2.1 INTRODUCTION

As required by the Council on Environmental Quality's (CEQ) regulations 1501.1(e) for implementing the National Environmental Policy Act of 1969 (NEPA) and for the purposes of this Environmental Assessment (EA), alternatives were considered for US Highway (US) 550 between Durango, Colorado, and the New Mexico state line, to improve safety, address future highway capacity needs, and improve access conditions. The alternatives include the "no action" alternative and a number of "action" alternatives. The action alternatives include Transportation System Management (TSM) and Transportation Demand Management (TDM) strategies, two alternative corridor alignments, and several modified existing alignment alternatives. All of the action alternatives were screened to determine if they meet the project purpose and need, and are considered reasonable to construct.

The purpose and need of the proposed highway improvements are to improve safety, address future highway capacity needs, improve access conditions, and address roadway deficiencies along the project corridor. To increase safety and improve access conditions, implementing certain critical elements are required, including: realigning and reducing steep grades, improving shoulder conditions, reducing animal-vehicle collisions, and realigning county and local road accesses throughout the corridor. In addition, increasing capacity along the corridor to handle future highway capacity needs can only be accomplished by adding lanes.

Alternatives that fail to address specific items identified in the Purpose and Need (Section 1.4, *Purpose and Need*) or are not considered reasonable to construct are dismissed from further consideration and are described in Section 2.2, *Alternatives Considered But Dismissed*. Alternatives that meet the Purpose and Need for the project and are considered reasonable to construct are presented in Section 2.3, *Alternatives Carried Forward*, and are evaluated in detail in Chapter 3, *Existing Environment, Impacts, and Mitigation*. The Preferred Alternative is included as one of the alternatives in Section 2.3, *Alternatives Carried Forward.*

2.2 ALTERNATIVES CONSIDERED BUT DISMISSED

2.2.1 Transportation System Management

TSM incorporates techniques, such as intersection improvements and access control, to smooth traffic flow and make efficient use of existing transportation facilities. These techniques are described below.

- **Intersection Improvements:** Intersection improvements were considered at each of the nine county road intersections. These intersection improvements would be minor improvements designed to improve traffic flow and safety of the existing intersections. Improvements could consist of right-turn and left-turn lanes, and approach reconstruction to improve grades or geometry.

- **Access Control:** Access control is used to systematically control the location, spacing, design, and operation of driveways and roadway connections to a highway. The purpose of access control is to provide vehicular entry to adjacent land development in a safe and orderly manner.

The TSM alternative described above would improve safety at the specific locations where implemented. However, TSM would not address important safety issues such as insufficient clear zone, poor sight distance, and the need to reduce animal-vehicle collisions. Also, TSM would not meet year 2025 capacity requirements. Since TSM by itself would not meet the Purpose and Need to improve safety and capacity, it was eliminated from further consideration as a stand-alone alternative. However, access control and intersection improvements were incorporated in the action alternatives advanced through the EA.

2.2.2 Transportation Demand Management

TDM strategies involve reducing the peak hour demand on existing roadways by changing the time or means of trips. TDM strategies include but are not limited to:

- car/van pooling
- telecommuting
- flexible/staggered work schedules
- employer-based and financed van-pooling programs
- alternative methods of transit including biking and walking
- involving major local employers by circulating ride share information, appointing a rideshare coordinator, and providing financial and administrative support to the city/county program
- including HOV lanes in highway designs

The TDM approach is generally most effective in high-density urban areas (like Denver) with concentrated employment areas and would not work as favorably in lower-density areas such as the US 550 project corridor. Historically, implementation of TDM strategies has less than a three percent diversion on peak hour trips (Link 2004). Based on year 2025 traffic projections of 12,800 vehicles per day (vpd), TDM strategies (for example, vanpools, telecommuting, etc.) alone would not address the Purpose and Need to improve highway capacity. Additionally, TDM would not address important safety issues such as insufficient clear zone, poor sight distance, and the need to reduce animal-vehicle collisions. Therefore, TDM was dismissed as a stand-alone alternative in this EA.

2.2.3 Animas River Corridor

An alternative alignment was considered that would deviate from the existing US 550 alignment at the US 550/CR 213 intersection, generally following the existing County Road (CR) 213 alignment along the Animas River Corridor (ARC) north to intersect with

US 160. The ARC alternative would require three crossings of the Animas River between the US 550/CR 213 intersection and US 160, and would have a northern terminus on US 160 approximately 0.5 mile west of the existing US 550/US 160 intersection at Farmington Hill.

The *US 550 Corridor Scoping Memo* was prepared to compare the relative impacts of reconstructing US 550 along the existing corridor versus constructing a new alignment along the ARC (URS 2002a). The scoping memo disclosed that the ARC alternative would have a much greater impact to wetlands, cultural resources, wildlife, and sensitive species' habitats than alternatives along the existing US 550 corridor. Upon review by the US Army Corps of Engineers (Corps), the agency with jurisdiction over wetland permitting, the ARC alternative did not prove to be the Least Environmentally Damaging Practicable Alternative (LEDPA) in accordance with Section 404 of the Clean Water Act (CWA). In June of 2001, the Corps issued a letter stating that a Section 404 (wetland) permit could only be issued for the LEDPA (Appendix I *Interagency Correspondence*). As such, the ARC could not be considered a reasonable alternative and was dismissed from further consideration.

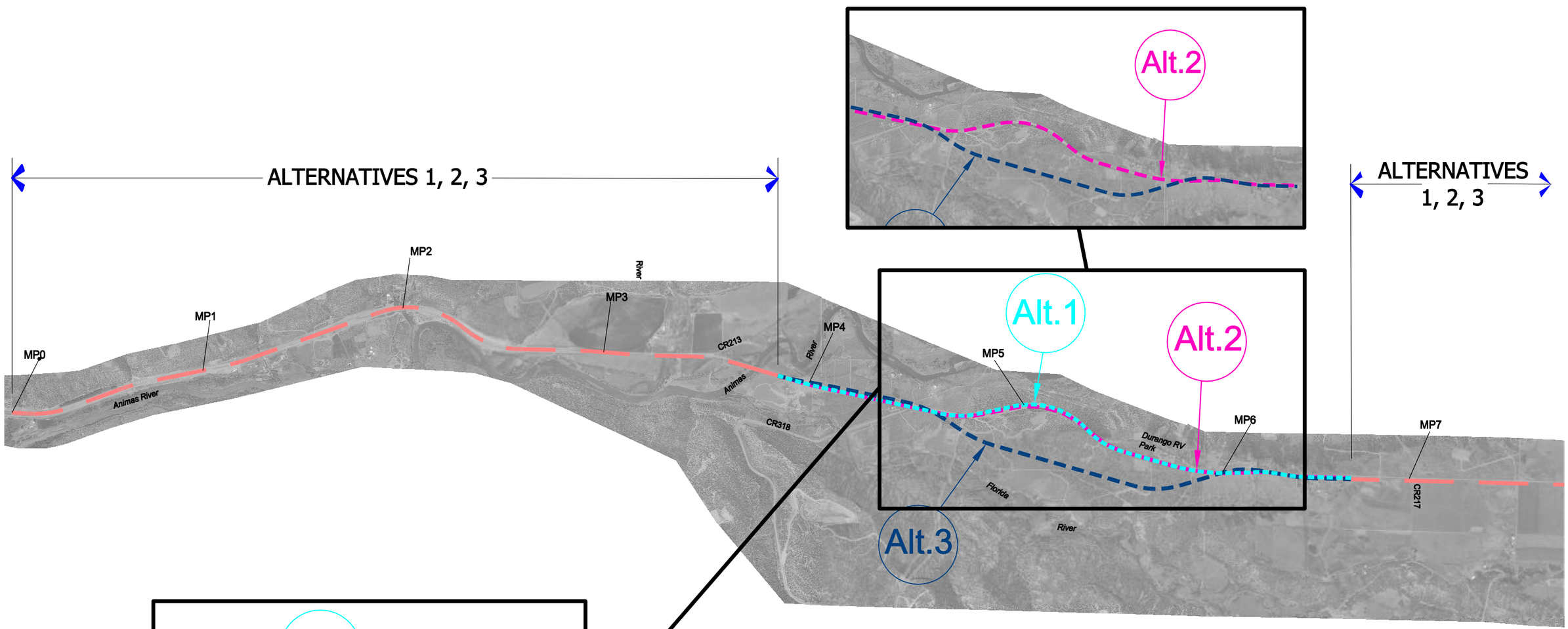
2.3 ALTERNATIVES CARRIED FORWARD

2.3.1 No Action Alternative

Under the No Action Alternative, US 550 would continue to exist as it does currently, with no major highway corridor-wide improvements that would enhance safety, add highway capacity, or improve access conditions. Improvements such as additional travel lanes that would add capacity would not occur. Small, site-specific safety and roadway improvements such as individual intersection reconstruction could occur under the No Action Alternative, but these improvements would not be coordinated and would not uniformly increase safety or improve access conditions along the entire corridor. Thus, the evaluation of a No Action Alternative would not improve safety, capacity, or access for the entire US 550 corridor evaluated in this EA. However, the No Action Alternative is required by NEPA to provide a baseline for comparison of the magnitude of environmental impacts of all action alternatives and is therefore carried forward for analysis.

2.3.2 Action Alternatives

Three action alternatives were carried forward for evaluation in this EA. All three alternatives would extend the existing four-lane widening on US 550 from approximately milepost (MP) 1.0 to MP 15.4. Alternative 1 generally follows the existing highway alignment, with alignment shifts east and west as needed to improve the highway geometry and reduce impacts to the environment and existing development. Alternatives 2 and 3 follow the Alternative 1 alignment except between MP 3.1 and MP 6.6, where variations from the existing alignment were developed. Each alternative is explained in greater detail in Sections 2.3.2.2 through 2.3.2.4 and depicted in Figures 2.3-1 and 2.3-2. Detailed maps of the alternative alignments are included in Appendix C.



Legend

- Alternatives 1, 2, 3
- Alternative 1
- Alternative 2
- Alternative 3

NOTE: Detailed maps of the alternative alignments are included in Appendix C.

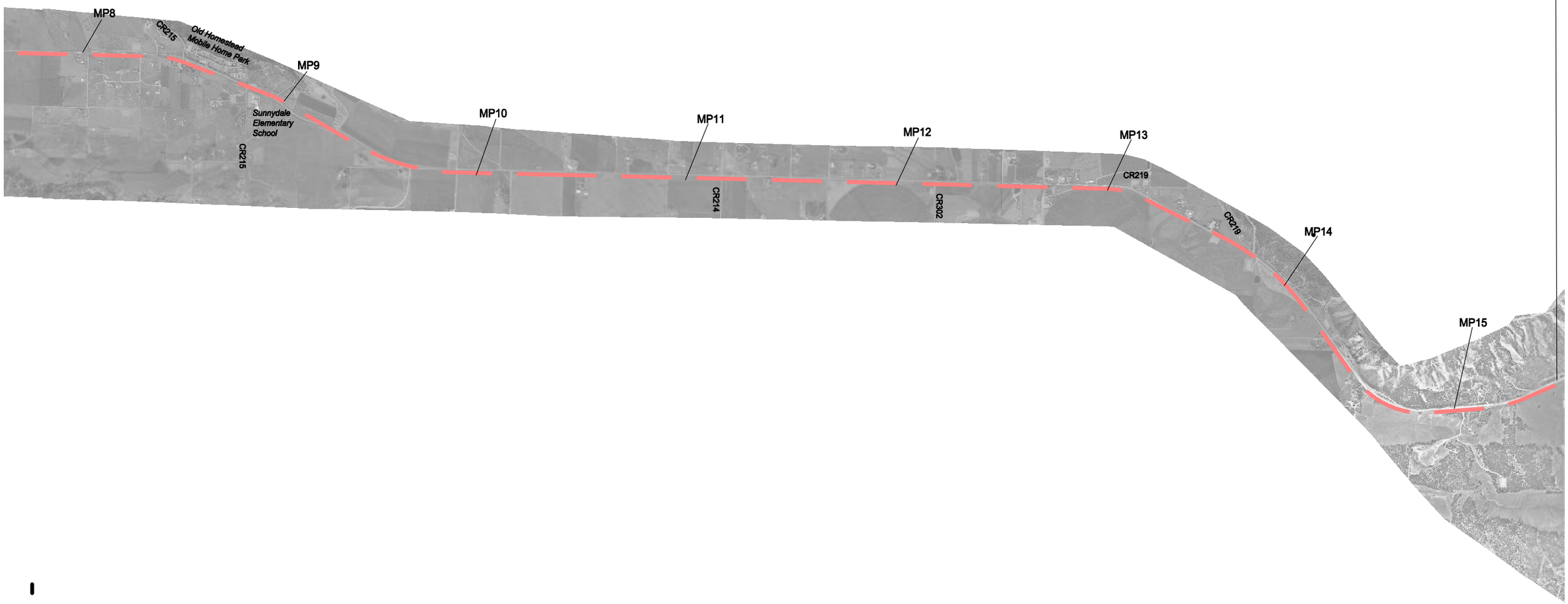
DEPARTMENT OF TRANSPORTATION

US 550 EA

Project Alternatives
Figure 2.3-1

02/15/05 Figure 2.3-1

ALTERNATIVES 1, 2, 3



Legend

Alternatives 1, 2, 3

NOTE: Detailed maps of the alternative alignments are included in Appendix C.

DEPARTMENT OF TRANSPORTATION

US 550 EA

Project Alternatives
Figure 2.3-2

02/14/05 Figure 2.3-2

Two roadway typical sections were developed for use with the three action alternatives. A typical section is a generic cross-section of the roadway that illustrates the number of lanes, lane widths, shoulder widths, median type and width, traversable slopes adjacent to the roadway, ditches, and other typical roadway features. Figure 2.3-3 illustrates the two typical sections used for the action alternatives. The typical section using a 46-foot-wide depressed grass median would be the primary typical section used for the three alternatives. The typical section using a 14-foot-wide raised median barrier would be used for Alternatives 1 and 2 at Bondad Hill to reduce environmental and right-of-way (ROW) impacts along the existing US 550 corridor.

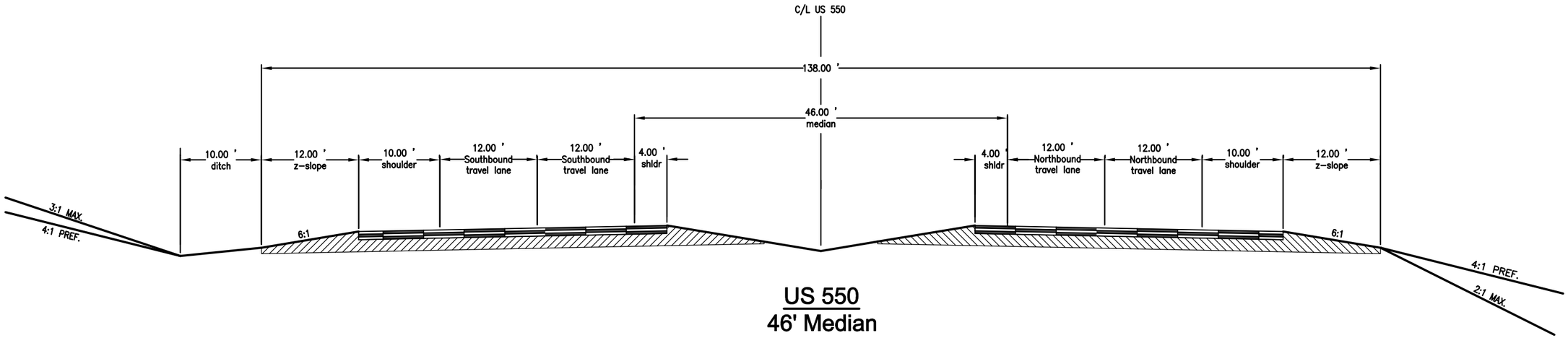
2.3.2.1 Design Features Common to All Action Alternatives

The action alternatives generally follow the same alignment, except between MPs 3.1 and 6.6, where variations were developed to address site-specific issues. All three action alternatives would extend four-lane widening on US 550 from approximately MP 1.0 to MP 15.4. No additional widening would be required between MP 0.0 and approximately MP 1.0 where the existing four-lane section ends. Between MP 1.0 and MP 15.4, the US 550 roadway for each travel direction would be a paved section comprised of two 12-foot travel lanes, a four-foot minimum inside shoulder, and a 10-foot outside shoulder. The four-lane configuration for MP 1.0 to MP 15.4 was chosen as the result of a Value Engineering Study that is included as Appendix D. Several designs were evaluated in the study to add capacity sufficient to meet year 2025 traffic projections, including the "Super Two" design (adding passing lanes at strategic locations) and a three-lane design. Neither design met the capacity requirements based on year 2025 traffic projections (Appendix B).

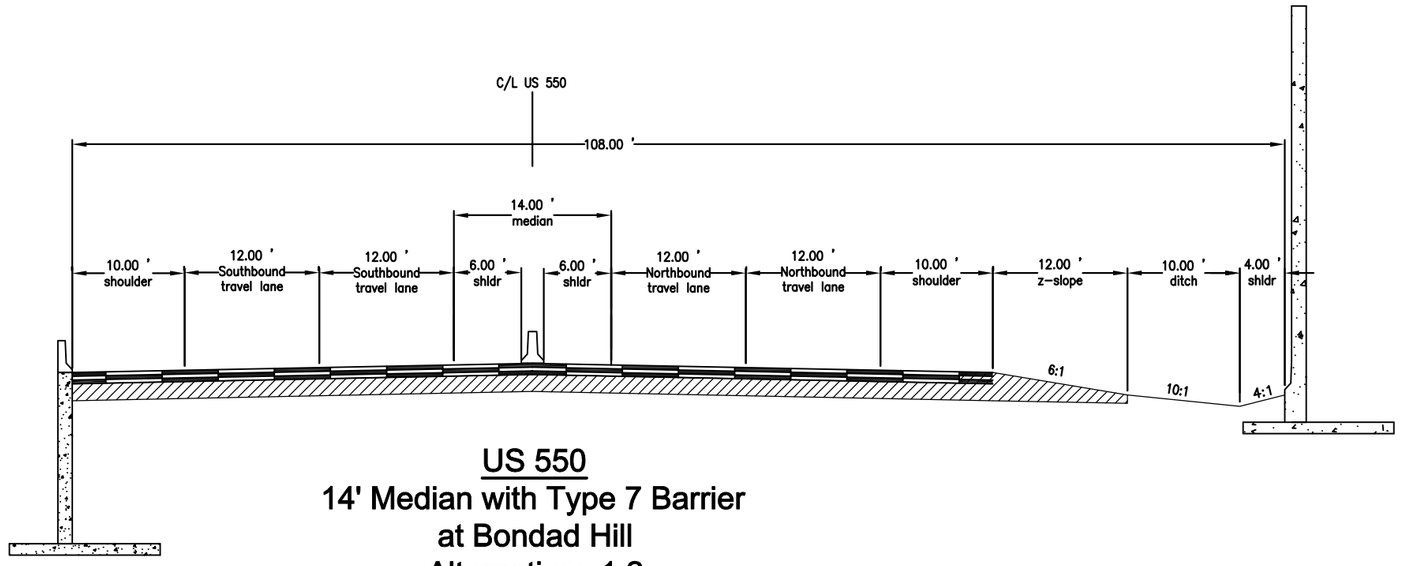
The design of all alternatives would result in increasing the width of the roadway section (travel lanes, median, and shoulders) between MP 1.0 and MP 15.4 from its current configuration (approximately 28 feet to 68 feet) to approximately 138 feet. Additional ROW outside the existing roadway would be required where excavation or embankment is necessary because of topography and to accommodate roadside drainage ditches.

In order to control stormwater discharges and reduce water quality impacts, all action alternatives would include permanent best management practices (BMPs) to prevent an increase in pollutant discharge. Permanent BMPs must be constructed in order to comply with the Colorado Department of Transportation (CDOT) Municipal Separate Storm Sewer System (also known as MS4) issued by the Colorado Department of Public Health and Environment (CDPHE) in accordance with Section 402 of the Clean Water Act (CWA). This permit program, which is generally geared towards municipalities, also requires CDOT to comply for new highway construction projects. As part of the design for this project, CDOT would install permanent BMPs adequate to remove at least 80 percent of the annual Total Suspended Solids (TSS) loading, and 100 percent of the required Water Quality Capture Volume (WQCV).

US 550 Environmental Assessment
Typical Sections



US 550
46' Median
Alternatives 1, 2, 3



US 550
14' Median with Type 7 Barrier
at Bondad Hill
Alternatives 1,2

US 550

DOT
DEPARTMENT OF TRANSPORTATION

US 550 EA

Typical Sections
Figure 2.3-3

02/12/05

In order to reduce animal-vehicle collisions, all action alternatives would include four large wildlife crossing structures that are designed for use by multiple species, which would pass under the highway from adjacent wildlife habitats. The structures are bottomless concrete box culverts with a minimum width of 24 feet and height of 8 feet. The culverts would have a natural substrate bottom, such as soil, sand, or pea gravel. Additionally, fencing would be erected along the corridor (MP 0.0 to MP 15.4) and deer guards would be installed at intersections and access points to prevent deer from entering the highway ROW.

- **MP 1.0 to 3.1.** This segment is comprised of a two-lane highway that would be increased to four lanes under all action alternatives. The proposed alignment of the widening generally follows the existing median centerline. New ROW would be required in the vicinity of the Southern Ute Tribal lands and where new driveway connections are necessary. The design speed for this segment is 70 miles per hour (mph) with a 46-foot vegetated median to separate opposing travel lanes and provide a recovery area for errant vehicles.
- **MP 3.1 to 6.6.** The alternative variations occur primarily in this segment, which traverses Bondad Hill. All three alternatives propose to realign the CR 213 and CR 318 intersections to improve the county road approach angles with minor variations. Further descriptions of the different alternatives are located in Sections 2.3.2.2 to 2.3.2.4. A multi-species wildlife crossing would be installed at MP 4.85, just north of a private access road. This crossing would link piñon-juniper habitat on both sides of the highway, as well as habitats in the Animas River Valley to the Florida River Valley to the east.
- **MP 6.6 to 10.5.** All action alternatives would generally follow the existing two-lane highway alignment, increasing the highway width to four travel lanes, with alignment shifts to the east and west to reduce impacts to existing development and to flatten horizontal curves. This segment includes CRs 215, 218, and 217. All action alternatives propose to realign the CR 215 intersection to improve geometrics and provide one-half mile spacing from the CR 218 intersection, and construct a full movement intersection at CR 217. The design speed for this segment is 70 mph with a 46-foot vegetated median to separate opposing travel lanes and provide a recovery area for errant vehicles. A multi-species wildlife crossing would be installed at approximately MP 6.75 near an irrigation ditch that crosses US 550.

  A noise wall would be constructed at the Old Homestead Mobile Home Park (MP 8.5) to prevent noise levels within the homes from exceeding federal noise limits. The proposed wall is 8 feet high and 1,800 feet long. Per federal requirements, an assessment of cost per impacted receiver per decibel was calculated to determine the reasonableness of constructing a noise wall at this location. The details are provided in Appendix E on CDOT Form 1209 (Noise Analysis and Abatement Guidelines). The location of the wall would require that the current driveway opening be relocated to the roadway south of the site. Analysis of projected noise levels determined that noise levels within the mobile home park would average 54.8 A-weighted decibels (dBA) after the project, including the noise wall, is constructed.

A pedestrian bridge or underpass would be built as part of the design to provide safe access to Sunnyside Elementary School from the Old Homestead Mobil Home Park.

- **MP 10.5 to MP 15.4.** All action alternatives would generally follow the existing two-lane highway alignment and increase the highway width to four travel lanes, with an easterly shift to preserve the existing west ROW boundary. This segment includes intersections at CRs 214, 219 and 302. CR's 214, 302, and the south approach of CR 219 would be reconstructed as full movement intersections. CR 219 South would also be realigned to improve its approach angle to US 550. The design speed for this segment is 70 mph with a 46-foot vegetated median to separate opposing travel lanes and provide a recovery area for errant vehicles.

  Due to the high number of deer-vehicle collisions in this segment, two wildlife crossings would be installed at MPs 13.90 and 15.05. The wildlife crossing at MP 13.90 would link habitat along the CO-OP Ditch to the east of US 550 with piñon-juniper woodland habitat to the west. At MP 15.05, the wildlife crossing would link piñon-juniper habitat on both sides of the highway.

2.3.2.2 Alternative 1

From MP 3.1 to MP 6.6, Alternative 1 would generally follow the existing highway alignment and increase the highway width to four travel lanes with alignment shifts to the east and west to reduce impacts to the environment and existing development. Alternative 1 reduces the grade on Bondad Hill from 6.5 percent to 5 percent between MP 4.3 and MP 5.3. The highway design transitions from a 70 mph design speed with a 46-foot vegetated median north and south of Bondad Hill to a 45 mph design speed with a 14-foot median and a median barrier separating opposing travel lanes. Due to the existing roadway traversing Bondad Hill in a cliff area, this alternative would require two retaining walls on Bondad Hill, one 25-foot wall on the uphill (east) side, and one 40-foot high wall on the downhill (west) side of the highway.

2.3.2.3 Alternative 2 (Preferred Alternative)

Alternative 2 (Preferred Alternative) also generally follows the existing highway alignment and increases the highway width to four travel lanes between MP 3.1 and MP 6.6, but shifts the alignment further to the east to flatten the horizontal curve at Bondad Hill. This alignment reduces the grade on Bondad Hill from 6.5 percent to 5 percent between MP 4.3 and MP 5.3. The highway design transitions from a 70 mph design speed with a 46-foot vegetated median north and south of Bondad Hill to a 60 mph design speed with a 14-foot median and a median barrier separating opposing travel lanes. Due to the existing roadway traversing Bondad Hill in a cliff area, this alternative would require two retaining walls on Bondad Hill, one 60-foot, stepped wall on the uphill (east) side, and one 40-foot high wall on the downhill (west) side of the highway.

2.3.2.4 Alternative 3

Alternative 3 increases the highway width to four-travel lanes between MP 3.1 and MP 6.6 and moves onto a new alignment east of Bondad Hill. The new alignment would

cross currently undeveloped Southern Ute Tribal lands. The design for the new alignment would reduce the grade in the Bondad Hill area from 6.5 to 4 percent and have minimal horizontal curves. By shifting the highway off of Bondad Hill, the design speed for this segment matches the rest of the US 550 corridor from MP 0.0 to MP 15.4, with a 70 mph design speed with a 46-foot vegetated median separating opposing travel lanes.

2.4 CONSTRUCTION FEATURES COMMON TO ALL ACTION ALTERNATIVES

The following sections describe the procedural, regulatory, and physical aspects of this project that would apply to construction regardless of which action alternative is selected.

2.4.1 Property Acquisition and Relocation

Property acquisition and relocation may be required when highway improvements necessary for safety or capacity cannot be built without affecting private or public property. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17) requires that a property owner be notified of CDOT's interest in acquiring his or her property before a real property appraisal is completed. When applicable, all qualified relocatees shall receive monetary payments, which may include payments for moving expenses, business in lieu of payment, rent supplements, down payments, and increased interest payments. CDOT would explain the basis of relocation to the relocatees in detail plus present information as it relates to their financial options.

2.4.2 Regulatory Permits

Table 2.4-1 provides a summary of the regulatory permits and approvals that would be required for construction. The permitting agency, permit/approval requirements and application deadlines are discussed. Note that the list is preliminary and additional requirements may be identified for construction of the project. However, all permits and approvals would be obtained prior to project construction.

Table 2.4-1
List of Required Permits/Approvals

Resource	Agency	Permit / Approval	Description
Air	Colorado Department of Public Health & Environment (CDPHE) – Air Pollution Control Division	Construction Permit (Land Development activities) for control of fugitive dust	Required if more than 25 acres of land is disturbed or activity lasts longer than 6 months.

Resource	Agency	Permit / Approval	Description
Water Resources	CDPHE – Water Quality Control Commission (WQCC)	National Pollutant Discharge Elimination System (NPDES) (MS4 and construction-related stormwater discharge permit)	MS4 required for all new and reconstructed highway developments; Construction discharge permit required for ground disturbing construction activities disturbing more than 1 acre.
		Section 401 Water Quality Certification	Required for activities authorized under Section 404 to ensure that state water quality standards are met.
		Dewatering Permit	Required for the discharge of water from construction dewatering operations to either surface water or ground water.
Wildlife and Fisheries	Colorado Division of Wildlife (CDOW)	SB40 Wildlife Certification	Required for state agency projects that affect streams or stream banks.
	U.S. Fish and Wildlife Service (USFWS)	Section 7 – Consultation	Required for any federal agency action that may affect a threatened or endangered species.
		Migratory Bird Treaty Act (MBTA) Depredation (Nest) Permit	Required for the removal of any Migratory Bird nests.
Historic and Archaeological Resources	State Historical Preservation Officer (SHPO)	Section 106 Determination of Historic objects, sites, buildings, structures eligible for preservation under National Historic Preservation Act	Requires determination of effect on any structure, object, and site eligible for inclusion on National Register. Advisory Council on Historic Preservation review and approval.
Wetlands and Floodplains	U.S. Army Corps of Engineers (Corps)	Dredge or Fill (Section 404)	Requires permits for discharge of dredged or fill material into waters of the U.S., including wetlands.
	La Plata County	Floodplain Permit	Required for any work to be performed in the 100-year floodplain.
	Federal Emergency Management Agency (FEMA)	Conditional Letter of Map Revision (CLOMR)/Letter of Map Revision (LOMR)	Required if published FEMA floodplain areas and elevations will be changed due to waterway restrictions (bridge abutment or embankment construction).

2.4.3 Stormwater Management

In addition to the installing permanent BMPs as part of the project design, Section 402 of the Clean Water Act (CWA) requires that CDOT install construction BMPs for the purposes of:

1. Controlling and minimizing erosion and sedimentation during the construction phase of a project; and
2. Reducing pollutants in stormwater runoff and receiving waters during construction.

CDOT would comply with this requirement and prepare a plan for design and implementation of construction BMPs to be used on the project. This plan is referred to as a Stormwater Management Plan (SWMP). The plan would be prepared prior to the start of construction. As required by the SWMP, CDOT would monitor the construction BMPs before, during, and after construction of the project to measure their effectiveness. A more comprehensive description of construction BMPs for stormwater and erosion control is contained in the CDOT manual, *Erosion Control and Stormwater Quality Guide* (CDOT 2002a).

2.4.4 Spill Prevention and Control

The equipment staging and bulk fuel storage areas must be compliant with the Colorado Petroleum Storage Tank regulations (7 Code of Colorado of Regulations [CCR] 1101-14) and the Environmental Protection Agency's (USEPA's) Spill Prevention, Control, and Countermeasure regulations (40 Code of Federal Regulations [CFR] 112). These regulations require site security, secondary containment, pressure relief, and a spill prevention control and countermeasure plan.

2.4.5 Reclamation

During construction of this project, short-term construction-related impacts would result in 52 to 75 acres of impact to native vegetation. Reclamation required for stormwater management per CDOT's National Pollutant Discharge Elimination System (NPDES) permit for construction would reduce the area of permanent vegetation disturbance to between 26 and 36 acres, depending on the alternative selected. Table 2.4-2 shows the area to be reclaimed by alternative.

Table 2.4-2
Total Acres Reclaimed Following
Construction of an Action Alternative

Alternative	Total Disturbance	Permanent Impact	Temporary Impact (Reclaimed)
Alternative 1			
MP 3.1 – 6.6	49.7	24.8	24.9
Total Impacts Common to All Alternatives	2.48	1.47	1.01
Total	**52.2**	**26.3**	**25.91**

Alternative	Total Disturbance	Permanent Impact	Temporary Impact (Reclaimed)
Alternative 2 (Preferred Alternative)			
MP 3.1 – 6.6	54.8	25.7	29.1
Total Impacts Common to All Alternatives	2.48	1.47	1.01
Total	**57.3**	**27.2**	**30.1**
Alternative 3			
MP 3.1 – 6.6	72.6	35.3	37.3
Total Impacts Common to All Alternatives	2.48	1.47	1.01
Total	**75.1**	**36.8**	**38.3**

2.4.6 CDOT Environmental Protection Measures

Both build and no-build alternatives may affect environmental resources not regulated at the federal, state, or local level. In most cases such impacts cannot be quantified, and cannot be avoided entirely. As part of its environmental ethic and policy, CDOT encourages its staff, consultants, and contractors to identify opportunities and methods to reduce the impact of projects and programs on environmental resources.

The CDOT Project Development Manual provides a guide for the processes related to project design and delivery (CDOT 2001). The engineer provides contract specifications for construction. These contract specifications become binding on the construction contractor. Special contract provisions are written to address unique or site-specific issues, including environmental concerns. For the US 550 corridor, standard and special contract specifications would be incorporated to minimize impacts to the following resources:

- **Archaeology and Paleontology –** When the Contractor's operations, including materials pits and quarries, encounter plant or animal fossils, remains of prehistoric or historic artifacts (bottle dumps, charcoal from subsurface hearths, old pottery potsherds, stone tools, arrowheads, etc.), the Contractor's affected operations shall immediately cease. The Contractor shall immediately notify the Engineer, or other appropriate agency for contractor source pits or quarries, of the discovery of these materials. The contractor's operations may continue only after the appropriate agencies are notified and the contractor is allowed to proceed.
- **Migratory Birds –** To facilitate compliance with the Migratory Bird Treaty Act (MBTA), vegetation removal and demolition or structural work on existing bridges will be timed to the extent possible to avoid the migratory bird breeding season (April 1 through August 15). Areas that must be scheduled to have vegetation removed or work completed on existing bridges between April 1 and August 15 shall be surveyed for nests and cleared by a qualified biologist prior to the initiation of work, and a migratory bird nest depredation permit under the MBTA shall be obtained (if necessary), or appropriate inactive nest removal and hazing/exclusion measures shall be incorporated into the work to avoid the need for a depredation permit.
- **Water Quality –** The project work shall be performed using practices that minimize water pollution during construction as detailed in Sections 107.25 and 208 of CDOT's Standard Specifications for Road and Bridge Construction. The measures

shall include, but not be limited to, erosion control measures during the life of the project to prevent or minimize erosion, sedimentation, and pollution of state waters. Bridge rail work, bridge deck work, and concrete washing and treatment work shall be conducted in a manner that prevents washwater and other potential pollutants, including concrete and sandblasting debris, from entering state waters. Potential pollutants shall be contained and disposed of in accordance with applicable state and federal waste disposal requirements.

- **Protection and Restoration of Property and Landscape –** Wetland and riparian areas shall be protected from construction equipment and unpermitted fills by installing temporary orange construction fencing as directed by the Engineer. Construction fencing shall be removed upon project completion. No unpermitted temporary or permanent fills within wetland areas are allowed under the Contract. Existing trees, shrubs, bushes, grass, or wetland areas outside the designated work area but inside the project limits, that are damaged due to the Contractor's operations, shall be replaced in kind at the Contractor's expense.
- **Visual -** Colors, architectural treatments, and finishes used for overpasses and underpasses, retaining walls, sound walls, highway guardrails, lighting and signage will be consistent throughout the project corridor so that the visual impact of the roadway and surrounding landscape is minimized.
- **Use of 2:1 Slopes** - 3:1 slope ratios or greater are preferred for corridor construction. Reduce environmental impacts where possible by constructing slopes between 3:1 and not steeper than a 2:1 slope ratio. Soil slopes will be topsoiled or prepared with an appropriate amendment, seeded with native grasses and forbs, and mulched with weed free hay or straw in combination with an organic mulch tackifier or mulched with soil retention blankets.

2.4.7 Construction Timing and Methods

Each of the action alternatives would result in complete reconstruction of the 15.4-mile US 550 project corridor. Funding for reconstruction of US 550 would be incremental over a period of several years, requiring multi-year phasing of construction. Based on data from recent highway reconstruction projects in southwestern Colorado, phased reconstruction of US 550 is estimated to take a minimum of five construction seasons (generally the eight-month period of April through November). The reconstruction would be performed in roughly four-mile segments so that each segment can be completed within a single construction season. The reconstruction of MP 3.1 to MP 6.6 would take two construction seasons because of the Animas River bridge and Bondad Hill retaining walls.

All construction activities described below would be subject to the permit requirements and environmental protection measures listed above. Construction activities would include the following on each of the project phases:

- **Vegetation Clearing –** Clearing of the vegetative cover would be performed by bulldozer, loader, and haul trucks. Clearing limits would be surveyed and fenced. Sensitive, wetland, and other areas to be left intact would be demarked with orange fencing to limit access. Areas to be left disturbed for more than 20 days would be

seeded and mulched. Runoff from disturbed areas would be collected and subject to BMPs for treatment.

- **Embankment Construction –** Surplus embankment would be stockpiled at the ends of previously built corridor projects, in areas determined during the final design phase. Embankment for individual projects would be constructed in a prism approximately 4 miles long and 150 ft wide, parallel to the existing roadway. This process would use three to five scrapers, two to four excavators, one to two compactors, and 10 to 20 haul trucks per project. Water trucks would use 10,000 to 40,000 gallons per day for moisture control of the embankment compaction as well as placing dust palliative on the project's disturbed ground surface.
- **Bridge Construction –** Foundations for the Animas River bridge would be constructed by a single crane/pile driver combination or by a single caisson drill rig and concrete trucks. The site for bridge pier foundations in the river would be created by a sheet pile cofferdam around the pier footprint or by temporarily diverting the river around the pier area. One to two excavators would create benches for the bridge abutments, and if sound rock permits, some minor pre-splitting and blasting of those benches for abutment spread footings.

  Piers and abutments would be constructed by forming and concrete pouring, using one to five concrete trucks for each substructure element. Pre-stressed concrete or steel bridge girders would be imported to the site and put in place by two cranes. The deck would be formed and concrete poured using five to 10 concrete trucks in continuous operation.
- **Retaining Wall Construction** – If Alternative 1 or Alternative 2 is selected, several types of retaining walls would be constructed on Bondad Hill. Downhill (west) walls, those on the downhill side of the final roadway, would be constructed in two steps. A temporary wall would be excavated from the top down using an excavator. As excavation progresses, holes would be drilled in the existing rock by a horizontal drill rig using bentonite slurry to suspend and remove material. Pre-cast concrete panels would be tensioned to the excavation face using post-tensioned bars or strand, clearing a downhill bench large enough to excavate, form, concrete pour, and backfill the permanent retaining wall.

  Uphill (east) walls would be constructed using traditional excavate, form, concrete pour, and backfill techniques. Both uphill and downhill walls would first require rock excavation. The rock would be pre-split by drilling with a vertical drill rig, and fractured at the pre-split face using controlled blasting techniques.

  Additional construction requirements on each project phase would include installation of drainage structures and wildlife crossings, paving, signing, striping, ROW and deer fence construction, and utility relocation.

- **Staging –** During each construction phase, a two- to three-acre site would be required for field offices, equipment and material storage, fueling areas, and water sources. An additional one-half to one acre would be required near Bondad Hill for specialized equipment storage for the construction of the bridge and retaining walls. The staging areas would be determined prior to the start of construction and would be subject to the regulatory permitting and CDOT requirements for environmental protection outlined above.

- **Traffic Control** – An embankment and roadway for the ultimate northbound configuration would be constructed parallel to the existing road. Upon completion of the new roadway, two-way traffic would be detoured to it, allowing reconstruction of the existing roadway to form the ultimate southbound configuration. Traffic control would be required at locations where trucks enter and exit the site, involving minimum stops for through traffic.

  Construction from MP 3.1 to MP 6.6 will require the construction of a detour on Bondad Hill to shift traffic east or west and allow construction of the retaining walls. North- and south-bound traffic on US 550 will be subject to 15- to 30-minute delays for several weeks until the detour is completed. Traffic will experience hour-long delays for several weeks, or night closures which will require detouring traffic during the rock excavation phase of the wall construction. The detour would use La Plata County CR 213 (La Posta Road), which was paved in 2005. CR 213 intersects US 550 approximately 2 miles south of Bondad Hill, and rejoins US 550/US 160 approximately 1 mile north of the US 550/US 160 Farmington Hill intersection in Durango.

2.5 ALTERNATIVE EVALUATION

The No Action Alternative and each of the action alternatives were evaluated for their effects on various environmental resources to determine the type and degree of environmental impacts. The environmental resource criteria and a summary of impacts for each alternative are included in Table 2.5-1. Table 2.5-2 identifies how well each of the alternatives satisfies the project Purpose and Need.

Table 2.5-1
Alternatives Impact Analysis

Resource Area	Alternatives			
	No Action	1	2	3
Wildlife				
Habitat impacted (acres)	0	55.0	60.0	77.8
Wetlands				
Wetlands impacted (acres)	0	2.67	2.7	2.74
Threatened/Endangered Species				
Bald Eagle (riparian habitat, acres)	0	2.53	2.56	2.58
Southwestern Willow Flycatcher (willow patches, acres)	0	0.48	0.47	0.47
Burrowing owl (prairie dog colonies, acres)	0	0.087	0.087	0.087
Gray Vireo (undisturbed piñon-juniper habitat, acres)	0	29.22	31.48	51.99

Resource Area	Alternatives			
	No Action	1	2	3
Soils and Geology	0	Soils and surficial geology would be impacted within the first 10 feet of the surface throughout the corridor. Surficial geology would be impacted to depths of 60 feet in the Bondad Hill area due to retaining wall construction.		Potential for increased wind and runoff-related erosion due to 16-20 acres of additional impacts in previously undisturbed area at Bondad Hill.
Vegetation (Undisturbed)				
Piñon Pine-Juniper Woodland (acres impacted)	0	29.32	31.5	52.0
Sagebrush Shrubland (acres impacted)	0	20.9	23.5	20.8
Riparian Areas (acres impacted)	0	2.10	2.14	2.17
Noxious Weeds	0	Potential spread of noxious weeds during construction.		Increased potential due to constructing in previously undisturbed area at Bondad Hill.
Floodplain and Hydrology	0	Upstream bridge would reduce 100-year water surface by more than 15 feet		
Water Quality	0	Potential construction-related impacts to surface water quality, and impacts from continued traffic use and highway maintenance		
Air Quality				
Expected impact to regional air quality	Potential exceedance of Carbon Monoxide (CO) standard due to reduced LOS by 2025	No violations or exceedances of the CO or particulate matter less than 10 microns in diameter (PM_{10}) standard are anticipated. Temporary PM_{10} emissions would occur during construction.		Increased temporary PM_{10} emissions due to constructing in previously undisturbed area at Bondad Hill.
Paleontology				
Number of sites impacted	0	0 estimated	0 estimated	0 estimated
Land Use				
Number of residential relocations	0	12	12	10
Residential impacts (acres)	0	94	94	101
Number of business relocations	0	3	3	3
Business impacts (acres)	0	6	6	5
Vacant/Undeveloped land impacts (acres)	0	20.11	19.11	37.11
Tribal land impacts (acres)	0	9	10	24
Prime farmland impacts (acres)	0	29.3	29.3	41.8
Socioeconomics	0	Access changes and/or restriction		
Noise				
Expected degree of noise change to existing properties	Approximately 20 homes experience noise	9 homes are expected to experience noise levels > 66 dBA. Noise level would increase in the Animas Valley. Reduction in grade would reduce		8 homes are expected to experience noise levels > 66 dBA.

Resource Area	Alternatives			
	No Action	1	2	3
	levels > 66 dBA. By 2025, 30 homes would experience noise levels exceeding 66 dBA.	truck air-brake use.		Noise level increase in sparsely populated Florida River Valley would be offset by decrease in noise in Animas Valley. Reduction in grade would reduce truck air-brake use.
Visual	0	High visibility of new roadway to nearby homes. Impacts to rural character of area.		Increased visual impact due to constructing in previously undisturbed area at Bondad Hill.
Historic and Archaeological Preservation				
Number of historic properties and sites eligible for National Register of Historic Places (NRHP) impacted	0	2 eligible sites.	2 eligible sites.	3 eligible sites.
Hazardous Materials				
Number of hazardous materials sites potentially impacted/encountered	0	7 Sites	7 Sites	7 Sites
Number of oil and gas facilities to be acquired or relocated	0	10 are within 300 feet of US 550 and 3 are located within the construction limits.		10 are within 300 feet of US 550 and 4 are located within the construction limits.
Project Cost				
Estimated Construction cost in 2004 dollars	N/A	$23,448,240	$27,426,089	$17,397,842
Estimated ROW costs in 2005 dollars		$7,030,000	$7,030,000	$10,230,000
Total Costs		$30,478,240	$34,456,089	$27,627,842

Table 2.5-2
Ability to Meet Purpose and Need

Purpose and Need Criteria	Alternatives			
	No Action	1	2	3
Safety				
Degree that improvements increase safety	Current accident rate is 18% higher than statewide average for similar roadways. The accident rate would continue to increase with increased traffic volume.	Improved sight distance, clear zone, roadway and intersection geometry, turn lanes, and wildlife crossings would reduce the frequency of accidents.		

Purpose and Need Criteria	Alternatives			
	No Action	1	2	3
		A median barrier at Bondad Hill would reduce sight distance resulting in reduced design speed to 45 mph, which may result in accidents related to drivers exceeding the speed limit in this segment.	A median barrier at Bondad Hill would reduce sight distance resulting in reduced design speed to 60 mph, which may result in accidents related to drivers exceeding the speed limit in this segment.	The Bondad Hill design speed is 70 mph. This alternative meets driver expectation of a consistent speed limit throughout the corridor.
Capacity				
Degree that improvements increase highway capacity to address future demand	Average Annual Daily Traffic (AADT) of 9,800 76.5% projected year 2025 demand of 12,800.	AADT of 64,800 500% of projected year 2025 demand of 12,800.		
Access				
How improvements address access problems	No change in access conditions. Approximately 135 full-movement accesses. Access spacing as little as 20 feet.	Minimum access spacing of 800 feet. Full-movement access at one-mile intervals. Turn-lanes constructed at all full-movement accesses. Shoulders provide space for acceleration/deceleration outside of travel lanes. Number of direct accesses reduced to 77.		Minimum access spacing of 800 feet. Full-movement access at one-mile intervals. Turn-lanes constructed at all full-movement accesses. Shoulders provide space for acceleration / deceleration outside of travel lanes. Number of direct accesses reduced to 76.
Roadway deficiencies				
How improvements address roadway deficiencies	Bridge & drainage deficiencies would not be addressed. The Animas River bridge would exceed its design life in 2007.	Undersized drainage structures, culverts, and the Animas River bridge would be replaced.		

The following is a summary of findings based on Tables 2.5-1 and 2.5-2.

- All three action alternatives meet the capacity and access components of the Purpose and Need.
- While all three action alternatives meet the safety component of the Purpose and Need, Alternative 3 addresses safety slightly better than Alternatives 1 and 2. The design speed for Alternatives 1 and 2, from MP 3.1 to MP 6.6, are 45 mph and 60 mph, respectively, whereas the design speed for the remainder of the corridor is 70 mph. The design speeds for Alternatives 1 and 2 are reduced because the median barrier reduces the sight distance on Bondad Hill. This change in design speed may result in speed-related accidents on the Bondad Hill segment. The safety issue with

Alternative 2 is less than that of Alternative 1 because the design speed differential is substantially less (10 mph versus 25 mph).

- Alternative 3 would require about 2.5 times more Tribal lands than Alternatives 1 and 2.
- Alternative 3 would have wildlife habitat impacts approximately 30% greater than Alternatives 1 and 2.
- Alternative 3 would have threatened and endangered species habitat impacts approximately 65% to 77% greater than Alternatives 1 and 2.
- All three alternatives have similar impacts to wetlands, irrigated farmland, riparian habitat, and businesses.
- Alternatives 1 and 2 impact two National Register of Historic Places-(NRHP) eligible site and Alternative 3 impacts three NRHP-eligible sites.
- Alternative 3 would result in two fewer residential relocations than Alternatives 1 and 2.
- The construction and ROW acquisition cost of Alternative 2 is approximately $4 million more than Alternative 1 and approximately $7 million more than Alternative 3.

Based on the information and data developed for each of the US 550 EA alternatives, Alternative 2 was identified as the Preferred Alternative. Alternative 2 meets the capacity, safety, access and roadway deficiency components of the Purpose and Need. Alternative 2 is preferred over Alternative 3 because it would have fewer impacts on wildlife habitat, Tribal lands, threatened and endangered species habitat and NRHP-eligible sites. While nearly all of the comparison criteria for Alternatives 1 and 2 have similar results, Alternative 2 is preferred over Alternative 1 because it would better meet the safety component of the Purpose and Need.

AASHTO's "A Policy on Geometric Design of Highways and Streets" states "Most highway design features are sufficiently similar to create driver expectancies related to common geometric, operational, and route characteristics…One of the most important ways to aid driver performance is to develop designs in accordance with prevalent driver expectancies" (AASHTO 2001). Alternative 1 improves an existing substandard three-lane situation at Bondad Hill to a widened, divided four-lane cross section, but reduces the speed limit on the new section to 45 mph due to the stopping sight-distance restraint. The characteristics of a widened and improved highway section at Bondad Hill, combined with a lowered speed limit would not provide the desired speed reduction due to conflicting driver expectancies, potentially causing a greater number of accidents.

Final selection of the Preferred Alternative will not be made until comments on the EA have been fully evaluated.