibility of the establishment for eastbound traffic and maybe a slight improvement in visibility for westbound traffic. There is not likely to be any change in the visibility of the Railroad Pass Hotel and Casino property's large, lit sign in any of the alternatives. In all build alternatives, the decision to exit the freeway to U.S. 93 and enter the property would have to be made sooner than is currently the case. There are no substantial differences between the build alternatives in terms of the visibility or ease of access to the property. Overall, the build alternatives for the project may result in a negative effect on revenues for the Railroad Pass Hotel and Casino establishment.

For the Hacienda Hotel and Casino, eastbound traffic in Alternatives B and C would need to exit the freeway at Lakeshore Road in order to access the property. The decision to exit would need to be made prior to the property being visible to the driver. This would have a negative effect on the hotel's revenues compared to Alternative A. Good signage to the property may help reduce any impacts. For westbound traffic, the property would be visible for some time prior to the decision point to exit the freeway; however, the decision point would be sooner than it would be under Alternative A. Thus, it is likely that visibility and access changes would also result in a negative effect on revenues from westbound traffic.

Like the other build alternatives, the interchanges at the western and eastern ends of the project would improve access to U.S. 93 and to Lake Mead, and they would be a positive impact compared to Alternative A.

Alternative C. Under this alternative, it is likely that the retail district along U.S. 93 between Veterans Memorial Drive and Canyon Road would experience lower sales, employment, and tax revenue than would be the case under Alternatives A or B. However, there would be potential for redevelopment that could offset some of those losses at the new U.S. 93

interchange at the Canyon Road extension. The land in the vicinity of this interchange is zoned BC and S. Based on conversations with Boulder City planning staff, commercial development would be allowed in the BC zone, and development in the S zone would require a zone change (Susan Danielewicz, pers. comm., 2001).

Ultimately, the course of any future development would rest with the city or its voters and the degree to which they are interested in allowing sales or leases of Boulder City-owned land for development at the new interchange or between the interchange and the Buchanan Boulevard/U.S. 93 intersection. In Boulder City, all city-owned land sales of more than 1 acre must be approved by the city's registered voters in an election, and any leases must be approved by the Council based on a recommendation by the Planning Commission (Boulder City Charter, Section XV).

Compared to the impacts expected for Alternative D, discussed below, this alternative would have less potential for impact on the retail sector associated with bypassing existing retail establishments, because the interchange at Canyon Road would provide better access to these establishments. With Alternative C, the presence of the freeway going through town could detract somewhat from the desirability of the town as a tourist destination (relative to Alternative D).

Changes in access and visibility to the Railroad Pass Hotel and Casino with Alternative C are expected to be similar to those of Alternative B.

For the Hacienda Hotel and Casino, the impacts would also be similar to those of Alternative B.

Like the other build alternatives, the interchanges at the western and eastern ends of the project would improve access to U.S. 93 and to Lake Mead, and they would be a positive impact compared to Alternative A.

Alternative D (Preferred Alternative). This analysis assumes that most through-traffic (autos and trucks) would use the bypass. The long-term operational impact of Alternative D to the Boulder City economy could be either positive or negative depending on the course of future events, Boulder City land use and development policies, and the perspective used for evaluation. This study analyzes the likelihood of various impacts by evaluating data developed for this project, as well as a recent review of 190 studies of bypass impacts based totally, or in part, on business sales (Liff et al., 1996). Most of these studies found that a highway bypass has a net positive impact on the local community (Table 4-30). Not surprisingly, that finding does not apply to traffic-serving businesses along the old route, for which about half of the studies found that the bypass had a negative impact on traffic-dependent businesses.

TABLE 4-30
Effects of Highway Bypasses on Communities

	% Positive	% No Impact	% Negative	% Total	Number of Studies
Overall community	89	4	7	100	141
Traffic-serving businesses along old route	30	22	49	100	88

Other conclusions from the 190 studies of bypass effects include:

- Bypasses generally result in decreased retail sales, gasoline service receipts, restaurant sales, and service receipts. The initial decreases are often counteracted by reorientation and refocusing of local stores. The economic impact of highway bypasses on small cities in a rural setting is not uniform across cities. Some factors that determine those impacts include:
  - The size of the city: smaller cities are typically impacted more severely than larger cities.
  - Average daily traffic (ADT) of the highway: the greater the traffic flow, the more beneficial the long-term prospects for through-traffic-dependent local businesses.
  - The economic base of an area: the more inflows of funds to the local economy are affected by the highway, the more the bypass will affect local businesses.
  - A highway bypass may cause a decrease in business volumes in small cities. However, other factors such as increases or decreases in economic base industries (e.g., tourism) or in the local and regional economy appear to be more important overall in determining the overall level of business sales and employment.
- Bypasses typically seem to have a favorable impact on rural communities and small urban areas, but evidence in these studies is often weak. Interviews and survey of residents and businesses indicate that bypasses increase development potential along the fringe areas served by the new route, and at the same time relieve congestion, safety hazards, and other undesirable conditions in the central areas from which traffic is diverted. The studies of bypass effects summarized by Liff et al. (1996) include bypasses that have interchanges, and it is likely that these interchanges are the features that enhance the development potential of outlying areas. For the preferred alternative there will be no interchanges east of U.S. 95; therefore, it is unlikely that this project will enhance the development potential of fringe areas.
- A potential impact of a bypass is that a downtown business district will suffer a decline in retail sales due to lower main street traffic volumes. In some instances, this decline was offset by increased sales at new developments near freeway interchanges. Many bypassed communities that suffered a reduction in retail sales experienced a transformation of the downtown area from a center of retail activity to a center supporting more professional and service businesses.

A study of the likely impacts of a southern bypass on Boulder City's local economy was recently commissioned by the Boulder Dam Credit Union (BDCU) (Borden and Fletcher, 2000). Some of the conclusions of that study include:

1. Total business activity in the local economy as a result of tourism is $36 million ($21 million direct and $15 secondary).
2. The most likely result from a southern bypass is a 50 percent reduction in tourism expenditures, which would be an $18 million reduction in sales (direct and secondary) and a reduction of about 200 jobs.

3. An estimated 30 to 40 Boulder City businesses would close.

4. Boulder City's retail and service sectors should experience increases in sales during construction of the Hoover Dam Bypass and the Boulder City/U.S. 93 Corridor project (Alternative D), which could lead to an expansion of existing businesses and new entrants in the market. When the construction is complete and this spending ceases, this could result in a "double-barreled" impact on the economy (when combined with the likely decline in tourism expenditures).

5. Continued growth in Henderson and Las Vegas, the construction of proposed new golf courses, and the renovation of the downtown business district are all factors that will draw more visitors to the area. If these sources of new income materialize, some people will conclude the bypass had no negative impact on the Boulder City economy.

To provide further perspective, the potential for lost sales and employment estimated in the BDCU study represents about 5 percent of total sales and 4 percent of total employment in Boulder City. It is estimated that about 50 percent of Boulder City's retail sales and 15 percent of its total sales are generated along U.S. 93 west of Canyon Road. Many of the businesses in this area, such as grocery stores, gas stations, and fast food restaurants, require high visibility locations with easy access to attract impulse purchases.

The estimates of lost jobs and sales stated in the BDCU study are reasonable estimates of one aspect of economic impact of this alternative, but they do not account for the positive influence of increased mobility and reduced truck traffic in town. It is difficult to estimate the extent of this positive impact, but it would probably serve to somewhat counteract the negative impact of reduced spending by through-traffic customers. Overall, however, Alternative D is likely to result initially in a noticeable negative economic impact to the town; and Boulder City would experience a short-term reduction in sales and property tax revenues.

The potential negative impacts of this alternative should also be weighed against other positive factors not directly related to this project that could ultimately lead to Boulder City's continued economic health, such as:

- The proposed new golf course developments
- Ongoing redevelopment in the historic downtown
- Boulder City's proximity to the fast-growing areas of Henderson and Las Vegas

Each of these factors has the potential to spur increased economic development in and around Boulder City, again dependent somewhat on the extent to which the City chooses to lease land for development or propose sales of land for approval by city voters.

In the long run, removal of most of the through-traffic would present a much more attractive environment for many businesses not dependent on significant numbers of through-traffic customers. Thus, Boulder City's economy might transition into one dependent more on services, destination tourism, or possibly even small-scale manufacturing. Any such transition would probably be a relatively lengthy process. Ultimately, it is uncertain if Boulder City would experience more or less long-term economic growth under this alternative versus another. However, assuming no other currently

unforeseen economic events, it is likely that the overall economy of Boulder City would remain reasonably healthy in the mid- to long-term if this alternative were implemented.

Boulder City's response to the project would play an important role in determining the response of the local economy to implementation of this alternative. Boulder City has an unusual amount of control over development by virtue of its ownership of large parcels of land. The ongoing debate in the town over allowing long-term leases or sales of land for development will ultimately have as great or a greater impact on Boulder City's economic future than the choice of transportation alternative for this project. Also, the extent to which Boulder City is successful in promoting the town, with its proximity to Hoover Dam and Lake Mead, as a destination through various media will affect how the local economy would fare after implementation of this alternative.

Changes in access and visibility to the Railroad Pass Hotel and Casino with Alternative D are expected to be similar to those of Alternative B.

For the Hacienda Hotel and Casino, eastbound traffic would be descending a long grade with a spectacular view of Lake Mead as it approaches the decision point to exit to the property. The property would not be readily visible prior to reaching that decision point. This would have a negative effect on the revenues of the hotel compared to Alternative A, and the impact would be similar to that of Alternatives B and C. For westbound traffic, the impacts to this property would be similar to the other build alternatives.

4.11.3 Mitigation

Construction Mitigation

To reduce the potential adverse impacts associated with the temporary change or restriction of access to businesses along the existing U.S. 93 corridor, a Traffic Construction Plan will be prepared prior to commencement of construction activity. Features of the Traffic Control Plan may include, but will not be limited to, the following:

- Using flaggers, detours, and temporary signage to inform drivers that access to businesses during construction is temporarily changed or restricted.
- Development of alternative access points for affected businesses.
- Coordinating with affected business owners to develop strategies to maintain access to businesses during construction.

Operational Mitigation

Implementation of Alternative B could require the acquisition of approximately five commercial properties to provide the required right-of-way for widening U.S. 93. Fair market value will be provided to the property/business owners. In addition, relocation support services will be provided to assist displaced businesses in finding other suitable locations in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. This form of compensation is described in the NDOT brochure, *Relocation Assistance in Nevada* (NDOT, no date).

Several additional businesses may be partially affected by implementation of Alternative B based on the conceptual alignment, potentially resulting in a loss of signage, landscaping

features, or parking area. If right-of-way is needed, the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970 will govern the acquisition of any right-of-way necessary for this project.

Under Alternative B, noise barriers would have to be considered to reduce project-related traffic noise to acceptable levels at the recreational vehicle (RV)/mobile home park at Yucca Street and U.S. 93, for the first few homes along Forest Lane and north of Lakeview Drive, and the single-family homes south of the proposed U.S. 93 alignment east of Nevada Way. For Alternative C, noise barriers would have to be considered for the Boulder Oaks RV Park, the single-family homes north of U.S. 93 east of the proposed Canyon Road interchange, and the single-family homes south of the proposed U.S. 93 alignment east of Nevada Way. Potential adverse environmental and economic impacts on residences from traffic noise will thus be mitigated with installation of noise barriers (NDOT, August 2001b).

Implementation of Alternative C would have the potential to adversely impact the planned golf courses north of existing U.S. 93. Purchase of the required right-of-way at fair market value or replacement of land in kind will serve to reduce the severity of this impact. Directional signs consistent with NDOT's sign program indicating the destination connection to Hoover Dam, Lake Mead, and the historic downtown of Boulder City, and the availability of food, gas, and lodging services will be placed prior to each new interchange.

For both Alternatives C and D, good signage would help local businesses counteract the effects of a decline in drive-through traffic. NDOT's business logo sign program would allow signs on the west end of the project, which would most likely be designated as Interstate roadway, as well as the east end of the project. This would be done through an arrangement between NDOT, the logo sign program vendor, and the Boulder City businesses; and if there were enough businesses interested in logos to make a sign feasible from a cost standpoint then it would be implemented. Any special roadway signing for tourist destinations and the downtown business district would also have to be consistent with the FHWA Manual on Uniform Traffic Control Devices (MUTCD).

As with Alternative C, signs indicating the destination connection to Hoover Dam, Lake Mead, and the historic downtown of Boulder City, and the availability of food, gas, and lodging services may be placed prior to each new interchange.

4.12 Social Impacts

4.12.1 Construction Impacts

Alternative A

The No Build Alternative (Alternative A) would not involve any construction activity and, consequently, would not result in any construction impacts.

Alternative B

Alternative B would be constructed through the existing commercial district between Veterans Memorial Drive and Buchanan Boulevard. This district is part of a redevelopment

area that generally includes those lands north of U.S. 93 between the city limits to the west and Buchanan Boulevard to the east, and the area south of U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard. Existing residential uses and the State Veterans Home are excluded from the redevelopment zone. Retail businesses in the affected commercial district would be impacted during construction activities due to reduced accessibility. Similarly, access to these businesses by local residents of Boulder City would be affected by construction.

Five businesses along U.S. 93 would require relocation for the construction of Alternative B, with the buildings being demolished. An additional seven businesses and a church would also be partially impacted by construction. These impacts are discussed further under Section 4.12.2, Operational Impacts. No business relocations would occur within the major retail shopping centers at the southwest and northeast intersection with Buchanan Boulevard. Access to these areas would be maintained at all times during construction.

Residents within the mobile home community south of U.S. 93 in the vicinity of Gingerwood Street would be subject to increased noise and dust resulting from construction, along with the addition of construction-related traffic along nearby roadways and changes to the visual environment. Residential neighborhoods adjacent to U.S. 93 in Hemenway Wash would experience similar effects.

Common to all the build alternatives would be the increase in construction-related jobs that would occur during the construction phase of the project (Section 4.11).

During construction, the demand for emergency services has the potential to increase due to possible construction-related accidents. The Boulder City Fire and Police Departments and Nevada Highway Patrol (NHP) would maintain first-response emergency services in case of accidents. While the potential demand for these services is difficult to predict, no expansion of existing facilities or additional personnel is anticipated to be required.

Pedestrians and bicyclists using existing U.S. 93 may experience short-term impacts during construction, as these activities will temporarily affect access and connectivity of the transportation system.

Alternative C

With the exception of the Railroad Pass Hotel and Casino, Alternative C would bypass existing development from the project's western terminus to the planned interchange with Canyon Road. Therefore, construction activities along this portion of the alignment would not result in any socially disruptive effects. Between the Canyon Road interchange and the existing U.S. 93 alignment, construction activities would occur directly adjacent to the Boulder Oaks RV Park and the residential neighborhood off Lakeview Drive. These neighborhoods would experience temporary impacts from noise, dust, construction traffic, and visual impacts associated with construction activity.

Similar to Alternative B, Alternative C would have the potential to increase demand for emergency services during construction activity but would not require an expansion of existing emergency facilities or additional personnel. In addition, Alternative C would provide similar benefits as Alternative B due to increased construction-related jobs.

Alternative D (Preferred Alternative)

Because Alternative D would bypass the developed portion of Boulder City, no neighborhoods or community facilities, with the exception of some recreational trails, would be impacted by construction activity. As discussed under Alternatives B and C, construction activity may increase the demand for emergency services due to the potential for construction-related accidents; response times may be longer due to the greater distances and remoteness of this alignment. However, no expansion of emergency facilities or additional personnel is anticipated to be required. Further, construction of Alternative D would provide the greatest benefits in terms of increased construction-related employment (see Section 4.11).

4.12.2 Operational Impacts

Alternative A

The No Build Alternative (Alternative A) would not result in any changes to the existing U.S. 93 alignment. As traffic volumes continue to increase, further congestion problems would result along the alignment, as well as indirect impacts related to air quality and noise. The increased traffic volumes would also exacerbate the barrier effect created by the U.S. 93 corridor, particularly between residents within Hemenway Wash to the north and downtown Boulder City to the south. This would impede safe access for pedestrians and bicyclists, as well as local traffic trips, between the two parts of the community. In addition, the high crash rates along U.S. 93 can be expected to remain the same or worsen over the long term. These adverse impacts would not be mitigated without some change to the physical configuration of U.S. 93.

Alternative B

Implementation of Alternative B would require an expanded right-of-way near the intersection with Buchanan Boulevard. Five existing businesses would be removed west of the intersection in order to accommodate the realigned intersection configuration. This expansion would eliminate the goods and services provided by these establishments and slightly reduce employment opportunities for residents of Boulder City.

Seven businesses and a church would be partially impacted by the expanded right-of-way, resulting in a loss of parking space, signage, and/or display areas. This change would not be anticipated to substantially alter the continuing viability of these establishments. Therefore, the goods, services, and employment provided by these establishments to the residents of Boulder City would not be impacted.

Changes to the configuration of U.S. 93 would potentially impact the commercial district between Veterans Memorial Drive and Buchanan Boulevard. Specifically, the installation of raised medians would limit ingress and egress to right turns only. This could limit accessibility from opposite lane traffic, such that the existing volume of business would be reduced. However, relative to the existing configuration, in which accessibility is often limited by high traffic volumes, the change would not be adverse. Furthermore, access from opposite traffic lanes would be available at designated left-turn and U-turn areas.

Residences within the mobile home community south of U.S. 93 would not be directly affected by project improvements. However, residents would be required to use an alternate route to downtown Boulder City via the planned extension of Elm Street. This would allow for the partial avoidance of U.S. 93 and should result in an improvement to local circulation. The enhanced connectivity to businesses, public services, and other facilities is a beneficial project effect.

East of Buchanan Boulevard, the project would result in changes to local circulation for residents of the Hemenway Wash area. The provision of a local frontage road north of U.S. 93, as well as two grade-separated crossings of the alignment would improve local circulation and diminish the barrier effect to the downtown area created by the existing U.S. 93 corridor. In addition, these improvements would be anticipated to reduce crash rates in this area and benefit public safety. However, the raised profile of Pacifica Way, for the proposed new bridge crossing over U.S. 93, would impede the existing views of Lake Mead from some of the residences immediately northwest of this intersection, potentially adversely impacting property values. With mitigation, Alternative B would not impact pedestrian and bicycle circulation along the existing wash trail.

East of Hemenway Wash, the alignment traverses primarily vacant federal land, with the exception of the Hacienda Hotel and Casino near the eastern project terminus. Access would be maintained or enhanced at this facility, and no direct or indirect impacts to the local community would result along this section of the alignment.

Through implementation of this alternative, improvements would be made to existing pedestrian and bicycle routes, and new bike lanes and access points would be constructed. This would allow pedestrians and bicyclists to more safely navigate through the city.

Alternative C

Alternative C would avoid developed neighborhoods and business districts west of the planned interchange with Canyon Road. Therefore, no direct impacts are anticipated along this portion of the alignment. Because a substantial portion of traffic on U.S. 93 would be diverted to the new alignment, residents of the mobile home community south of existing U.S. 93 would experience indirect benefits resulting from reduced traffic congestion and noise.

The reduced level of through-traffic along the existing alignment may adversely impact traffic-dependent businesses located between Veterans Memorial Drive and Buchanan Boulevard. Based on the results of the economic analysis prepared for the project (see Section 4.11), the viability of some businesses in this area may be jeopardized. This would result in a reduction of employment opportunities within Boulder City. However, these adverse impacts may be offset by increased local patronage resulting from reduced congestion levels along U.S. 93, which would enhance the accessibility and attractiveness of this area for local residents. In addition, a potential shift in traffic-related businesses to the planned interchange at Canyon Road would create new employment opportunities, thereby offsetting potential employment impacts.

Between Canyon Road and U.S. 93 to the east, the alignment would be located adjacent to the Boulder Oaks RV Park to the southwest and an established residential community to the northeast. No residences would be displaced by project implementation. Anticipated

operational impacts would include increased noise levels and adverse visual impacts. Because a wall and a vacant strip of land currently separate these two residential areas, the project would not have the effect of dividing the residents or creating a barrier. However, depending on the intensity of anticipated noise and visual impacts, there is the potential that property values within these two communities could be adversely impacted. These impacts would be lessened by the construction of noise barriers. This area is not included in Boulder City's "Clean and Green" landscaping plans.

Impacts within the Hemenway Wash area would be nearly identical to those described for Alternative B. These include beneficial effects on local circulation, public safety, and reduction of the barrier effect created by the existing alignment. Also similar to Alternative B, improvements will be made to pedestrian and bicycle routes, thereby benefiting pedestrian and bicycle circulation throughout the city.

Alternative D (Preferred Alternative)

Alternative D would divert most nonlocal traffic away from developed areas in Boulder City. This would substantially alleviate the ongoing congestion, noise, and traffic safety impacts. In addition, the barrier effect created by the existing U.S. 93 alignment would be substantially diminished due to decreased traffic volumes.

Similar to Alternative C, the decreased volume of traffic within Boulder City would have an adverse effect on businesses located between Veterans Memorial Drive and Buchanan Boulevard from loss of through-traffic. With less through-traffic, certain businesses would be anticipated to experience decreased revenue and may no longer remain viable. In turn, this would result in a loss of employment opportunities in Boulder City. This impact would be greater than that resulting from Alternative C. However, as with Alternative C, the impact may be offset by a general increase in local patronage resulting from decreased congestion levels that would enhance accessibility and attractiveness of this area.

Implementation of Alternative D would not affect pedestrian and bicycle circulation in the area south of Boulder City. However, safety, accessibility, and connectivity would improve for pedestrians and bicyclists along the existing U.S. 93 through Boulder City due to the reduction in traffic volumes.

4.12.3 Mitigation

Construction Mitigation

Implementation of a Traffic Control Plan will reduce short-term impacts associated with the change or restriction of access to businesses and residences near the proposed construction. The Traffic Control Plan will include, but not be limited to, detours, flagmen, signage, and phasing of construction activities to limit impacts.

Operational Mitigation

Alternative B would result in the loss of five businesses along U.S. 93. Mitigation will be in accordance with the Uniform Relocation Act. In addition, relocation support services will be provided to assist displaced businesses in finding alternative locations. The seven

additional businesses and a church partially impacted by the expansion of U.S. 93 will be similarly mitigated.

4.13 Environmental Justice

4.13.1 Environmental Impacts

Using the methodology described in Section 3.13.1, it can be shown that there are no classifiable minority populations and only one low-income population within the project area. This latter group is located in the mobile home park south of U.S. 93 and west of Buchanan Boulevard. As a result, the only further environmental justice analysis necessary is for the low-income population within census tract 55.01, block group 2. The discussion below shall only focus on impacts to this area.

Construction Impacts

Construction of the proposed project would not result in environmental justice impacts for Alternatives A, C, or D, because there are no classifiable minority populations within the project area, and the only low-income population is located well away from these alternatives. Impacts resulting from the construction of Alternative B are discussed below. The discussion of impacts resulting from the construction of Alternative B is further limited because some do not occur near enough to the low-income neighborhood to result in environmental justice impacts. As a result, the discussion below does not include impacts relating to floodplains, water quality, hazardous waste, historic structures, archaeological/cultural resources, or biological resources.

Alternative B – Improvements to the Existing U.S. 93 Alignment. Construction of improvements to the existing alignment of U.S. 93 would result in noise, social, economic, air quality, and visual impacts. An evaluation of whether or not these project effects would result in environmental justice impacts follows.

Noise Impacts. As discussed in Section 4.3, noise from construction activities would add to the noise environment in the immediate project area. Activities involved in construction would generate noise levels ranging from 88 to 92 dBA at a distance of 15 m (50 ft). Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours. Noise would also be generated by increased truck traffic associated with transport of heavy materials and equipment on area roadways. This noise increase would be of short duration and would probably also occur primarily during daytime hours.

The low-income area that would be affected by this noise would be the mobile home park located south of U.S. 93 with access from Gingerwood Street. Commercial buildings along U.S. 93 would provide a buffer to the mobile homes from some of the construction-related noise and would lessen the impact of the construction noise on the low-income population within this area. Because the construction noise impact would be short-term in nature, would mainly occur during the daytime, and would be buffered by commercial structures between the residences and the highway, this impact would not be adverse. As a result, the construction noise would not result in an environmental justice impact.

Land Use Impacts. As discussed in Section 4.9, the mobile home park west of Buchanan Boulevard and south of U.S. 93, in addition to other residential areas within Boulder City, may be subject to detours during construction of Alternative B. Despite potential detours, access to all residential neighborhoods would be maintained at all times, and special accommodation would be made for emergency vehicle access. As a result, no environmental justice impacts would occur.

Social Impacts. As discussed in Section 4.12, construction of Alternative B would result in decreased accessibility to retail businesses along U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard. Boulder City residents, including the residents off Gingerwood Street, would experience these impacts. However, implementation of a Traffic Control Plan will reduce these short-term impacts and avoid environmental justice impacts.

Economic Impacts. As discussed in Section 4.11, construction of Alternative B has the potential to impact retail businesses that depend on good visibility and access to through-traffic. Temporary detours and access points, lasting approximately 12 to 18 months, would be established during construction to allow customer access to these businesses. Businesses relying on U.S. 93 for the delivery of goods and services may also experience a temporary increase in transportation costs due to traffic delays. However, these costs are expected to be minor and short term, and they would not result in environmental justice impacts for nearby low-income residents.

The displacement of five businesses, which generate sales and property tax revenue for Boulder City and Clark County, could also result in the loss of employment opportunities. These businesses account for an estimated 0.4 percent of the total sales in Boulder City. Because their contribution is negligible and there is also a possibility that these businesses would relocate somewhere else in Boulder City, the overall economic impact from displacement of these businesses is negligible. There would be no resulting environmental justice impact.

Air Quality Impacts. As discussed in Section 4.2, construction activities would cause short-term impacts to localized air quality. These impacts would result from fugitive dust generated by clearing and grading activities and from tailpipe emissions generated from the use of diesel-powered construction equipment and vehicles.

Areas near the construction site, particularly the senior mobile home park and neighborhood off of Gingerwood Street, would be impacted. Fugitive dust may adversely affect those people who are susceptible to air pollutants, such as the elderly, young children, and those with respiratory disorders. If left unmitigated, the impacts resulting from construction emissions would be temporary but adverse. In order to mitigate the negative effects of these impacts, several measures would be employed. Wet dust suppression techniques, such as watering and chemical stabilization, would be used to prevent or suppress dust from becoming airborne. Trucks would also be washed or cleaned before leaving the construction site and covered when transferring materials. Unnecessary vehicular and machinery activities (e.g., excessive idling) would be minimized to reduce tailpipe emissions. After mitigation, construction emissions would not be adverse and would not result in an environmental justice impact.

Visual Impacts. As discussed in Section 4.10, construction activities would cause short-term impacts to the area's views. Impacts common to all alternatives include dust generated by construction activities, the presence of construction equipment, and increased light emitted during possible nighttime construction. These impacts would largely affect residents living along the built alternatives.

Residents are regarded as a sensitive viewer group due to the prolonged nature of the proposed construction, as well as their increased sensitivity to their place of residence. Therefore, the residents of the mobile home park can be considered a sensitive viewer group, despite the low quality of their present view of U.S. 93, and would be particularly vulnerable to visual impacts. If emitted in sufficient quantities, fugitive dust generated by construction activities in conjunction with adverse weather conditions could degrade existing views. However, such an impact would vary depending on the activity performed on a specific day and would not be considered an adverse visual impact due to the intermittent nature of the construction period and the application of appropriate mitigation measures. Dust suppression techniques, like those used to mitigate air quality impacts, would also mitigate impacts to views.

The presence of construction equipment would be a temporary unavoidable impact that could not be mitigated. However, should construction activities be performed during nighttime hours, the light emanating from the floodlights would be directed away from residences and shielded so as not to be intrusive and cause an adverse impact. With the implementation of mitigation measures, construction effects on views would not result in environmental justice impacts.

Operational Impacts

Operation of the proposed project would not result in environmental justice impacts for Alternatives A, C, or D, because there are no classifiable minority populations within the project area, and the only low-income population is located away from these alternatives. Impacts resulting from the operation of Alternative B are discussed below.

The discussion of impacts resulting from the operation of Alternative B is further limited because some impacts do not occur near enough to the low-income neighborhood to result in environmental justice impacts. As a result, the discussion below does not include noise, floodplain, water quality, land use, hazardous waste, historic structures, archaeological/ cultural resources, visual, or biological resource impacts.

Alternative B – Improvements to the Existing U.S. 93 Alignment. Operation of the proposed improvements to the existing alignment of U.S. 93 would result in land use, social, economic, and air quality impacts. An evaluation of whether or not these project effects would result in environmental justice impacts follows.

Social Impacts. As discussed in Section 4.12, Alternative B would require an expanded right-of-way near the intersection of U.S. 93 and Buchanan Boulevard. Five businesses would be removed west of that intersection, thereby eliminating the goods and services provided by these establishments and slightly reducing employment opportunities for Boulder City residents. Additionally, seven businesses and a church would be partially affected by the expanded right-of-way. This loss of right-of-way would result in a loss of parking space, signage, and/or display areas.

The expansion of right-of-way near the intersection of U.S. 93 and Buchanan Boulevard would require the residents living south of U.S. 93 to use an alternate route to downtown Boulder City via the extension of Elm Street. While this change in circulation would be a minor annoyance for long-time residents, the change would also allow for the partial avoidance of U.S. 93 and would result in an improvement to local circulation and a beneficial project impact.

Alternative B would also result in the installation of raised medians in the commercial district between Veterans Memorial Drive and Buchanan Boulevard. These medians would restrict ingress and egress to right turns only, limiting accessibility from the opposite traffic lane. However, the raised medians would not substantially limit traffic access as left-turn and U-turn pockets would be provided. The raised medians would also serve as pedestrian refuges at designated crossings, benefiting the elderly, who may walk to the U.S. 93 businesses. Consequently, the operation of Alternative B would not produce social environmental justice impacts.

Economic Impacts. As discussed in Section 4.11, Alternative B would result in the installation of raised medians along U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard. In addition to limiting access (discussed above), these medians could result in lower revenues for affected businesses whose customers choose to avoid the additional driving time. However, the impacts are not likely to be substantial, and the improved mobility from this alternative would probably result in overall improved sales. As a result, Alternative B would not result in environmental justice impacts resulting from economic impacts.

Air Quality Impacts. As discussed in Section 4.2, Alternative B would produce the highest CO concentrations of all the build alternatives, yet it would still be well below the federal standards. As for PM_{10} emissions, because Alternative B is comparable to existing Flamingo Road in Las Vegas, which is not a major source of emissions in Clark County, it can be deemed that this alternative would not have an adverse PM_{10} impact. Therefore, Alternative B would not result in environmental justice impacts resulting from air quality effects.

4.13.2 Mitigation

Construction Mitigation

Because none of the effects from construction of the proposed project would result in environmental justice impacts, no mitigation is necessary. However, to prevent future problems and accommodate access for the area's disabled residents, it is recommended that the construction management plan for Alternative B address transit locations, crosswalks, and street ramps.

Operational Mitigation

Because none of the effects from operation of the proposed project would result in environmental justice impacts, no mitigation is necessary. However, to prevent future problems and accommodate access for the area's disabled residents, it is recommended that the design of Alternative B ensure that transit stop locations, crosswalks, and street ramps

are included and conform to Americans with Disabilities Act (ADA) specifications for elderly, handicapped, and those with disabilities.

4.14 Bicycles/Pedestrians

4.14.1 Environmental Impacts

Construction Impacts

During construction, short-term impacts to pedestrians and bicycle facilities for each of the build alignments would occur. A description of the construction impacts expected for each of the project alternatives follows.

Alternative A. Because Alternative A would not require any construction activities, there would be no impacts to pedestrians or bicycle facilities.

Alternative B. The construction of Alternative B would have the greatest effect on access and connectivity of the existing bicycle and pedestrian transportation system because this alternative impacts the largest area of the existing U.S. 93 corridor. Impacts resulting from construction of this alternative would include detouring bicyclists and pedestrians along the entire portion of U.S. 93 within Boulder City (i.e., Veterans Memorial Drive to Pacifica Way). Furthermore, the widening of U.S. 93 in Hemenway Wash would likely cause the temporary closing of the multiuse drainage/pedestrian crossings of U.S. 93, potentially resulting in pedestrians crossing the busy roadway, as well as a section of the River Mountains Loop Trail.

Rerouting of traffic would also reduce the available travel area for bicyclists and pedestrians where they use the shoulder of U.S. 93. Without a strong presence of signage and temporary facilities, safety could be compromised along U.S. 93 within Boulder City.

Alternative C. Because more of Alternative C would be located away from the congested traffic areas of U.S. 93 than Alternative B, Alternative C would produce less of an impact to existing bicycle and pedestrian facilities during construction than Alternative B. For example, between Veterans Memorial Drive and Buchanan Boulevard, construction impacts would be minimal.

However, construction of Alternative C would result in some of the same impacts within the Hemenway Wash area that would occur for Alternative B. These impacts would include the possible redirection of traffic into temporary roadway shoulders and the potential closure of the multiuse tunnels and trail. In addition, some construction staging areas would impact the southern portions of the Bootleg Canyon mountain bike trails.

Alternative D (Preferred Alternative). The construction of Alternative D would result in the least amount of impact to existing bicycle and pedestrian facilities of any of the build alternatives because the only areas of existing U.S. 93 included in this alternative are the very western and eastern portions of the alignment. However, access points for NPS backcountry roads and other recreational (hiking, equestrian, etc.) trails would be cut off temporarily during construction. Bicycle traffic in the Railroad Pass area would be directed to a connector roadway to Foothills Road in Henderson, Nevada.

Operational Impacts

This section evaluates impacts to pedestrians and bicycle facilities, the mass transit system, and recreational trails resulting from the operation of each of the alternatives for the proposed project.

Alternative A. Noise, dirt, dust, speed of traffic, and the type of traffic along U.S. 93 discourage the use of bicycle and pedestrian facilities within Boulder City. The existing roadway has a considerable amount of through truck traffic that crowds roadways, and traffic volumes for Alternative A are projected to increase substantially in the future. As a result, current unsafe conditions for bicyclists would be exacerbated in the future. Planned new bus routes in Henderson and Boulder City, and a possible new transit transfer terminal, will increase the number of pedestrians and bicyclists becoming part of the transit system in the Boulder City area. Implementation of Alternative A would not result in adverse impacts to the transit system, the NPS backcountry road system, or any hiking or recreational trail.

Alternative B. Construction of Alternative B would change traffic patterns within Boulder City, resulting in impacts to pedestrians and bicycle facilities. Within Boulder City and west of the River Mountains Trailhead, the new roadway would be widened and improved. In Hemenway Wash, the new roadway would parallel a frontage road, for which pedestrian and bicycle facilities would be needed.

U.S. 93 has a considerable amount of through truck traffic that crowds roadways, and traffic volumes for Alternative B are projected to increase substantially for most portions of the study area in the future, especially those areas west of the River Mountains Trailhead. Because these existing traffic conditions already discourage the use of U.S. 93 by pedestrians or bicyclists, increased future volumes would perpetuate these unsafe conditions.

At the western study limits, Alternative B would also prevent bicyclists and pedestrians from traveling along U.S. 93 from Railroad Pass to Henderson (Figure 4-13). Because the new highway would overlap the existing road at the western limits and the new highway would not permit pedestrian or bicycle travel, bicyclists and pedestrians would no longer be able to use the shoulder of the road for travel. In essence, Alternative B would cut off the existing route to Henderson along the shoulder of the road.

An increase in traffic within the Boulder City commercial corridor would continue to restrict bicycle and pedestrian facilities for Alternative B. Along this section of the alignment, without a signal the widened roadway would result in pedestrians jaywalking across U.S. 93 to access the westbound bus. Because of the current and future projected high traffic volumes, jaywalking across any portion of U.S. 93 is unsafe.

Alternative B would result in an improved intersection at U.S. 93 and Buchanan Boulevard. However, safe pedestrian access to the Albertson's shopping center on the west side of U.S. 93 near the Boulder Oaks RV Park would be reduced. Without mitigation measures, existing bicycle and pedestrian facilities in the Hemenway Wash area would also be impacted by the operation of Alternative B. Possible impacts include closing the multiuse tunnels under U.S. 93, displacement of a section of the River Mountains Loop Trail, as well as reduced access to recreational areas and trails.

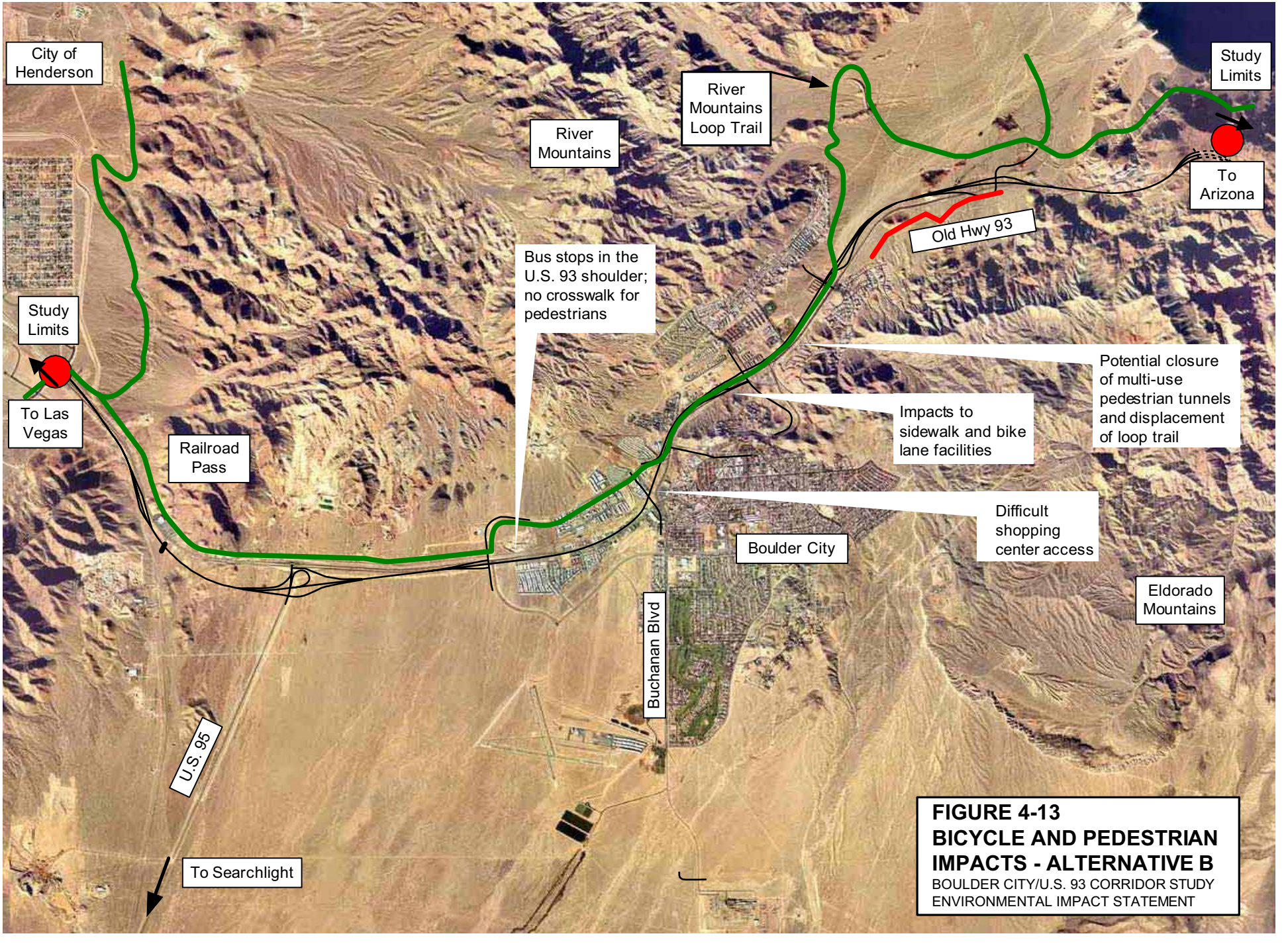

FIGURE 4-13
BICYCLE AND PEDESTRIAN IMPACTS - ALTERNATIVE B
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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Alternative C. Alternative C would be located away from the existing U.S. 93 alignment throughout most of its western portion. As a result, Alternative C would have less of an impact to existing and proposed pedestrian and bicycle facilities within town. However, the alignment outside of Boulder City results in a larger impact to recreational facilities and the trails that lead to in-town bicycle/pedestrian facilities (Figure 4-14). For example, Alternative B crosses both access roads for the Bootleg Canyon mountain bike trails (e.g., Red Mountain Road and a dirt road that extends from Canyon Road).

The operation of Alternative C would result in similar impacts to Alternative B, most notably the lack of a bicycle/pedestrian link from Railroad Pass to the City of Henderson at the western study limits. Alternative C also crosses the River Mountains Loop Trail in the vicinity of Industrial Road.

Alternative D (Preferred Alternative). The operation of Alternative D would reduce traffic volumes on existing U.S. 93 through Boulder City. However, because some motorists would continue to travel on existing U.S. 93 rather than the proposed Alternative D, traffic volumes would continue to increase within Boulder City, but at a slower rate. Therefore, the current problems of safety, accessibility, and connectivity would only be partially resolved for pedestrians and bicyclists along existing U.S. 93 for this alternative. Although Alternative D would not directly impact existing U.S. 93 (except to divert traffic away from it), it would affect recreational trails and NPS backcountry roads in the eastern portion of the alignment through the Eldorado Mountains (Figure 4-15). The area around the Mead Substation in the southern part of the project area is a popular location for parking and beginning recreational excursions for equestrian and four-wheeler enthusiasts. As a result, maintaining access to this location and the desert region south of the project area is very important. Furthermore, Alternative D crosses several NPS backcountry roads, including Canyon Point Road, Boy Scout Canyon Road, and various WAPA powerline access roads. The Goldstrike Canyon Trailhead is located near the Hoover Dam Bypass Nevada Interchange.

The spectacular view of Lake Mead and the LMNRA afforded to motorists near the crest of Eldorado Ridge (Figure 4-3) is expected to create a safety hazard as vehicles pull-off the road to take pictures and enjoy that view.

4.14.2 Mitigation

Construction Mitigation

During construction, provisions for safe pedestrian and bicycle access throughout the corridor shall be designed and developed as part of a construction management plan for all build alternatives. In particular, the plan shall address how pedestrians will be accommodated during construction along existing U.S. 93. Other specific issues that shall be addressed include pedestrian/bicycle access across U.S. 93 and detour plans for pedestrians and bicyclists. Appropriate and well marked signage and striping shall be included to allow for safe transport. Where new roadways cross existing recreational trails, access shall be maintained by detouring users around the construction.

Operational Mitigation

Alternative A. No mitigation measures are needed for Alternative A, which would have no construction impacts.

Alternative B. Mitigation measures to reduce the adverse impacts of this alternative include the following:

- Construct or expand sidewalks along U.S. 93 between Veterans Memorial Drive and Buchanan Boulevard, construct or expand sidewalks to permit pedestrians to use sidewalks safely, and create facilities and signs to distinguish space for bicyclists.
- Work with RTC to relocate the CAT bus stop, located west of the signalized Yucca Street intersection with U.S. 93, and construct a crosswalk to permit safer pedestrian crossing to the westbound bus. Construct bus turnouts at the CAT stops on both sides of U.S. 93 and provide better lighting around the bus stops.
- Install crossing facilities at the new U.S. 93/Buchanan Boulevard intersection; investigate the feasibility of a signal-activated crosswalk with raised median/pedestrian refuge area or construct a pedestrian bridge with wheelchair access at the crossing.
- Construct pedestrian bridges with wheelchair access at the U.S. 93/Industrial Road intersection to accommodate residents of the Boulder Oaks RV Park. Install pedestrian bridges at existing locations of multiuse tunnels if the tunnels cannot be maintained for pedestrian access.
- Construct or relocate bicycle routes along the corridor within Boulder City that adhere to the locations of the planned facilities for Boulder City shown in the RTC "Summary of Bicycle Travelways."
- Provide appropriate pedestrian and bicycle route signage.
- Replace impacted sections of the River Mountains Loop Trail.

Alternative C. In this alternative, mitigation measures would be necessary only where the new alignment crosses existing facilities, rather than along stretches of the corridor through Boulder City, as with Alternative B. Mitigation measures to reduce the adverse impacts of this alternative include the following:

- Provide for a crossing facility of the River Mountains Loop Trail at the new facility east of the U.S. 95 interchange.
- Work with RTC to relocate the CAT bus stop, located east of the signalized Veterans Memorial Drive intersection with U.S. 93, and construct a crosswalk to permit safer crossing to the westbound bus. Construct bus turnouts at the CAT stops on both sides of the road and provide better lighting of the area around the bus stops.
- Construct a crossing at Red Mountain Road (a gravel road extension of Yucca Street to the north leading into the Bootleg Canyon mountain bike trails).
- Maintain the River Mountains Loop Trail alignment in the vicinity of Industrial Road as Alternative C approaches Hemenway Wash.
- Construct pedestrian bridges within Hemenway Wash at existing locations of multiuse tunnels if the tunnels cannot be maintained for pedestrian access.

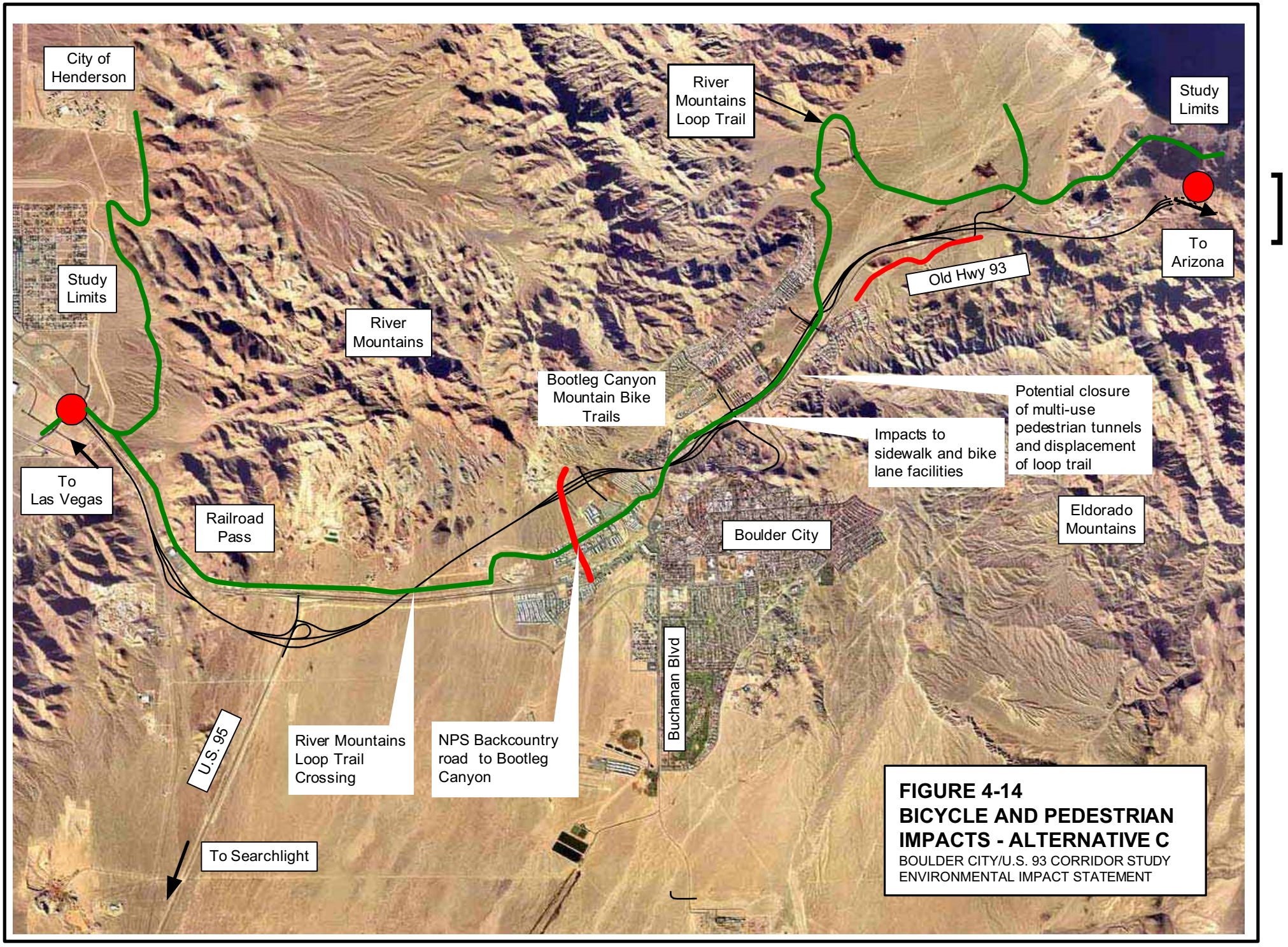

FIGURE 4-14
BICYCLE AND PEDESTRIAN IMPACTS - ALTERNATIVE C
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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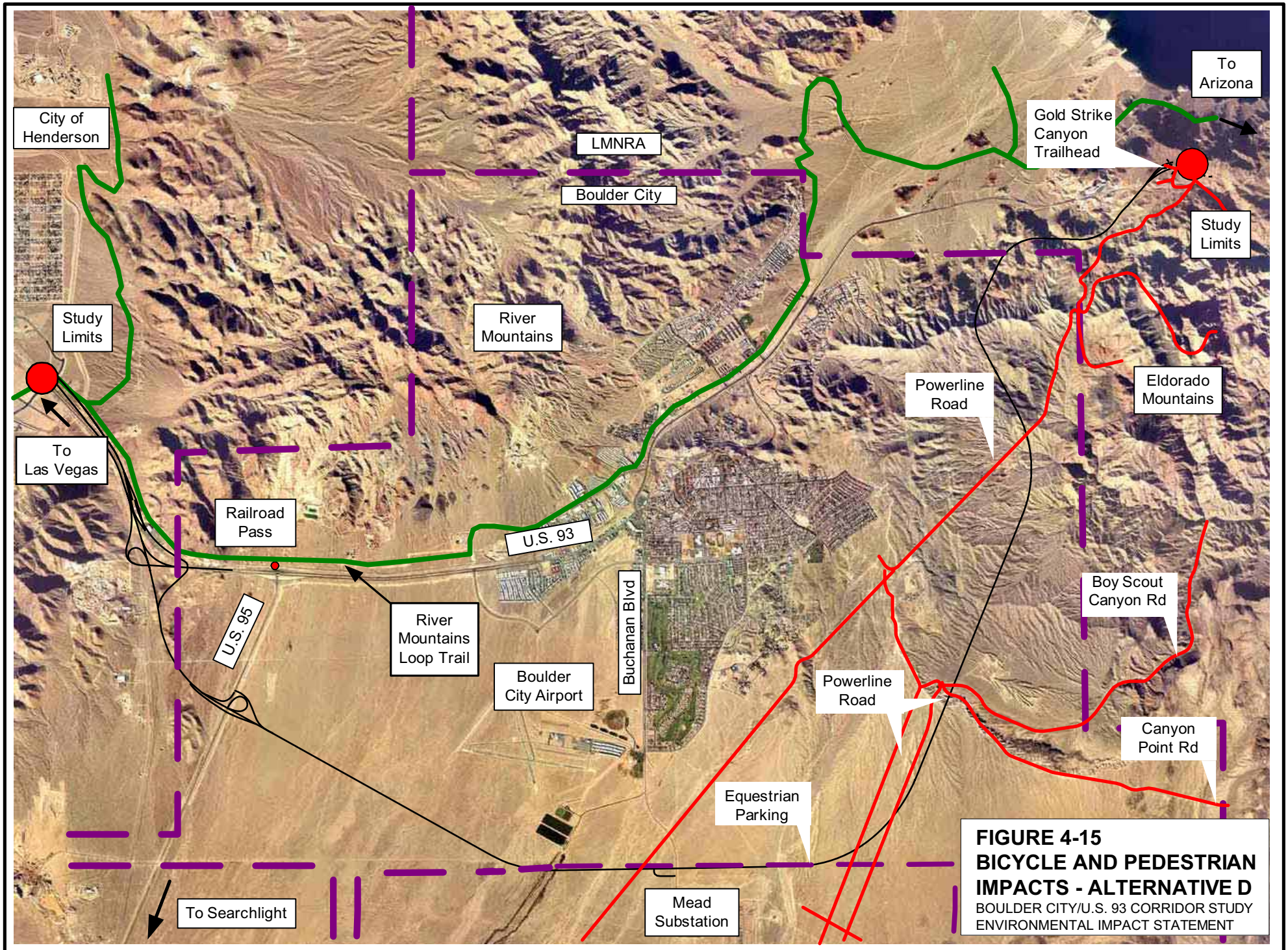

FIGURE 4-15
BICYCLE AND PEDESTRIAN IMPACTS - ALTERNATIVE D
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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- Construct or relocate bicycle routes along the corridor within Boulder City that adhere to the locations of the planned facilities for Boulder City shown in the RTC "Summary of Bicycle Travelways."
- Maintain the integrity and access to Old Highway 93, an NPS backcountry road.
- Provide appropriate pedestrian and bicycle route signage.
- Replace impacted sections of the River Mountains Loop Trail.

Alternative D (Preferred Alternative). Appropriate measures to mitigate impacts along the southern alignment include the following:

- Provide a local access connector from the Railroad Pass area using existing U.S. 93 and connecting to Foothills Road.
- Construct a grade separation for continued access from Boulder City to Mead Substation.
- Construct a crossing to the east of Mead Substation to allow for equestrian and four-wheel drive access to recreational areas south of Boulder City.
- Construct crossings at the following NPS backcountry roads: Canyon Point Road, Boy Scout Canyon Road. Measures to ensure access to pre-existing power line roads will also be implemented, including a dual-use culvert crossing in the vicinity of the Intertie Substation (Figure 4-3).
- Provide appropriate pedestrian and bicycle route signage.

In addition to the above, a scenic overlook will be constructed near the crest of the Eldorado Ridge with vehicle pull-outs and a parking area to afford visitors with a safe means of stopping to enjoy the view of Lake Mead and the LMNRA from this point.

4.15 Hazardous Waste

4.15.1 Construction Impacts

Hazardous wastes encountered during construction of any of the corridor alternatives would result in unavoidable adverse impacts if the wastes are not managed properly and/or releases to the environment occur without appropriate cleanup. However, existing federal and state laws and regulations described in Section 3.15.2 provide stringent control over hazardous waste management, as well as prevention and response to spills and releases. Construction of any corridor alternative would be required to comply with all existing hazardous waste laws and regulations.

The following sections evaluate potential impacts related to the hazardous waste and material sites identified in Section 3.15.3 from the construction of the project alternatives. Planning-level plan and profile drawings of the corridor alternatives were used to locate the sites with respect to the potential areas of construction.

Alternative A – No Build Alternative

Alternative A would leave existing conditions as they are, so no construction would occur. Therefore, no construction impacts would occur.

Alternative B – Improvements to the Existing U.S. 93 Alignment

GTE Government Systems, 301 Conestoga Way. This site would be a significant distance (approximately 1 km [0.6 miles]) from the construction footprint of the corridor. No contamination was reported during the removal of USTs at this site. Therefore, this site would not result in hazardous waste impacts during construction.

NDOT, U.S. 95 and Wagonwheel. This site would be a significant distance west (almost 1 km [0.6 mile]) of the construction footprint of the corridor. The reported diesel spill at this site was cleaned up, and contaminated soil was removed as part of the cleanup effort. Although confirmation samples were not taken, there is little likelihood that significant contamination remains. This is supported by the regulatory agency decision to close the case without the confirmation samples. The site does not fall within the area that would undergo construction, so even if low-level contamination was to still exist at the site, it would not pose an exposure concern during construction or operation of this alternative. Therefore, this site would not result in hazardous waste impacts during construction.

Boulder Highway Diesel Spill. This site would be a significant distance west (almost 1 km [0.6 mile]) of the construction footprint of the corridor. The Vista database entry indicated that the site involved diesel fuel and was closed in 1994. No agency file was found at NDEP or DAQEM. No indication of this site was observed during the March 26, 2001, reconnaissance. With the lack of agency records on the site, assessment of potential impacts relied on the Vista database entry and inferences from other sites in the area with similar conditions. The database entry does not refer to a UST or AST, so the release was likely a surface spill of diesel fuel. In other reports of fuel spills reviewed, contaminated soil was removed and disposed of prior to the issuance of an NFA letter. It is reasonable to assume appropriate action such as soil removal would have taken place, if necessary, in order for the site to be closed in 1994. Therefore, this site would not result in hazardous waste impacts during construction.

Goudie Industrial Plaza, 1581 Foothill Drive. This site would be approximately 200 m (650 ft) north of the construction footprint for the corridor. One UST was removed from this site and there was no soil contamination reported. Therefore, this site would not result in hazardous waste impacts during construction.

Veltman Property, 1553 and 1559 Industrial Road. This site would be approximately 250 m (800 ft) north of the construction footprint for the corridor. Site closure, with the reported residual TPH and trace amounts of PCE and TCE in soil, would not likely result in significant offsite contamination or exposure risk. Therefore, there would be no hazardous waste impacts during construction.

LADWP, 690 Wells Road. This site would be approximately 200 m (650 ft) north of the construction footprint for the corridor, so there would be no impacts to existing USTs at this site. No hazardous waste issues were identified in documents reviewed for this site. Therefore, there would be no hazardous waste impacts during construction.

Reclamation, 500 Date Street. This site would be approximately 100 m (328 ft) southeast of the construction footprint of the corridor. The case was closed in 1993, and there was no information reviewed that suggested an existing hazardous waste issue at the site. Therefore, there would be no hazardous waste impacts during construction.

Boulder City Transformer Site, 500 Date Street. This site would be approximately 150 m (500 ft) southeast of the construction footprint of the corridor. The case was closed, and residual contamination was below detection limits, except for one sample. Residual soil contamination would likely not extend beyond the immediate vicinity of the spill. Therefore, this site would not result in hazardous waste impacts during construction.

Reclamation, 400 Railroad Avenue. This site would be approximately 100 m (328 ft) east of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact an area over 100 m (328 ft) long to extend to the corridor. That does not appear to be the situation here. The UST case at this site was closed with no further action required. Residual soil contamination would not likely extend significantly beyond the excavation area. Therefore, this site would not result in significant hazardous waste impacts during construction.

Boulder City Maintenance Yard, 500 Railroad Avenue. This site would be approximately 100 m (328 ft) east of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact an area over 100 m (328 ft) long to extend to the corridor. That does not appear to be the situation here. The UST case at this site was closed with no further action required. Residual soil contamination would not likely extend significantly beyond the excavation area. Therefore, this site would not result in significant hazardous waste impacts during construction.

Public Works Department Yard, 500 Railroad Avenue. This site would be approximately 100 m (328 ft) east of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact a relatively large area to extend to the corridor. That does not appear to be the situation here. The case at this site was eventually closed with no further action required. Although residual soil contamination was higher than reported at other sites, it probably does not extend significantly beyond the disposal areas. Therefore, this site would not result in significant hazardous waste impacts during construction.

LADWP, 600 Nevada Way. This site would be approximately 150 m (500 ft) east of the construction footprint of the corridor. The UST case at this site was closed, and residual soil contamination was below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

Central Telephone Company, 503 Ash Street. This site would be approximately 150 m (500 ft) east of the construction footprint of the corridor. The UST case at this site was closed, and residual soil contamination was below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

FAA, Red Mountain VORTAC. This site is located on the top of a mountain, over 2 km (1.25 miles) from any anticipated corridor construction. The cleanup at this site was very limited (3 cubic yards of soil removed) and resulted in an NFA letter. Therefore, this site would not result in hazardous waste impacts during construction.

Water Treatment Facilities, 243 Lakeshore Road. This site would be located over 8 km (5 miles) north of the construction footprint of the corridor. A hazardous waste concern would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was closed with no further action required. Therefore, this site would not result in hazardous waste impacts during construction.

Lake Mead Fish Hatchery, 245 Lakeshore Road. This site would be located almost 10 km (6.2 miles) north of the construction footprint of the corridor. A hazardous waste concern would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was closed with no further action required. Therefore, this site would not result in hazardous waste impacts during construction.

D. H. Blatner Sons, Lakeshore Road. The precise location of this site was not identified in available records. However, the spill was quite small (10 to 20 gallons of diesel fuel), and the case was resolved very quickly (3 days). No information was found to suggest that there is a hazardous waste concern at this site. Therefore, this site would likely not result in hazardous waste impacts during construction.

First Stop/Last Stop, 100 Ville Drive. This site would be 60 m (200 ft) north of the construction footprint for the corridor, so there would be no impacts to existing USTs at this site. The USTs passed tightness testing, and there were no reported releases at the time of this study. No hazardous waste issues were identified in documents reviewed for this site. Therefore, there would be no hazardous waste impacts during construction.

Lakeview Station, U.S. 93. This site would be located approximately 30 m (100 ft) north of the construction footprint of the corridor. After multiple tests, the UST case at this site was eventually closed with no further action required. It is not known whether residual soil contamination extends significantly beyond the excavation area. However, there is only a slight potential that it would extend into the corridor. Therefore, this site would not likely result in hazardous waste impacts during construction.

Lowe North Construction, Nelson Road. The location of this site could not be determined from agency records. However, the diesel spill case at this site was closed with no further action required, and residual soil contamination was reported as below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

Service Station, 3715 South Industrial. This site is located in Las Vegas, not Boulder City. Therefore, there would be no hazardous waste impacts during construction.

Omega Recycling, Nevada and California. Although the Vista database entry referenced this site to Boulder City, there was no file for this site at NDEP or DAQEM, and no information to indicate a Boulder City location. No information was found that would suggest a hazardous waste impact during construction.

Alternative C – Through Town Alignment

GTE Government Systems, 301 Conestoga Way. This site would be a significant distance (approximately 1 km [0.6 miles]) from the construction footprint of the corridor. No contamination was reported during the removal of USTs at this site. Therefore, this site would not result in hazardous waste impacts during construction.

NDOT, U.S. 95 and Wagonwheel. This site would be a significant distance (almost 1 km [0.6 mile]) from the construction footprint of the corridor. The reported diesel spill at this site was cleaned up, and contaminated soil was removed as part of the cleanup effort. Although confirmation samples were not taken, there is little likelihood that significant contamination remains. This is supported by the regulatory agency decision to close the case without the confirmation samples. The site does not fall within the area that would undergo construction, so even if low-level contamination was to still exist at the site, it would not pose an exposure concern during construction or operation of this alternative. Therefore, this site would not result in hazardous waste impacts during construction.

Boulder Highway Diesel Spill. This site would be a significant distance (almost 1 km [0.6 mile]) from the construction footprint of the corridor. The Vista database entry indicated that the site involved diesel fuel and was closed in 1994. No agency file was found at NDEP or DAQEM. No indication of this site was observed during the March 26, 2001, reconnaissance. With the lack of agency records on the site, assessment of potential impacts relied on the Vista database entry and inferences from other sites in the area with similar conditions. The database entry does not refer to a UST or AST, so the release was likely a surface spill of diesel fuel. In other reports of fuel spills reviewed, contaminated soil was removed and disposed of prior to the issuance of an NFA letter. It is reasonable to assume appropriate action such as soil removal would have taken place, if necessary, in order for the site to be closed in 1994. Therefore, this site would not result in hazardous waste impacts during construction.

Goudie Industrial Plaza, 1581 Foothill Drive. This site would be approximately 100 m (328 ft) south of the construction footprint for the corridor. One UST was removed from this site, and there was no soil contamination reported. Therefore, this site would not result in hazardous waste impacts during construction.

Veltman Property, 1553 and 1559 Industrial Road. This site would be approximately 60 m (200 ft) south of the construction footprint for the corridor. Site closure, with the reported residual TPH and trace amounts of PCE and TCE in soil, would not likely result in significant offsite contamination or exposure risk. Therefore, there would be no hazardous waste impacts during construction.

LADWP, 690 Wells Road. This site would be approximately 100 m (200 ft) south of the construction footprint for the corridor, so there would be no impacts to the USTs at this site. No hazardous waste issues were identified in documents reviewed for this site. Therefore, there would be no hazardous waste impacts during construction.

Reclamation, 500 Date Street. This site would be approximately 700 m (2,300 ft) southeast of the construction footprint of the corridor. The case was closed in 1993, and there was no information reviewed that suggested an existing hazardous waste issue at the site. Therefore, there would be no hazardous waste impacts during construction.

Boulder City Transformer Site, 500 Date Street. This site would be approximately 700 m (2,300 ft) southeast of the construction footprint of the corridor. The case was closed, and residual contamination was below detection limits, except for one sample. Residual soil contamination would likely not extend beyond the immediate vicinity of the spill. Therefore, this site would not result in hazardous waste impacts during construction.

Reclamation, 400 Railroad Avenue. This site would be approximately 500 m (1,600 ft) south of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact a relatively large area to extend to the corridor. That is not the situation here. The UST case at this site was closed with no further action required. Residual soil contamination would not likely extend significantly beyond the excavation area. Therefore, this site would not result in hazardous waste impacts during construction.

Boulder City Maintenance Yard, 500 Railroad Avenue. This site would be approximately 500 m (1,600 ft) south of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact a relatively large area to extend to the corridor. That is not the situation here. The UST case at this site was closed with no further action required. Residual soil contamination would not likely extend significantly beyond the excavation area. Therefore, this site would not result in hazardous waste impacts during construction.

Public Works Department Yard, 500 Railroad Avenue. This site would be approximately 500 m (1,600 ft) south of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact a relatively large area to extend to the corridor. That is not the situation here. The case at this site was eventually closed with no further action required. Although residual soil contamination was higher than reported at other sites, it probably does not extend significantly beyond the disposal areas. Therefore, this site would not result in hazardous waste impacts during construction.

LADWP, 600 Nevada Way. This site would be approximately 500 m (1,600 ft) south of the construction footprint of the corridor. The UST case at this site was closed, and residual soil contamination was below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

Central Telephone Company, 503 Ash Street. This site would be approximately 0.4 km (0.25 mile) south of the construction footprint of the corridor. The UST case at this site was closed, and residual soil contamination was below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

FAA, Red Mountain VORTAC. This site is located on the top of a mountain, over 2 km (1.25 miles) from any anticipated corridor construction. The cleanup at this site was very limited (3 cubic yards of soil removed) and did result in an NFA letter. Therefore, this site would not result in hazardous waste impacts during construction.

Water Treatment Facilities, 243 Lakeshore Road. This site would be located over 8 km (5 miles) north of the construction footprint of the corridor. A hazardous waste concern would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was closed with no further action required. Therefore, this site would not result in hazardous waste impacts during construction.

Lake Mead Fish Hatchery, 245 Lakeshore Road. This site would be located almost 10 km (6.2 miles) north of the construction footprint of the corridor. A hazardous waste concern would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was closed with no further action required. Therefore, this site would not result in hazardous waste impacts during construction.

D. H. Blatner Sons, Lakeshore Road. The precise location of this site was not identified in available records. However, the spill was quite small (10 to 20 gallons of diesel fuel), and the case was resolved very quickly (3 days). No information was found to suggest that there is a hazardous waste concern at this site. Therefore, this site would likely not result in hazardous waste impacts during construction.

First Stop/Last Stop, 100 Ville Drive. This site would be 60 m (200 ft) north of the construction footprint for the corridor, so there would be no impacts to existing USTs at this site. The USTs passed tightness testing, and there were no reported releases at the time of this study. No hazardous waste issues were identified in documents reviewed for this site. Therefore, there would be no hazardous waste impacts during construction.

Lakeview Station, U.S. 93. This site would be located approximately 30 m (100 ft) north of the construction footprint of the corridor. After multiple tests, the UST case at this site was eventually closed with no further action required. It is not known whether residual soil contamination extends significantly beyond the excavation area. However, there is only a slight potential that it would extend into the corridor. Therefore, this site would not likely result in hazardous waste impacts during construction.

Lowe North Construction, Nelson Road. The location of this site could not be determined from agency records. However, the diesel spill case at this site was closed with no further action required, and residual soil contamination was reported as below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

Service Station, 3715 South Industrial. This site is located in Las Vegas, not Boulder City. Therefore, there would be no hazardous waste impacts during construction.

Omega Recycling, Nevada and California. Although the Vista database entry referenced this site to Boulder City, there was no file for this site at NDEP or DAQEM and no information to indicate a Boulder City location. No information was found that would suggest a hazardous waste impact during construction.

Alternative D – Southern Alignment (Preferred Alternative)

Public Works Department Yard, 500 Railroad Avenue. This site would be located over 4 km (2.5 miles) north of the corridor. A hazardous waste concern at this site would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was eventually closed with no further action required. Although residual soil contamination was higher than reported at other sites, it probably does not extend significantly beyond the disposal areas. Therefore, this site would not result in hazardous waste impacts during construction.

DOE, Mead Substation. This site would be located approximately 500 m (1,600 ft) south of the construction footprint of the corridor. A hazardous waste concern at this site would have to impact a very large area to extend to the corridor. That is not the situation here. The reported hazardous waste case was closed in 1992. No information was found to suggest that there is a significant hazardous waste concern at this site. Therefore, this site would likely not result in hazardous waste impacts during construction.

DOE Westermead, Buchanan Boulevard. The location of this site along Buchanan Boulevard was not specified in the agency file. However, the UST case at this site was closed with no further action required and very little residual soil contamination. Therefore, this site would not be expected to result in hazardous waste impacts during construction.

Boulder City Landfill. This landfill would be located approximately 1 km (0.6 miles) west of the construction footprint of the corridor. Available information reviewed for this study did not indicate any hazardous waste issues with this facility. Therefore, this site would not result in hazardous waste impacts during construction.

FAA, Red Mountain VORTAC. This site is located on the top of a mountain, over 6 km (3.7 miles) from any anticipated corridor construction. The cleanup at this site was very limited (3 cubic yards of soil removed) and did result in an NFA letter. Therefore, this site would not result in hazardous waste impacts during construction.

Water Treatment Facilities, 243 Lakeshore Road. This site would be located over 8 km (5 miles) north of the construction footprint of the corridor. A hazardous waste concern would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was closed with no further action required. Therefore, this site would not result in hazardous waste impacts during construction.

Lake Mead Fish Hatchery, 245 Lakeshore Road. This site would be located almost 10 km (6.2 miles) north of the construction footprint of the corridor. A hazardous waste concern would have to impact a vast area to extend to the corridor. That is not the situation here. The case at this site was closed with no further action required. Therefore, this site would not result in hazardous waste impacts during construction.

D. H. Blatner Sons, Lakeshore Road. The precise location of this site was not identified in available records. However, the spill was quite small (10 to 20 gallons of diesel fuel), and the case was resolved very quickly (3 days). No information was found to suggest that there is a hazardous waste concern at this site. Therefore, this site would likely not result in hazardous waste impacts during construction.

Lakeview Station, U.S. 93. This site would be located approximately 300 m (1,000 ft) north of the construction footprint of the corridor. After multiple tests, the UST case at this site was eventually closed with no further action required. It is not known whether residual soil contamination extends significantly beyond the excavation area; however, there is only a slight potential that it would extend into the corridor. Therefore, this site would not likely result in hazardous waste impacts during construction.

Lowe North Construction, Nelson Road. The location of this site could not be determined from agency records. However, the diesel spill case at this site was closed with no further action required, and residual soil contamination was reported as below detection limits. Therefore, this site would not result in hazardous waste impacts during construction.

4.15.2 Operational Impacts

Once roadway improvements are constructed, traffic operations on these roadways would not normally result in the generation of hazardous wastes that would impact the corridor. Likewise, the highway traffic would not impact the existing hazardous waste sites in the

vicinity of the roadways simply by driving through the area. There would be no difference among the alternatives.

Occasional incidents, such as truck crashes, may result in the release of hazardous waste or materials. These releases would be expected to be cleaned up as part of the response to each vehicle crash. All of the build alternatives (B, C, and D) are intended to satisfy the need for reducing the frequency of vehicle crashes in comparison to No Build (Alternative A).

In addition to hazardous wastes, the public has expressed a concern related to potential impacts from possible future transportation of radioactive wastes through the Boulder City area in the event the Yucca Mountain Nuclear Fuel and High-Level Radioactive Waste Repository is built and operated. While nuclear wastes do not fall under the definition of "hazardous wastes," the issue is evaluated in this section of the EIS. An FEIS for the Yucca Mountain Repository was published in February 2002. As part of the evaluation of the project, the FEIS analyzed potential transportation impacts within the State of Nevada and throughout the U.S. The FEIS evaluated potential truck routes and rail routes that might serve the Yucca Mountain facility. No roadways in the vicinity of Boulder City were identified as a potential truck route for the Yucca Mountain project. The closest potential truck route would be I-15, including a planned beltway to the west of Las Vegas. However, according to the FEIS, the State of Nevada could designate alternative and additional preferred routes as specified in 49 CFR 397.103. Therefore, impacts from the Yucca Mountain project could occur in the Boulder City/U.S. 93 Corridor project area, but they cannot be effectively evaluated at this time because the routes have not been finalized.

4.15.3 Mitigation

This study did not include a Phase I Environmental Site Assessment of commercial real estate parcels in accordance with American Society for Testing and Materials (ASTM) Standard E 1527-93. Once a preferred alternative is selected and right-of-way parcels are identified for property transfer, a Phase I Environmental Site Assessment will be performed in accordance with ASTM Standard E 1527-93 for all parcels subject to property transfer.

4.15.4 Construction Mitigation

Disposal of the minimal hazardous wastes expected to be generated during construction (i.e., wastes from onsite minor maintenance and repair of construction vehicles) would require the generator to have an EPA generator identification (ID) number. Hazardous wastes would have to be managed and disposed of at EPA-permitted treatment, storage, and disposal facilities in accordance with applicable laws and regulations. Transporters and disposal sites would have to have valid permits, but these permits would be expected to already be in place by the owner/operators and would not be a direct action or requirement of this project.

Because no sites with potential environmental concerns were identified within the planned construction areas in the hazardous waste assessment, no specific mitigation measures would be required for any of the alternatives presently under consideration.

4.15.5 Operational Mitigation

No specific mitigation measures would be required for any of the alternatives currently under consideration.

4.16 Energy Use

4.16.1 Construction Impacts

This section discusses the energy used to construct the build alternatives, including the preferred alternative. Construction of each of the build alternatives would require similar fuel commitments. This fuel usage is considered a short-term project impact, and the largest portion of all energy consumed for the proposed project would occur during the construction period. The No Build Alternative would not require fuel for construction.

Construction of the proposed project would require energy in a variety of forms. Various types of petroleum would be used during the construction period, with diesel and gasoline fuel being used to operate construction equipment and vehicles. Electrical energy would be used for the onsite maintenance trailers. Fossil fuels and electrical energy to manufacture the materials and products associated with roadway construction would also be used.

The energy consumed to construct the proposed project can be estimated by making assumptions about the following variables:

- Construction cost of the alternative
- Construction duration of the alternative
- Number of construction workers traveling to and from the construction site
- Number of trucks and pieces of equipment used
- Efficiency of trucks and equipment (e.g., miles per gallon)
- Length of time trucks and equipment would be used

For this analysis, the energy consumed would be the fuel used for project trucks, construction equipment, and workers' personal vehicles (Table 4-31). Based on construction cost and estimated duration, the estimated number is 100 full-time-equivalent workers throughout the construction duration of each of the build alternatives.

TABLE 4-31
Estimated Fuel Consumption[1]

Alternative	Gallons Per Day	
	10 Miles-Per-Gallon Usage Rate	5 Miles-Per-Gallon Usage Rate
Alternative B[1]	334	548
Alternative C[1]	322	523
Alternative D (Preferred Alternative)[2]	340	560

[1] Over a 3-year construction duration.
[2] Over a 3.3-year construction duration.

4.16.2 Operational Impacts

This section discusses the energy used to operate the build alternatives, including the preferred alternative. The primary energy usage during operation of the proposed highway would be fuel for vehicles traveling over the roadway. Because roadway inspection and maintenance would require regular, but infrequent, trips to the area, energy usage for this phase would be lower than for the construction phase, and it is not considered substantial.

In general, postconstruction operational energy requirements would be expected to be less for the three build alternatives than for the No Build Alternative, because the existing traffic congestion on U.S. 93 is expected to worsen as traffic volumes increase and speeds decrease. This condition would result in increasingly lower fuel efficiency of vehicles traveling on U.S. 93 through the Boulder City area.

Estimated fuel consumption requirements for each of the project alternatives were calculated using the methodology discussed in Section 3.16 (Table 4-32). A discussion of the energy requirements of each alternative as they compare to the No Build Alternative follows.

Alternative B would convert much of the existing U.S. 93 into an expressway. As shown in Table 4-32, the operation of Alternative B would result in a decrease in fuel consumption when compared to the No Build Alternative, resulting in a substantial decrease in the total number of gallons of gasoline used. The operational decrease for this alternative would be the result of increased speed and fewer delays due to traffic congestion.

Alternative C would be a freeway. It would result in both an increase in peak-hour vehicle miles and a decrease in peak-hour vehicle hours when compared to the No Build Alternative. The increased speed of the vehicles and decrease in delay time would allow for a more efficient flow of traffic, resulting in substantially decreased energy consumption.

The preferred alternative (Alternative D) would also be a freeway west of U.S. 95, and a highway east of the U.S. 95 interchange. It would result in a substantial increase in the number of peak-hour VMT due to the increased length of the alignment. The longer length would increase the amount of energy used, but the reduction in delay time provided by the alternative would help offset that increase.

Overall, Alternatives B and C would result in a reduction of energy usage, while Alternative D would result in an increase in energy usage compared to the No Build Alternative. All of the project build alternatives would have a positive influence on the total operational energy consumption for the entire Boulder City road network. The decrease in traffic delays on U.S. 93 would allow traffic from local streets to use the existing U.S. 93, which would create a more efficient roadway system.

4.16.3 Mitigation

Alternatives B and C would result in an overall operational energy consumption savings compared to the No Build Alternative. While Alternative D would result in an increase of operational energy, when compared to the No Build Alternative, it would provide indirect traffic and circulation benefits to the entire Boulder City traffic network. These benefits would offset the increase in energy consumption requirements. The net result would be an overall savings in energy usage.

TABLE 4-32
Year 2027 Estimated Peak-Hour Fuel Consumption Requirements

Alternative	Total Peak-Hour Vehicle Miles	Total Peak-Hour Vehicle Hours	Peak-Hour Average Speed (mph)	Normal Operating Fuel Consumption (gallons)	Idling Time (hours)	Fuel Consumption at Idle (gallons/hour)	Total Estimated Peak-Hour Fuel Consumption (gallons)
Alternative A - No Build	484,969	13,021	37	15,644	3,295	1,911	**17,555**
Alternative B - Expressway Alternative	502,400	8,760	57	15,545	267	155	**15,700**
Alternative C - Through-Town Alternative	522,705	8,773	60	16,631	50	29	**16,660**
Alternative D - Southern Alternative	577,731	10,354	56	18,355	257	150	**18,504**

The proposed build alternatives would complement local and regional efforts to conserve energy resources and would promote more direct and efficient travel through the project area and region. Additionally, these alternatives would ease traffic congestion on existing U.S. 93 and reduce peak-hour traffic volumes. The proposed build alternatives will decrease the traffic congestion, thereby allowing vehicles to travel at an increased LOS. The improved LOS would subsequently result in a more efficient consumption of energy; as a result, no mitigation measures are needed.

4.17 Construction Impacts

The following section details the impacts that may be anticipated during construction of a build alternative. Activities that are considered in this analysis include the use of staging areas, temporary haul and access roads, and other actions that would require additional land area or traffic rerouting. Construction impacts have been grouped into those that affect sensitive environmental conditions and traffic conditions, and those that could result from the concurrent construction of the Hoover Dam Bypass with a build alternative for the Boulder City/U.S. 93 Corridor Study.

The exact degree of impact from construction is dependent upon the number of workers, number and types of heavy-duty vehicles and equipment, and length of time over which these activities would occur. Typical construction activities must be assumed due to the lack of a specific construction schedule and equipment information. It is assumed that a mixture of loaders, haulers, scrapers, backhoes, water trucks, pavers, compactors, generators, bulldozers, and other miscellaneous equipment would be used during construction. For the purpose of this analysis, impacts are determined based on general assumptions concerning access points, length of roadway, and cross-sectional cuts and fills.

4.17.1 Environmental Resources

In this section, potential adverse environmental impacts that might occur during construction of a build alternative are discussed. The following environmental impacts are summarized in this section and presented in more detail in the DEIS sections (Chapters 3 and 4): Air Quality, Noise, Water Quality, and Visual Resources.

Air Quality

Construction of any of the build alternatives, including the preferred alternative, would temporarily degrade the air quality of the immediate project area. Fugitive dust would be generated by clearing and grading earthwork and by construction and haul vehicles traveling on paved and unpaved surfaces. Fugitive dust may adversely impact sensitive people, such as the elderly, young children, and those individuals suffering from respiratory disorders, as well as hikers and other users of LMNRA resources.

Tailpipe emissions from construction equipment and vehicles would also contribute to increased particulate matter and other primary pollutants. The degree of degradation at any given time would be dependent upon the intensity of construction activity in that period.

However, areas near the construction site would be the most susceptible to this nuisance. Therefore, Alternatives B and C would have adverse impacts, as they both are located close to residential and commercial facilities. Alternative D, which predominantly runs through vacant open desert land, would not have this impact.

Noise

Construction activities would add to the noise environment in the immediate project area in the form of two general sources:

- Construction noise ranging from 88 to 92 dBA at a distance of 15 m (50 ft). These noise levels could result in annoyance or sleep disruption if nighttime operations occur or if unusually noisy equipment is used. Because of this, construction activities in developed areas rarely occur during nighttime periods.
- Increased truck traffic associated with transport of heavy materials and equipment on area roadways. This noise increase would be of short duration and would probably occur primarily during daytime hours.

Construction activities could take place for Alternative D at night, as the nearest receptors are over 1 mile away and would not be able to hear the activity. However, Alternatives B and C are near residential neighborhoods, which precludes nighttime activity. By limiting activities in these areas to daylight hours, all build alternatives would avoid adverse noise impacts during construction.

Water Quality

Construction activities would temporarily impact the quality of surface runoff that is conveyed through desert washes into receiving waters. The accidental discharge of waste products and fluids used for equipment cleaning during construction are of primary concern. Alternative B crosses six washes that lead to navigable waters (Lake Mead or the Colorado River), while Alternative C crosses seven washes and Alternative D crosses six washes. Staging areas would be located in the general vicinity of all crossings, creating the potential for accidental discharge into a receiving water.

Erosional effects of construction of the build alternatives also degrade water quality and are primarily caused by construction of channels and access roads and site grading. In general, steeper grades of constructed channels and temporary access roads lead to greater erosion potential. Of the three build alternatives, Alternative D has the steepest grades, largest cuts and fills, and the most temporary access roads. Therefore, Alternative D would have the most negative water quality impact with respect to erosion potential.

Visual Resources

Construction activity in the vicinity of residential and commercial areas will temporarily degrade the visual landscape for all three build alternatives. Alternatives B and C have similar visual resources construction impacts, as construction would take place in the vicinity of Boulder City residential areas with views of Lake Mead. Alternative D, however, passes south of Boulder City and only approaches Lake Mead at the east end of the project area.

During construction of the build alternatives, dust emitted from earthwork activities would move throughout the surrounding airspace. For the construction of Alternatives B and C, this could potentially hamper views of surrounding mountains, valleys, and Lake Mead for residents and tourists in Hemenway Valley. This is most probable under high wind conditions.

Some naturalists visiting the LMNRA could find the presence of construction equipment and associated construction activities detracts from the views currently experienced within the area. For Alternative D, in particular, cuts in the Eldorado Mountains as deep as 60 m (200 ft) will be visible to hikers and other naturalists traveling within the LMNRA.

Nighttime lighting of the construction area is another potential construction impact on visual resources. This impact is greater for Alternatives B and C, since both alternatives are close to several residential areas in Boulder City. However, Alternative B could take advantage of existing lighting along U.S. 93. The impact is less for Alternative D, as any lighting used for construction will be over 1 mile away from the nearest residential area.

4.17.2 Traffic and Circulation

Construction of a build alternative will have an effect on the routing, congestion, and overall safety of the traffic network within already busy roads in the project area. This assessment of traffic impacts takes into consideration the locations of new access roads to the facility; delivering gravel, equipment, and vehicles to the site; and the number of heavy truck and personnel vehicle trips associated with construction of the facility. Because of the preliminary nature of engineering at this time, the assessment of impacts to traffic is presented in a general, order-of-magnitude manner in this section.

Vehicle Routing and Access

For each of the build alternatives, temporary access roads and detours would be used to allow for passage of construction traffic on U.S. 93 and side roads. This action is by far the most intensive for Alternative B, which makes improvements to existing U.S. 93 while maintaining existing traffic flows to the maximum extent feasible. Detailed signage, lane restrictions, and detours will likely be required during the staged construction of Alternative B, especially within the Boulder City limits.

Construction will require access roads to deliver material, equipment, and workers to the project site. These access roads will consist of both temporary gravel roads and existing roads that are currently used by vehicle traffic. It is those access roads and, in particular, the existing intersections with U.S. 93 that will have the greatest impact on traffic movement. Table 4-33 shows the major access roads that are most likely to be utilized for each build alternative.

TABLE 4-33
Major Access Roads for the New Facility Construction - Boulder City / U.S. 93 Corridor Study Build Alternatives

Alternative B	Alternative C	Alternative D (Preferred Alternative)
U.S. 93	U.S. 93	U.S. 93
U.S. 95	U.S. 95	U.S. 95
	Veterans Memorial Drive	Power line road (Utah Street extension)
	Buchanan Boulevard	Buchanan Boulevard

Construction vehicles for Alternative B will use only the two existing facilities during construction, because the alternative is located on the existing alignment. This indicates that more construction-related traffic would be on existing U.S. 93 for Alternative B than for Alternatives C and D. Additionally, because the construction would be within the existing right-of-way of U.S. 93, a series of detours and lane-shifts would be necessary throughout construction of the facility. This would tend to minimize access to businesses along the commercial corridor between Veterans Memorial Drive and Buchanan Boulevard, and make residential access more difficult in Hemenway Wash.

Because Alternative C passes south and then north of the existing alignment in the western portion of the project area, construction traffic can avoid continuous movement along existing U.S. 93 and access the new facility at Veterans Memorial Drive. This would keep construction traffic from being routed through the commercial corridor and the Buchanan Boulevard intersection. However, through the Hemenway Wash residential area, construction impacts on traffic routing and the required detours would be nearly identical to those for Alternative B.

Construction of Alternative D would produce the least amount of construction-related traffic through town and, specifically, on existing U.S. 93 of all the build alternatives in the study. Gravel haul trucks and trucks carrying raw materials would be able to use U.S. 95 and construct temporary access roads in the relatively flat alluvial fan area west of the airport. In the areas east of the Mead Substation, however, the more efficient routes for construction vehicles would be to travel through town and access the new facility using Buchanan Boulevard and the extension of Utah Street that leads to gravel powerline roads near the Boulder City landfill.

Traffic Congestion

The use and transport of construction vehicles, heavy equipment, and materials equipment would vary throughout the construction period of a build alternative. Some of the heavy equipment would be transported on flatbed trucks. Heavy equipment associated with several construction spreads could be on the site at any given time. The teams would be working simultaneously in different areas of the project site for all build alternatives, and the majority of all equipment would be left onsite for the duration of construction.

For the purpose of this EIS, it is assumed that there would be 100 construction workers, each making three trips per day, on average. An additional 100 construction vehicles of other types, per day, would travel within the project area, for a total of 400 construction-related trips per day. Since these would likely be trucks and other heavy vehicles, an adjustment factor was introduced to account for the additional impact of heavy vehicles. West of Buchanan Boulevard, a factor of 1.2 was used for the additional construction trips. East of Buchanan Boulevard, where grades are steep, a factor of 1.5 was used. This resulted in 480 daily trips west of Buchanan Boulevard and 600 daily trips east of Buchanan Boulevard.

Table 4-34 shows the impact of these added trips to the existing traffic volumes and V/C ratios for construction of Alternative B, the worst-case scenario for construction traffic. To be conservative, the construction trips are added to each link for the project 2016 volumes, and a corresponding adjusted V/C is calculated. While it is likely that the corridor would be constructed before 2016, using the (readily available) 2016 traffic forecasts should provide a conservative estimate of the construction impacts.

TABLE 4-34
Average Annual Daily Traffic (AADT) Volumes and V/C Ratios along U.S. 93
Build Alternative B – Temporary Impacts during Construction

Location on U.S. 93	NDOT Counting Station	1999		2016		2016 + Construction[2]	
		AADT[1]	V/C	AADT	V/C	AADT	V/C
West study limit to U.S. 93/95	230	38,300	0.63	56,300	0.92	56,780	0.93
U.S. 93/95 to Veterans Memorial Drive	331509	32,000	0.53	47,200	0.78	47,680	0.79
Veterans Memorial Drive to Buchanan Boulevard	1087	31,200	0.94	35,900	1.08	36,380	1.09
Buchanan Boulevard to Pacifica Way	228	16,000	0.79	31,500	1.48	32,100	1.51
Pacifica Way to Lakeshore Road	225	15,000	0.91	24,800	1.49	25,400	1.53
Lakeshore Road to east study limit	222	13,000	0.79	21,500	1.30	22,100	1.34

[1] The ADT volumes have been adjusted for seasonal changes, per NDOT factoring procedures.
[2] An additional 720 trips per day is estimated to be added to each trip for construction traffic.

Due to the minimal construction traffic compared to the overall traffic volumes, none of the proposed build alternatives is anticipated to result in a substantial adverse impact to traffic congestion within the project area. As is depicted in Table 4-35, the largest increase in V/C ratio is 0.04, which occurs east of Boulder City in the Hemenway Wash area. Overall, the additional construction vehicles do not decrease the LOS to a substantial degree in any of the links. However, travel time is expected to increase along U.S. 93 for Alternative B throughout Boulder City and for Alternative C through Hemenway Wash, as restricted lanes, detours, and slower posted speeds would be required.

Pedestrian and Traffic Safety

Large construction trucks traveling in the project area may result in safety hazards for through and turning traffic on U.S. 93. Additionally, approximately 10 percent of all existing vehicles travelling on U.S. 93 are medium to large trucks, which would further decrease vision for other motorists with construction traffic added to the mix. Safety concerns would be greatest for Alternative B, less severe for Alternative C, and minimal for Alternative D.

It is anticipated that the greatest impact on public safety would occur in the commercial corridor and Hemenway Wash residential areas. This is in part due to the additional pedestrian and bicyclist presence in these areas, using facilities provided within the existing U.S. 93 right-of-way. Lane restrictions and the detouring of traffic to temporary routes would present a potential concern for pedestrians and bicyclists, and adequate signage and public outreach would be necessary to prevent collisions and other conflicts during construction.

Another safety concern during construction is the maintenance of an adequate emergency vehicle route. Emergency vehicles currently utilize U.S. 93 in conjunction with Buchanan Boulevard to travel from west to east and north to south within the Boulder City area. This includes emergency vehicles that must travel to Hoover Dam. The proposed build alternatives

are not anticipated to result in the closure of any existing emergency access roads during construction, and an emergency vehicle traffic flow plan would be required prior to construction. Because of this, the proposed build alternatives are not anticipated to result in an unavoidable adverse impact on emergency access.

4.17.3 Overall Construction Impacts

Table 4-35 summarizes the overall construction impacts for environmental and traffic-related aspects of the project area, rated at either low (slight), medium, or high (severe):

TABLE 4-35
Construction Impact Analysis
Boulder City / U.S. 93 Corridor Study Build Alternatives

Construction Impact on:	Alternative B	Alternative C	Alternative D (Preferred Alternative)
Air Quality	Medium	Medium	Low
Noise	Low	Low	Low
Water Quality	Medium	Medium	High
Visual Resources	High	High	Medium
Routing and Access	High	High	Medium
Congestion	High	High	Low
Safety	Medium	Medium	Low

4.17.4 Mitigation

Mitigation of adverse construction-related impacts will be required for constructing any of the build alternatives in the Boulder City/U.S. 93 Corridor Study. The following is a breakdown of mitigation measures addressing the environmental and traffic impacts.

Environmental Resources

To minimize air quality impacts during construction, wet dust suppression techniques, such as watering and applying chemical stabilization, shall be used to prevent (or suppress) the fine particulate from leaving the surface and becoming airborne through the action of mechanical disturbance or wind. This mitigation measure shall be applied for the construction of any of the build alternatives.

Construction mitigation for water quality impacts shall require the adoption of BMPs, as outlined in the Water Quality Impacts section of the DEIS (Section 4.5). This includes cleaning and inspecting construction equipment, designating locations away from washes for equipment servicing, and constructing spill containment systems. Additional mitigation measures are necessary for containment of eroded material from side slopes, especially for Alternative D, whose cuts and fills are the largest of all the build alternatives.

Visual resources impacts, in part, are covered by mitigation for air quality impacts, as the dust suppression methods to maintain reasonably healthy air during construction also serve to avoid impairment of existing views. Additionally, during construction in the LMNRA, all vehicles and equipment not in use shall be relocated to staging areas outside the park area. This will

help to maintain the views of Lake Mead and the Eldorado Mountains to which park naturalists are accustomed.

Traffic and Circulation

Prior to construction of the preferred alternative, the contractor shall determine the appropriate traffic control and safety devices to be installed and maintained on U.S. 93 and U.S. 95, as well as any other major streets to be utilized as construction routes to ensure traffic safety. Some examples of typical traffic safety devices include the installation of warning lights, signs, traffic cones, and signals. Required traffic safety devices will warn oncoming motorists that there may be large, slow-moving trucks ahead. Locations where these devices are necessary would include, but are not necessarily limited to, the following:

- Construction of the new interchange at Railroad Pass Hotel and Casino
- Construction of the new east end interchange in the vicinity of the Hacienda Hotel and Casino

The contractor and NDOT shall review the need for requiring flag persons and temporary traffic signage and signals during peak traffic periods at specific locations, especially in the commercial corridor and Hemenway Wash. Traffic safety devices shall be installed prior to use of the major roads of travel within the project limits for gravel hauling or other heavy truck trips, such as the delivery of heavy equipment and construction vehicles to the site.

For construction of crossings of the new highway with existing roads, such as U.S. 95 and the historic railroad, the contractor shall prepare and implement a traffic detour plan outlining the flow of vehicles around the work zone. This plan shall be in accordance with all NDOT and FHWA safety standards, and provide adequate speeds and sight distances for drivers. The plan shall also address the routing of bicyclists and pedestrians through the work zone, and account for adequate signage to allow for safe passage into residential, commercial, government, and recreational areas.

To reduce the potential adverse impacts associated with the temporary loss of access to commercial areas along the existing U.S. 93 corridor, a Traffic Control Plan shall be prepared prior to commencement of construction activity. Features of the Traffic Control Plan may include, but not be limited to, a public awareness campaign and the use of alternative access points, and phasing of construction activities to reduce conflicts with existing land uses.

The contractor shall also repair any roads that are damaged by construction activities and shall return these damaged roads to preconstruction conditions. All road repairs shall be scheduled and conducted to ensure that safe operating conditions are maintained.

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