

2. Project Description and Alternatives

2.1 Introduction

Traffic on U.S. 93 in Boulder City doubled from 17,200 average daily traffic (ADT) in 1985 to approximately 32,000 ADT in 1999. This increase in traffic in the vicinity of the City of Henderson, Boulder City, and Hoover Dam continues, and it has created congestion. The significant traffic growth is due to increased local traffic on U.S. 93 in Boulder City and Hemenway Valley, an increased stream of recreational traffic to Lake Mead, an increased flow of traffic to Hoover Dam with the completion of the new visitor's center, and increased interstate truck traffic. Increased truck traffic is expected with the development of the CANAMEX Trade Corridor, which extends from the Mexican to the Canadian border. This high-priority corridor is being developed chiefly to facilitate transportation distribution, commerce, and tourism throughout the region.

The Boulder City/U.S. 93 Corridor Study was undertaken by NDOT at the request of Boulder City through the RTC to address traffic-related problems along U.S. 93 through the Boulder City area. Figure 1-1 depicts the project area and the study limits.

Corridor alternatives connecting the western and eastern study limits were developed from comments received as a result of the project public outreach and scoping program, which includes public open forum and scoping meetings, and project management team (PMT) meetings. Initial alignments identified were reduced to viable corridor alternatives, which were evaluated and then reduced to three build alternatives plus a "no-build" alternative for future study in the preparation of this EIS. The PMT, consisting of cooperating agencies, NDOT, and FHWA (see Section 1.1), have concurred on the identification of these alternatives, based on this evaluation process.

FHWA approved the Hoover Dam Bypass ROD in March 2001 for the Sugarloaf Mountain Alternative and initiated the preliminary and final design of the project in August 2001. This required the Boulder City/U.S. 93 Corridor Study and Hoover Dam Bypass design teams to begin coordinating the connection between both projects, located just east of the Hacienda Hotel and Casino near existing U.S. 93. Both projects have separate and distinct purpose and need statements, have been planned to operationally stand alone, and have been developed with logical termini consistent with FHWA regulations. The Hoover Dam Bypass project team's development of the Nevada interchange design east of the Hacienda Hotel and Casino is consistent with the ROD. This interchange design did not preclude or predetermine any of the build alternatives developed in this EIS or other alternatives that were considered in the Boulder City/U.S. 93 Corridor Study.

This chapter describes the alternatives considered for the Boulder City/U.S. 93 Corridor Study, and studies of those alternatives, screening criteria developed to aid in selecting alternatives to be evaluated, alternatives eliminated from detailed impact evaluation, and the preferred alternative.

A wide array of alternatives was considered and compared, and the identification of a preferred alternative was not made until impacts of the alternatives and comments on the DEIS and from the public hearings were fully evaluated (see Section 2.8). The four most reasonable alternatives fully evaluated (including the No Build Alternative) were developed to a comparable level of detail so that their comparative merits could be analyzed.

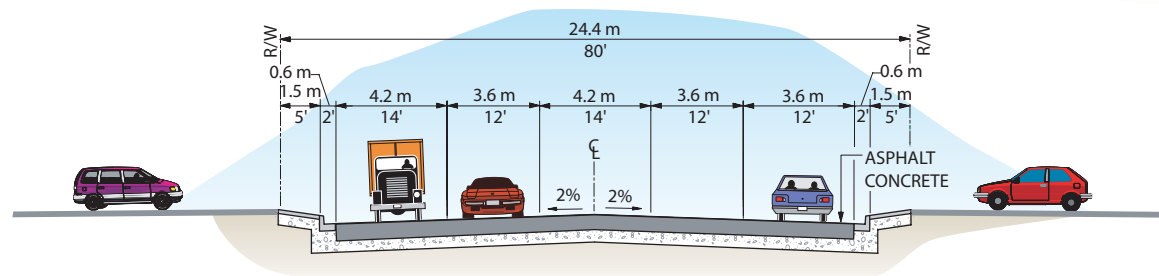
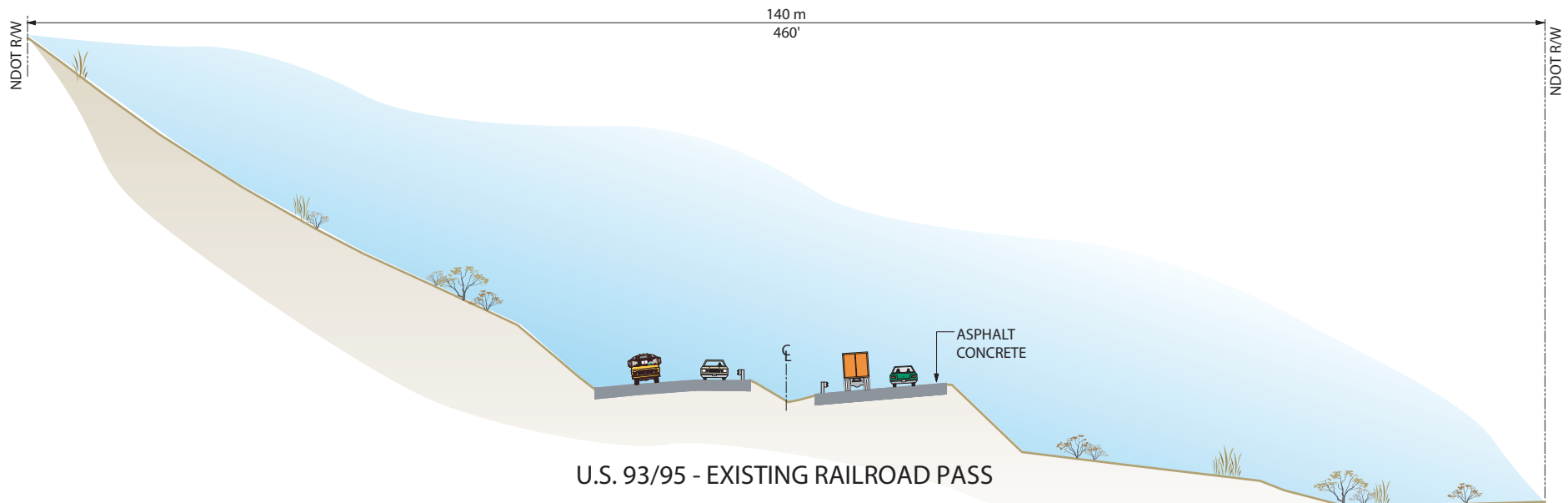
2.2 Project Description

The proposed project involves traffic improvements to U.S. 93 in the Boulder City area, referred to as the U.S. 93 Corridor. The project limits are between a western boundary on U.S. 95 in the City of Henderson, approximately 1.6 km (1 mile) north of the Railroad Pass Hotel and Casino, near the Foothills grade separation, and an eastern boundary on U.S. 93, approximately 1.2 km (0.75 mile) east of the Hacienda Hotel and Casino. The study covers a total distance of approximately 16.7 km (10.4 miles) on the present route of U.S. 93. Within the study corridor, U.S. 93 varies from a four-lane divided roadway to a two-lane roadway with numerous business driveways and cross streets.

The project seeks to provide transportation improvements in the corridor to reduce traffic congestion and crashes, and to improve regional mobility while maintaining or improving local circulation and access to Boulder City businesses. This may be accomplished by either widening and upgrading existing U.S. 93 or by realigning U.S. 93 as a freeway either north or south of the present highway. Figures 2-1 through 2-4 depict the existing U.S. 93, improved U.S. 93 (Alternative B), through-town freeway (Alternative C), and a southern freeway corridor (Alternative D, the preferred alternative).

2.3 Project History

Population growth and increased use of U.S. 93 over Hoover Dam and through Boulder City, Nevada, in recent decades has led to some analysis of the potential to improve the roadway in this area to accommodate the growth. The first consideration of improving the U.S. 93 Corridor occurred in 1982 when NDOT completed an environmental assessment to construct a Truck Bypass at the Buchanan Boulevard intersection and down Hemenway Wash. Since 1982, growth and development of the City in the Hemenway Valley Wash and increased traffic volumes along the corridor due to local and regional traffic compelled the Boulder City Council to request RTC and NDOT to address the growing traffic congestion. NDOT and FHWA initiated the environmental process at the beginning of 2000 to address the social, environmental, and economic considerations of improvements to the U.S. 93 Corridor.



NOTE:
The Nevada Department of Transportation has designated existing U.S. 93 as a principal urban arterial between study limits

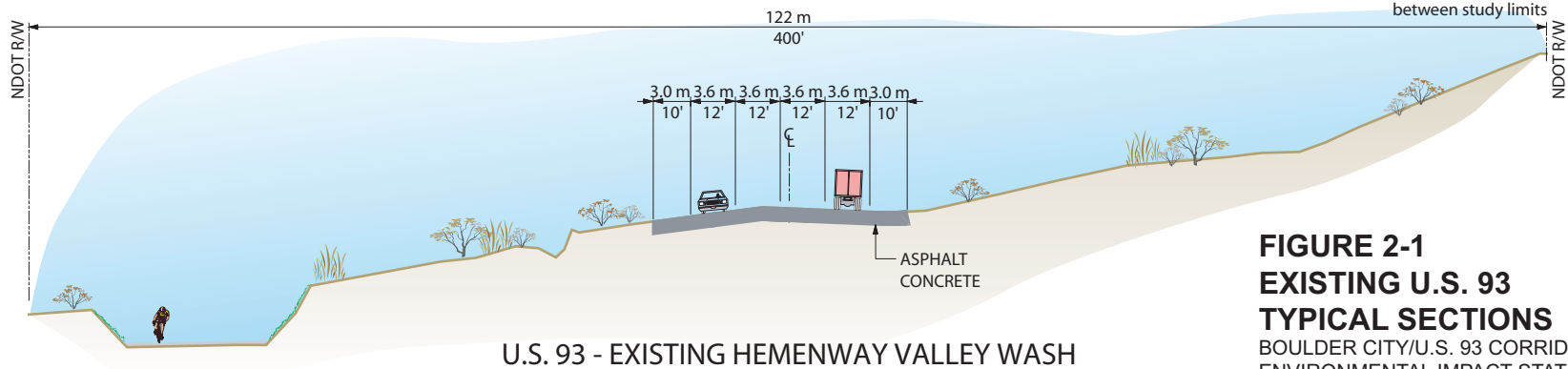
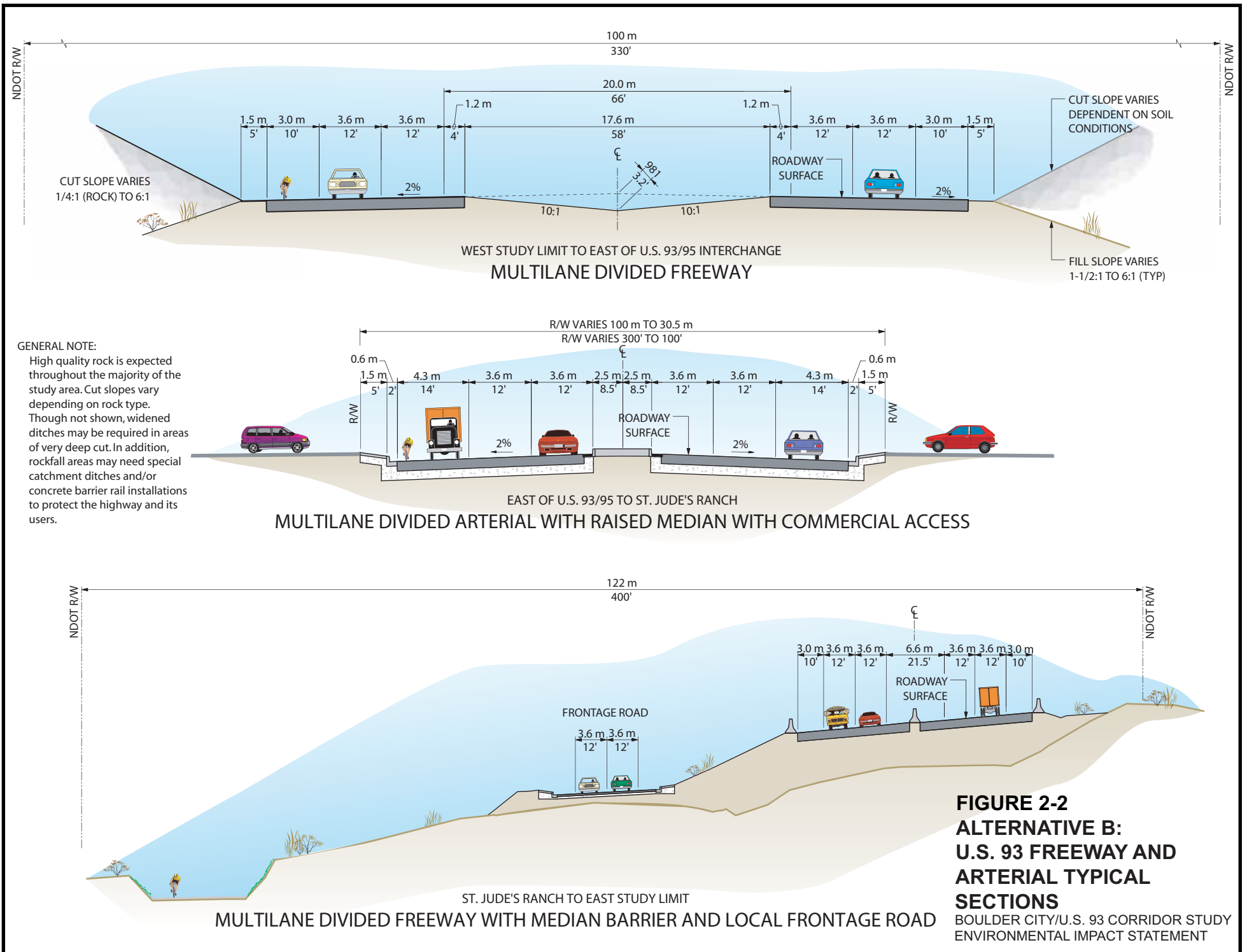


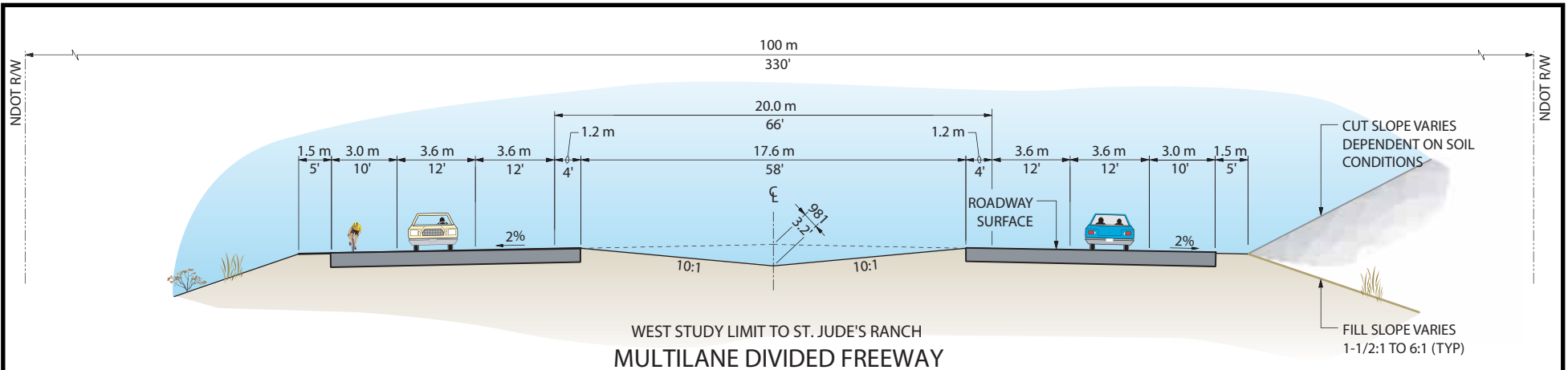
FIGURE 2-1
EXISTING U.S. 93
TYPICAL SECTIONS
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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**FIGURE 2-2
ALTERNATIVE B:
U.S. 93 FREEWAY AND
ARTERIAL TYPICAL
SECTIONS**
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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GENERAL NOTE:
 High quality rock is expected throughout the majority of the study area. Cut slopes vary depending on rock type. Though not shown, widened ditches may be required in areas of very deep cut. In addition, rockfall areas may need special catchment ditches and/or concrete barrier rail installations to protect the highway and its users.

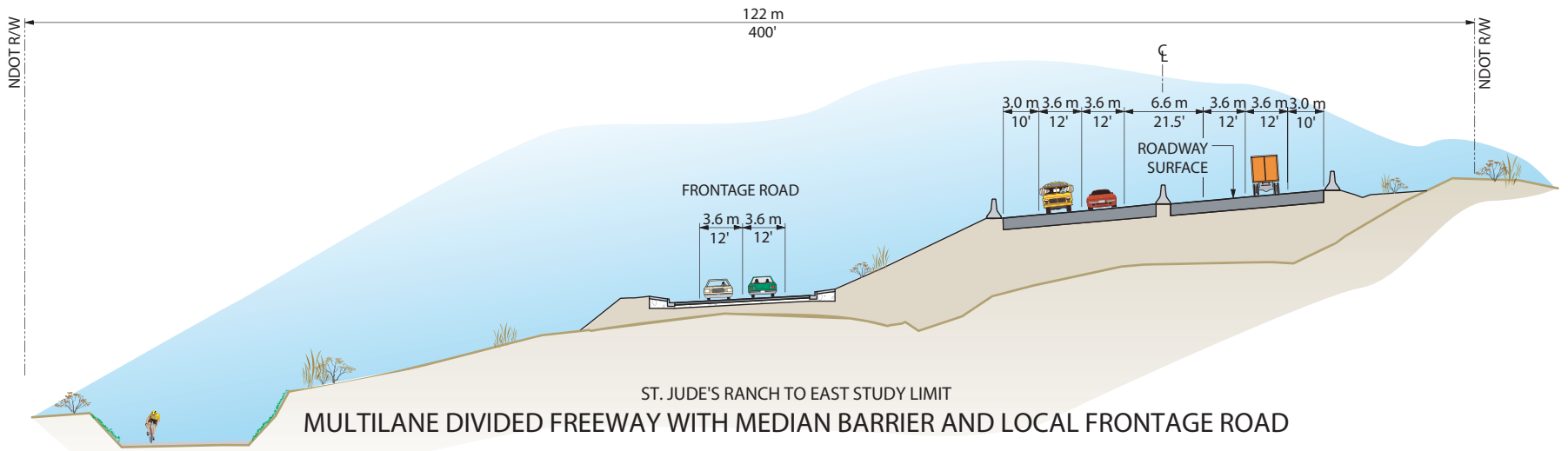
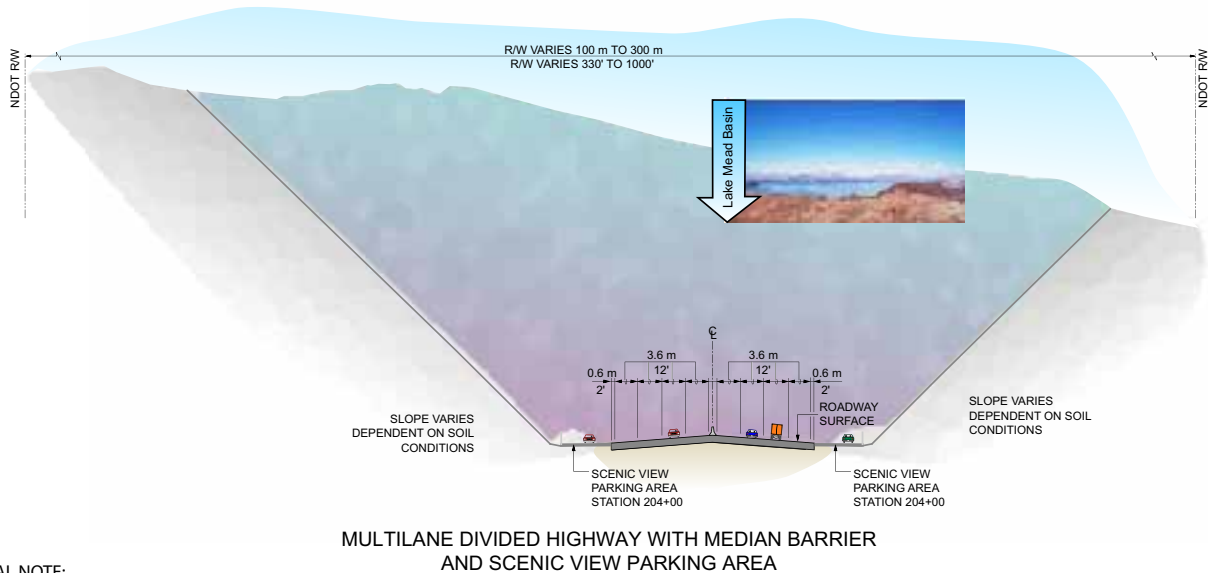
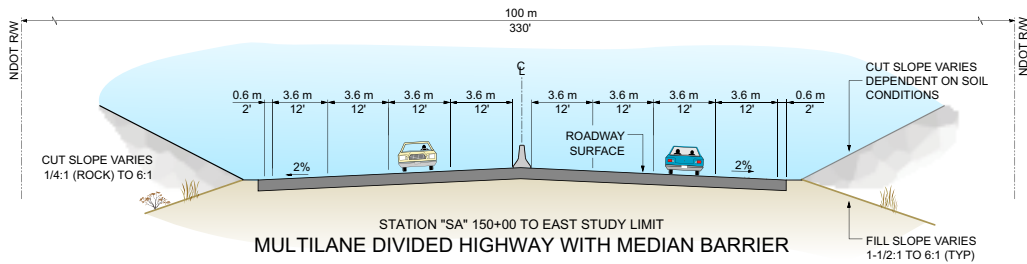
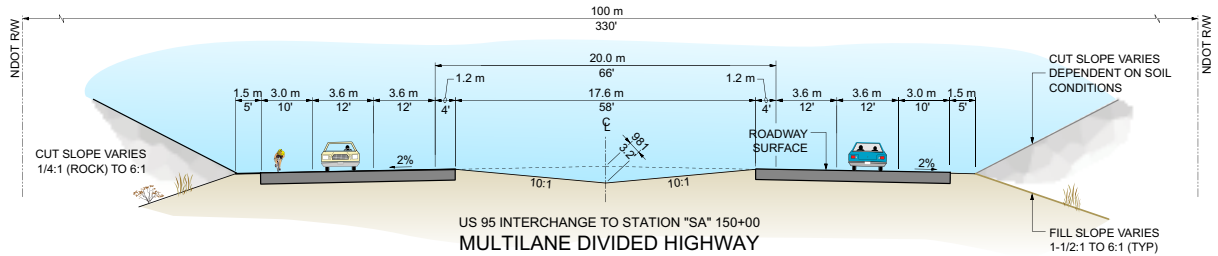
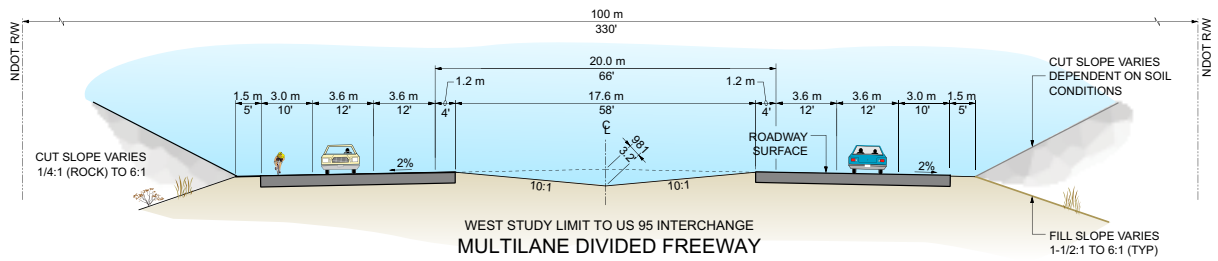


FIGURE 2-3
ALTERNATIVE C:
U.S. 93 FREEWAY
TYPICAL SECTIONS
 BOULDER CITY/U.S. 93 CORRIDOR STUDY
 ENVIRONMENTAL IMPACT STATEMENT

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GENERAL NOTE:

High quality rock is expected throughout the majority of the study area. Cut slopes vary depending on rock type. Though not shown, widened ditches may be required in areas of very deep cut. In addition, rockfall areas may need special catchment ditches and/or concrete barrier rail installations to protect the highway and its users.

**FIGURE 2-4
ALTERNATIVE D:
U.S. 93 HIGHWAY
TYPICAL SECTIONS
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT**

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The second time considerations for improving the transportation corridor were undertaken was in 1990 by Reclamation with the completion of the *Colorado River Crossing Phase A Study Report* (Reclamation, 1990). In this report, Reclamation identified nine alternative routes linking U.S. 93 in Arizona and Nevada. Of the nine routes, the five that crossed the Colorado River well south of Hoover Dam and entered Boulder City from the east or southeast were eliminated from consideration for the following reasons:

- Impact to LMNRA land is much greater than the alternatives that cross near Hoover Dam
- Greater costs based on a longer section of a new route
- Longer sections of U.S. 93 would have to be disposed of
- Perception of some Boulder City businesses that these routes would have a greater adverse impact to local businesses

The alternatives that remained for consideration included the existing alignment and three alternative crossings of Hoover Dam that reconnected with existing U.S. 93 east of Boulder City, all of which did not allow for any improvements to U.S. 93 through Boulder City.

Reclamation proceeded into the Phase B studies, analyzing the Hoover Dam crossing alternatives in more detail, and in 1992 published *The Colorado River Bridge-Hoover Dam, Arizona-Nevada, Phase B Corridor Studies* (Reclamation, 1992). The report contains plan and profile engineering development of the alternatives, as well as some environmental mitigation and a construction schedule. Concurrent with the Phase B studies, Reclamation proceeded with the preparation of a DEIS. However, a change in policy direction at Reclamation, a lack of funding, and concerns from some citizen groups for this project halted the DEIS preparation before its completion.

In 1994, NDOT completed the *U.S. 93 Colorado River Crossing Study* (NDOT, 1994). In this conceptual feasibility study, NDOT took a second look at the Willow Beach Crossing alternative, which was dropped from consideration in Reclamation's Phase A studies, and also analyzed a Hoover Dam Bypass (Sugarloaf Mountain)/Boulder City Southern Bypass combination alternative. This report, however, only conceptually addressed transportation and engineering aspects of the corridor alternatives and not environmental aspects. Environmental documentation of both the Hoover Dam Bypass and Boulder City transportation improvements began in separate EISs, entitled *U.S. 93 Hoover Dam Bypass Project* and the *Boulder City/U.S. 93 Corridor Study*. The U.S. 93 Hoover Dam Bypass Project reached a ROD in March 2001, with the Sugarloaf Mountain Alternative being selected by FHWA. The alternative consists of a freeway bridge crossing of the Colorado River approximately 460 meters (m) (1,500 feet [ft]) south of Hoover Dam (FHWA, 2001).

Boulder City revisited the topic of improvements to the U.S. 93 Corridor as it passes through Boulder City in 1997 when it made a formal request to the RTC. After the request, the project was given a higher priority on NDOT's Statewide Transportation Improvement Program (STIP) coincidental with the RTC's Regional Transportation Plan (RTP). Eventually, the project was selected for study, and it was determined that an EIS would be suitable due to its large scope and overall potential impact.

2.4 Alternatives Identification, Screening, and Evaluation

2.4.1 Initial Screening

Corridor improvement alternatives were developed based on the problems and recommended solutions identified by the residents of Boulder City and the City of Henderson at two public meetings in January and April 2000 in Boulder City, as well as an agency scoping meeting and PMT meetings. A combination of the public involvement input, engineering, and environmental baseline analysis efforts produced 35 alignment segments, totaling over 640 km (400 miles). These initial alignments were described by segment so that different logical segment combinations yielded over 40 potential corridor alignments. Figure 2-5 illustrates the segments subject to initial screening.

The initial alignments (Figure 2-5) were screened from an engineering and environmental perspective with the goal of identifying alignments that met the purpose and need for the project, while minimizing undesirable land use, environmental, and social impacts, thus narrowing the number of alternatives. The analysis included a comparative assessment of impacts with respect to engineering judgment, and an application of environmental considerations raised at the agency scoping meeting and PMT meetings. In their February 2000 meeting, the PMT identified 65 issues and concerns against which to qualitatively screen these initial alternatives. These included concerns regarding land use and community impacts, impacts to natural and cultural resources including sensitive species, recreational access, residential and business relocation, economic effects, impacts to landfill sites, pedestrian and traffic safety and congestion, and trucking and hazardous material transportation. This process used by the PMT reduced the number of segments to comprise 16 viable corridor alternatives, as depicted in Figure 2-6 (NDOT, January 2001).

2.4.2 Initial Evaluation of Corridor Alternatives

After the initial screening described above, 16 corridor alternatives remained (Figure 2-6) to be subsequently evaluated on 30 individual criteria, described below. The alternative corridors were grouped into three categories. The alternative aligned north through the River Mountains was designated as the Northern Alternative (NA). The seven alternatives aligned through the developed areas of Boulder City were designated as Through-Town Alternatives (TA). The six alternatives aligned south of the Boulder City Airport were designated as Southern Alternatives (SA). The remaining two alternatives utilized the existing U.S. 93 Corridor. They included a transportation systems management (TSM) alternative that provides surface improvements at intersections and no grade separations, and a U.S. 93 improved alternative that provides grade separations at key intersections and an overall widening of the roadway. The TSM and U.S. 93 Improved Alternatives were originally not given a "TA" designation, but evaluated with the through-town alternatives.

The corridors were further broken down into families of alternatives. Each "family" indicates a group of alternatives that share similar segments along their alignments. For example, corridor alternatives TA101, TA101A, and TA101B share the same roadway segment from the western study limit, south of the U.S. 93/95 interchange and north of existing U.S. 93 and Industrial Road, and only differ in their respective segments through Hemenway Valley. In addition, there were several northern corridor alternatives that made up an "NA" family of alternatives (NDOT, January 2001).

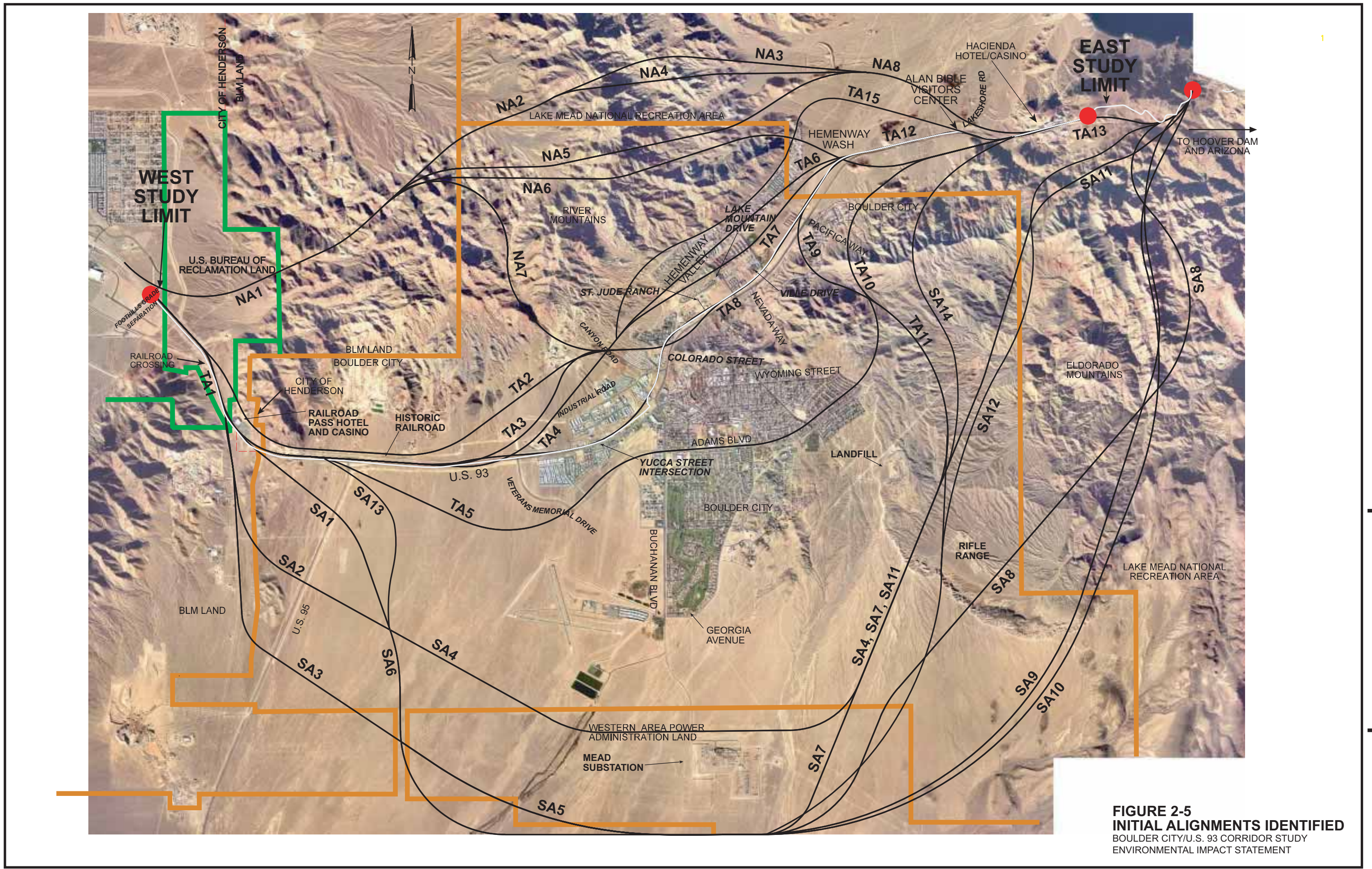
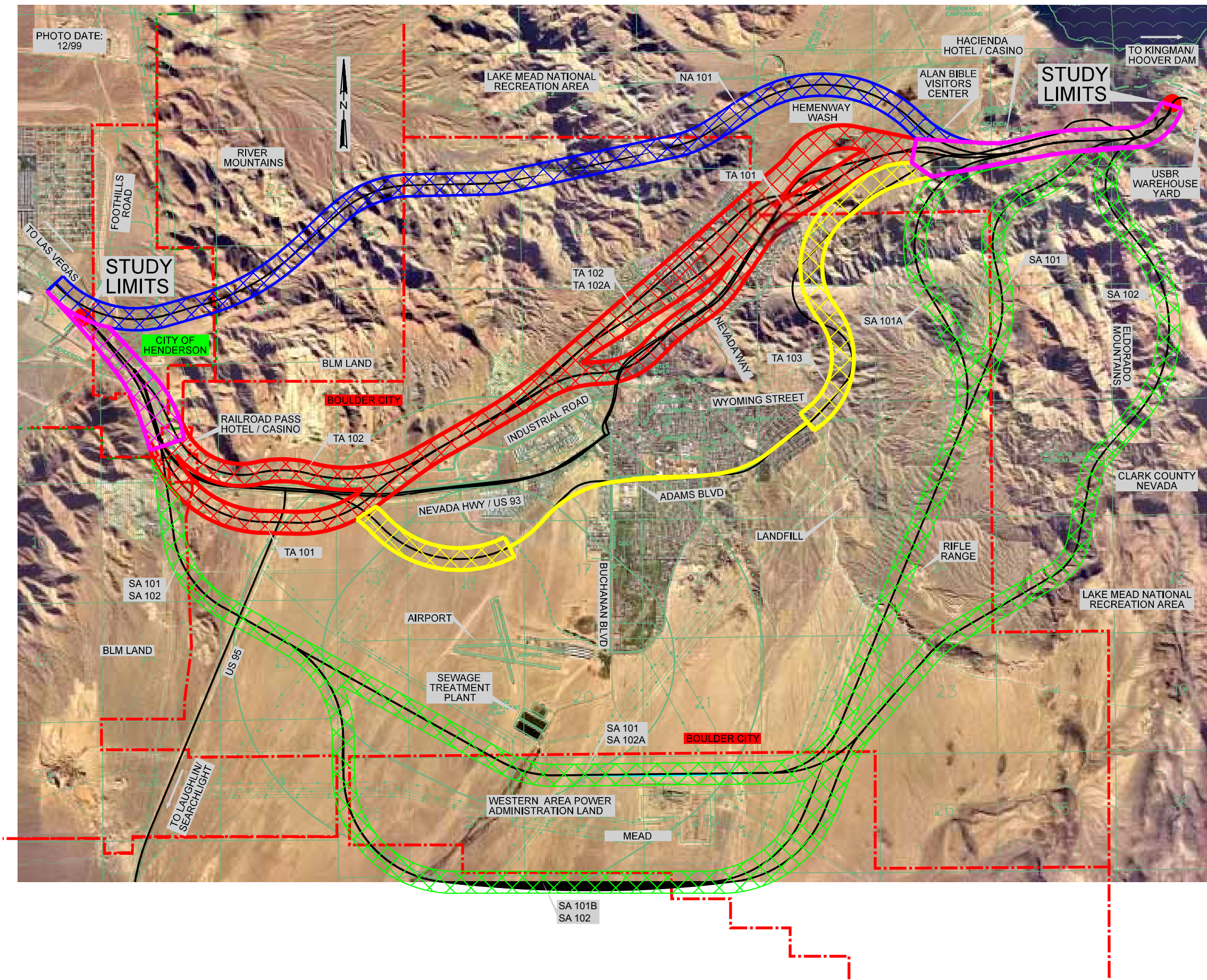


FIGURE 2-5
INITIAL ALIGNMENTS IDENTIFIED
 BOULDER CITY/U.S. 93 CORRIDOR STUDY
 ENVIRONMENTAL IMPACT STATEMENT

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LEGEND

- NORTHERN ALTERNATIVES
- THROUGH-TOWN ALTERNATIVES
- SOUTHERN ALTERNATIVES

FIGURE 2-6
ALTERNATIVE CORRIDORS
EVALUATED
 BOULDER CITY/U.S. 93 CORRIDOR STUDY
 ENVIRONMENTAL IMPACT STATEMENT

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Preliminary horizontal and vertical alignments for each of the corridor alternatives were prepared based on minimizing cuts and fills along the roadway. The alignments conformed to the corridor topography, existing drainage patterns, existing local traffic circulation, and utilized American Association of State Highway and Transportation Officials (AASHTO) design guidelines. A digital color aerial map was prepared at a scale of approximately 1 inch equals 1,000 ft for the project area, created from color aerial photography and U.S. Geological Survey (USGS) quadrangle maps (NDOT, January 2001).

Northern Alternative

The Northern Alternative alignments pass to the north of Boulder City, beyond residential or commercial developments. During the initial engineering and environmental evaluation, the northern alternatives were represented by corridor alternative NA101 (Corridor NA101), which was considered to be the most reasonable of the northern alignments (NDOT, January 2001, Appendix A). Corridor NA101 originates near the Foothills Road grade separation, crosses the high River Mountains through Hidden Valley along the northern limits of Boulder City, passes through Hemenway Wash, crossing the existing U.S. 93 and Lakeshore Road intersection, and ties in to existing U.S. 93 in the vicinity of the Hacienda Hotel and Casino (NDOT, January 2001, Appendix B).

Corridor NA101 was selected for criteria screening evaluation, because all of the northern routes exhibited nearly identical properties.

Through-Town Alternatives

This family of alternative alignments pass through or near town, are compatible with the local network, and generally follow the same geographic corridor as existing U.S. 93. Nine “build” alternatives were considered (NDOT, January 2001, Appendix B). There are three segments that can be combined to make six possible through-town corridor freeway alternatives: TA101, TA101A, and TA101B. The family of Corridor TA101 alternatives realign U.S. 93 westerly through Railroad Pass and consider the same three segments through Hemenway Wash. Because the Hemenway Wash area produces fairly large stormwater flows along existing U.S. 93, all through-town alignments are being considered as abovegrade through the wash segment.

Corridor TA102 alternatives realign U.S. 93 easterly through Railroad Pass and consider three alternative corridors through Hemenway Wash. Corridor TA103 (the Adams Boulevard Alternative) is an arterial improvement that extends the Adams Boulevard corridor with tie-ins just east of the existing U.S. 95 interchange and just west of the Lakeshore Road intersection with existing U.S. 93. An expansion of the existing U.S. 93 facility (U.S. 93 Improved Corridor Alternative), with interchanges at critical intersections, was also considered. This alternative was initially referred to as the “Low-Build” Alternative; it subsequently passed through the screening evaluation and, after refinement, became one of the four alternatives studied in detail in this EIS, referred to as Alternative B. Finally, a TSM alternative was initially evaluated, which provides only surface improvements to existing intersections of U.S. 93 and no grade separations.

Southern Corridor Alternatives

All southern corridors provide for an interchange upgrade at the Railroad Pass Hotel and Casino, a grade-separated crossing of the historic railroad, and a new U.S. 93/95 interchange. The six corridors were developed based on alignments north and south of the Mead Substation and through two different reaches of the Eldorado ridge (NDOT, January 2001, Appendix B).

These alternative alignments pass south of town, serving as a bypass corridor to existing U.S. 93. Six “build” corridors were initially considered. There are two families of corridors within the southern alternatives. The SA101 corridor alternatives consist of alignments that pass through the power line saddle east of Boulder City and through the Eldorado Mountains. The SA102 corridor alternatives include a segment that passes through the Eldorado Mountains further to the east, which takes these alignments well within the National Park Service (NPS) LMNRA boundary. While the SA101 area is aligned further west and avoids most of this LMNRA land, it requires much larger cuts and fills as the alignments traverse considerably steeper terrain.

2.4.3 Evaluation and Criteria

Evaluation criteria were developed by the PMT from the issues and concerns described by the residents of Boulder City and the City of Henderson at the two public meetings held in January and April 2000, as well as from the agency scoping meeting in February 2000. The PMT added issues and concerns to this list during PMT meetings in March and April. A set of 30 criteria was subsequently developed and used to evaluate the 16 corridor alternatives. The criteria were developed by attending to key engineering, environmental, land use, and economic factors that impact the project and were grouped into the following six categories:

- Accessibility
- Operations
- Safety/Design
- Environmental Impacts
- Implementation
- Socioeconomic Impacts

The criteria were formed so that both quantitative and qualitative evaluations of the 16 alternative corridors could be derived. The criteria, not listed in any particular order, were defined as follows.

Accessibility Criteria

- **A1 – Access to Pedestrian Facilities:** This criterion accommodates the requirements of pedestrians in the vicinity of a given alternative. The intent of the criterion is to evaluate pedestrian mobility resulting from a given alternative.
- **A2 – Access to Approved Bicycle Facilities:** This criterion accommodates the transportation and recreation requirements of bicyclists in the vicinity of a given alternative. The intent of the criterion is to evaluate bicyclist mobility resulting from a given alternative.

- **A3 – Local Access for Residents:** This criterion evolved from an issue brought up at the first public meeting when a resident requested the project provide access for people who do not want to use the freeway. The measurement of this will indicate whether local Boulder City residents would be able to travel throughout the city while not being required to enter existing U.S. 93 or a new freeway.
- **A4 – Access to Recreational Facilities:** This criterion evolved from an issue brought up at the PMT Meeting, noting the need to maintain access to LMNRA by means of interchanges at appropriate intersections or other roadway connections. This access is measured for automobiles, as well as hikers and bicyclists.
- **A5 – Access to Businesses along U.S. 93:** This criterion evaluates the degree of access to existing businesses provided by a given alternative. It is measured on a physical basis of traffic proximity and ease of access, unlike Criterion S4, which measures the degree of business exposure to passing traffic.

Operations Criteria

- **O1 – Reduction of Truck Traffic through Town:** This criterion evolved from an issue presented at the first public meeting, which stated that “trucks are a safety problem.” The criterion is measured by reduction of vehicle miles traveled (VMT), a distance parameter that indicates the number of miles logged by trucks traveling on the existing U.S. 93 roadway on a given day after construction of an alternative.
- **O2 – Congestion:** The alleviation of congestion at the three critical intersections within the study area (Railroad Pass, Buchanan Boulevard, and Lakeshore Road) is currently part of the Purpose and Need Statement. Future LOS, as determined by traffic modeling, is used to measure congestion alleviation, where “A” provides the highest degree and “F” provides the lowest. The V/C ratio is also incorporated into the evaluation as a measurement of efficiency of a given alternative.
- **O3 – Traffic Flow through Town:** The public made comments at both public meetings that travel time through Boulder City on existing U.S. 93 is too long. PMT members shared these thoughts. Corridor alternatives are measured with this criterion by average running speed, determined by traffic modeling of the various alternatives (NDOT, January 2001, Appendix C).
- **O4 – Accommodation for Mass Transit:** This criterion was included in the matrix to evaluate the potential of a given corridor alternative to accommodate mass transit needs within Boulder City. The issue was requested by the RTC.
- **O5 – Railroad Operations:** The Nevada State Railroad Museum expressed in the agency scoping meeting that a goal of this EIS should be to preserve the integrity of the historic Boulder City Branch Railroad (BCBRR) and restore the railroad crossing near Railroad Pass.

Safety/Design Criteria

- **D1 – Safety (I):** This safety criterion addresses the overall degree of safety within the entire corridor alternative. This includes geometric and other engineering considerations and traffic elements related to safety.

- **D1 – Safety (II):** This criterion specifically addresses the three key high-crash U.S. 93 intersections (Railroad Pass, Buchanan Boulevard, and Lakeshore Road), as determined by NDOT. The measurement is performed by modeling the decrease in traffic at these intersections with the construction of a given alternative and estimating the effect of the traffic reduction on the number of crashes.
- **D2 – Design Standards:** This criterion was created to quantify the length of new alignment that would be required to be constructed at six percent grade, the NDOT design maximum for a freeway. Operations are compromised when designing extended lengths of a six percent grade and from high truck usage.

Environmental Impacts

- **E1 – Visual Impacts (I):** This visual impact criterion deals with the physical adaptation of a new roadway to the existing environment in or adjacent to the corridor. High ratings are given to a structure that blends well and is nearly “hidden” in the surrounding terrain, while low ratings are given to a structure that is highly visible from long distances.
- **E1 – Visual Impacts (II):** This visual impact criterion deals with the illumination of the roadway and the lighting currently in existence in or adjacent to the corridor area. If an alternative could be designed with a new system of lighting that is highly visible from extended distances, the rating for that alternative would be low. Conversely, if an alternative would not contain much new illumination, the rating would be higher.
- **E2 – Floodplain Impacts:** This criterion was established to account for the infringement upon 100-year floodplains established by the Federal Emergency Management Agency (FEMA). These flood zones are typically more environmentally sensitive than other areas. In addition, this criterion provides a measurement of potential drainage modifications required upon construction of a given roadway alignment. A crossing of a substantial amount of acreage is an indicator that multiple and costly drainage modifications would be required.
- **E3 – Preserve Habitat:** This criterion was created to indicate the degree of impact or disturbance of sensitive and threatened and endangered species that are known to inhabit the project area. A high acreage count within the 100-m (328-ft) corridor indicates the possibility of a substantial level of mitigation, such as fencing, crossing areas, and other forms of mitigation. The desert tortoise, gila monster, and bighorn sheep are primary threatened and protected species that inhabit the project area.
- **E4 – Noise Levels in Residential Areas:** This criterion indicates the degree of mitigation (sound walls, berms, etc.) that would be required upon construction of a given alternative. Residences are counted in this preliminary general evaluation as the number of rooftops within the 66-decibel A-weighted (dBA) noise contour, incorporating preliminary estimates of traffic on a given alternative.
- **E5 – Known Hazardous Materials Impacts:** This criterion was included to account for mitigation measures that would have to be taken should a selected corridor impact a hazardous waste site, which can take the form of a spill, contamination plume, or potential hazardous site such as leachate from a landfill.

- **E6 – Water Quality:** Impacts to “Waters of the U.S.” were used as a proxy for water quality impacts, defined in this study as bodies of water (which include mostly dry desert washes) that eventually flow to a navigable water source. In this study, these sources are the Colorado River and Lake Mead.
- **E7 – Recreational Areas Impacts:** Section 4(f) lands (public parks, recreation lands, wildlife refuges, etc.) impact is a necessary criterion because an overall Section 4(f) evaluation is required in the EIS, and infringement upon these lands is to be avoided or minimized. NPS has strongly urged the PMT to preserve existing recreational areas and is especially concerned about areas within the LMNRA that NPS has designated with a special zoning status as a highly sensitive area.
- **E8 – Cultural Resources:** This criterion takes into consideration known sensitive cultural areas, probable sensitive cultural areas, and historic resources within the project area. Cultural areas have been found to contain artifacts and campsites from pre-Hoover Dam miners, and Native American artifacts. Historic resources include the historic BCBRR, and several properties in downtown Boulder City, and historic transmission lines.

Implementation

- **I1 – Utility Impacts:** This criterion was measured by evaluating the number of potential utility conflicts and required relocations within a given corridor width.
- **I2 – Airport Impacts:** This criterion measures the effect of a new roadway on the Boulder City airspace approach zones. Airspace contours have been depicted on a study map along with the alternatives, allowing for measurement of this criterion. Consideration is also given to any corridor that impacts airport right-of-way.
- **I3 – Construction Impacts:** This criterion was used to measure the degree of impact of construction activities on the area around a selected corridor. In this level of analysis, an evaluation was given to each corridor alternative as to the impact of construction on traffic patterns in the vicinity of the work.

Socioeconomic Impacts

- **S1 – Neighborhood Cohesion:** This criterion evolved from an issue brought up at a PMT meeting, “Splitting the Community,” where the concern is the overall effect on the residents of Boulder City.
- **S2 – Right-of-Way Impacts to Businesses and Mining Claims:** The business displacements that would occur upon construction of a given alternative are important indicators, from an economic perspective, of the overall effect on the Boulder City community. An approximate count of these displacements and a potential number of mining claims impacts were generated for each alternative.
- **S3 – Right-of-Way Impacts to Residences:** The potential number of residential displacements as a result of the construction of a given alternative was evaluated. Low ratings were given to any alternative that forced any substantial number of displacements.

- **S4 – Business Exposure:** This criterion was used to estimate the change in volume of vehicles passing by businesses on stretches of existing U.S. 93 as a result of implementation of a given alternative. This criterion was used to evaluate the overall economic effect of a potential decrease in exposure of businesses to passing traffic.
- **S5 – Current Land Use and Circulation Plan Impacts:** This criterion evolved from an issue brought up at a PMT meeting concerning the effect on planning for parcels of land within the Boulder City limits. The measurement of this criterion was expanded to capture the effect on expected land use of undeveloped areas, as well as anticipated traffic circulation planning in developed areas.

2.4.4 Evaluation Results

The corridor evaluation process employed an assessment by the PMT of the potential build alternatives (Figure 2-6) with respect to each of the 30 criteria described above. A rating of 1 to 5 was given, where a score of “5” indicates the most desirable alternative, and a score of “1” indicates a rating given to the least desirable alternative. For each individual criterion, a measurement scheme was determined that produced these ratings. In some cases, a qualitative analysis based on professional judgment was employed, such as for Criterion A1 (Access to Pedestrian Facilities), which rates the impact of an alternative on pedestrian safety, directness, convenience, and quality of environment. Conversely, a number of criteria were measured by quantitative means, such as Criterion E2 (Floodplain Impacts), which takes into account the acreage of floodplain impacts with 100-m-wide (328-ft-wide) corridor widths. For these quantitative measurements, a spread of ratings for the corridors was determined in the 1-to-5 range for the numerical values.

Discussions were held at PMT meetings in May, June, and July 2000 concerning a weighted ranking process whereby the corridor alternatives could be evaluated in a manner consistent with the values of all the agencies represented in this study. It was decided that the best manner of weighting the criteria is to attribute a percentage of desired weight to each of the 30 criteria, with the total equaling 100 percent. Each PMT member provided a distribution of weights for the 30 criteria, and the individual weights were averaged by percentages to produce the results shown in Table 2-1.

The screening results were presented to the PMT at meetings in June and July of 2000. Corridor SA102A, with the weighting applied, remained the most favorable alternative according to the Criteria Evaluation Matrix (NDOT, January 2001). Overall, the weighting system had little effect on the results, as compared to the unweighted results, with no single alternative increasing or decreasing in rank more than two places. However, the weighting process clearly identifies less desirable alternatives with respect to the criteria evaluation. Corridors TA102, TA102A, and TA103 occupy the bottom three spaces in both the weighted and unweighted versions of this analysis.

TABLE 2-1
Corridor Evaluation Summary (Weighted Results)

Corridor Alternative	Accessibility	Operations	Safety/Design	Environmental Impacts	Implementation	Socioeconomic Impacts	Corridor Average Rating	Corridor Rank
NA101	2.3	4.1	1.5	2.4	1.7	3.5	3.09	8
TA101	2.6	3.7	2.7	3.0	0.8	2.4	3.03	9
TA101A	2.5	3.7	2.2	3.0	0.5	2.1	2.81	12
TA101B	2.5	3.7	2.2	3.3	0.5	2.1	2.86	11
TA102	2.3	3.8	1.2	3.3	0.5	2.1	2.64	14
TA102A	2.3	3.8	1.2	3.0	0.9	2.1	2.59	15
TA102B	2.4	3.8	1.7	3.0	0.9	2.1	2.76	13
TA103	1.2	1.8	1.5	5.0	0.8	2.6	2.59	16
U.S. 93 Improved	1.5	2.9	2.5	4.6	0.9	2.8	3.03	10
U.S. 93 TSM	1.3	2.4	1.6	5.7	1.5	4.2	3.33	6
SA101	2.6	4.1	1.9	3.7	1.4	3.3	3.40	3
SA101A	2.6	4.1	2.0	3.2	1.6	3.4	3.42	2
SA101B	2.6	4.1	1.9	3.3	1.4	3.3	3.32	7
SA101AB	2.6	4.1	2.0	2.9	1.6	3.3	3.32	5
SA102	2.6	4.1	2.2	2.9	1.7	3.3	3.36	4
SA102A	2.6	4.1	2.2	3.3	1.7	3.3	3.44	1

2.4.5 Review of Initial Evaluation

On June 27, 2000, the PMT met with FHWA management to discuss preliminary legal sufficiency aspects of the project. FHWA and NDOT management endorsed the criteria evaluation process used in the study and commented that the identification of alternatives to be studied further should be both a quantitative evaluation as well as a subjective evaluation of what alternatives would be better to study further.

An item on the agenda of the preliminary legal sufficiency meeting was dedicated to a discussion concerning a request by NPS to remove Corridors SA102 and SA102A from further consideration in this EIS. NPS, in a letter from Alan O'Neill, Superintendent, to John Price, FHWA Division Administrator (provided in Appendix A), stated that these two alternatives pass through LMNRA lands that are denoted by NPS as being "Natural Zones" and "Outstanding Natural Feature Subzones." For this reason, NPS contended the evaluation of Section 4(f) impacts on simply an acre-for-acre basis is not acceptable. It is the

position of NPS that special consideration must be given to some criteria with respect to passing through these special zones. FHWA agreed that environmental regulations (23 *Code of Federal Regulations* [CFR] 771) state that if a given alternative has substantial Section 4(f) impacts, and there are other reasonable and prudent alternatives with more moderate Section 4(f) impacts, then FHWA is required to remove the given alternative from consideration. The PMT agreed that there are other reasonable and prudent alternatives remaining in this study. Therefore, FHWA agreed in writing (by letter dated December 14, 2000, Appendix A) to remove Corridors SA102 and SA102A from further consideration.

2.4.6 Alternatives Eliminated from Further Consideration

Sixteen potential corridor build alternatives were recognized by the PMT as viable for more detailed screening evaluation from the original 40 alignments identified during the initial public involvement and scoping phase of the project. The corridor build alternatives studied were developed to the point of identifying approximate centerline, and a 300-m-wide (1,000-ft-wide) construction impacts limit was established for purposes of the screening analysis (Figure 2-6). Those alternatives that incorporate only arterial improvements to existing roadways did not have a 300-m (1,000-ft) study limit defined. The following alternatives described (shown with corridor ranking and rating numbers) were eliminated from detailed study in this EIS based on the screening evaluation:

NA101 (Rank 8, 3.09 Rating)

Corridor NA101 originates near the Foothills Road grade separation; crosses the River Mountains through Hidden Valley along the northern limits of Boulder City; passes through Hemenway Wash, crossing the existing U.S. 93 and Lakeshore Road intersection; and ties into existing U.S. 93 in the vicinity of the Hacienda Hotel and Casino. The general topography across the route consists of low rolling hills for the first 7 km (4.5 miles) and then a large mountain (Radar Mountain), which rises about 200 m (650 ft) above the surrounding ground. Passing through the west side of Radar Mountain, the alignment would require two parallel tunnels measuring approximately 3.4 km (2.1 miles) in length. The alignment also has 8.7 km (5.4 miles) of 6 percent grades, far greater than any other alternative (see Section 2.4.1 for additional details).

TA101A (Rank 12, 2.81 Rating)

The alignment of Corridor TA101A splits off from Corridor TA101 east of Buchanan Boulevard (see Section 2.4.2 and description of Alternative C, Section 2.7.3). It then continues above existing grade, down a steep Hemenway Wash power transmission corridor through a residential area. Grade separations would be provided at Lake Mountain Drive, Ville Drive, and Pacifica Way. The reach down Hemenway Wash requires 2.4 km (1.5 miles) of 6 percent grades.

TA101B (Rank 11, 2.86 Rating)

The alignment of Corridor TA101B splits off Corridor TA101 east of Buchanan Boulevard (see Section 2.4.2 and description of Alternative C, Section 2.7.3). It then continues along the alignment of the TA102 corridor, northwest of Corridor TA101A (see Figure 2-6 and NDOT, January 2001). This alignment is also above existing grade and down a steep Hemenway Wash power transmission corridor through a residential area. Grade separations would be

provided at Lake Mountain Drive, Ville Drive, and Pacifica Way. The reach down Hemenway Wash requires 2.5 km (1.6 miles) of 6 percent grade.

TA102 (Rank 14, 2.64 Rating)

The Corridor TA102 alignment realigns U.S. 93 northeasterly through Railroad Pass, passing north of the Railroad Pass Hotel and Casino and running parallel and north of U.S. 93 until veering northeasterly, following TA101, around the Industrial Road developments. It follows the most northerly powerline corridor located south of the homes along Marina Drive and provides interchanges at the west end, at U.S. 95, at Buchanan Boulevard, and at the east end. This corridor was created in part to avoid the current historic railroad at-grade crossing on U.S. 95. Corridor TA102 has 2.5 km (1.6 miles) of 6 percent grade.

TA102A (Rank 15, 2.59 Rating)

The Corridor TA102A alignment is very similar to TA102, except where it passes through a parallel utility corridor south of Corridor TA102 in the same Hemenway Valley residential area. The Corridor TA102A alignment contains slightly less 6 percent grade along the centerline (2.4 km versus 2.5 km [1.5 versus 1.6 miles]) compared to Corridor TA102. Corridor TA102A also crosses the Hemenway Wash outfall area in a more longitudinal direction than Corridor TA102.

TA102B (Rank 13, 2.76 Rating)

Corridor TA102B is identical to Corridor TA101, with the exception of the west-end segment containing the northerly bypass of Railroad Pass. This includes the bypass of the existing at-grade historic railroad crossing and the hotel casino intersection with U.S. 95 (see Section 2.6.4 and description of Alternative C, Section 2.7.3).

TA103 (Rank 16, 2.59 Rating)

Corridor TA103 is an arterial improvement only (no freeway status along the entire alignment) that begins just east of the existing U.S. 93/95 interchange. U.S. 93 is then realigned to tie into existing Adams Boulevard at the Veterans Memorial Drive intersection. Existing Adams Boulevard is used in its current configuration through Boulder City. The east end of Adams Boulevard is extended to thread to the northern face of the Eldorado Mountain ridge. It begins a 3,400-m (2.1-mile) descent along a 6 percent grade on the face of the Eldorado ridge to tie with existing U.S. 93 just east of the Lakeshore Road intersection. The profile for Corridor TA103 utilizes gentle grades for the entirety of the alignment, with the exception of 2,600 m (1.6 miles) of 6 percent grade from Wash "C" to the eastern tie-in with existing U.S. 93.

U.S. 93 TSM (Rank 6, 3.33 Rating)

The TSM Alternative would improve key intersections by adding approach and departure lanes, turn lanes, and traffic signals at key locations. It also provides additional connectivity for the local circulation system so that traffic can avoid using U.S. 93 during local trips. The alternative assumes that an additional eastbound lane is added between Buchanan Boulevard and Lakeshore Road to create a four-lane section. Specific TSM improvements consist of reconfiguring the U.S. 93/Buchanan Boulevard intersection to eliminate the

U.S. 93 traffic left and right turns at the intersection; realignment of Industrial Road and Colorado Street to form a single four-legged intersection with U.S. 93; adding a signalized intersection at U.S. 93 and Nevada Way in Hemenway Wash, with the north leg of the intersection connecting with Lake Mountain Drive and Ville Drive; and a new signalized intersection at Yucca Street and U.S. 93.

SA101B (Rank 7, 3.32 Rating)

Corridor SA101B provides a route that circulates to the south of Boulder City and south of the Mead Substation, connecting with the existing U.S. 93 Corridor east of the Hacienda Hotel and Casino. Corridor SA101B diverges from Corridor SA101 (see Section 2.4.3 and description of Alternative D, Section 2.7.4) easterly and westerly of the Mead Substation to enable the alternative to pass south of the substation. The same amount of 6 percent grades (a total of 2.5 km [1.6 miles]) through the Eldorado Mountains east of Boulder City are found in Corridor SA101B as in Corridor SA101.

SA101AB (Rank 5, 3.32 Rating)

Corridor SA101AB provides a route that circulates to the south of Boulder City and south of the Mead Substation, connecting with the existing U.S. 93 Corridor east of Boulder City but east of the Hacienda Hotel and Casino (utilizing the same final segment as Corridor SA101A). Corridor SA101B uses both “A” and “B” alternate segments described elsewhere (see SA101B, Section 2.6.9, Section 2.4.3, and Alternative D, Section 2.7.4). The same 6 percent grades (a total of 2 km [1.3 miles]) are found in Corridors SA101AB and SA101A (see description of Alternative D, Section 2.7.4).

SA102 (Rank 4, 3.36 Rating)

This alternative provides a route that circulates to the south of Boulder City and connects with the existing U.S. 93 Corridor east of town in the vicinity of the Hacienda Hotel and Casino. Corridor SA102 follows an identical path as the Corridor SA101B alternative over the first half (west to east) of its alignment, crossing the alluvial fan on flat grades (see Section 2.4.3 and description of Alternative D, Section 2.7.4). East of the Mead Substation, the alternative alignment veers to the northeast towards Boy Scout Canyon, then begins a steady, curvilinear descent through mountainous terrain. Several structures will be required to cross many washes and canyons before concluding the 27.5-km (17.1-mile) corridor at the eastern terminus. There is one 1.7-km (1-mile) section of 6 percent grade occurring near the eastern terminus.

SA102A (Rank 1, 3.44 Rating)

Corridor SA102A follows an identical path as Corridor SA102, with the exception of its passing north of the Mead Substation. The realignment of the corridor north of the Mead Substation reduces the length of the corridor to 24.9 km (15.5 miles), approximately 2.5 km (1.6 miles) shorter than Corridor SA102.

2.4.7 Corridor Evaluation Summary

Table 2-2 lists the potential build alternatives subject to initial evaluation and summarizes the main reasons for elimination of the alternatives described above. The numerical results attained in the criteria evaluation process were used in conjunction with professional

judgment of the PMT and consultants to identify the three build alternatives (highlighted in Table 2-2) which, in addition to the No Build Alternative, are studied in detail in this EIS. The PMT reached the following major conclusions during the alternatives evaluation process:

- There is not enough benefit to routing an alignment south of the Mead Substation (SA101B and SA102) to counter the additional cost of a longer roadway and greater environmental impacts.
- Corridor TA103 (Adams Boulevard) and U.S. 93 TSM Alternatives will not satisfy the Purpose and Need statement (Chapter 1) in this EIS.
- The TA102 family of corridors, which incorporate a segment that passes north of Railroad Pass Hotel and Casino, would have an unavoidable adverse impact on the historic railroad, the future Park Place golf course, and U.S. 93 connectivity with U.S. 95.
- Public opinion at Public Meetings No. 1 and No. 2 in January and April 2000 generated enough interest in a Through-Town Alternative that a freeway and a widening of the existing roadway option should be considered.
- The Through-Town Alternative identified for further detailed study should be the most desirable alignment within this family of alternatives, much in the same way the original group of 40 alignments was brought down to the 16 corridors that were evaluated.
- Cost alone cannot be the reason to eliminate an alignment alternative.

Table 2-2 summarizes the weighted evaluation rating and ranking for each corridor alternative, as well as the respective reasons for inclusion or removal from further consideration in the study. (For further details on the alternatives evaluation and elimination process, see Section 2.5 and NDOT, January 2001.)

TABLE 2-2
Corridor Evaluation Summary

Corridor Alternative	Weighted Rating	Weighted Rank	PMT Decision on Alternative
NA101	3.09	8	Eliminated due to very poor safety/design and environmental impacts ratings and very high construction costs
TA101	3.03	9	Highest-rated Through-Town Alternative – carried forth into the EIS for detailed study as Alternative C
TA101A	2.81	12	Eliminated due to poor overall ratings, especially in implementation and socioeconomic categories
TA101B	2.86	11	Eliminated due to poor overall ratings, especially in implementation and socioeconomic categories
TA102	2.64	14	Eliminated due to very poor overall ratings – all TA102 family alternatives eliminated because of negative impacts of routing behind Railroad Pass Hotel and Casino
TA102A	2.59	15	Eliminated due to very poor overall ratings – all TA102 family alternatives eliminated because of negative impacts of routing a freeway behind Railroad Pass Hotel and Casino

TABLE 2-2
Corridor Evaluation Summary

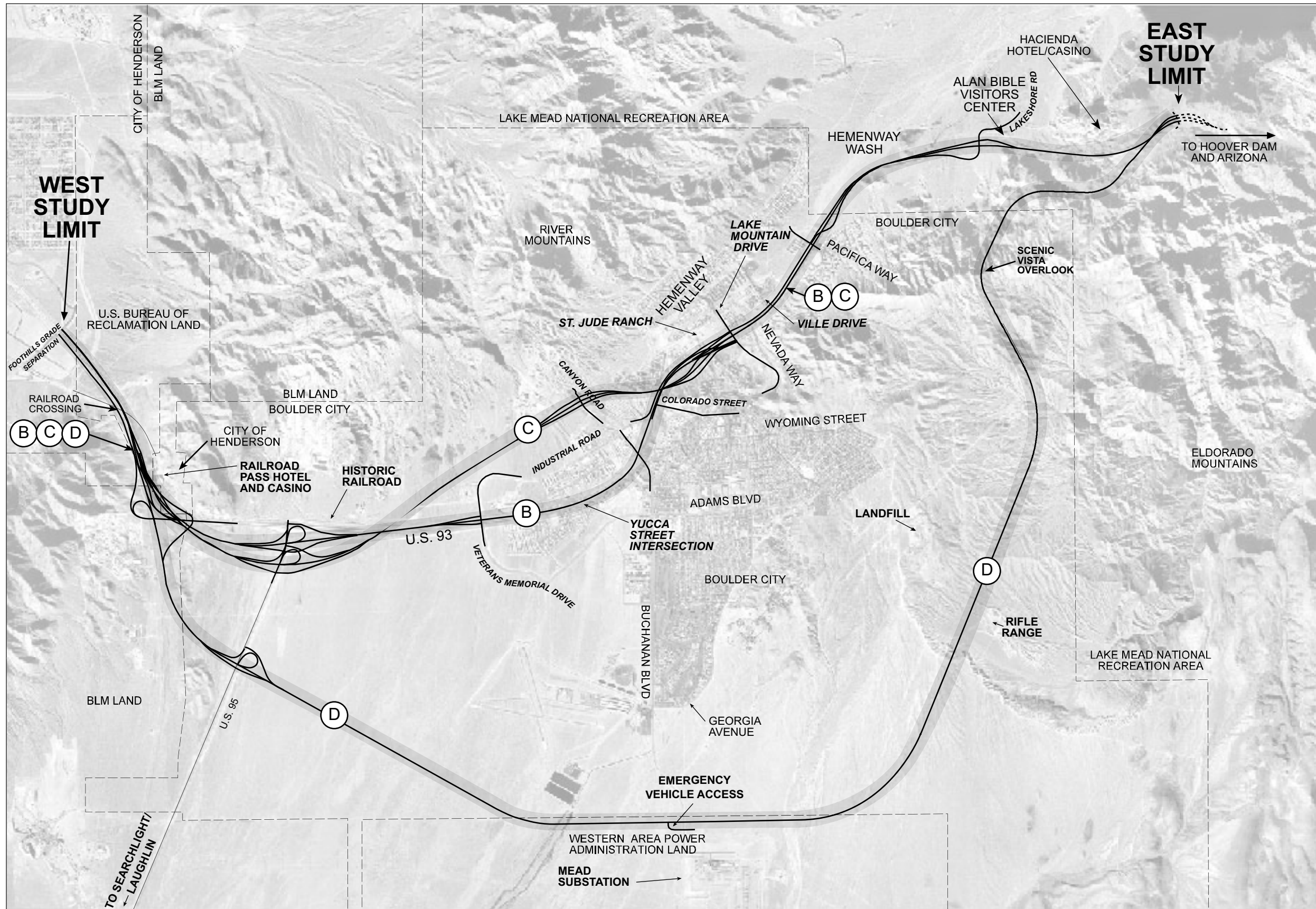
Corridor Alternative	Weighted Rating	Weighted Rank	PMT Decision on Alternative
TA102B	2.76	13	Eliminated due to poor overall ratings, especially in implementation and socioeconomic categories; TA102 family eliminated
TA103	2.59	16	Eliminated due to very poor ratings, negative community cohesion impacts, does not meet Purpose and Need
U.S. 93 Improved	3.03	10	Carried forth into the EIS for detailed study as Alternative B
U.S. 93 TSM	3.33	6	Minor surface improvements does not meet the project Purpose and Need
SA101	3.40	3	Combined with SA101A to make SA101C, and carried forth into the EIS for detailed study as Alternative D
SA101A	3.42	2	Combined with SA101 to make SA101C, and carried forth into the EIS for detailed study as Alternative D
SA101B	3.32	7	Eliminated from consideration, insufficient benefit to routing south of the Mead Substation to warrant added roadway length
SA101AB	3.32	5	Eliminated from consideration, insufficient benefit to routing south of the Mead Substation to warrant added roadway length
SA102	3.36	4	Eliminated from consideration due to NPS request to remove corridor due to unusually high LMNRA Section 4(f) infringement on Park Service Natural Zones
SA102A	3.44	1	Eliminated from consideration due to NPS request to remove corridor due to unusually high LMNRA Section 4(f) infringement on Park Service Natural Zones

Note: The shaded build alternatives were retained for detailed evaluation in the EIS; all others were eliminated from further consideration.

2.5 Alternatives Studied in Detail

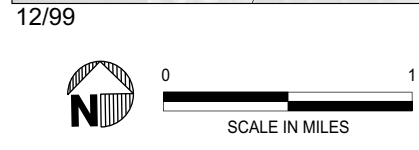
Subsequent to the initial evaluation of the sixteen alternatives described above, thirteen were rejected (Table 2-2), leaving three build alternatives and the no-build alternative for further study in the EIS. The areas of potential effect of the corridors studied are 300 m (1,000 ft) wide, with the exception of those alternatives that incorporate only arterial improvements to existing roadways (Figure 2-7). Based on a comprehensive review of the screening evaluation results, the PMT eliminated all but four alternatives (three build alternatives plus a “no-build” alternative) from further consideration during several workshop meetings in June and July 2000. After eliminating corridor alternatives based on the criteria screening, the PMT concurred upon the following three build alternatives from the 16 evaluated, along with the no-build, as most reasonable and feasible to carry into detailed evaluation in the EIS:

- 1) Existing U.S. 93 Improved
- 2) Through-Town Freeway Alignment
- 3) Southern Freeway Alignment



LEGEND

- (A) EXISTING U.S. 93 (NO BUILD ALTERNATIVE)
- (B) ALTERNATIVE B - IMPROVEMENTS TO THE EXISTING U.S. 93 ALIGNMENT
- (C) ALTERNATIVE C - THROUGH TOWN ALIGNMENT
- (D) ALTERNATIVE D - SOUTHERN ALIGNMENT



**FIGURE 2-7
ALTERNATIVES UNDER
CONSIDERATION**
BOULDER CITY/U.S. 93 CORRIDOR STUDY
ENVIRONMENTAL IMPACT STATEMENT

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The following sections describe the four alternatives that were identified by the PMT for detailed study in the Boulder City/U.S. 93 Corridor Study EIS. The project alternatives are described in greater detail in the *Boulder City/U.S. 93 Corridor Study Preliminary Engineering Report* (NDOT, November 2001). The proposed build alternatives and the overall project study area, including study limits, are shown in Figure 2-7.

2.5.1 Alternative A: No Build

The No Build Alternative would consist of leaving the existing roadway facilities along U.S. 93 through Boulder City as they are and would take no action to address current or projected traffic congestion, traffic circulation, or safety problems. This alternative assumes that no geometric improvements are made to the present-day roadway network within the study limits, except for expansion of U.S. 93 to a three-lane roadway section with a new westbound lane between the Hoover Dam Bypass tie-in (see Section 2.1) and Lakeshore Road. All intersections are assumed to remain unsignalized except for the existing signalized intersections at Railroad Pass, Veterans Memorial Drive, and Buchanan Boulevard.

2.5.2 Alternative B: Improvements to the Existing U.S. 93 Alignment

This build alternative is proposed as a freeway and arterial improvement combination that includes a general widening of existing U.S. 93 and other roadway improvements within the study limits (see Figures 2-2 and 2-7). The goal of the alternative is to make improvements to the present 17.7 km (11 miles) of roadway, mostly within the existing U.S. 93 corridor, in order to improve safety and reduce congestion through Boulder City. The proposed improvements consist primarily of a new four-lane divided freeway beginning from the Foothills grade separation, crossing under the existing at-grade railroad crossing, and continuing just south of the existing highway to a new diamond interchange near the Railroad Pass Hotel and Casino. From there, the freeway continues to just east of a half-diamond interchange at Veterans Memorial Drive. The existing U.S. 93/95 interchange would be replaced by a new, higher-capacity interchange. A six-lane principal urban arterial would extend from east of the new half-diamond interchange at Veterans Memorial Drive to Colorado Street, with a new traffic signal at an improved Buchanan Boulevard/U.S. 93 intersection. There would be a four-lane median barrier divided freeway through Hemenway Valley to the eastern project limit, with existing U.S. 93 converted to a frontage road and interchanges at Lake Mountain Drive, Pacifica Way, and Lakeshore Road. The freeway would tie in to the U.S. 93 Hoover Dam Bypass Nevada Interchange east of the Hacienda Hotel and Casino (see Section 2.1). Table 2-3 describes the features and improvements of the current development of Alternative B. These features and improvements are further displayed in the plan and profile drawings in the *Preliminary Engineering Report* (NDOT, November 2001, Appendix A).

The total estimated comparative cost of this alternative is \$220 million (in year 2002 dollars). The cost elements include construction, right-of-way, utilities, engineering, construction administration, and contingencies.

TABLE 2-3
Development Features of Alternative B (Existing U.S. 93 Improved Alignment)

Feature Number	Location	Description
1	Western Study Limit	Alignment ties into existing I-515 at the Foothills Road grade separation in the City of Henderson, Nevada.
2	New Freeway Segment: Western Study Limit to U.S. 95 (Extension of I-515)	Construct a four-lane divided freeway (extending I-515) with a 20-m (65-ft) median from the western study limits to a new U.S. 93/95 interchange; the new alignment would be located just south of existing U.S. 93 in this area, and existing U.S. 93 would serve as a frontage road.
3	Historic Railroad Crossing (within Feature 2)	Construct a grade separation at the BCBRR and U.S. 93 (the new alignment passes approximately 7.6 m [25 ft] below the railroad grade).
4	Railroad Pass Interchange (within Feature 2)	Construct a diamond interchange, providing access to Boulder City via existing U.S. 93 near the Railroad Pass Hotel and Casino, and providing access to old Highway 95.
5	U.S. 93/95 Interchange	Construct an interchange at the junction of U.S. 93 and U.S. 95 just south of the existing interchange. The interchange would contain a combination of ramp and stop-controlled access points and would provide access to Boulder City via existing U.S. 93.
6	New Freeway Segment: U.S. 95 to Veterans Memorial Drive	Construct a six-lane divided freeway with a 20-m (65-ft) median from the new U.S. 93/95 Interchange to Veterans Memorial Drive.
7	Veterans Memorial Drive Interchange	Construct a half-diamond interchange at Veterans Memorial Drive, providing ramp access to north and south Veterans Memorial Drive and to west U.S. 93 from Veterans Memorial Drive.
8	New Arterial Roadway Segment: Veterans Memorial Drive to Buchanan Boulevard	Construct a seven-lane divided principal urban arterial roadway with either a raised median or a left-turn lane from the Veterans Memorial Drive Interchange to Buchanan Boulevard. The Yucca Street intersection would be signalized and access would be maintained to local businesses.
9	Buchanan Boulevard Intersection	Construct an intersection and install a new traffic signal at a realigned Buchanan Boulevard intersection, with Buchanan Boulevard widened and extended north to Canyon Road.
10	New Arterial Roadway Segment: Buchanan Boulevard to Colorado Street	Construct a six-lane divided arterial roadway with a raised median from the Buchanan Boulevard intersection to Colorado Street.
11	New Freeway Segment: Buchanan Boulevard to Eastern Study Limit	Construct a four-lane divided freeway (six lanes to St. Jude Street), with a barrier median, from Colorado Street to the eastern study limit; a frontage road would be constructed on the north side of the new alignment on existing U.S. 93 to provide local access circulation.
12	Lakeshore Road Interchange (within Feature 11)	Construct an interchange utilizing existing U.S. 93 to the north, allowing for access to Lakeshore Road and Hoover Dam.
13	Eastern Study Limit	Alignment ties into proposed Hoover Dam Bypass alignment at the eastern study limits (see Section 2.1).

2.5.3 Alternative C: New Through-Town Alignment

Alternative C would be a new through-town freeway connecting the western and eastern study limits of the project. It would consist of a continuous four-lane, controlled-access freeway parallel to existing U.S. 93 (Figures 2-3 and 2-7). Alternative C would be a divided freeway from the Foothills grade separation to the west end of Hemenway Valley, and from there it would be a barrier-median freeway to the eastern project limit. The alignment begins at the Foothills grade separation, crosses under the existing at-grade railroad crossing, and continues just south of the existing highway to a new diamond interchange near the Railroad Pass Hotel and Casino. From there, the freeway continues to the east to approximately 0.8 km (0.5 mile) south of the U.S. 93/95 interchange. The existing U.S. 93/95 interchange would be replaced by a new, higher-capacity interchange. After the alignment turns north, crossing underneath U.S. 93, it runs parallel to and north of Industrial Road along the transmission line corridor. A new diamond interchange would be provided at Canyon Road. This alternative meets existing U.S. 93 at the west end of Hemenway Wash and generally follows the Alternative B alignment in the Hemenway Valley area with interchanges at Lake Mountain Drive, Pacifica Way, and Lakeshore Road. The freeway would tie in to the U.S. 93 Hoover Dam Bypass Nevada Interchange east of the Hacienda Hotel and Casino (see Section 2.1). The proposed freeway would be approximately 17.7 km (11 miles) in length.

Alternative C includes the following features and improvements described in Table 2-4. These features and improvements are further displayed in the plan and profile drawings in the *Preliminary Engineering Report* (NDOT, November 2001, Appendix A).

The total estimated comparative cost of this alternative is \$220 million (in year 2002 dollars). The cost elements include construction, right-of-way, utilities, engineering, construction administration and contingencies.

TABLE 2-4
Development Features of Alternative C (Through-Town Alignment)

Feature Number	Location	Description
1	Western Study Limit	Alignment ties into existing I-515 at the Foothills Road grade separation in the City of Henderson, Nevada.
2	New Freeway Segment: Western Study Limit to U.S. 95 (Extension of I-515)	Construct a four-lane divided freeway (extending I-515) with a 20-m (65-ft) median from the western study limits to a new U.S. 93/95 interchange; the new alignment would be located south of existing U.S. 93 in this area and existing U.S. 93 would serve as a frontage road.
3	Historic Railroad Crossing (within Feature 2)	Construct a grade separation at the BCBRR and U.S. 93 (the new alignment passes approximately 7.6 m [25 ft] below the railroad grade).
4	Railroad Pass Interchange (within Feature 2)	Construct a diamond interchange, providing access to Boulder City via existing U.S. 93 near the Railroad Pass Hotel and Casino, and providing access to old Highway 95.

TABLE 2-4
Development Features of Alternative C (Through-Town Alignment)

Feature Number	Location	Description
5	U.S. 93/95 Interchange	Construct an interchange at the junction of U.S. 93 and U.S. 95 approximately 0.4 km (0.25 mile) south of the existing interchange. The interchange would contain a combination of ramp and stop-controlled access points, and would provide access to Boulder City via existing U.S. 93.
6	New Freeway Segment: U.S. 95 to existing U.S. 93 in Hemenway Wash	Construct a four-lane divided freeway with a 20-m (65-ft) median from the new U.S. 93/95 interchange to Hemenway Wash, crossing underneath existing U.S. 93 and BCBRR just east of the interchange and passing north of the Boulder City commercial corridor. A new diamond interchange providing access to Boulder City via an extended Buchanan Boulevard will be provided. In this segment, the alignment passes through the area designated for the Boulder Ridge Golf Course.
7	New Freeway Segment: Hemenway Wash to Eastern Study Limit	Construct a four-lane divided freeway with a barrier median from the grade separation over existing U.S. 93 in Hemenway Wash to the eastern study limit; a frontage road would be constructed on the north side of the new alignment in Hemenway Wash to allow access to side streets.
8	Lakeshore Road Interchange (within Feature 7)	Construct a new interchange utilizing existing U.S. 93 to the north, allowing for access to Lakeshore Road and Hoover Dam.
9	Eastern Study Limit	Alignment ties into proposed Hoover Dam Bypass alignment at the eastern study limits (see Section 2.1).

2.5.4 Alternative D: Southern Alignment (Preferred Alternative)

Alternative D is proposed as a southern bypass of Boulder City connecting the western and eastern study limits of the project. It would consist of a continuous four-lane, controlled-access divided freeway and highway bypassing the developed area of Boulder City to the south (Figures 2-4 and 2-7). The alignment begins at the Foothills grade separation, crosses under the existing at-grade railroad crossing, and continues just south of the existing highway to a new interchange near the Railroad Pass Hotel and Casino. From there, the freeway continues east to U.S. 95 with a new interchange approximately 1.9 km (1.2 miles) south of the existing U.S. 93/95 interchange, and then a highway alignment continues south towards the Mead Substation. The alignment runs approximately 1.4 km (0.85 mile) south of Georgia Avenue, just north of the Mead Substation, and generally runs parallel to the transmission corridor between the landfill and the rifle range transitioning into a median barrier divided highway through the Eldorado Mountains east of Boulder City.

Subsequent to the release of the DEIS for this project, the need was identified by the cities of Boulder City and Henderson for an emergency access ramp at the crossing of the Southern Alternative and Buchanan Boulevard to decrease emergency vehicle response time (fire, police, and ambulances) to accidents along the new roadway. Rather than limiting access of emergency vehicles to the U.S. 95 interchange on the west and the Nevada Interchange on the east, access points a total distance of 11.6 miles apart, this 15-m (50-ft)-wide, gravel-surfaced ramp would provide a means for emergency vehicles to enter the

highway approximately 3.6 miles further east of the U.S. 95 crossing. In particular, it would allow emergency access directly from southern Boulder City. Without this ramp, emergency vehicles from Boulder City would have to travel miles to either the east or the west before being able to turn onto the highway. Use of the emergency access ramp will be controlled by NDOT; it will have locked gates, and no public vehicular access would be allowed. The access ramp would also be used by WAPA for heavy equipment deliveries destined for the Mead Substation, and its use would alleviate the need to send these heavy trucks through Boulder City.

A scenic vista point would be constructed at the top of the ridge through the Eldorado Mountains for views of Lake Mead and the surrounding area. The highway would tie in to the U.S. 93 Hoover Dam Bypass Nevada Interchange east of the Hacienda Hotel and Casino (see Section 2.1). The proposed roadway would be approximately 24 km (15 miles) in length.

Alternative D includes the features and improvements described in Table 2-5. These features and improvements are further displayed in the plan and profile drawings in the *Preliminary Engineering Report* (NDOT, March 2002, Appendix A).

The total estimated comparative cost of this alternative is \$345 million (in year 2002 dollars). The cost elements include construction, right-of-way, utilities, engineering, construction administration and contingencies. Alternative D has been identified as the preferred alternative (see Section 2.8).

TABLE 2-5
Development Features of Alternative D (Southern Alignment-Preferred Alternative)

Feature Number	Location	Description
1	Western Study Limit	Alignment ties into existing I-515 at the Foothills Road grade separation in the City of Henderson, Nevada.
2	New Freeway Segment: Western Study Limit to U.S. 95 (Extension of I-515)	Construct a four-lane divided freeway (extending I-515) with a 20-m (65-ft) median from the western study limits to a new U.S. 93/95 interchange; the new alignment would be located south of existing U.S. 93 in this area, and existing U.S. 93 would serve as a frontage road.
3	Historic Railroad Crossing (within Feature 2)	Construct a grade separation at the BCBRR and U.S. 93 (the new alignment passes approximately 7.6 m [25 ft] below the railroad grade).
4	Railroad Pass Interchange (within Feature 2)	Construct a new interchange, providing access to Boulder City via existing U.S. 93 near the Railroad Pass Hotel and Casino.
5	U.S. 93/95 Interchange (within Feature 2)	Construct a new interchange at the junction of U.S. 93 and U.S. 95 about 1.6 km (1 mile) south of the existing interchange. The interchange would contain a combination of ramp and stop-controlled access points, and would provide access to Boulder City via existing U.S. 93.
6	New Highway Segment: U.S. 95 to Eldorado Mountains foothills	Construct a new four-lane divided highway with a 20-m (65-ft) median from the new U.S. 93/95 interchange to the Eldorado Foothills; this portion of the alignment passes through the flat alluvial fan area approximately 1.4 km (0.85 mile) south of Georgia Avenue.

TABLE 2-5
Development Features of Alternative D (Southern Alignment-Preferred Alternative)

Feature Number	Location	Description
7	Emergency Access Ramp: Buchanan Boulevard (within Feature 6)	At the crossing of the Southern Alternative and Buchanan Boulevard, an emergency access ramp will be constructed to decrease response time by emergency vehicles to accidents along the new roadway. The ramp connection will consist of locked gates, and no public vehicular access would be allowed. The access would also be used by heavy equipment destined for the Mead Substation, and its use will be controlled by NDOT.
8	Georgia Avenue Wash Crossing (D-6; within Feature 6)	Alignment crosses the Georgia Avenue Wash (one of two major Boulder City drainages); flows are split between two sets of box culverts.
9	Mead Substation Access Road Grade Separation (within Feature 6)	Construct a grade separation at the access road and U.S. 93 (new U.S. 93 passes approximately 10 m [32 ft] above the access road grade).
10	Wash "C" Crossing (within Feature 6)	Crossing of Wash "C" (the second of two major Boulder City drainages); flow is directed into a channel at the crossing. Crossing provides recreational access to the Colorado River.
11	New Highway Segment: Eldorado Mountains foothills to Eastern Study Limit	Construct a four-lane divided highway tapered to a four-lane divided highway with a concrete median barrier through the Eldorado Mountains to the eastern study limit; alignment passes through several deep cuts and fill points and requires several structures.
12	Intertie Maintenance Road Crossing (within Feature 11)	A bridge will be constructed to span an existing dirt road which provides access to nearby electrical transmission facilities. The structure opening will be appropriate to serve a secondary function as a wildlife passage.
13	Eldorado Ridge Scenic Overlook (within Feature 11)	Construct a scenic overlook at the ridgeline of the Eldorado Mountains, offering views of Lake Mead and Boulder City to passing vehicles.
14	Eastern Study Limit	Alignment ties into proposed Hoover Dam Bypass alignment at the eastern study limits (see Section 2.1; Figure 2-7).

2.6 Determination of the Preferred Alternative

In a meeting on June 27, 2002, the PMT for the Boulder City/U.S. 93 Corridor Study completed the process preparatory to recommending the preferred alternative and identified Alternative D as the preferred alternative. At this meeting, each of the PMT members, representing cooperating agencies for the project, presented their individual evaluations of Alternatives B, C, and D, and the No Build Alternative relative to social, environmental, and economic impacts. An overall determination was agreed upon based on a compilation of all PMT member evaluations.

The relative scores for each of the alternatives were recorded by PMT members using the form illustrated in Table 2-6. The scores initially provided by PMT members at the June 27, 2002, meeting employed varying scales that, as a consequence, were not directly comparable from one PMT member's rating to another. To achieve comparability, the agency scores for each alternative were ranked by the PMT members on a uniform scale of 1 to 5. The

summation matrix shown in Table 2-7 provides the individual PMT ranking for each of the alternatives, based on the criteria in Table 2-6. All PMT members were present for this ranking process, with the exception of Reclamation and BLM. The Reclamation representative's evaluation was provided prior to the meeting.

TABLE 2-6
Alternative Evaluation Matrix Initially Employed by PMT Members

Preferred Alternative Evaluation Criteria	Alternative A No Build	Alternative B Improvements to Existing U.S. 93	Alternative C Through-Town	Alternative D Southern
Social Impacts Criteria*				
- Accessibility				
- Operations				
- Safety/Design				
- Public Comments				
Environmental Criteria*				
- Criteria Scoring Matrix				
- DEIS Chapter 4				
- DEIS Chapter 7				
- Public Comments				
Economics Criteria*				
- DEIS Section 4.11				
- Implementation				
- Public Comments				

*Maximum score for each criterion or per criterion.

The first column for each alternative in Table 2-7 presents the total initial scores (summations of social, environmental, and economics criteria) provided by each of the PMT agencies, as described above. The second column for each alternative provides the corresponding rank (1 through 4, where 4 represents the top-ranked alternative of an individual agency). Note that Reclamation only provided the overall rank of the alternatives.

Both the sum of the individual scores and of the derived ranks led to the recommendation by the PMT of Alternative D as the preferred alternative. These analyses further indicated that Alternative C ranked second and Alternative B was a close third preference. Alternative A (No Build) was a distant fourth as appropriate to an alternative that does not meet the purpose and need for this project. Upon this determination, Scott Rawlins, NDOT Project Manager and chairman of the PMT, agreed that Alternative D (Southern Alternative) was to be identified by the PMT as the preferred alternative in the Boulder City/U.S. 93 Corridor Study. PMT members agreed at this PMT meeting to recommend to the Director of NDOT and the Division Administrator of FHWA to move forward with the study of Alternative D, recognizing that not all agencies had identified Alternative D as the best scoring alternative (Table 2-7).

TABLE 2-7
Preferred Alternative Evaluation Results

Evaluation Results by PMT Agency	Alternative A No Build		Alternative B Improvements to Existing U.S. 93		Alternative C Through-Town		Alternative D Southern	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
NPS	6.0	1	13.0	3	14.0	4	11.0	2
City of Henderson	8.5	1	9.0	2	9.2	3	9.7	4
City of Boulder City	8.0	2	7.0	1	8.0	3	12.0	4
RTC	10.3	3	9.8	2	9.5	1	10.4	4
WAPA	7.0	1	13.4	4	13.0	3	10.7	2
FHWA	5.0	1	5.0	1	8.0	3	12.0	4
NDOT	5.0	1	8.0	3	7.0	2	9.0	4
Clark County	10.5	3	10.6	4	7.9	2	5.8	1
Reclamation		1		2		3		4
Total	60.3	14	75.8	22	76.6	24	80.6	29

In the June 2002 PMT meeting it was concluded that the primary reasons for identifying Alternative D as the preferred alternative related to (1) the fact that it meets the purpose and need of this project and (2) it has the least impact to those environmental components that directly determine the quality of the human environment. On the other hand, impacts to the natural environment from the implementation of Alternative D will be greater than those resulting from implementation of any of the other build alternatives or the No Build Alternative. A memorandum to Thomas Stephens, NDOT Director, and John Price, FHWA Division Administrator, was transmitted by Scott Rawlins on June 28, 2002, identifying Alternative D as the preferred alternative. The memorandum discussed the basis for this identification, with the following considerations:

- Alternative D meets the Purpose and Need of the project, including (see Section 1.2, above):
 - Resolving traffic problems in the vicinity of Boulder City
 - Extending freeway status to the U.S. 93/95 interchange
 - Improving operations at the junction of U.S. 93/95
 - Creating a safer transportation corridor
 - Accommodating future transportation demand
 - Improving system linkage on U.S. 93 and maintaining route continuity
- Alternative D maintains the quality of life of the residents of Boulder City
- Alternative D would require significantly less disruption of the existing corridor during construction than any of the other build alternatives
- Alternative D lends itself to flexible staging of construction

- Based on public comments received, there is broad public acceptance of Alternative D
- Alternative D has fewer impacts to the human environment of Boulder City
- The noise impacts on the residents of Boulder City from Alternative D are fewer during the operation of the facility
- Alternative D contains fewer visual impacts to Boulder City than the other build alternatives
- Implementation of Alternative D would result in improved air quality along existing U.S. 93 in the Boulder City area

Alternative D resolves traffic problems on U.S. 93 by diverting through traffic from the urbanized environment of Boulder City onto a southern bypass. Traffic projections suggest that acceptable LOS is attained at all critical links and intersections through the design year. Alternative D does extend freeway status to a new, improved U.S. 93/95 interchange, as detailed in the development of the preferred alternative. Alternative D increases safety along the existing roadway by lowering the number of vehicles on existing U.S. 93 through Boulder City and by improving the connection of the roadway at the Railroad Pass Hotel and Casino, which is currently a high crash intersection (see Section 1.3.3).

Alternative D best addresses the purpose and need goals of accommodating future transportation demand, improving system linkage, and maintaining route continuity. The physical footprint of Alternative D allows for future expansion to accommodate increasing traffic volumes as growth continues in southern Nevada and Arizona, whereas Alternatives B and C are limited by the confines of Boulder City. Additionally, the preferred alternative links more appropriately with the freeway and highway sections on either side of the project, containing an easier transition from the I-515 freeway in Henderson to the west and to the new Hoover Dam Bypass highway to the east. Alternative B has an arterial segment that does not provide the best system linkage; and both Alternatives B and C require a complicated system of frontage roads and drainage improvements through Hemenway Valley, which Alternative D does not require.

Greater impacts to Section 4(f) lands (all in the LMNRA) will result from the implementation of Alternative D than from Alternative B or from the No Build Alternative. Alternative C has the most Section 4(f) impacts of all the alternatives. Implementation of measures described in Chapters 4 and 7 will mitigate these impacts. An evaluation of impacts to the NPS values and resources within the LMNRA resulting from the implementation of Alternative D has been completed, and it is provided in Appendix D. Additional assessments of effects and the development of appropriate mitigation measures will be prepared subsequent to the completion of the design development for the preferred alternative, when the specific project footprint and impacts can be delineated. Development of mitigation measures will be done in consultation with the appropriate PMT members, as well as other agencies such as USFWS, USACE, SHPO, NDOW, and EPA.

Additionally, Alternative D does not involve impacts to the River Mountains Loop Trail through Hemenway Wash (see Bicycle and Pedestrian Impacts, Section 4.14, and Chapter 7). Alternatives B and C would impact the trail, resulting in potentially costly and time-consuming relocation of a facility that has only recently been built. Alternative D would also impact fewer cultural resources than either Alternative B or C.

Finally, although implementation of Alternative D will result in some environmental impacts that are greater than Alternatives B and C, or the No Build Alternative, the PMT determined that the preferred alternative will maintain the quality of life that Boulder City predominantly desires. Numerous public comments (see Volume II of this FEIS) express the view that either Alternative B or C would divide Boulder City in half and forever change the small-town atmosphere that many residents moved there to acquire. Because U.S. 93 is the main route of travel from Arizona into Las Vegas, southern Nevada, and beyond, as well as serving as the CANAMEX Corridor route, it is necessary to have a facility in place that will accommodate travel demand. Implementation of Alternative D will accomplish that while minimizing impacts to and maintaining the desired quality of life in Boulder City.

2.7 Changes Since Publication of the DEIS

In addition to the incorporation of public and agency input on the DEIS and the identification of Alternative D as the preferred alternative, changes to this document since the publication of the DEIS also reflect refinement of the limits and types of resources affected, and of the alternative alignments, under the direction of the PMT. The following components of the process have led to the revision of impact evaluations for all build alternatives:

1. Update of the historic structures inventory report, and completion of the final report
2. Completion of initial SHPO consultation, and receipt of SHPO concurrence on determinations of eligibility
3. Receipt of concurrence from the USACE on which desert wash crossings impact Waters of the U.S., and consultation with the EPA on avoidance and mitigation measures
4. Receipt of additional biological resources data from Nevada Department of Wildlife (NDOW), and discussions with the EPA and NDOW regarding appropriate mitigation measures
5. Receipt of guidance from FHWA regarding which impacts constitute use under Section 4(f)
6. Receipt of guidance that existing right-of-way within the LMNRA is not considered part of that Section 4(f) resource
7. Refinement of alignment positions, their impacts to historic structures (including the Boulder City Branch Railroad), and cut and fill limits of the alternatives

Additional changes, chiefly reflected by updated mitigation measures, came as a result of consultations between NDOT, FHWA, NPS, NDOW, EPA and ACOE on avoidance, minimization, and mitigation measures for Alternative D impacts to biological resources and jurisdictional waters of the U.S.

In the DEIS, Alternative D included a directional interchange with a large footprint at the east study limit. At the request of the PMT, the east limit of this alignment was modified to tie in to the Hoover Dam Bypass Nevada Interchange.

Also, in July 2003, a Programmatic Agreement (PA) for the identification, evaluation and treatment of historic properties within the Area of Potential Effect (APE) of Alternative D was signed by the FHWA, SHPO, NDOT, NPS, Reclamation, WAPA, and the BLM. A copy of the PA is provided as Appendix E.

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