Appendix D
Biological Assessment

BIOLOGICAL ASSESSMENT

ARIZONA EASTERN RAILWAY SAFFORD BRANCH PROJECT AND GILA RIVER BRIDGE CROSSING

Prepared for:

ARIZONA EASTERN RAILWAY

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1. INTRODUCTION

1.1 BACKGROUND

WestLand Resources, Inc. (WestLand) was retained by Arizona Eastern Railway (AZER) to prepare a Biological Assessment (BA) to evaluate the impacts to threatened and endangered species associated with construction of a new railway spur (the Project). The proposed alignment (the Alignment) spans privately owned land and Arizona State Trust Land in Graham County, Arizona (Township 6 South, Range 26 East, portions of Sections 5, 6, 8, 9, 10, 15, 22, 23, 26, 34, and 35 and Township 7 South, Range 26 East, portions of Sections 1, 11, 12, 13, 14, and 23). The Alignment is approximately 12.4 miles in length, with a 500-foot-wide corridor (250 feet on either side of centerline). The total area within this corridor is approximately 745 acres (the Project Area).

This assessment evaluated the potential for occurrence of 18 species listed threatened, endangered, or candidates for listing in Graham County by the U.S. Fish and Wildlife Service (USFWS). An initial screening analysis determined that no such species were present along the 12.4-mile corridor. Designated Critical Habitat for two listed endangered species, the southwestern willow flycatcher (*Empidonax traillii extimus)* and the razorback sucker (*Xyrauchen texanus*), is present along the Alignment associated with the Gila River and adjacent riparian habitat. No nesting southwestern willow flycatchers were detected during the 2006 or 2007 (partial) survey season and the Arizona Game and Fish Department's (AGFD) Heritage Database Management System has no recent records of razorback sucker in this reach of the Gila River.

1.2 REGULATORY CONTEXT

Construction of the railway requires authorization under several federal permits; two federal agencies are directly involved in issuing permits for this Project. The Surface Transportation Board (the Board) is the designated agency to oversee transportation projects and is the lead federal agency for this Project. Because the Project crosses waters of the United States (waters), AZER must also obtain authorization under Section 404 of the Clean Water Act (CWA), administered by the U.S. Army Corps of Engineers (the Corps). The need for these permits creates the federal nexus and requires compliance with the Endangered Species Act (ESA). The presence of designated critical habitat for two endangered species requires coordination with the USFWS. The STB – Section of Environmental Analysis (SEA) will take the lead on this coordination effort.

AZER filed a petition with the Board seeking an exemption under 49 United States Code (U.S.C.) 10502 from prior approval requirements of 49 U.S.C. 10901 for authority to construct and operate 12.4 miles of new rail line in Graham County, Arizona. The Board, pursuant to 49 U.S.C. 10901, is the agency responsible for granting authority for the construction, operation, and maintenance of new rail line

facilities. The Board, through its Section of SEA, is the lead agency responsible for compliance with the National Environmental Policy Act (NEPA) as well as Section 7 of the Endangered Species Act (ESA). An Environmental Assessment (EA) is being prepared for the project in accordance with the requirements of NEPA. The EA is being prepared by CirclePoint, the Board's designated third-party contractor. CirclePoint's team for this project includes biologist Mark Cochran of CH2M HILL who has reviewed this BA on behalf of the SEA.

AZER will be seeking authorization from the Corps, in accordance with Section 404 of the CWA, for activities that result in impacts to jurisdictional waters. The 404-Permitted Activities include the planned construction of the railway bridge, which crosses numerous ephemeral drainages and the Gila River, and construction of a temporary access road. Section 404(e) of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the navigable waters (33 USC 1344(e)). The phrase "navigable waters" is defined in Section 502(7) of the CWA as "waters of the United States" including the "territorial seas" (33 USC 1362(7)). The term "waters of the United States" is further defined in the Corps' regulations and prescribes the policy, practice, and procedures to be used in determining the extent of Corps' jurisdiction under Section 404. A jurisdictional delineation of waters located within the Project Area was completed by WestLand and submitted to the Corps for review and approval (File No. SPL-2006-2234-RJD). The Corps has coordinated with SEA and concurred with the Board's role as the lead federal agency for the Section 7 consultation (via email, dated 11-30-07).

1.3 PURPOSE AND NEED FOR THIS BIOLOGICAL ASSESSMENT

An initial screening analysis was conducted for the Project Area to determine the potential presence of special-status species. Results of that analysis indicated that habitats associated with the Gila and San Simon rivers and are within the designated critical habitats for two listed species and have the potential to support these species. This BA supports the ESA Section 7 consultation for the southwestern willow flycatcher and the razorback sucker and their designated critical habitats. The Action Area for the BA is defined as the area within the overlay zone created by the USFWS to define designated critical habitat for the razorback sucker and the southwestern willow flycatcher. The critical habitat for each species includes the 100-year floodplain, as delineated by the Federal Emergency Management Agency (FEMA), within areas that contain or have the potential to contain constituent elements that define habitat for each of the species.

The eastern and western boundaries of the Action Area for the consultation are defined as the 500-foot-wide corridor adjacent to the Alignment at the Gila River Crossing. The northern boundary is the top of the cliff adjacent to the Gila River; the southern boundary extends south to the limits of the river training devices. Impacts are assessed along the 1,600-foot-long alignment of the Gila Bridge crossing at the Gila River, with a 500-foot-wide (250 feet either side of centerline) corridor, and the portion of the San Simon River within the 100-year floodplain of the Gila River.

This BA has been prepared in accordance with USFWS procedures for consultation as set forth in 50 CFR Parts 402.12 and 402.14(c)(1-6).

1.4 ORGANIZATION OF DOCUMENT

This BA consists of the following sections:

- Section 1, Introduction (this section), provides the background and regulatory context of the project and the purpose and need for the BA.
- Section 2, Environmental Setting, describes the local and regional context of the site, focusing on threatened and endangered species present or potentially present within the proposed corridor.
- Section 3, Project Description, details the Permitted Activities and describes the overall project.
- Section 4, Analysis of Impacts, describes the impacts to the threatened and endangered species present or potentially present within the proposed corridor which are likely to occur as a result of the Permitted Activities.
- Section 5, Literature Cited, provides a reference list of other documents used to support our research.

2. ENVIRONMENTAL SETTING

2.1. PROJECT LOCATION

The Alignment spans privately owned land and Arizona State Trust Land in Graham County, Arizona (Township 6 South, Range 26 East, portions of Sections 5, 6, 8, 9, 10, 15, 22, 23, 26, 34, and 35 and Township 7 South, Range 26 East, portions of Sections 1, 11, 12, 13, 14, and 23). The Alignment is approximately 12.4 miles in length with a 500-foot-wide corridor (250 feet either side of centerline). The total Project Area is approximately 745 acres. The southern portion of the Alignment runs parallel along the western side of the San Simon River and crosses the Gila River, just west of the confluence of the two watercourses. The planned Gila River Bridge (the Bridge) crossing is located just west of the confluence of these two watercourses (Township 7 South, Range 26 East, portion of Sections 11 and 14).

2.2. EXISTING LAND USE AND OWNERSHIP

The corridor begins at the existing railroad in the City of Safford, heads north across State Route 70, and follows an existing dirt road along the western side of the San Simon River to the Gila River crossing. South of the Gila River crossing the primary land use is agriculture. Lands immediately adjacent to the Alignment north of the Gila River are primarily undeveloped. There are some disturbed lands west of the Alignment on which there are a few widely spaced houses, a trailer, and a corral for cattle. An open area is littered with farm equipment in various states of disrepair, appliances, railroad ties, and other debris. The Safford Municipal Airport is located east of the Alignment. Some surrounding lands have been impacted by historic mining activities. Private lands, primarily owned by Phelps-Dodge including the Dos Pobres Mine, which is currently operational, is located along the northern potion of the Alignment. The solvent extraction/electro-winning facility for the mine is located at the northern terminus of the Alignment.

Agriculture and cattle grazing are the primary existing land uses along the Alignment. Lands adjacent to the Bridge are privately owned. Other adjacent lands include State Trust Lands administered by the Arizona State Land Department (ASLD) and the Bureau of Land Management (BLM). Figure 2 depicts the Project Area in relation to surrounding land ownership.

2.3. TOPOGRAPHIC AND GEOLOGIC SETTING

The Safford Valley lies along the northern margin of the Basin and Range physiographic province (BLM 1998). The Gila Mountains define the northern extent of the valley, and the Pinaleño Mountains the southwestern. The Pinaleño Mountains, reaching a maximum height of 10,713 feet above mean sea level (ft amsl) at Mount Graham, shield the Safford Valley from Pacific storms arriving from the west. The

Gila River enters the Safford Valley from the northeast, curving to the northwest. The San Simon River enters the valley from the southeast. In the vicinity of the Bridge, elevations range from approximately 2,930 ft amsl to approximately 3,045 ft amsl.

The Basin and Range characteristics of the region include heavily eroded northwest-trending, elongated mountain ranges separated by broad valleys. Downslope from the rugged ranges, eroded material has been deposited in a series of alluvial fans that slope moderately toward the valley center. The ranges and basins were formed in the Tertiary period, and the eroded materials from the mountains have filled the basins with sediments to great depths (BLM 1998). Tertiary volcanics form the basement rocks and are overlain by the basin fill and capped by Quaternary alluvium. Arizona Department of Water Resources (ADWR) (2004a, referencing Halpenny and Cushman [1947]; not reviewed by WestLand) indicates that the basin fill in the Safford Valley can be divided into two units based on their age. The younger (Quaternary) alluvium consists of clay and unconsolidated silt, sand, and clay in discontinuous lenses, with a thick clay layer defining the bottom of the unit. The older alluvium consists of weakly consolidated clay, silt, evaporates, and conglomerate. Both alluvial units are important aquifers in the Safford Valley.

2.4. JURISDICTIONAL WATERS OF THE UNITED STATES

In September 2006, WestLand submitted a preliminary jurisdictional delineation (JD) of waters along the Alignment to the Corps. It is currently under review. Within the Project Area, there are approximately 9.7 acres of perennial waters associated with the Gila River crossing and less than 1 acre of ephemeral waters along the San Simon River. An aerial depicting the proposed JD for the Project Area and the estimated maximum footprint of disturbance is depicted in Figure 3.

2.5. 100-YEAR FLOODPLAIN

The Project Area is within the 100-year floodplain for the Gila River as defined by FEMA. Designated critical habitat for the razorback sucker and the southwestern willow flycatcher are defined by areas of suitable habitat (e.g., areas containing constituent elements) within the 100-year floodplain of the Gila River. Although the floodplain limits extend south of SR 70 and include the San Simon River, constituent elements of habitat for this species are more specifically defined. For the southwestern willow flycatcher, critical habitat is defined as "stream and lake edge habitats within the 100-year floodplain." The razorback sucker requires an aquatic environment and is therefore limited to the river channels.

2.6. VEGETATION AND GENERAL HABITAT DESCRIPTION

The Alignment occurs within an area identified as Arizona Upland subdivision of the Sonoran desertscrub biotic community. The northern portion of the Alignment occurs within the Semidesert grassland biotic community (Brown 1994). Vegetation types vary along the length of the Alignment, as described in the

following sections. Most native vegetation on upland areas south and immediately north of the Gila River is absent as a result of historic and current farming and ranching activities. The Gila and San Simon River corridors support mesoriparian vegetation that is subject to scour during high water events in response to storms. The dominate species include desert broom, velvet mesquite, tamarisk, and Goodding willow. Table 1 contains a list of plants associated with upland habitats and riparian areas along the river corridors. The photographs below are representative of the vegetation of these areas.

Table 1. Plant species within the Various Habitat Types Along the Alignment

Common Name	Scientific Name	Riparian Floodplain	Upland Habitats
Sand Verbena	*Abronia villosa*	✓	
White-thorn acacia	*Acacia constricta*		✓
Four-o'clock	*Allionia* sp.		✓
Palmer's Amaranth	*Amaranthus palmeri*	✓	
Ragweed	*Ambrosia psilostachya*	✓	
Four-wing Saltbush	*Atriplex canescens*	✓	✓
Seepwillow	*Baccharis salicifolia*	✓	
Desert Broom	*Baccharis sarothroides*	✓	
Spiderling	*Boerhaavia* sp.	✓	✓
Needle Grama	*Bouteloua aristidoides*	✓	✓
Six-weeks Grama	*Bouteloua barbata*	✓	
Rattlesnakeweed	*Chamaesyce albomarginata*		✓
Bermuda Grass	*Cynodon dactylon*	✓	
Nut Sedge	*Cyperus rotundus*	✓	
Datura	*Datura wrightii*	✓	
Jungle grass	*Echinochloa* sp.	✓	
Spike Rush	*Eleocharis* sp.	✓	
Ephedra	*Ephedra* sp.		✓
Stink Grass	*Eragrostis cilianensis*	✓	✓
Barrel Cactus	*Ferocactus wislizenii*		✓
Ocotillo	*Fouquieria splendens*		✓
Threadleaf Snakeweed	*Gutierrezia microcephala*	✓	✓
Sunflower	*Helianthus annuus*	✓	
Camphorweed	*Heterotheca subaxillaris*	✓	
Burrobrush	*Hymenoclea salsola*	✓	
Burroweed	*Isocoma tenuisecta*		✓
Prickly lettuce	*Lactuca serriola*	✓	
Creosote Bush	*Larrea tridentata*		✓
Mexican sprangletop	*Leptochloa fusca* ssp. *uninervia*	✓	
Wolfberry	*Lycium* sp.		✓
White Sweet Clover	*Melilotus alba*	✓	
Blazing Star	*Mentzelia multiflora*	✓	
Muhly	*Muhlenbergia* sp.	✓	
Tree tobacco	*Nicotiana glauca*	✓	
Engelmann Pricklypear	*Opuntia engelmannii*		✓
Chain-fruit Cholla	*Opuntia fulgida*		✓
Club Cholla	*Opuntia kunzei*		✓
Cane Cholla	*Opuntia spinosior*		✓
Blue Palo Verde	*Parkinsonia florida*		✓

Table 1. Plant species within the Various Habitat Types Along the Alignment

Common Name	Scientific Name	Riparian Floodplain	Upland Habitats
Dallisgrass	*Paspalum dilatatum*	✓	
Chinchweed	*Pectis papposa*	✓	✓
Arrow weed	*Pluchea sericea*	✓	
Rabbitfoot grass	*Polypogon monspeliensis*	✓	
Fremont cottonwood	*Populus fremontii*	✓	
Odora	*Porophyllum gracile*		✓
Unicorn Plant	*Proboscidea althaeifolia*	✓	
Velvet Mesquite	*Prosopis velutina*		✓
Coyote Willow	*Salix exigua*	✓	
Goodding's Willow	*Salix gooddingii*	✓	
Russian thistle	*Salsola tragus*	✓	
Bulrush	*Schoenoplectus americanus*	✓	
Desert Senna	*Senna covesii*		✓
Plains Bristle Grass	*Setaria macrostachya*		✓
London Rocket	*Sisymbrium irio*	✓	
Silver-leaf Nightshade	*Solanum oleagnifolium*	✓	✓
Buffalo bur	*Solanum rostratum*	✓	
Johnson Grass	*Sorghum halepense*	✓	
Sporobolus sp.	*Sporobolus* sp.	✓	
Tamarisk	*Tamarix* sp.	✓	
Honeysweet	*Tidestromia lanuginosa*	✓	✓
Horse Purslane	*Trianthema portulacastrum*	✓	
Cattail	*Typha* sp.	✓	
Jackass Clover	*Wislizenia refracta*	✓	
Cocklebur	*Xanthium strumarium*	✓	
Graythorn	*Ziziphus obtusifolia*		✓

The San Simon River is a narrow, confined channel along the eastern side of the Alignment that has been significantly altered by agricultural activities. The vegetation along the San Simon River is more strongly influenced by the surrounding agricultural fields with numerous non-native species present. It flows north, discharging to the Gila River just east of the Bridge crossing (Photo 1).

Photo 1. San Simon River, near its confluence with the Gila River

Within the Project Area, the Gila River is a perennial stream that supports mesoriparian vegetation (Photo 2). The southern bank of the Gila River at the proposed crossing is relatively level, while the north is bounded by an approximately 100-foot-high cliff. The dominant plant along the Gila River is coyote willow which creates a hedge of habitat approximately 10 to 13 feet (3 to 4 miles) in width and 10 to 40 feet (3 to 12 miles) in height at the water's edge. Vegetation across the wide floodplain of the Gila River tends to be open with scattered patches of trees and dense willow strands

adjacent to the river (Photo 3). Beavers have created numerous breaks in vegetation adjacent to the channel. Fremont cottonwood and tamarisk patches, which are present throughout the floodplain, are not dependent on surface flows. The cottonwood trees tend to be older, more mature plants. The tamarisk tends to occur in scattered mono-typical patches across the floodplain, and throughout the action area comprises only a small fraction (approximately 10 percent) of the overall vegetation biomass. Saturated soils are present along the beaver pools and extend about two feet (0.6 m) up the bank. Some plants noted along the survey area include nut sedge, spike rush, sweet clover, rabbitfoot grass, bull rush, seepwillow, cockle burr, and sunflower. Other tree and shrub species found in this region of the Alignment include Gooding's willow and desert broom. There are no pools or wetlands present at the proposed crossing for the Alignment.

Photo 2. Gila River Mesoriparian Habitat along the low flow channel

Photo 3. Floodplain of Gila River near south bank

2.7. GENERAL WILDLIFE

Table 2 provides a list of wildlife species that are likely to occur in or adjacent to the Alignment. This list was compiled based on direct observations by biologists in the field or on habitat characteristics or other indicators such as tracks or scat.

Table 2. Typical Wildlife (*observed, or sign observed in field)

Common Name	Scientific Name	Common Name	Scientific Name
Birds			
Abert's Towhee	*Pipilo aberti*	Lesser Gold Finch	*Carduelis psaltria*
Bell's Vireo	*Vireo bellii*	Lucy's Warbler	*Vernivora luciae*
Black Hawk	*Buteogallus anthracinus*	Mallard	*Anas platyrhynchos*
Black-Chinned Hummingbird	*Archilochus alexandri*	Mourning Dove	*Zenaida macroura*
Black-Crowned Night Heron	*Nycticorax nycticorax*	Northern Cardinal	*Cardinalis cardinalis*
Blue Grosbeak	*Guiraca caerulea*	Northern Mocking Bird	*Mimus polyglottos*
Brown-Crested Flycatcher	*Myiagra azureocapilla cataneigularis*	Northern Rough Winged Swallow	*Stelgidopteryx serripennis*
Brown-Headed Cow Birds	*Molothrus ater*	Peregrine Falcon	*Falco peregrinus*
Cliff Swallow	*Petrochedlidon pyrrhonota*	Phainopepla	*Phainopepla nitens*

Table 2. Typical Wildlife (*observed, or sign observed in field)

Common Name	Scientific Name	Common Name	Scientific Name
Common Yellow Throat	*Geothlypis trichas*	Red-Winged Black Bird	*Agelaius phoeniceus*
Gila Woodpecker	*Melanerpes uropygialis*	Song Sparrow	*Melodia*
Great Blue Heron	*Ardea herodias*	White-Winged Dove	*Zenaida asiatica*
Green Heron	*Butorides virescens*	Yellow Warbler	*Dendroica petechia*
House Finch	*Carpodacus mexicanus*	Yellow-Breasted Chat	*Icteria virens*
Reptiles			
Ornate Box Turtle	*Terrapene ornata*	Coachwhip	*Masticophis flagellum*
Sonora Mud Turtle	*Kinosternon sonoriense*	Sonoran Whipsnake	*Masticophis bileatus*
Western Banded Gecko	*Coleonyx variegatus*	Western Patch-nosed Snake	*Salvadora hexalepis*
Eastern Collared Lizard	*Crotaphytus collaris*	Gopher Snake	*Pituophis catenifer*
Long-nosed Leopard Lizard	*Gambelia wislizenii*	Glossy Snake	*Arizona elegans*
Greater Earless Lizard	*Cophosaurus texanus*	Common Kingsnake	*Lampropeltis getula*
Zebra-tailed Lizard	*Callisaurus draconoides*	Long-nosed Snake	*Rhinocheilus lecontei*
Desert Spiny Lizard	*Sceloporus magister*	Black-necked Gartersnake	*Thamnophis cyrtopsis*
Clark's Spiny Lizard	*Sceloporus clarkii*	Checkered Gartersnake	*Thamnophis marcianus*
Southwestern Fence Lizard	*Sceloporus cowlesi*	Groundsnake	*Sonora semiannulata*
Common Side-blotched Lizard	*Uta stansburiana*	Smith's Black-headed Snake	*Tantilla hobartsmithi*
Ornate Tree Lizard	*Urosaurus ornatus*	Western Lyresnake	*Trimorphodon biscutatus*
Great Plains Skink	*Eumeces obsoletus*	Nightsnake	*Hypsiglena torquata*
Tiger Whiptail	*Cnemidophorus tigris*	Sonoran Coralsnake	*Micruroides euryxanthus*
Gila Monster	*Heloderma suspectum*	Western Diamond-backed Rattlesnake	*Crotalus atrox*
Western Threadsnake	*Leptotyphlops humilis*	Mohave Rattlesnake	*Crotalus scutulatus*
Ring-necked Snake	*Diadophis punctatus*	Black-tailed Rattlesnake	*Crotalus molossus*
Amphibians			
Tiger Salamander	*Ambystoma tigrinum*	Great Plains Toad	*Bufo cognatus*
Couch's Spadefoot	*Scaphiopus couchii*	Sonoran Desert Toad	*Bufo alvarius*
Mexican Spadefoot	*Spea multiplicata*	Canyon Treefrog	*Hyla arenicolor*
Green Toad*	*Bufo debilis*	Lowland Leopard Frog	*Rana yavapaiensis*
Red-spotted Toad*	*Bufo punctatus*	American Bullfrog	*Rana catesbeiana*
Woodhouse's Toad	*Bufo woodhousii*	Tiger Salamander	*Ambystoma tigrinum*
Mammals			
Desert Shrew	*Notiosorex crawfordi*	Deer Mouse	*Peromyscus maniculatus*
California Leaf-nosed Bat	*Macrotus californicus*	White-footed Mouse	*Peromyscus leucopus*

Table 2. Typical Wildlife (*observed, or sign observed in field)

Common Name	Scientific Name	Common Name	Scientific Name
Yuma Myotis	*Myotis yumanensis*	Southern Grasshopper Mouse	*Onychomys torridus*
Cave Myotis	*Myotis velifer*	Hispid Cotton Rat	*Sigmodon hispidus*
Western Pipistrelle	*Pipistrellus hesperus*	White-throated Woodrat	*Neotoma albigula*
Big Brown Bat	*Eptesicus fuscus*	Muskrat	*Ondatra zibethicus*
Townsend's Big-eared Bat	*Plecotus townsendii*	Porcupine	*Erethizon dorsatum*
Pallid Bat	*Antrozous pallidus*	Coyote	*Canis latrans*
Brazilian Free-tailed Bat	*Tadarida brasiliensis*	Kit Fox	*Vulpes macrotis*
Desert Cottontail	*Sylvilagus audubonii*	Gray Fox	*Urocyon cinereoargenteus*
Black-tailed Jack Rabbit	*Lepus californicus*	Black Bear*	*Ursus americanus*
Harris' Antelope Squirrel	*Ammospermophilus harrisii*	Raccoon*	*Procyon lotor*
Rock Squirrel	*Spermophilus variegatus*	Coati	*Nasua nasua*
Spotted Ground Squirrel	*Spermophilus spilosoma*	Ringtail	*Bassariscus astutus*
Botta's Pocket Gopher	*Thomomys bottae*	Badger	*Taxidea taxus*
Bailey's Pocket Mouse	*Chaetodipus baileyi*	Western Spotted Skunk	*Spilogale gracilis*
Rock Pocket Mouse	*Chaetodipus intermedius*	Striped Skunk	*Mephitis mephitis*
Desert Pocket Mouse	*Chaetodipus penicillatus*	Hooded Skunk	*Mephitis macroura*
Ord's Kangaroo Rat	*Dipodomys ordii*	Mountain Lion	*Puma concolor*
Merriam's Kangaroo Rat	*Dipodomys merriami*	Bobcat*	*Lynx rufus*
Beaver*	*Castor canadensis*	Collared Peccary*	*Pecari tajacu*
Western Harvest Mouse	*Reithrodontomys megalotis*	Mule Deer*	*Odocoileus hemionus*
Cactus Mouse	*Peromyscus eremicus*		

2.8. THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT

2.8.1. Screening Analysis

The USFWS lists 18 species for Graham County as threatened or endangered under the ESA (USFWS web site, accessed October 24, 2007; Appendix A). WestLand reviewed published and unpublished literature on the flora and fauna of the Sonoran Desert, focusing on the presence or likely presence of threatened or endangered species in Graham County along the length of the Alignment. After concluding that none of these special interest species had significant potential to occur within the upland portions of the Alignment, our analysis focused in particular, on those most likely to occur within the vicinity of the

Bridge crossing. A list of recorded occurrences of special-status species was provided by the AGFD from the Heritage Data Management System (HDMS) (August 24, 2006; Appendix B). The review indicated that the southwestern willow flycatcher was the only federally listed species with recorded occurrences within three miles of the Project Area. This portion of the Gila River is designated critical habitat for both the southwestern willow flycatcher and the razorback sucker. Critical habitat is not designated along the San Simon River; however; by definition critical habitat for these two species occurs within the 100-year floodplain of the Gila River where constituent elements are present. Accordingly, a portion of the San Simon River from its confluence with the Gila River south is included within critical habitat for both species. These species are discussed in greater detail in the sections that follow. Information for the analysis was taken from the AGFD (2007) and the USFWS (2007), except as noted.

Table 3 summarizes the results of the evaluation for each of the 18 species. The results of the evaluation indicate that there is very low to no potential for occurrence of 16 federally listed species, consequently, these 16 species are not considered further in this BA. The determinations are based on habitat analysis, review of the best available information regarding the biology of these species, comparisons of this information with habitat along the Alignment, and known ranges of the species. These 16 species have been eliminated from further review because their known ranges are outside the Project Area, or they are found in habitats dissimilar to those within the Project Area.

Table 3. U.S. Fish & Wildlife Service Threatened, Endangered, Proposed, and Candidate Species for Graham County, Arizona; Species status; and Potential for Occurrence Within the Project Area and Basis for this Determination. Species in bold are evaluated further in this BA.
(Information from the USFWS Summary of Listed, Proposed, Candidate, and Conservation Agreement Species in Graham County Except as Noted.)

Species	Status	Potential Occurrence in the Project Area; Basis for Potential Occurrence Determination
Arizona cliffrose (*Purshia subintegra*)	Endangered	No potential to occur; the Project Area lacks suitable habitat for this plant (white soils of tertiary limestone lakebed deposits).
Mexican gray wolf (*Canis lupus baileyi*)	Endangered	No potential to occur; the Project Area lacks suitable habitat for this species (chaparral, woodland, and forested areas) and occurs below the lower elevation limit of this species.
Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*)	Endangered	No potential to occur; the Project Area lacks suitable montane habitat for this squirrel and occurs below the lower elevation limit of this species.
Lesser long-nosed bat *(Leptonycteris curasoae yerbabuenae)*	Endangered	Not likely to occur; the Project Area lacks the desert scrub habitat with agave and columnar cactus required by this species. There are no known roost sites, and no recorded observations of this species within the Project Area.
Chiricahua leopard frog (*Rana chiricahuensis*)	Threatened	Not likely to occur; the Project Area occurs below the known elevation range of this species.
Wet Canyon talussnail (*Sonorella macrophallus*)	Conservation Agreement	No potential to occur; this talussnail is only known to occur in Wet Canyon.
Apache (Arizona) trout (*Oncorhynchus apache*)	Threatened	Not likely to occur; the Project Area lacks suitable aquatic habitat for this fish (cold mountain streams) and occurs below the known elevation of this species.

Table 3. U.S. Fish & Wildlife Service Threatened, Endangered, Proposed, and Candidate Species for Graham County, Arizona; Species status; and Potential for Occurrence Within the Project Area and Basis for this Determination. Species in bold are evaluated further in this BA.
(Information from the USFWS Summary of Listed, Proposed, Candidate, and Conservation Agreement Species in Graham County Except as Noted.)

Species	Status	Potential Occurrence in the Project Area; Basis for Potential Occurrence Determination
Desert pupfish *(Cyprinodon macularius)*	Endangered	Not likely to occur; all existing populations of this species have been stocked and no desert pupfish have been stocked in the Gila or Sam Simon rivers.
Gila chub *(Gila intermedia)*	Proposed	Not likely to occur; currently the Gila chub is only known to occur in headwater tributaries to the Gila River. There is no critical habitat designated within the Project Area.
Gila topminnow *(Poeciliopsis occidentalis occidentalis)*	Endangered	Not likely to occur; no natural populations of the Gila topminnow occur within the Project Area and no stocking of Gila topminnow has been done in this area.
Headwater chub (*Gila nigra*)	Candidate	Not likely to occur; the current range of the headwater chub is not within the Project Area.
Loach minnow *(Tiaroga cobitis)*	Threatened	Not likely to occur; the species persists in Arizona only in limited reaches in the White River, Aravaipa Creek, San Francisco and Blue Rivers, and Campbell Blue Creek.
Razorback sucker *(Xyrauchen texanus)*	Endangered	**Not likely to occur; the proposed bridge occurs within designated critical habitat for this species however; a review of the HDMS indicated that there are no known occurrences of this species within a three-mile buffer of the Alignment. See Section 2.8.2**
Spikedace *(Meda fulgida)*	Threatened	Not likely to occur; spikedace are not known to occur in the Gila River and no spikedace have been observed in Eagle Creek (tributary to the Middle Gila River) for 17 years.
California brown pelican *(Pelecanus occidentalis californicus)*	Endangered	Not likely to occur; the Project Area lacks suitable aquatic habitat (open water); the brown pelican is a coastal bird that is an uncommon transient in Arizona.
Mexican spotted owl *(Strix occidentalis lucida)*	Threatened	Not likely to occur; the Project Area does not contain mature conifer forests with deep shady ravines needed to support the Mexican Spotted owl.
Southwestern willow flycatcher *(Empidonax traillii extimus)*	Endangered	**Some potential to occur; the Project Area includes some marginally suitable habitat for this bird (dense riparian vegetation). See Section 2.8.3**
Yellow-billed cuckoo *(Coccyzus americanus)*	Candidate	Some potential to occur as a transient. However; unlikely to occur as a resident species. The Project Area does not contain large block of riparian woodlands needed to support yellow-billed cuckoo breeding territories.

2.8.2. Razorback Sucker

Legal Status

The razorback sucker was listed by the USFWS as endangered on October 23, 1991. Critical habitat was designated for this species on March 21, 1994. The Recovery Plan for this species was completed in December 23, 1998, and amended August 1, 2001 (USFWS 2002). At the time of listing of the razorback sucker as endangered, critical habitat was not designated because the USFWS concluded that critical

habitat was not determinable at the time of listing, so it was not prudent to designate at that time. However, the Sierra Club Legal Defense Fund filed a notice of intent to sue due to the USFWS's failure to designate critical habitat pursuant to Section 4(b)(6)(c) of the ESA. As a result, the USFWS was required to designate critical habitat for the razorback sucker. Designated critical habitat encompasses parts of the Colorado, Gila, Salt, and Verde rivers, including Lake Mead and Lake Mohave. This designation states that only those portions of the 100-year floodplain that contain the constituent elements are considered part of critical habitat. Over the last 25 years, the species has been bred in fish hatcheries and released back into the Gila, Salt, and Verde rivers with varied success (USFWS 2002).

Natural History

The razorback sucker is a large fish (up to 3 feet long and 6 pounds in weight) with a high sharp-edged keel-like hump behind its flattened head. It occurs in riverine and lacustrine areas, including backwaters, flooded bottom lands, pools, side channels, and other slower moving habitats below 6,000 feet elevation (AESFO 2003). Larvae are believed to prefer shallow, littoral waters, before dispersing to deeper waters a few weeks after hatching (59 FR 13374, 1994).

Historically, the species was dispersed throughout the Colorado River Basin. However, the population of razorback suckers has declined due to major alterations to the river system that have caused decreased and/or altered flows, decreased water quality, fragmented habitat, and the introduction of non-native species (USFWS 2002). In the Upper Colorado River Basin, the fish is currently isolated to the Green River, Yampa River, upper Colorado River, and San Juan River subbasins. In the Lower Colorado River Basin, small numbers of the species are located in the lower Colorado River between Lake Havasu and Davis Dam, Lake Mohave, Lake Mead, and in small tributaries of the Gila River subbasin, i.e. Verde River, Salt River, and Fossil Creek (AESFO 2003; USFWS 2002). The species is under rigorous management in several local areas, such as Cibola High Levee Pond, Achii Hanyo Native Fish Facility, and Parker Strip (USFWS 2002). Though recovery in both the Upper and Lower Colorado River Basins is considered necessary for survival of the species (USFWS 2002), the Upper Basin population will not be discussed in detail since the Property is located within the Lower Basin. In the Lower Basin, recovery plans were implemented for the main Colorado River and its tributaries downstream of the Glen Canyon Dam to the Mexico border.

In the Lower Colorado River Basin (Lower Basin), females generally range from 18.5 to 29 inches, and males generally range from 14.5 to 25 inches. The fish is a member of the sucker family Catostomids and genus Xyrauchen. The razorback sucker has well-developed, elongated filaments on its gill rakers used for feeding on zooplankton. Its pharyngeal teeth are compressed and arranged in comb-like fashion for benthic feeding. The fish has a bony dorsal keel, hardened caudal skeleton, and thickened and foreshortened caudal rays, which are thought to help against the strong river currents in which the fish lives. Its color ranges from dark to olive brown above, and yellow to white below. The coloration varies between sexes, especially during breeding season, when males are black or dark brown above and bright

yellow below. Morphology also varies between sexes: males have longer pelvic and anal fins, and more pronounced tubercles during the breeding season, and females are generally longer and heavier with a broader dorsal keel (USFWS 2002). Razorback suckers are located near the bottom of the food chain, feeding on algae, insect larvae, plankton, and detritus (AGFD 2002).

Populations have been declining for the past 50 years. Currently, there are only a few isolated populations that remain small due to lack of recruitment. Native razorback suckers have not been found in the Gila River drainage since the late 1960s (USFWS 2002). In the 1980s the USFWS reintroduced razorback suckers in this area, however, the stocked fish were juveniles and they did not survive. They were either eaten or out-competed for habitat resources by other larger fish that were likely non-native (L. Fitzpatrick, personal communication, August 1, 2007). The BLM reported a large razorback sucker found in Bonita Creek in 1991. Small or very small numbers of razorback suckers may survive in the Gila River, however these fish are relicts. No viable population of razorback sucker exists in the Gila River. For all practical purposes this species has been extirpated from the Gila River.

Site Specific Surveys

There is no established survey protocol for the razorback sucker. Because there are no records of occurrences and the presence of razorback sucker is not anticipated, no surveys were conducted for this species. Currently, the closest known occupied razorback sucker habitat is located several miles to the northwest in the Verde River.

The proposed Bridge occurs within designated critical habitat for the razorback sucker. The portion of critical habitat that includes the Bridge extends from the Arizona-New Mexico border (Township 8 South, Range 32 East, Section 34, Gila and Salt River Meridian) to the Coolidge Dam (Township 3 South, Range 18 East, Section 17, Gila and Salt River Meridian) (Figure 4).

2.8.3. Southwestern Willow Flycatcher

Legal Status

The southwestern willow flycatcher was listed as “endangered” by the USFWS in 1995, following candidacy in 1989 and proposed listing in 1994 (AGFD 2002). Critical Habitat was originally established in 1997, but set aside in 2001; the Proposed Rule (as noted above) for Critical Habitat designation was published in October 2004 (USFWS 2004). The Final Rule on Critical Habitat, published on October 19, 2005 (70 FR 60886), identifies critical habitat as the stream and lake edge habitats within the 100-year floodplain. Figure 4 depicts the boundary of critical habitat designated along the Gila River at the proposed crossing. The southwestern willow flycatcher is listed as Wildlife of Special Concern by the AGFD (AGFD 2002).

Natural History

The general description, diet, and foraging behavior of the southwestern willow flycatcher are well documented in a number of sources (AGFD 2002; Sogge 2000; DeLay et al. 2002) and are not replicated here. The following paragraphs summarize the bird's range, habitat, breeding, and foraging characteristics.

The southwestern willow flycatcher is a migratory bird with little known about its winter range. Mist-netting studies in the Southwest to date indicate that migration occurs primarily along major riparian corridors (Finch et al. 2000). Historically, the southwestern willow flycatcher summer (breeding) range included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (Sogge 2000). Broadly, the current summer range for the flycatcher is similar to the historic range, but the riparian habitat loss and fragmentation across its range has reportedly reduced the overall population (AGFD 2002). Unitt (1987, p. 149) describes the species' occurrence in Arizona as "always localized and usually uncommon." He maps only 11 locations in Arizona where breeding southwestern willow flycatchers have definitely or possibly been recorded since 1970. One site is at Fort Thomas, which is on the Gila River within Safford Valley, about 15 miles northeast of the Project Area.

During its stay in the United States, this migratory bird exists only in fragmented and scattered locations throughout the states of Arizona, California, New Mexico, Utah, and Colorado. Habitat used during migration tends to be diverse, with a greater number of plant communities used at this time than during breeding season (Finch et al. 2000). Some migration spots and stopover areas are lacking the primary constituent elements necessary for breeding birds, such as water and adequate patch size (Finch et al. 2000). Although detailed studies of wintering habitat (in Central and possibly South America) are lacking, studies to date suggest that wintering willow flycatchers prefer semi-open brushy habitat or woodland edges near water (Finch et al. 2000).

Southwestern willow flycatcher habitat during the breeding season (i.e., their summer stay in the United States) can be broadly described as dense riparian habitat with specific plant species. At low elevations, the bird breeds in stands of dense cottonwood, willow, and tamarisk thickets (Sogge and Marshall 2000). Stoleson and Finch (2003) found that the likelihood of nesting at a site increased when foliage density increased and a greater percentage of canopy cover was present. The presence of water has also been identified as an important component of southwestern willow flycatcher breeding habitat (USFWS 2002). According to USFWS (2002), occupied breeding sites are most often found near sections of slow-moving streams, swampy areas, marshes, or at the edges of impounded water. In addition, Stoleson and Finch (2001) report that habitat occupied by southwestern willow flycatchers is significantly closer to water than unoccupied but otherwise suitable habitat. At study sites along the Rio Grande in New Mexico, it was found that water flow influenced the reproductive efforts of nesting southwestern willow flycatchers (Johnson et al. 1999).

Arrival on the breeding grounds varies annually and geographically due to elevational and latitudinal differences, but typically occurs between May and early June (USFWS 2002). Southwestern willow flycatchers are highly territorial, and territories tend to be clustered rather than spread out evenly (USFWS 2002). However, there is a high degree of variation in territory size across the range of the species due to habitat quality and distribution. According to USFWS (2002), the territory size ranges from 0.1 hectare (ha) to 2.3 ha, with most territories being between 0.2 and 0.5 ha. By late May or early June nest building begins. Southwestern willow flycatcher nests are found in native tree species, such as willow, and exotic species such as tamarisk and Russian olive (Sogge 2000).

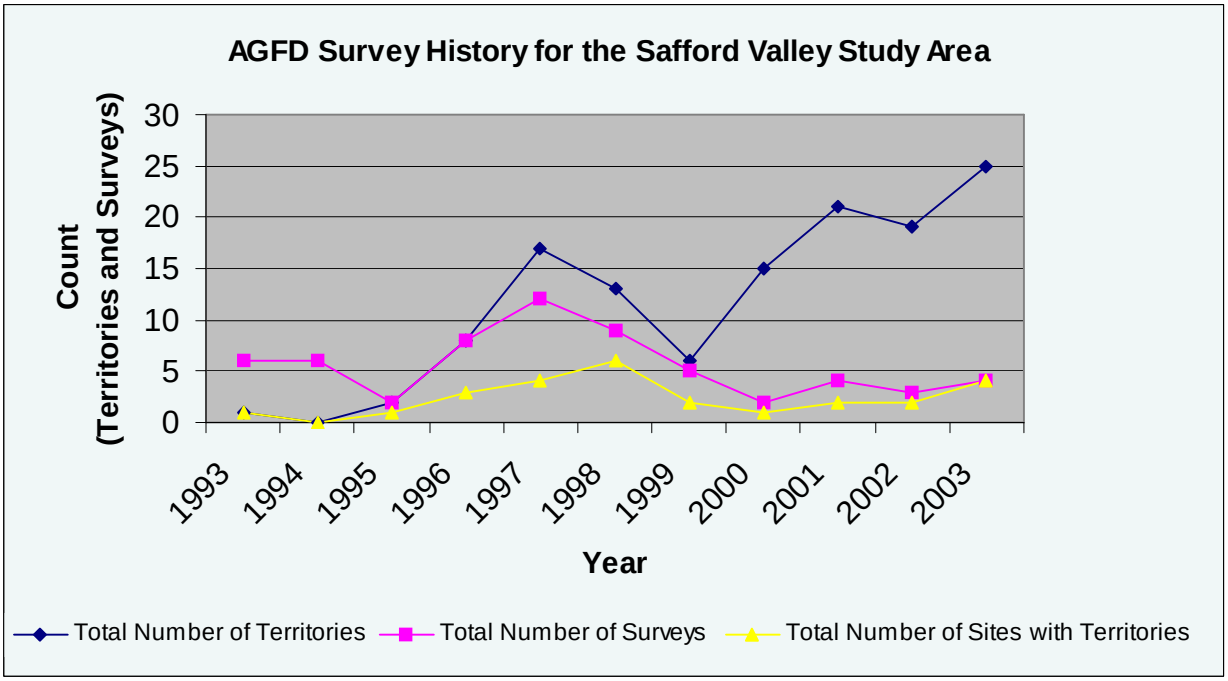
Breeding success is heavily affected by predation and parasitism (USFWS 2002). Sogge (2000) suggests that predation may be the single greatest factor in nest failure during some years. A wide range of potential predators is implicated in nest predation, and includes snakes, cats, weasels, jays, crows, and hawks (USFWS 2002). In addition, nest parasitism by brown-headed cowbirds (*Molothrus ater*) is a significant form of predation (AGFD 2002).

General Survey History

Historic survey data were obtained from Unitt (1987). Recent survey data were compiled from AGFD's yearly survey and nest monitoring reports and SWCA's late-1990s site-specific surveys. The following paragraphs describe the Unitt and AGFD survey history; the more focused SWCA work is summarized in the following section.

In an analysis of southwestern willow flycatcher historical and then-current breeding distribution, Unitt (1987) identifies only one site on the Gila River between the confluence with the San Pedro River and the New Mexico border. One nesting pair and two apparently unmated singing birds were observed by W.C. Hunter in 1985 on the Gila River at Fort Thomas (personal communication, as referenced in Unitt 1987). Unitt's account includes an examination of records (and collected birds) throughout the southwestern United States dating from as early as 1888. Bird localities mapped by Unitt are scattered sparsely across the state, but, again, no sites other than the Fort Thomas location are shown on the Gila River in the vicinity of the AZER Alignment.

The AGFD survey history for the Safford Valley study area covers the period from 1993 to 2003 but is limited and patchy, with gaps in coverage for specific sites. Although numerous sites have been surveyed at least once, large portions of the middle segment of the Gila River identified in the Proposed Rule have not been surveyed. The following graph depicts the total number of AGFD surveys, the total number of territories, and the total number of sites with territories found within the Safford Valley study area.

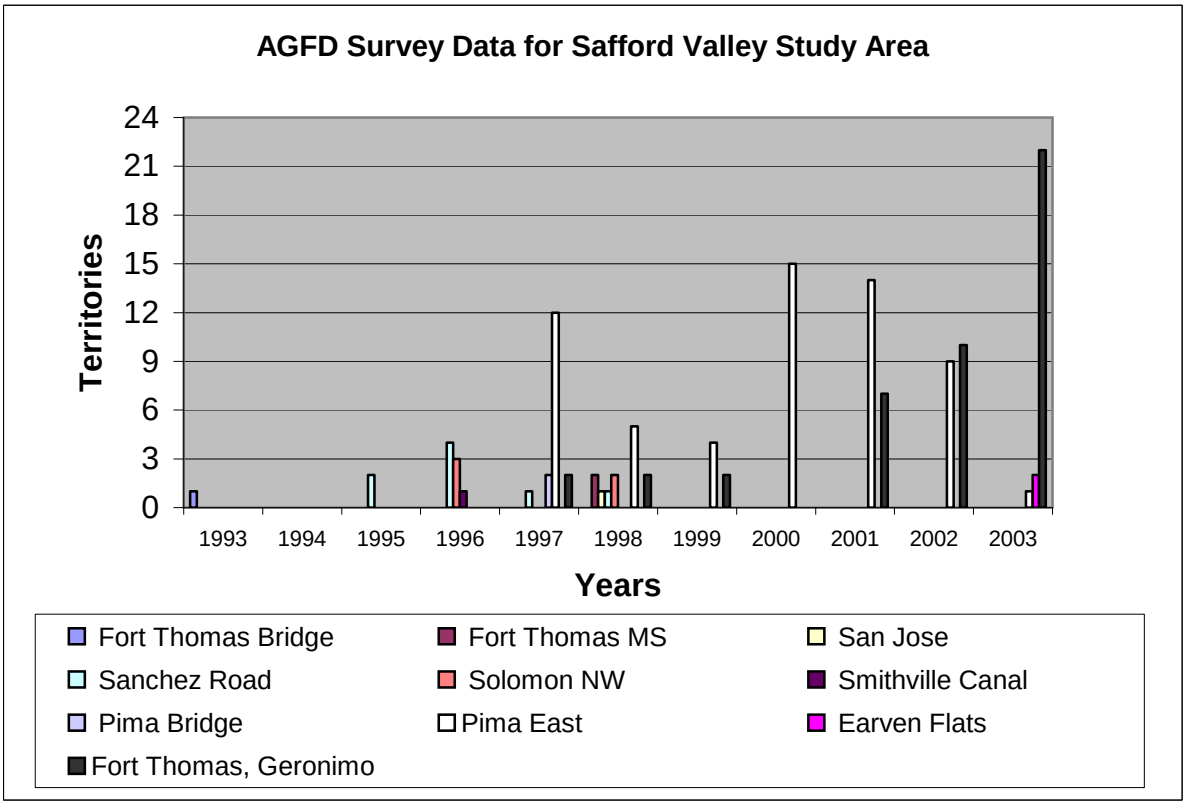


Note: Count denotes the number of total territories found per year, the total number of surveys conducted per year, and the total number of sites surveyed where territories were found.

As depicted in the graph, the total number of territories has increased over time, even though the number of sites surveyed has decreased over time. This relationship could be explained by a number of factors or a combination of factors, including the presence of quality habitat, survey intensity, survey bias, and private property access.

The following graph displays a more detailed look at the AGFD survey history of sites that have recorded territories (as opposed to bird detections, which may represent passing-through migrants) for the Safford Valley study area. The data presented suggest that only a few sites along the Gila River have ever functioned as important breeding areas.

In September 2007, WestLand reviewed AGFD southwestern willow flycatcher survey data for 2004 through 2006. There were a total of four surveys conducted within the vicinity of the Project in these three years. Two of these four surveys occurred at the Watson Wash survey area which is 12.7 river miles west of the Project Area. These two surveys resulted in the location of flycatcher territories; three territories were located in 2005 and two in 2006. The other two surveys, both of which produced negative results, were located at the Solomon Northwest Survey area and the Earven Flat survey area.



Safford Valley Survey History

SWCA biologists conducted formal surveys for the southwestern willow flycatcher on the Gila River in the vicinity of Safford in 1996, 1997, and 1998 (SWCA, 1996, 1998b, and 1998a, respectively) (Figure 6). The surveys were conducted as part of a baseline study for a proposed land exchange. In 1996 surveys were conducted according to 1994 National Park Service (NPS) protocol with 1996 revisions. The 1997 and 1998 surveys were conducted according to the 1997 NPS protocol. A summary of the SWCA findings is provided in the text that follows and in Table 4.

The 1996 SWCA surveys were conducted at 17 sites along a 10-mile stretch of the Gila River, extending from the Solomon Bridge downstream to the confluence of the Gila River and Watson Wash (west of Thatcher Bridge). Southwestern willow flycatchers were observed at two patches. Patch No. 3, located on the south side of the Gila River approximately one mile west of the Solomon Bridge, recorded two to three birds on three occasions in June 1996. The SWCA (1996) report includes a reference to an AGFD record of four pairs of birds at this site in 1996, but this information is not reflected in the yearly AGFD report. A nearby site, Sanchez, is shown by the AGFD records as recording four territories in 996. Patch No. 11, located on the south side of the Gila River about one mile northeast of Thatcher, recorded one to two birds in three occasions in June and July 1996.

Table 4. Summary of the SWCA southwestern willow flycatcher survey history along the Gila River

	Sites Surveyed	Survey Dates	Patch Number or Name (Estimated Number of Birds)
1996			
1st visit	17	12 thru 14 June	Patch 3 (2-3)
2nd visit	17	20 thru 21 June	Patch 3 (2-3), Patch 11 (1)
3rd visit	17	26 thru 27 June	Patch 3 (2-3), Patch 11 (2)
4th visit	10	1 thru 13 July	Patch 11 (1)
1997			
1st visit	15	27 thru 30 May	Patch 19 (18-20), Patch 20 (1), Patch 29 (2)
2nd visit	15	18 thru 20 June	Patch 19 (18-20), Patch 20 (6-10), Patch 29 (6-8)
3rd visit	15	1 thru 2 July	Patch 19 (18-20), Patch 20 (6-10), Patch 29 (6-8)
1998			
1st visit	3	27 thru 29 May	Fort Thomas (5), Thatcher (1)
2nd visit	3	10 thru 11 June	Fort Thomas (4), Thatcher (1), Solomon (2)
3rd visit	3	30 June thru 2 July	Fort Thomas (4), Thatcher (2)

Note: In the reports, SWCA did not attempt to discern the establishment of territories within the patches. Therefore, we do not report territories, but instead report the overall bird count at each patch.

The 1997 surveys (SWCA 1998b) were conducted at 15 sites along a 13.5-mile stretch of the Gila River. Some of these survey sites were the same as the 1996 surveys; access restrictions prevented survey of all of the previous sites. The 1997 survey effort extended farther downstream, past Pima, than the 1996 effort. Birds were recorded at three of the new survey sites. One additional bird was heard at a 1996 survey site, but access to that site (Patch No. 6) had not been granted. The bird was heard during survey of an adjacent patch (Patch No. 7). Patch No. 11, the only site out of two where birds had been recorded in 1996, was resurveyed in 1997. No birds were detected in Patch No. 11 during the 1997 survey. The three sites at which birds were detected in 1997 by SWCA are:

- *Patch No. 19*, located on the south side of the Gila River approximately 0.75 mile west of the confluence with Watson Wash. A large number (18 to 20) of willow flycatchers were heard on four dates in May, June, and July 1997.
- *Patch No. 20*, located on the north side of the Gila River immediately north of Patch No. 19. One bird was heard in May, and 6 to 10 birds were heard in June and July 1997.
- *Patch No. 29*, located on the south side of the Gila River approximately 0.25 mile east of Pima Bridge. Two birds were heard in May, six to eight birds in June, and three in July 1997.

The 1998 surveys (SWCA 1998a) were conducted at three "mitigation areas" set aside as part of the CWA Section 404 permit for the Dos Pobres/San Juan project's impacts to waters. The three mitigation sites studied were:

- Solomon Mitigation Site, located east of the town of Solomon, which does not encompass any of the survey areas covered by SWCA in 1996 or 1997. Two birds were recorded at this site in June 1998.

- Thatcher Mitigation Site, located northwest of the town of Thatcher, which encompasses Patch No. 19 of the SWCA 1997 survey effort. One to two birds were detected at this site in May, June, and July 1998.
- Fort Thomas Mitigation Site, located northwest of the town of Fort Thomas, which does not encompass any of the survey areas covered by SWCA in 1996 or 1997. It does include the AGFD survey point, at which two territories were recorded in 1998. Up to five birds were detected by SWCA in three areas of the Fort Thomas Mitigation Site in May 1997.

Site Specific Surveys

WestLand completed a southwestern willow flycatcher survey in 2006 for the proposed Alignment in Graham County, Arizona, approximately four miles east of the city of Safford and one mile west of Solomon. A series of five surveys, as required by USFWS protocol, were completed under USFWS Permit No. TE-834782-0 and AGFD License No. SP722555. A report summarizing the results of the survey was completed (Appendix C) and includes the map and survey form submitted to USFWS, as required by the terms of our permit.

The Project includes construction of a railway bridge that will cross the Gila River west of its confluence with the San Simon River. Therefore, the southwestern willow flycatcher survey area included the Gila River from its confluence with the San Simon River to approximately one mile downstream, and the San Simon River from its confluence with the Gila River to approximately two miles upstream.

One individual was detected during the first survey in 2006, but is considered to be a migrant bird because no southwestern willow flycatchers were detected during the next four surveys. WestLand does not have any other historical records of southwestern willow flycatcher surveys or activity for the survey area. The Gila River portion of the Project Area is within critical habitat for the southwestern willow flycatcher, although habitat characteristics at the crossing create marginal habitat for the southwestern willow flycatcher. Patch size is limited and multi-story structure is lacking.

The first survey was conducted by one surveyor and occasionally one observer on May 26 and 31, 2006. On May 26, a southwestern willow flycatcher called spontaneously from the San Simon River at the confluence with Gila River. No visual was obtained of the bird, and there were no other detections during survey along the Gila River that day. The San Simon River was surveyed on May 31 by one surveyor. The area observed included the confluence of the San Simon and Gila rivers where the southwestern willow flycatcher was detected on May 26. There were no detections during the survey. During the next four surveys, on June 15 and 29 and July 6 and 13, the entire survey area was observed on a single morning by two surveyors. The surveyors followed the current USFWS protocol for southwestern willow flycatcher. They concentrated their efforts on areas with potentially suitable habitat. A total of 44 hours and 50 minutes of survey was conducted.

In 2007, the Action Area was surveyed along the Gila and San Simon rivers where constituent habitat elements occur. No southwestern willow flycatchers were detected during the survey efforts (Appendix C). The surveys were not completed in full compliance with the currently accepted project clearance protocol. No surveys were conducted during the first two survey periods of the USFWS protocol (May 1 to 31 and June 1 to 21). Per the protocol, three surveys were conducted during the third survey period, on June 26, July 10 and July 16. During each survey, two biologists surveyed all potentially suitable habitat within the survey area. The surveys were completed under USFWS Permit No. TE-834782-0 and AGFD License No. SP722555.

3. PROJECT DESCRIPTION

3.1. ARIZONA EASTERN RAILROAD GILA RIVER BRIDGE ALIGNMENT

Proposed Action

The Project is defined as the new freight rail line which will connect the region with an existing 133.5-mile AZER line that operates between the towns of Miami and Bowie, Arizona. AZER connects with the Union Pacific railroad near Bowie. Although the Project involves construction of a 12.4 mile railway, the results of the assessment show that impacts to listed species and/or critical habitat for such species will be limited to the construction of the Bridge and associated features. The Proposed Action is defined as construction of the 1,600-foot railway bridge and the supporting embankment, the river training devices, and the temporary access road for installation of the bridge support structures in the Gila River (Figure 2). The final Alignment will be contained within a 100-foot-wide right of way (ROW) within the 500-foot-wide corridor defining the Action Area.

Construction

All construction activities, including staging areas, will be located within the 500-foot-wide corridor centered on the proposed Gila River Bridge. AZER anticipates two equipment staging areas will be required, one at the north and one at the south end of the Bridge. Construction of the Bridge will be concurrent with grading and railbed construction. Bridge construction will require the use of additional specialized equipment, including drills, power shovels, and concrete trucks. Three primary components of the bridge construction are discussed below:

- Bridge construction and installation of 15 support piers
- Temporary access road within the Gila River
- Bridge embankment and river training devices

Bridge construction and installation of 15 support piers

The plan and profile for the Gila Bridge designed by Mountain States Contracting for HDR Engineering, Inc. are shown in Appendix D. There are 15 pier structures, 11 of which will be located within the Gila River channel. A typical cross section for the pier supports is provided in Appendix D. The temporary road, described in greater detail in the following section, is required for construction access. The road will be designed to allow placement of the drill rig at the pier locations with room for other construction vehicles to pass. Construction of the piers will require excavation for placement of concrete forms, rebar, and the pier shafts. Excavation of the shafts will generate material (drill spoils) from alluvium underlying the river channel. These materials will not be stockpiled in the river bottom. All drill spoils will be put

into dump trucks and transported offsite for use in construction of the railroad embankment approaches for the bridge structure. The estimated volume of drill spoils for each pier structure is about 170 cubic yards (HDR Engineering).

There are several options for installing the piers and the exact construction methods will be determined during the later stages of engineering design. Alternate methods of construction include temporary casing with a vibratory hammer, uncased/partially cased construction without slurry, or uncased/partially cased with slurry. Preliminary studies indicate that this project could be constructed using partially cased construction without slurry or uncased slurry construction. These construction methods are accomplished using a crane-mounted drill rig on a relatively flat pad adjacent to the access road, as previously described. If slurry construction is used, a closed slurry tank system will be used to ensure the slurry is not introduced into the river or surroundings. Similarly, temporary casings are usually smooth steel plate cans that are positioned with the vibratory hammer and then removed as the shaft is constructed. Partially cased construction typically consists of stay-in-place corrugated metal-pipe forms at the top of the excavation to prevent sloughing in the upper reaches. The metal-pipe forms are used when the lower reaches of the pier are demonstrated to be structurally sound.

Temporary access road within the Gila River

A temporary construction access road will be built adjacent to the Bridge crossing within the 100-foot-wide ROW along the entire length of the bridge. Construction vehicles, including vehicles carrying materials from off-site sources, will travel to the Project Area on interstate highways, state highways, county, and local roads, pursuant to the posted weight limitations.

The temporary access road will be constructed for use during the estimated 11-month construction period. The two-year storm event at the Gila River crossing is 9,400 cubic feet per second (HDR Engineering). Designing the temporary access road to allow flows of this volume to pass underneath is not practicable, therefore the road will most likely be washed out at some point during construction. On-site native materials from within the Gila River channel will be sufficient for construction of the temporary access road, resulting in no change in the character of the sediment within the river. No material will be imported for road construction. The road will be designed to pass low flow volume; the height and number of culverts will guide design of the access road. The top of the road will be approximately 20 feet wide with a 60-foot-wide graded work zone at each of the pier structures. A typical cross section is provided, although the exact dimensions of the road cannot be determined until additional field surveys are conducted (Figure 7).

Railroad construction would follow generally accepted practices, including conformance to American Railway Engineering and Maintenance-of-Way Association standards. Extensive grading is anticipated in the Gila River crossing area. Unneeded excavated materials will be disposed at approved off-site locations. The selected contractor would obtain all necessary permits for disposal of waste including vegetation and other debris removed during clearing, grading and construction of the ROW.

Bridge embankment and river training devices

River training devices will protect the structure and the embankment during flood events and will be constructed along the west bank of the San Simon River where it runs parallel to the east side of the Bridge. In the event of a flood, these devices will divert the overflow north toward the Gila River. The actual method of bank protection will be determined during design and therefore is subject to change. There are numerous methods available for protection, though the selected option will be designed to avoid encroachment on the San Simon low flow channel and to avoid the need for the purchase of additional right of way. Fill slope protection may include riprap, rail bank protection, or sheet pile (Figure 7 and Appendix D).

Operations and Maintenance

The bridge will handle one round trip per day at 20 to 25 carloads per trip, seven days a week. On an annual basis, this would total between 7,300 to 10,950 railcars traveling the bridge. Six to 12 permanent employees are anticipated to be hired to perform operations and maintenance tasks.

AZER would perform all maintenance and inspections in compliance with Federal Railroad Administration Standards. Crews using "high-rail" vehicles traveling on the rail line would perform daily inspection and maintenance activities. AZER would take necessary measures to ensure that appropriate vegetation control is followed and that any herbicides applied are approved by the United States Environmental Protection Agency. In areas where the Alignment crosses public highways, the maintenance requirements of Arizona Department of Transportation and/or Graham County will be employed. AZER has contingency plans for emergencies such as derailments and natural disasters. AZER emergency crews are headquartered at Claypool, Arizona.

3.2. CONSERVATION MEASURES

Construction of the Bridge and associated features will be completed using methods designed to minimize environmental impacts to the extent practicable. The temporary access road within the channel of the Gila River will consist of on-site native materials with no armoring. In the likely occurrence of a flood event, the road will wash out but will not result in the addition of pollutants or non-native materials into the Gila River. The river training devices will be constructed to maintain the San Simon River channel so that current conditions at the confluence with the Gila River will remain unchanged during normal flow conditions.

The Arizona Department of Environmental Quality (ADEQ) provided a list of conditions likely to be required under the Section 401 Water Quality Certification. This list was based on preliminary design information provided by the engineers. The individual Section 401 Certification is a requirement of the

404 permit and will be obtained concurrent with the CWA Section 404 permit. The conditions provided by ADEQ are intended to minimize the potential for water quality degradation and will be incorporated in the Project's design and construction. There are 3 general conditions regarding completion of the Stormwater Pollution Prevention Plan and Arizona Pollution Discharge Elimination Permit that are designed to minimize potential negative effects to surface water quality. Nineteen specific conditions provide more detailed direction (Attachment E). In accordance with this letter, AZER will not import materials for the purpose of building temporary structures in the streambed during construction of the Bridge. Project activities would shutdown during high flow events (estimated to be the two-year return interval event) and require removal of mobile equipment from the streambed during the flow event. Upon completion of construction activities, AZER will restore the streambed as close to its original contours as possible given the new permanent bridge support structures.

General Best Management Practices and the conditions outlined in the 401 Water Quality Certification will be incorporated into the Project design and construction. It is AZER's aim to minimize water quality degradation to the greatest extent possible and implementation of these conservation measures will help to ensure that.

4. ANALYSIS OF IMPACTS

This section summarizes the likely effects of the Project on the southwestern willow flycatcher, the razorback sucker, and the designated critical habitat for both of these species. The USFWS adopts a broad definition of the area subject to consultation and defines the effects of an action (i.e., the Permitted Activities) in the USFWS Consultation Handbook (1998) as:

> The direct and indirect effects of an action on the species or Critical Habitat, together with the effects of other activities that are interrelated or interdependent. These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species for purposes of preparing a biological opinion on the proposed action.

Indirect effects are further defined as:

> Those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02).

Cumulative effects are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation (50 CFR §402.02). Cumulative effects are considered together with the effects of the federal action under consultation by the USFWS to determine whether the effects of the federal action are likely to jeopardize the continued existence of a listed species. Other future federal actions that may affect a listed species would be subject to consultation requirements established in Section 7 of the ESA and, therefore, are not considered cumulative to the proposed action.

An Action Area is defined by the USFWS as "all areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (USFWS 1998). For the purposes of impact assessment, the Action Area is defined as the Bridge and associated features. This definition takes into consideration the areas of direct surface disturbance from the Bridge, indirect effects associated with development in upland habitats, and the benefits derived from implementation of the conservation measures described in Section 3.1 above.

4.1. ANALYSIS OF IMPACTS TO RAZORBACK SUCKER

4.1.1. Direct Impacts of the Permitted Activity

The proposed action has been analyzed for its potential to reduce the reproduction, numbers, or current distribution of the razorback sucker within the Gila River. The Gila River at the location of the Bridge is designated critical habitat for this species.

Historically razorback suckers did occur in the Gila River in the Safford area; however, this species was extirpated from the area several decades ago. No razorback suckers have been found in this area for 10 to 15 years (L. Fitzpatrick, personal communication, August 1, 2007). Three is no longer a viable population of razorback suckers extant in the Gila River system. Although relict individuals may exist, for all practicable purposes this species is extinct in the Gila River. Accordingly, no direct impacts to razorback sucker are anticipated from construction of the Project.

4.1.2 Indirect Impacts of the Permitted Activity

Due to the absence of the razorback suckers within the Project Area, no indirect impacts will occur as a result of construction of the Project. Construction methods are designed to minimize potential impacts to surface water quality and there will be no change to the current flow conditions once construction of the Bridge is completed.

4.1.3 Cumulative Effects

Other activities in the vicinity of the Project include the construction of bridges crossing the Gila River upstream and downstream of the Gila River Bridge crossing. Adjacent land use will remain unchanged, although the area where the Bridge is located will no longer be available for agricultural use. The Project will not result in direct or indirect effects to the razorback sucker, therefore when combined with other past, present, and known future uses the Project is not expected to result in cumulative effects to its population.

4.1.4 Impacts to Designated Critical Habitat

The USFWS Section 7 Consultation Handbook defines the destruction or adverse modification of critical habitat as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.”

The Permitted Activities occur within the Gila River channel and are therefore likely to have temporary adverse effects to critical habitat for razorback sucker. These effects are likely to stem from disturbance due to temporary dewatering of limited areas within the Gila River channel, which is required in order to construct the bridge support piers. Flows will pass under the temporary road via pipes placed within the road. Potential temporary changes during construction include increased sediment and changes in sediment patterns, alteration of stream morphology, and accelerated erosion.

Installation of piers for the Bridge will impact a small area of critical habitat for the razorback sucker. The area of critical habitat to be permanently disturbed by construction of the Bridge associated with the Permitted Activities is 1.8 acres (the area of the 100-foot-wide corridor). An additional 7.3 acres within the Action Area (500-foot-wide corridor) may be temporarily disturbed during Bridge construction. There are 517 river miles of critical habitat designated for the razorback sucker in Arizona. The maximum area of impact to razorback sucker critical habitat is 500 linear feet or 0.095-mile. This accounts for 0.02 percent of razorback sucker critical habitat in Arizona. The permanent nature of the Bridge and its piers will impact a small portion of critical habitat for the razorback sucker. However, the Gila River flows will be maintained in their current condition, subject to change in response to storm events. The Permitted Activities will not result in any permanent change in flow regime or cause any ponding or increased sedimentation.

Road and bridge construction will lead to permanent removal of about 0.08 acre of riparian vegetation. Loss of riparian vegetation may destabilize streambanks, reduce cover and nutrient input, increase water temperatures, and remove or deplete the filtering capacity of the riparian zone for sediment and pollutants. Railway construction and activity adjacent to the stream may result in minimal changes in riparian vegetation and stream channel morphology that reduces the quality and availability of razorback sucker critical habitat. In order to mitigate these minor impacts to critical habitat equipment staging and storage areas will be situated outside of the river bed. Additionally, all construction equipment will be removed from the river channel prior to onset of storm events.

Construction of the Bridge will not compromise the functionality of the Gila River ecosystem. Therefore, adverse impacts and long-term changes to critical habitat for the razorback sucker are not anticipated.

4.2. ANALYSIS OF IMPACTS TO SOUTHWESTERN WILLOW FLYCATCHER

4.2.1. Direct Impacts of the Permitted Activity

In order to determine whether or not a proposed project will reduce appreciably the likelihood of both the survival and recovery of a listed species, one must analyze an action's potential to reduce the reproduction, numbers, or (current) distribution of that species. The construction of the Project under current conditions is not likely to affect any of these factors for the southwestern willow flycatcher. Only the Bridge portion of the Alignment includes potential habitat for the southwestern willow flycatcher.

Southwestern willow flycatchers may use the Gila River in the Action Area as a movement/migration corridor to other, occupied suitable habitat along other portions of the river. However, two years of survey results for southwestern willow flycatcher within this portion of the Project Area have resulted in no detections of nesting birds. The best available evidence, including agency records and two years of surveys with negative results, indicates that the Action Area is not occupied by southwestern willow flycatcher. This is most likely due to a lack of suitable habitat within the area of the Bridge. Therefore, construction of the Bridge is not likely to reduce reproduction, numbers, or distribution of southwestern willow flycatcher.

The Action Area does not presently contain suitable nesting habitat because it generally lacks the density and structure of vegetation known to be used by nesting flycatchers. Given this, no direct impacts to any individual southwestern willow flycatchers are expected to result from construction of the Bridge or associated structures. Survey results indicate that southwestern willow flycatcher have not established a territory on or used the Action Area for nesting purposes.

The Permitted Activities will result in the loss of 0.08-acre of existing riparian habitat and could result in temporary impacts to an additional 0.32-acre of potentially suitable southwestern willow flycatcher habitat. Project-related construction activities on site will result in the clearing of a maximum of 0.4-acre of riparian habitat. The near-absence of breeding habitat within the Project Area, the limited magnitude of impacts, and the high likelihood that vegetation will re-establish itself relatively quickly will minimize direct effects to the flycatcher. The Gila River system is dynamic and subject to scour following storm events, therefore adjacent riparian habitat is generally not able to fully develop between storm events. Indirect impacts to the southwestern willow flycatcher and designated critical habitat are described in detail in the sections that follow.

4.2.2. Indirect Impacts of the Permitted Activity

Potential indirect impacts to designated critical habitat include:

- Changes in vegetation structure within the Action Area as a result of construction activities
- Increases in noise levels adjacent to Bridge during the operation and maintenance phase of the railway

The upland areas south of the Gila River, which are primarily agricultural, and the riparian strands adjacent to the Gila and San Simon rivers will be cleared to accommodate the support structures, Bridge embankment, and river training devices required for construction of the bridge. There is approximately 0.4-acre of potentially suitable southwestern willow flycatcher habitat within the area to be cleared. Due to the absence of territories located within this patch of riparian habitat, the removal of such vegetation is not likely to have any indirect impacts to the southwestern willow flycatcher.

Background noise levels will increase during the construction period and although the noise disturbance will not be sustained, it may have temporary impacts to southwestern willow flycatcher behavior. Additionally, after construction the noise created from the one round trip per day may initially have the effect of disrupting willow flycatcher behavior, but it is likely that birds will adapt to this noise and eventually their nesting and breeding habits will be undisturbed.

Indirect impacts to any southwestern willow flycatcher from vegetation clearing and increased noise levels are expected to be negligible.

4.2.3. Cumulative Impacts

Cumulative effects are those effects of future state or private activities not involving federal activities that are reasonably certain to occur within the Action Area of the federal action subject to consultation (50 CFR §402.02). This definition applies only to Section 7 analyses and should not be confused with the broader use of this term in the National Environmental Policy Act (NEPA) or other environmental laws (USFWS Consultation Handbook).

We are unaware of any state or private activities within the Action Area that are reasonably certain to occur that are likely to significantly affect southern willow flycatcher. Considering the size of the Gila River and the distribution of ephemeral drainages in the vicinity of the Project, virtually any project with significant impacts to areas that might affect southern willow flycatcher within the Project Area would require a CWA Section 404 permit and thus be subject to consultation under Section 7 of the ESA.

4.2.4 Impacts to Designated Critical Habitat

The USFWS Section 7 Consultation Handbook defines the destruction or adverse modification of critical habitat as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.”

Completion of the Permitted Activities requires vegetation clearing within an area that the federal government has designated as critical habitat for southwestern willow flycatcher. The Project will result in permanent impacts to 0.08-acre and temporary impacts to an additional 0.32-acre of potentially suitable southwestern willow flycatcher habitat with no documented history of occupancy. The Upper Gila Management Unit encompasses 17,043 acres of land along 101 river miles of rivers and streams within Graham, Greenlee and Gila Counties, Arizona. The downstream-most segment of the Upper Gila Management Unit encompasses the Safford Valley and extends for approximately 43 river miles from the upper end of the Earven Flat, above the City of Safford, through the Safford Valley to the San Carlos Apache Tribal boundary. Impacts to designated critical habitat, temporary and permanent combined,

account for 0.002 percent of designated critical habitat for the southwestern willow flycatcher in the Upper Gila Management Unit.

The construction of the Project will not appreciably diminish the value of critical habitat for either the survival or recovery of the southwestern willow flycatcher.

5. LITERATURE CITED

Alles, David L. Western Washington University. *The Colorado River: An Ecological Case Study in Coupled Human and Natural Systems*. 1/1/05. http://fire.biol.wwu.edu/trent/alles/ColoradoRiverIntro.pdf#search=%22Colorado%20river%20basin%20system%20map%20az%22 accessed August 22, 2006.

Arizona Ecological Services Field Office (AESFO). *General Species Information: Razorback Sucker*. August 2003. http://www.fws.gov/arizonaes/Documents/Redbook/Razorback%20Sucker%20RB.pdf, accessed August 22, 2006.

Arizona Game & Fish Department. 2002. *Empidonax trallii extimus*. Unpublished abstract compiled and edited by the Heritage Data Management System, AGFD: Phoenix, AZ. 6 pp.

_____. 2002. Razorback sucker: *Xyrauchen texanus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 1-3 pp. http://www.gf.state.az.us/w_c/edits/documents/Xyratexa.f_000.pdf#search=%22Minckley%20et%20al.%201991%20razorback%20sucker%22, accessed August 23, 2006.

_____. 1996. In prep. *Wildlife of Special Concern in Arizona*. Non-game and Endangered Wildlife Program, Arizona Games & Fish Department, Phoenix, Arizona. October 14, 1996. Draft.

Brown, D. E. (ed.) 1994. *Biotic Communities: Southwestern United States and Northwestern Mexico*. Salt Lake City, UT: University of Utah Press.

Federal Register. Volume 59, Number 54. March 21, 1994. 50 CFR Part 17 RIN 1018—A891 *Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Colorado River Endangered Fishes: Razorback Sucker, Colorado Squawfish, Humpback Chub, and Bonytail Chub*. http://www.fws.gov/arizonaes/Documents/Federal%20Registers/CH_four_colorado_river_fishes.pdf, accessed August 22, 2006.

Johnson, K., P. Mehlhop, C. Black, and K. Score. 1999. Reproductive Failure of Endangered Southwestern Willow Flycatchers on the Rio Grande, New Mexico. The Southwestern Naturalist: Vol. 44, No. 2 pp 226-231.

Sogge, M.K., 2000. Chapter 6: Breeding season ecology. – In: Finch, Deborah M. and Scott H. Stoleson (eds.), Status, ecology and conservation of the Southwestern willow flycatcher. Gen. Tech. Rep. RMRS-GTR-60. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station., 57-71 pp.

Sogge, M.K., and R.M. Marshall, 2000. Chapter 5: A survey of current breeding habitats. – In: Finch, Deborah M. and Scott H. Stoleson (eds.), Status, ecology and conservation of the Southwestern willow flycatcher. Gen. Tech. Rep. RMRS-GTR-60. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, 43-57 pp.

Stoleson S.H. and D. M. Finch. 2003. Microhabitat use by breeding Southwestern Willow Flycatchers on the Gila River, New Mexico. Studies in Avian Biology, No.26:91-95.

———. 2001. Southwestern Willow Flycatcher in the Cliff-Gila Valley, New Mexico: Landscape-level effects on density, reproduction, and cowbird parasitism; Final Report for the 2000 Field Season.

SWCA. 1998a. Technical Memorandum. Southwestern Willow Flycatcher Surveys for the Ft. Thomas, Thatcher, and Solomon Mitigation Areas, Safford, Arizona. SWCA, Inc.: Tucson, AZ.

———. 1998b. Technical Memorandum. Southwestern Willow Flycatcher Surveys Along the Gila River Between Solomon and Pima During 1997. SWCA, Inc.: Tucson, AZ.

———. 1996. Technical Memorandum. Southwestern Willow Flycatcher Surveys Along the Gila River Between Solomon and Thatcher. SWCA, Inc.: Tucson, AZ.

Unitt, P. 1987. *Empidonax Traillii Extimus:* An Endangered Species. Western Birds, Vol. 18, No. 3. 1987: pp. 137-162.

U.S. Fish and Wildlife Service. 2005. Biological Opinion for a residential subdivision, Andrada Ranch. [AESO/SE 02-12-05-F-0347].

———. 2004. 50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for Southwestern Willow Flycatcher (*Empidonax trailii extimus*); Proposed Rule. Federal Register Vol. 69, No. 196, Tuesday, October 12 2004.

———. 2002. Southwestern Willow Flycatcher Recovery Plan. USFWS: Albuquerque, NM. i-ix + 210 pp., Appendices A-O.

_____. 2002. *Recovery Plan: Razorback Sucker*. August 1, 2002. http://www.fws.gov/arizonaes/Documents/RecoveryPlans/Razorbacksucker_02.pdf, accessed August 22, 2006.

———. 1998. Endangered and Threatened Species of Arizona. Ecological Services Field Office, Phoenix. 123 pp.

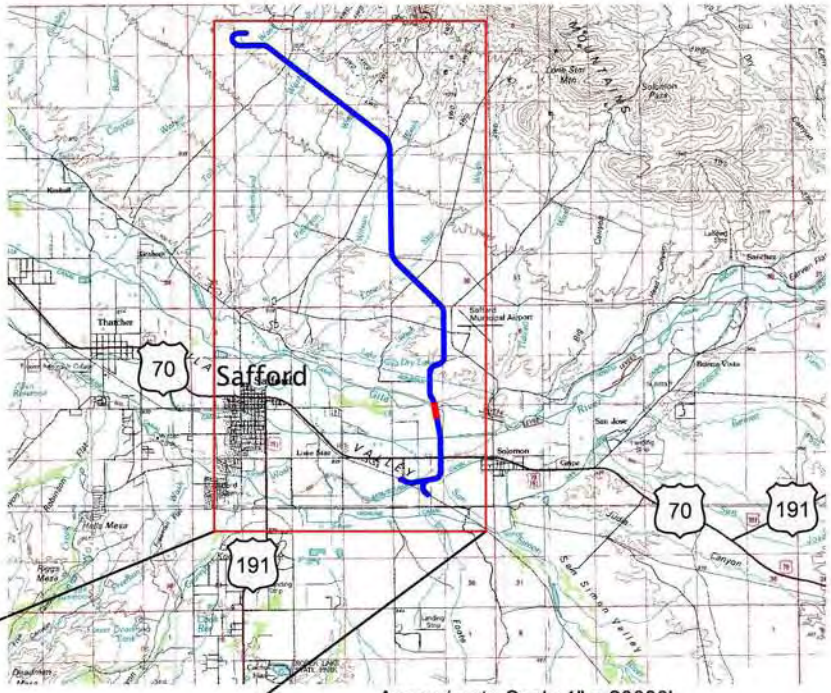
———. 1997. Lesser long-nosed bat recovery plan. Arizona Ecological Services State Office. Phoenix, Arizona.

WestLand Resources, Inc. 2005. Southwestern Willow Flycatcher Habitat Evaluation Report. Tucson, Arizona.

FIGURES

ARIZONA

Portion of Graham County



Approximate Scale 1" = 20000'
Safford 1:100,000 USGS Quadrangle.

T.7S.,R.26E., Portion Sections 11 & 14.
Graham County, Arizona,
Safford 1:24,000 USGS Quadrangle.

0' 6800' 13600'
APPROX. SCALE: 1" = 13600'

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ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Project Area

VICINITY MAP
Figure 1

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Engineering and Environmental Consultants
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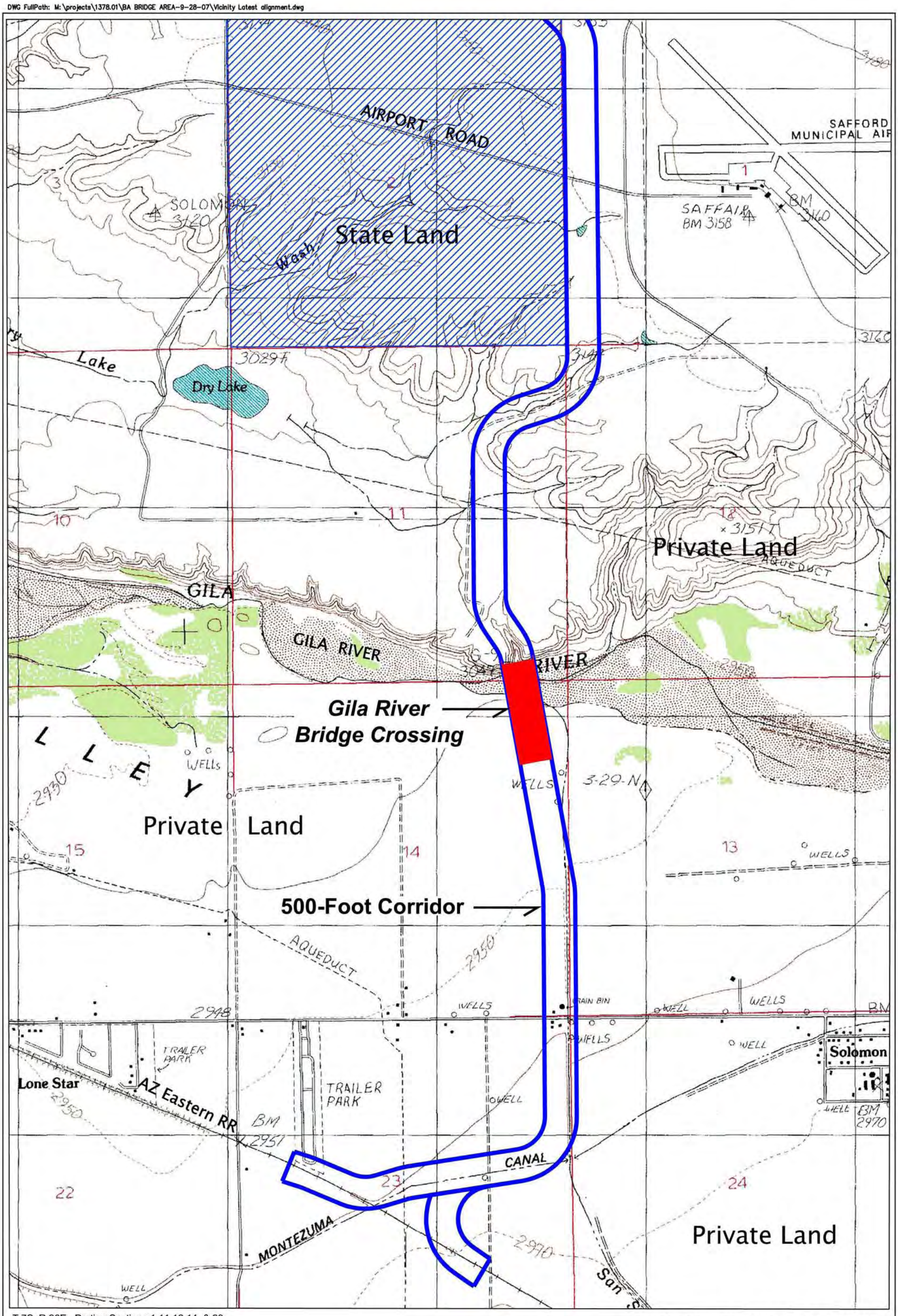
Tucson, Az 85712 (520) 206-9585

DWG FullPath: M:\projects\1378.01\BA BRIDGE AREA-9-28-07\Vicinity Latest alignment.dwg



T.7S.,R.26E., Portion Sections 1,11,12,14, & 23.
Graham County, Arizona,

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0' 700' 1400'
SCALE 1" =1400'

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ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Gila River Bridge Crossing

Project Overview With
Land Ownership

Figure 2

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T.7S.,R.26E., Portion Sections 11, & 14.
Graham County, Arizona,

Photo Source - Lee Harbers, Consultant
Photo Date - April 7, 2006

Bridge Data Source - HDR Engineering, Inc.

Jurisdictional delineation currently under review by the U.S. Army Corps of Engineers.

0' 250' 500'
SCALE 1" =500'

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ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Gila River Bridge Crossing

Aerial Overview of the
Jurisdictional Waters
Figure 3

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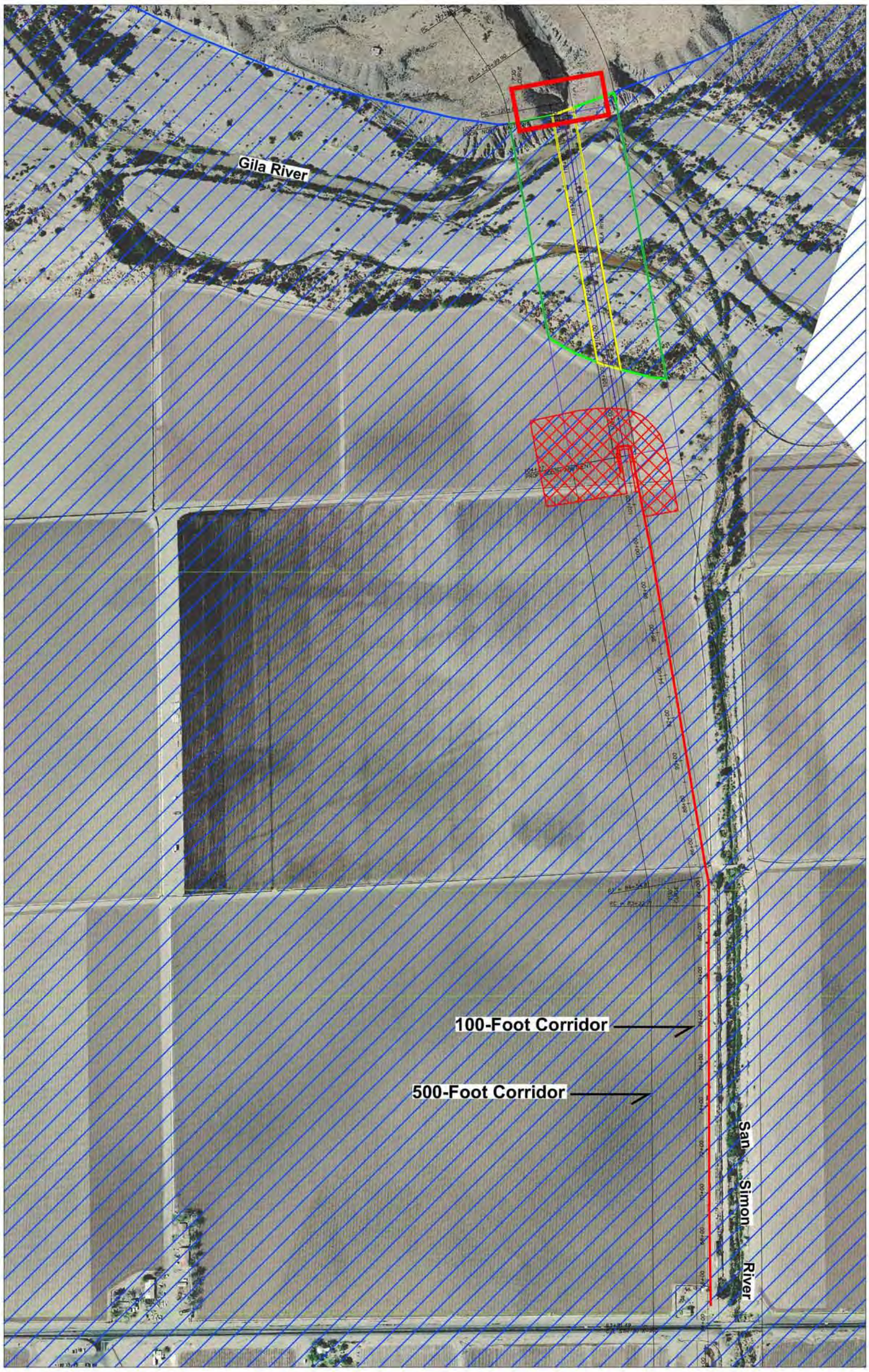

T.7S.,R.26E., Portion Sections 11, & 14.
Graham County, Arizona,

Photo Source - Lee Harbers, Consultant
Photo Date - April 7, 2006

Bridge Data Source - HDR Engineering, Inc.

Critical Habitat for Southwestern Willow Flycatcher (100-year Floodplain Per FEMA)

Area of Potential Temporary Impacts 13.6 acres (Gila River)

Area of Potential Permanent Impacts 2.7 acres (Gila River)

River Training Device (RTD)

Riprap or Other Flexible Revetment Associated with RTD

Note: All primary constituent elements of critical habitat for the southwestern willow flycatcher are found in the riparian ecosystem within the 100-year floodplain or flood prone area (70 FR 60886).

0' 250' 500'
SCALE 1" =500'

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ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Gila River Bridge Crossing

Southwestern Willow Flycatcher
Critical Habitat With Potential Impacts

Figure 4

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LEGEND

- STUDY AREA
- LATERAL BOUNDARY FOR THE PROPOSED SOUTHWESTERN WILLOW FLYCATCHER CRITICAL HABITAT IN THE SAFFORD VALLEY
- 17 — 1996 SWCA Survey Point (approximate location). Note: Points 19, 20, and 29 were not surveyed in 1996.
- (16) — 1997 SWCA Survey Point (approximate location)
- 1996 SWCA Survey Area (approximate location)
- 1998 SWCA Survey Area (approximate location)
- Ft. Thomas*, Thatcher and Solomon Site Boundaries
- AGFD Survey Areas (Very approximate locations; locations are plotted based on AGFD text descriptions. No maps were provided in the reports.)

Note: Bird detections or numbered territories are identified in text boxes; no birds were ever detected at other survey points or areas.

* Fort Thomas Site is approximately 26 miles downstream from the Alignment.

N W E S

0' 4200' 8400'

Scale 1" = 8400'

AGFD 1997 Pima Bridge Survey Area
1997: 2 Territories

SWCA 1997 Patch 20 Survey Point
(Estimated 6-10 birds detected)

SWCA 1997 Patch 29 Survey Point
(Estimated 6-8 birds detected)

AGFD Watson Wash Survey Area
2006: 2 Territories
2005: 3 Territories

PROJECT BOUNDARY

AGFD Sanchez Road/San Jose Survey Area

Sanchez Road	San Jose
1998: 0 Territory	1998: 1 Territory
1997: 1 Territories	1997: -----
1996: 4 Territories	1996: -----
1995: 2 Territories	1995: -----

AGFD Pima East Survey Area
2004: 3 Territories
2003: 1 Territory
2002: 9 Territories
2001: 14 Territories
2000: 15 Territories
1999: 4 Territories
1998: 5 Territories
1997: 12 Territories

SWCA Thatcher Site
1998: 1-2 Birds Detected

SWCA 1997 Patch 19 Survey Point
(Estimated 18-20 birds detected)

AGFD 1996 Smithville Canal Survey Area
(1 bird detected)

SWCA 1998 Solomon Site Survey Area
(2 birds detected)

SWCA 1996 Patch 7 Survey Point
(2 birds detected)

AGFD Earven Flat Survey Area
2005: 0 Territories
2003: 2 Territories
2002: 0 Territories
2001: 0 Territories
1999: 0 Territories
1998: 0 Territories
1997: 0 Territories

SWCA 1997 Patch 6 Survey Point
(1 bird heard singing in Patch 6 during Patch 7 survey, but access to Patch 6 not granted)

SWCA 1996 Patch 3 Survey Point
(2-3 birds detected)

AGFD Solomon Northwest Survey Area
2006: 0 Territories
1998: 2 Territories
1997: 0 Territories
1996: 3 Territories

Cluff Reservoir No. 1 Ash Creek

Cluff Reservoir No. 3 Ash Creek

BASEMAP SOURCE: GLOBE, CLIFTON, MAMMOTH, & SAFFORD USGS 1:100,000

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ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Gila River Bridge Crossing

Southwestern Willow Flycatcher
Previous Surveys

Figure 5

DWG FullPath: M:\projects\1378.01\BA BRIDGE AREA-9-28-07\Fig 5 Previous Surveys-11-17-06-NO FADE.dwg

DWG FullPath: M:\projects\1378.01\BA BRIDGE AREA-9-28-07\Figures Revised-3-12-07-JD-south-UTM-Gila River Crossing-jeff francis topo

T.7S.,R.26E., Portion Sections 11, & 14.
Graham County, Arizona,
Photo Source - Lee Harbers, Consultant
Photo Date - April 7, 2006

Bridge Data Source - HDR Engineering, Inc.

River Training Device (RTD)

Riprap or Other Flexible Revetment Associated with RTD

Critical Habitat for Razorback Sucker (100-year Floodplain Per FEMA)

Area of Potential Temporary Impacts 13.6 acres (Gila River)

Area of Potential Permanent Impacts 2.7 acres (Gila River)

Note: The 100-year floodplain is generally included as part of the critical habitat designation; however, only those portions of the floodplain that contain the constituent elements are considered part of critical habitat (59 FR 13374).

0' 250' 500'
SCALE 1" =500'

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ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Gila River Bridge Crossing

Razorback Sucker Critical Habitat With Potential Impacts

Figure 6

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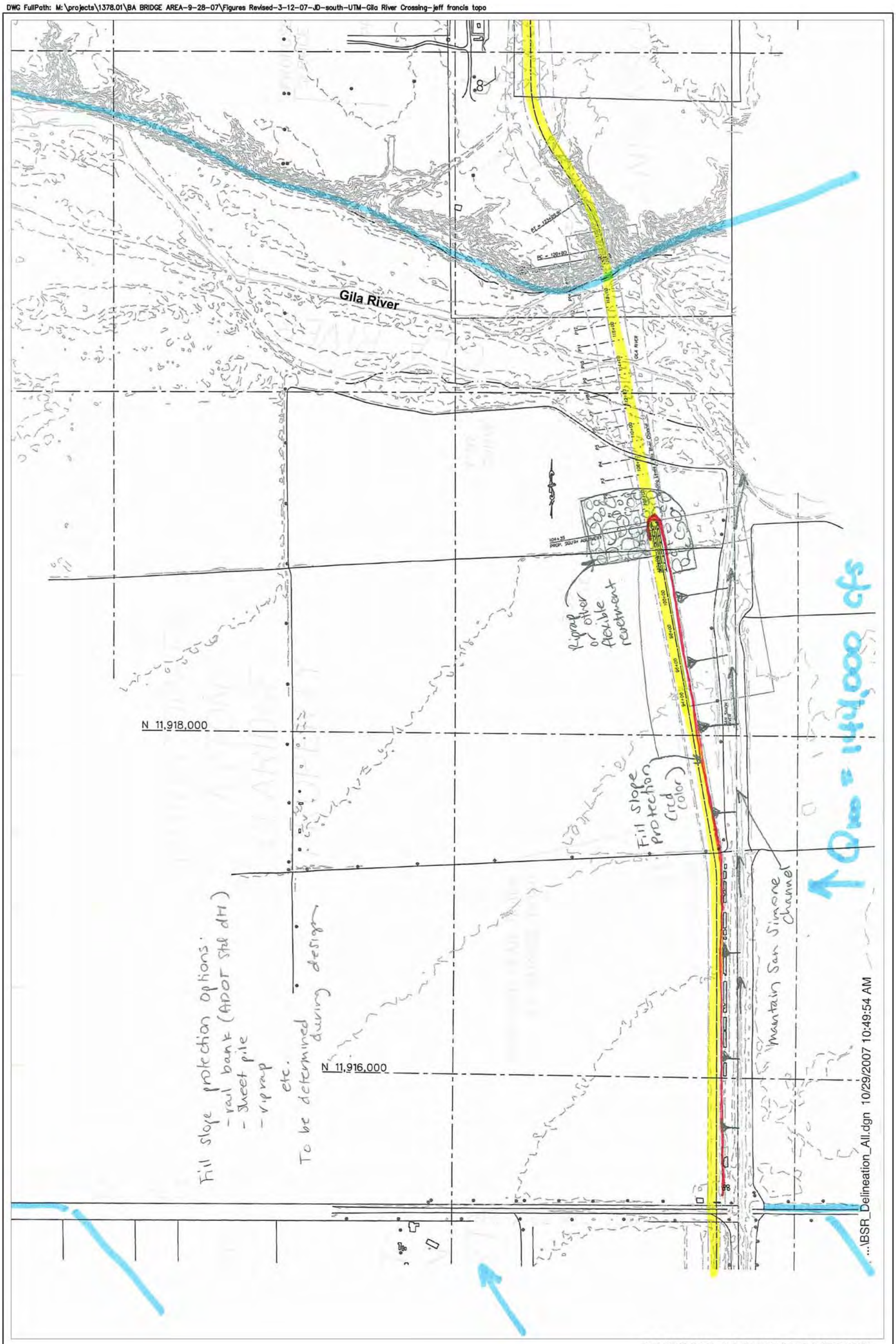
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

DWG FullPath: M:\projects\1378.01\BA BRIDGE AREA-9-28-07\Figures Revised-3-12-07-JD-south-UTM-Gila River Crossing-jeff francis topo



Bridge Data & River Training Device
Source - HDR Engineering, Inc.

ARIZONA EASTERN RAILWAY
SAFFORD BRANCH PROJECT
Gila River Bridge Crossing
With River Training Devices

Conceptual Design
Figure 7

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

APPENDIX A

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR GRAHAM COUNTY, ARIZONA

Graham County

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Apache (Arizona) trout	*Oncorhynchus apache*	Threatened	This yellowish or yellow-olive cutthroat-like trout has large dark spots on body. Its dorsal, anal, and caudal fins are edged with white. It has no red lateral band.	Apache, Coconino, Gila, Graham, Greenlee, Navajo	>5000 ft	Presently restricted to cold mountain streams with many low gradient meadow reaches.	Occupies stream habitats with substrates of boulders, rocks, and gravel with some sand or silt through mixed conifer and spruce-fir forests, and montane meadows and grasslands in the White Mountains. Also managed as a sport fish under special regulations.
Arizona cliffrose	*Purshia subintegra*	Endangered	Evergreen shrub of the rose family (Roseaceae). Bark pale shreddy. Young twigs with dense hairs. Leaves 1-5 lobes and edges curl downward (revolute). Flowers: 5 white or yellow petals <0.5 inches long.	Graham, Maricopa, Mohave, Yavapai	< 4,000 ft	Characteristic white soils of tertiary limestone lakebed deposits.	White soils of teritiary limestone lakebed deposits can be seen from a distance.
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Large, adults have white head and tail. Height 28-38 inches; wingspan 66-96 inches. Dark with varying degrees of mottled brown plumage. Feet bare of feathers.	Apache, Cochise, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey.	Some birds are nesting residents while a larger number winters along rivers and reservoirs. An estimated 200 to 300 birds winter in Arizona. Once endangered (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) because of reproductive failures from pesticide poisoning and loss of habitat, this species was down listed to threatened on August 11, 1995. Illegal shooting, disturbance, and loss of habitat continues to be a problem. Species has been proposed for delisting (64 FR 36454) but still receives full protection under the ESA.
California Brown pelican	*Pelecanus occidentalis californicus*	Endangered	Large dark gray-brown water bird with a pouch underneath long bill and webbed feet. Adults have a white head and neck, brownish black breast, and silver gray upper parts.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Coastal land and islands; species found around many Arizona lakes and rivers.	Subspecies is found on Pacific Coast and is endangered due to pesticides. It is an uncommon transient in Arizona on many Arizona lakes and rivers. Individuals wander up from Mexico in summer and fall. No breeding records in Arizona.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Chiricahua leopard frog	*Rana chiricahuensis*	Threatened	Cream colored tubercules (spots) on a dark background on the rear of the thigh, dorsolateral folds that are interrupted and deflected medially, and a call given out of water distinguish this spotted frog from other leopard frogs.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai	3300-8900 ft	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	Require permanent or nearly permanent water sources. Populations north of the Gila River may be a closely-related, but distinct, undescribed species. A special rule allows take of frogs due to operation and maintenance of livestock tanks on State and private lands.
Desert pupfish	*Cyprinodon macularius*	Endangered	Small (2 inches) smoothly rounded body shape with narrow vertical bars on the sides. Breeding males blue on head and sides with yellow on tail. Females and juveniles tan to olive colored back and silvery sides.	Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	< 5,000 ft	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Critical habitat includes Quitobaquito Springs, Pima County, portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash, Imperial County, California. Two subspeices are recognized: Desert Pupfish (C.m.macularis) and Quitobaquito Pupfish (C.m.eremus).
Gila chub	*Gila intermedia*	Endangered	Deep compressed body, flat head. Dark olive-gray color above, silver sides. Endemic to Gila River Basin.	Cochise, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	2,000 - 5,500 ft	Pools, springs, cienegas, and streams.	Found on multiple private lands, including the Nature Conservancy, the Audubon Society, and others. Also occurs on Federal and state lands and in Sonora, Mexico. Critical habitat occurs in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz and Yavapai counties.
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	Endangered	Small (2 inches), guppy-like, live bearing, lacks dark spots on its fins. Breeding males are jet black with yellow fins.	Gila, Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	< 4,500 ft	Small streams, springs, and cienegas vegetated shallows.	Species historically occurred in backwaters of large rivers but is currently isolated to small streams and springs.
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered	Elongated muzzle, small leaf nose, and long tongue. Yellowish brown or gray above and cinnamon brown below. Tail minute and appears to be lacking. Easily disturbed.	Cochise, Gila, Graham, Greenlee, Pima, Pinal, Maricopa, Santa Cruz	< 6000 ft	Desert scrub habitat with agave and columnar cacti present as food plants.	Day roosts in caves and abandoned tunnels. Forages at night on nectar, pollen, and fruit of paniculate agaves and columnar cacti. This species is migratory and is present in Arizona usually from April to September and south of the border the remainder of the year.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Loach minnow	*Tiaroga cobitis*	Threatened	Small (<3 inches) slender, elongated fish, olive colored with dirty white spots at the base of the dorsal and caudal fins. Breeding males vivid red on mouth and base of fins.	Apache, Graham, Greenlee, Pinal, Navajo, Gila	<8000 ft	Benthic species of small to large perennial streams with swift shallow water over cobble and gravel. Recurrent flooding and natural hydrograph important.	Presently found in Aravaipa Creek, Deer Creek, Turkey Creek, Blue River, Campbell Blue Creek, San Francisco River, Eagle Creek, North Fork East Fork Black River, and White River in Arizona, and Dry Blue Creek, Pace Creek, Frieborn Creek, the Tularosa River, West Fork Gila River, and the mainstem upper Gila River in New Mexico. Proposed critical habitat (70 FR 75545-75590, December 20, 2005) includes portions of East Fork Black River, North Fork East Fork Black River, Boneyard Creek, Aravaipa Creek, Turkey Creek, Deer Creek, Eagle Creek, San Francisco River, Blue River, Campbell Blue Creek, and Little Blue Creek found in Apache, Graham, Greenlee, and Pinal counties, Arizona, as well as portions of the Blue River, San Francisco River, Tularosa River, Negrito Creek, Pace Creek, Dry Blue Creek, Frieborn Creek, Whitewater Creek, Gila River, and its West, Middle, and East Forks in Catron, Grant, and Hidalgo counties in New Mexico.
Mexican gray wolf	*Canis lupus baileyi*	Endangered	Large dog-like carnivore with varying color, but usually a shade of gray. Distinct white lip line around mouth. Weight 60-90 pounds.	Apache, Graham, Greenlee	4,000 -12,000 ft	Chapparal, woodland, and forested areas. May cross desert areas.	Historical range is considered to be larger than the counties listed above. Unconfirmed reports of individuals in the southern part of the state (Cochise, Pima, Santa Cruz) continue to be received. Individuals may still persist in Mexico. Experimental nonessential population introduced in the Blue Primitive Area of Greenlee and Apache counties.
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	Medium sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	4100-9000 ft	Nests in canyons and dense forests with multi-layered foliage structure.	Generally nest in older forests of mixed conifer or ponderosa pine/gambel oak type, in canyons, and use variety of habitats for foraging. Sites with cool microclimates appear to be of importance or are preferred. Critical habitat was finalized on August 31, 2004 (69 FR 53182). Critical habitat in Arizona occurs in Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz, and Yavapai counties.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Mount Graham red squirrel	*Tamiasciurus hudsonicus grahamensis*	Endangered	Grayish-brown tinged rusty or yellowish on the back. Summer-dark lateral line separates the light undersides from the gray sides. Ears are slightly tufted in the winter and the tail is bushy. Diet primarily conifer seeds.	Graham	> 8,000 ft	Montane upper elevation mature to old-growth conifer forest.	Distribution limited to the mixed conifer and spruce-fir associations in the Pinaleno Mountains. Critical habitat has been designated for this species.
Razorback sucker	*Xyrauchen texanus*	Endangered	Large, up to 3 feet long and up to 6 lbs, high sharp-edged keel-like hump behind the head. Head flattened on top. Olive-brown above to yellowish below.	Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pinal, Yavapai, Yuma	< 6000 ft	Riverine and lacustrine areas, generally not in fast moving water and may use backwaters.	Species is also found in Horseshoe reservoir (Maricopa County). Critical habitat includes the 100-year floodplain of the river through the Grand Canyon from confluence with Paria River to Hoover Dam; Hoover Dam to Davis Dam; Parker Dam to Imperial Dam. Also Gila River from Arizon/New Mexico border to Coolidge Dam; and Salt River from Hwy 60/SR77 Bridge to Roosevelt Dam; Verde River from FS boundary to Horseshoe Lake.
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Small passerine (about 6 inches) grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars visible. Eye-ring faint or absent.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	<8500 ft	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Migratory riparian-obligate species that occupies breeding habitat from late April to September. Distribution within its range is restricted to riparian corridors. Difficult to distinguish from other members of the Empidonax complex by sight alone. Training seminar required for those conducting flycatcher surveys. Critical habitat was finalized on October 19, 2005 (50 CFR 60886) and can be viewed at http://arizonaes.fws.gov. In Arizona there are critical habitat segments in Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Pima, Pinal, and Yavapai counties.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Spikedace	*Meda fulgida*	Threatened	Small (<3 inches) slim with silvery sides and "spine" on dorsal fin. Breeding males brassy golden color.	Graham, Greenlee, Gila, Navajo, Pinal, Yavapai	< 6000 ft	Moderate to large perennial streams with gravel cobble substrates and moderate to swift velocities over sand and gravel substrates. Recurrent flooding and natural hydrograph important.	Presently found in Aravaipa Creek, Eagle Creek, Verde River, and the Gila River form the San Pedro River to Ashurst-Hayden Dam in Arizona, and the Gila River and its East and West Forks in New Mexico. Proposed critical habitat (70 FR 75545-75590, December 20, 2005) includes portions of the Verde River, Gila River, lower San Pedro River, Aravaipa Creek, and Eagle Creek in Graham, Greenlee, Pinal, and Yavapai counties in Arizona, and the Gila River and its East, Middle, and West Forks in Catron, Grant, and Hidalgo counties in New Mexico.
Headwater chub	*Gila nigra*	Candidate	A streamlined dark gray to brown fish, often with longitudinal stripes on the sides, reaching a maximum size of about 12 inches.	Yavapai, Gila, Graham	3,000 - 6,700 ft	Small to medium-sized streams, often associated with deep pools and cover such as boulders or vegetation.	Occurs in the East Verde River and tributaries, Fossil Creek, Wet Bottom Creek, Deadman Creek, Tonto Creek and tributaries, San Carlos River, Ash Creek, and the upper Gila River in New Mexico.
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate	Medium-sized bird with a slender, long-tailed profile, slightly down-curved bill, which is blue-black with yellow on the lower half of the bill. Plumage is grayish-brown above and white below, with rufous primary flight feathers.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	< 6,500 ft	Large blocks of riparain woodlands (cottonwood, willow, or tamarisk galleries).	Listing was found warranted, but precluded as a distinct vertebrate population segment in the western U.S. on July 25, 2001. This finding indicates that the Service has sufficient information to list the bird, but other, higher priority listing actions prevent the Service from addressing the listing of the cuckoo at this time.
Wet Canyon talussnail	*Sonorella macrophallus*	Conservation Agreement	Very small (<1 inch) light brown pill-shaped shells. Brown stripe encircles outside perimeter of shell.	Graham	6050	Talus slopes in heavily vegetated area of Wet Canyon (Pinaleno Mountains).	Talus must be deep and largely free of excess sedimentation with stable moisture conditions. This species cannot be distinguished from other Sonorella species without dissection.

APPENDIX B

HERITAGE DATABASE MANAGEMENT SYSTEM RESPONSE LETTER FROM AGFD

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 WEST GREENWAY ROAD
PHOENIX, AZ 85023-4399
(602) 942-3000 • AZGFD.GOV

GOVERNOR
JANET NAPOLITANO
COMMISSIONERS
CHAIRMAN, JOE MELTON, YUMA
MICHAEL M. GOLIGHTLY, FLAGSTAFF
WILLIAM H. MCLEAN, GOLD CANYON
BOB HERNBRODE, TUCSON
JENNIFER L. MARTIN, PHOENIX
DIRECTOR
DUANE L. SHROUFE
DEPUTY DIRECTOR
STEVE K. FERRELL

August 24, 2006

Ms. Karlin Lamberto
Westland Resources, Inc.
2343 E. Broadway Blvd.
Suite 202
Tucson, AZ 85719

Re: Special Status Species Information for **Arizona Eastern Railroad Alignment.**

Dear Ms. Lamberto:

The Arizona Game and Fish Department (Department) has reviewed your request, dated August 15, 2006, regarding the construction and operation of 10 miles of rail line in Graham County. The Department's Heritage Data Management System (HDMS) has been accessed and current records show that the special status species listed on the attachment have been documented as occurring in the project vicinity (3-mile buffer)[1]. In addition, this project occurs in the vicinity of Designated Critical Habitats for Razorback sucker (*Xyrauchen texanus*) and Southwestern willow flycatcher (*Empidonax traillii extimus*).

The Department understands the proposed project would include the placement of track rails, ties, trestles, and culverts. The Department offers the following general comments, based on the limited information provided:

- Limit project activities during the breeding season for birds, generally May through late August, depending on species in the local area. Raptors breed in early February through May. Conduct avian surveys to determine bird species that may be utilizing the area and develop a plan to avoid disturbance during nesting season. Any disturbance during the breeding season may lead to a violation of the Migratory Bird Treaty Act.
- Contact the Army Corp. of Engineers for Best Management Practices and guidelines for minimizing and mitigating impacts to riparian areas.
- Aquatic species breed at different times throughout the year. Review the biology of each species to determine a timeframe and actions (e.g. limiting sediment input into the river during construction) that would minimize impact to the species.
- Identify wildlife crossing areas. Design culverts and bridges to accommodate the upstream and upland movement of fish and wildlife (bottom surface of structure should

[1] The Department's HDMS data are not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity.

be flush with ground i.e. no drop-offs or plunge pools). Identify structure shape and size needs as well as consider noise, temperature, light, and moisture requirements of species of animals that may use the structure.

- Minimize impacts to the vegetation community. Use existing roads and rights-of-way for all transportation. Off-road driving should be avoided. Staging areas should be located in previously disturbed sites, where possible, and kept as small as possible. Implement erosion and drainage control measures during the project to prevent introduction of sediment-laden runoff into surface waters and to prevent impacts to surface water quality. Stabilize exposed soils, particularly on slopes, with vegetation as soon as possible to prevent excess erosion.
- Minimize the potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g., microbes) that may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g., livestock forage reduction, increase wildfire risk). Wash all equipment utilized in the project activities before leaving the site. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules R3-4-244 and R3-4-245), please see the Arizona Department of Agriculture website for restricted plants **http://www.azda.gov/PSD/quarantine5.htm**.
- Coordinate plant salvage efforts with the Arizona Department of Agriculture, in accordance with the Arizona Native Plant Law. In addition, the applicable land management agencies should be consulted regarding guidelines for revegetation efforts.

The Department appreciates the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with the project activities. If you have any questions regarding this letter, please contact me at (602) 789-3606.

Sincerely,

Ginger Ritter

Ginger L. Ritter
Project Evaluation Specialist

GLR:glr

Attachment

cc: Rebecca Davidson, Project Evaluation Program Supervisor
Joan Scott, Habitat Program Manager, Region V

AGFD #M06-08154953

Special Status Species within 3 Miles of T6S, R26E Sec. 5, 6, 8-10, 15, 221, 23, 26, 34, & 35 and T7S, R26E Sec. 3, 11, 14, & 23-25

NAME	COMMON NAME	ESA	USFS	BLM	STATE
Abutilon parishii	Pima Indian Mallow	SC	S	S	SR
Bat Colony					
CH for *Empidonax traillii extimus*	Designated Critical Habitat for southwestern willow flycatcher				
CH for *Xyrauchen texanus*	Designated Critical Habitat for razorback sucker				
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	C	S		WSC
Empidonax traillii extimus	Southwestern Willow Flycatcher	LE	S		WSC
Limenitis archippus obsoleta	Obsolete Viceroy Butterfly		S		
Myotis yumanensis	Yuma Myotis	SC			

AGFD #M06-08154953. Proposed Arizona Eastern Railroad Alignment.

Arizona Game and Fish Department, Heritage Data Management System, August 24, 2006.
Project Evaluation Program.

APPENDIX C

2007 SOUTHWESTERN WILLOW FLYCATCHER SURVEY REPORT

WestLand Resources, Inc.
Engineering and Environmental Consultants

August 30, 2007

Mr. Jeff Barker
1938 Beach Side Court
Atlantic Beach, Florida 32233

RE: SOUTHWESTERN WILLOW FLYCATCHER SURVEY AT THE GILA RIVER AND SAN SIMON RIVER PROJECT AREA, 2007 WESTLAND PROJECT NO. 1378.01 X341 341

Dear Mr. Barker:

At your request, WestLand Resources, Inc. (WestLand) completed a southwestern willow flycatcher (SWFL; *Empidonax traillii extimus*) survey program in 2007 for the proposed Arizona Eastern Railway Safford Branch project in Graham County, Arizona, approximately four miles east of the city of Safford and one mile west of Solomon. No SWFLs were detected during the survey efforts, but the surveys were not completed in full compliance with the currently accepted project clearance protocol (see details below). The surveys were completed under U.S. Fish & Wildlife Service (USFWS) Permit No. TE-834782-0 and Arizona Game & Fish Department (AGFD) License No. SP722555.

The project includes construction of railroad tracks along the western side of the San Simon River from existing tracks south of Montezuma Canal north for more than 1.5 miles to near the river's confluence with the Gila River, then across the Gila River within a 500-foot corridor downstream from the confluence. Pursuant to the USFWS recommendation (Attachment A), the SWFL survey area included an 1,800-foot (ft) corridor[1] on the Gila River, 0.5 mile upstream and downstream from the 1,800-ft corridor, and approximately 1.5 miles of the San Simon River south from its confluence with the Gila River (Township 7 South, Range 26 East, Section 11 E¾ of S½, Section 12 S½ of SW¼, Section 13 N½ of NW¼, Section 14 NE¼ of NE¼, Sections 13/14 boundary, and N½ of Sections 23/24 boundary; Figure 1).

On October 19, 2005 (70 FR 60886) the USFWS designated Critical Habitat for the SWFL, including the Gila River from the upper end of Earven Flat downstream to the San Carlos Apache Tribal Boundary. The survey area along the Gila River is within designated Critical Habitat, but the San Simon River is not (Figure 1).

Except as noted below, WestLand followed the 1997[2] USFWS SWFL survey protocol, as modified in 2000.[3] To survey, recorded SWFL songs are broadcast along transects within potential habitat. At each call station, a 1- to 2-minute listening period is followed by a 15- to 30-second SWFL vocalization, followed by another 1- to 2-minute listening period. This is repeated every 65 to 100 ft (20 to 30 meters [m]), or less in areas with

[1] The Gila River crossing location was within a 1,800-ft-wide corridor at the start of the 2007 SWFL survey effort, and has been narrowed to a 500-ft-wide area since.
[2] Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbits. 1997. *A southwestern willow flycatcher natural history summary and survey protocol.*
[3] USFWS letter R2/ES-TE.

2343 E. Broadway Blvd., Suite 202 • Tucson, AZ 85719 • 520·206·9585 Fax 520·206·9518
5150 N. 16th Street, Suite B-235 • Phoenix, AZ 85016 • 602·279·2051 Fax 602·279·5431

high background noise. The daily survey period starts when there is enough light to walk (45 minutes to one hour before sunrise) and ends generally between 9:00 and 10:00 a.m. due to weather conditions, particularly heat. If no SWFLs are detected, five surveys at least five days apart must be completed between May 15 and July 17; one between May 15 and May 31, one between June 1 and June 21, and three between June 22 and July 17.

No surveys were conducted during the first two survey periods of the USFWS protocol (May 1 to 31 and June 1 to 21). Per the protocol, three surveys were conducted during the third survey period, on June 26, July 10 and July 16. During each survey, two biologists surveyed all potentially suitable habitat within the survey area (Figure 1).

There were no SWFL detections during any of the survey efforts, but brown-headed cowbirds, a known nest parasite of the SWFL, were detected during the June 26 and July 7 surveys. Recent sign of livestock use was not noted within the survey area. A total of 20 hours and 5 minutes of survey was conducted. Detailed information regarding survey at the two project sites is found on the survey form (Attachment B) that is transmitted to USFWS and AGFD per permit requirements.

The survey area is within a broad, open valley. On the northern bank of the Gila River, the western half is defined by mud and gravel cliffs rising approximately 100 to 130 ft (30 to 40 m) above the riverbed, and the eastern half by a secondary shelf approximately 6 to 8 ft higher than the active floodplain. It appears that an unnamed wash that discharges into the Gila River from the north carries large amounts of debris and sediment during rain events, and deposits the debris and sediment at the mouth of the wash, creating the shelf. The tops of the cliffs consist of open desert habitat. The survey area south of the Gila River and on both sides of the San Simon River consists of agricultural fields. Based on the USGS 7.5-minute topographic map, elevations within the survey area range from approximately 2,935 to 2,965 ft above mean sea level.

The Gila River survey area is approximately 7,000 ft (2,150 m) long, and the San Simon survey area is approximately 7,900 ft (2,400 m) long. Potentially suitable habitat within the survey area along the Gila River is patchy and generally between 10 ft (3 m) and 30 ft (10 m), but along the San Simon River generally does not exceed 10 ft (3 m) wide. Surveys included all potentially suitable SWFL habitat along the proposed railroad alignment. Vegetation patches that were included in the survey are identified on an aerial overview of the survey area (Figure 2).

The two rivers support different habitat types. Humans have channelized the San Simon River, and actively manage its vegetation throughout the length of the survey area to allow unimpeded irrigation run off from agricultural fields. Vegetation along the San Simon River is more strongly influenced by the surrounding agricultural fields than the Gila River and includes numerous non-native species. The dominant species are desert broom (*Baccharis sarothroides*), velvet mesquite (*Prosopis velutina*), saltcedar (*Tamarix ramosissima*), and Goodding willow (*Salix gooddingii*).

Habitat along the Gila River is more diverse than that along the San Simon River. The Gila River floodplain is extremely broad (approximately 350 to 1,600 ft [100 to 500 m] wide). Potentially suitable SWFL habitat exists

almost entirely alongside the currently active river channel, primarily on the edges of three pools that have been created by beaver dams. The pools extend through over 60 percent of the survey area length.

Vegetation across the floodplain of the Gila River includes scattered patches of trees and dense willow strands adjacent to the river. The dominant plant along the Gila River is coyote willow (*Salix exigua*), which creates a hedge approximately 10 to 13 ft (3 to 4 m) in width and 10 to 40 ft (3 to 12 m) in height at the water's edge. Beavers have created numerous breaks in vegetation adjacent to the channel. Fremont cottonwood (*Populus fremontii*) and tamarisk (*Tamarix* sp.) patches are present throughout the floodplain and are not dependent on surface flows. The cottonwood trees tend to be senescent plants and the tamarisk is found mainly in scattered mono-typical patches across the floodplain. Tamarisk comprises only an estimated 10 percent of the overall vegetation biomass throughout the survey area. Saturated soils are present along the beaver pools and extend about 2 ft (0.6 m) up the bank. Other plant species noted within the survey area include nutsedge (*Cyperus* sp.), spikerush (*Eleocharis* sp.), yellow sweetclover (*Melilotus officinalis*), rabbitsfoot grass (*Polypogon monspeliensis*), bulrush (*Schoenoplectus americanus*), seepwillow (*Baccharis salicifolia*), rough cocklebur (*Xanthium strumarium*), and common sunflower (*Helianthus annuus*).

On the secondary shelf of the eastern half of the survey area along the northern side of the Gila River is a vegetation community that in some respects is different than that noted in the previous paragraphs. As noted above, this shelf is composed of sediment from a tributary wash, and sedimentation from the tributary appears to be active. The sediment on the shelf tends to be finer (more clay and less sand) than that in the active floodplain. This shelf appears to have weathered the flooding events of the past two decades. Vegetation on the shelf consists of senescent plants with little recruitment, suggesting that the shelf is drier than the active floodplain on the Gila River. The large dense stands of tamarisk and mesquite present across the shelf do not form impenetrable thickets as are often seen along the Gila River. In addition, numerous mature cottonwoods were noted along the edge of the shelf and the active floodplain, with mature cottonwoods and willows scattered across the shelf. We noted no surface water on the shelf, and moist soils were limited to the leading edge of the active floodplain. The nearest surface flows were approximately 300 ft (100 m) south of the shelf.

WestLand conducted SWFL survey within the project area for the first time in 2006. That survey effort extended over 2,000 ft further downstream on the Gila River than the 2007 survey, but did not include the Gila River upstream from its confluence with the San Simon River. One SWFL was detected during the first survey in 2006, but was considered a migrant because no SWFLs were detected during the next four surveys. WestLand did not have any SWFL detections in 2007 and has not found any historical records of SWFL surveys or activity for the survey area.

Because the alignment for the railroad crosses the Gila River within designated critical habitat for the SWFL, a Section 7 consultation with the USFWS may be required under the Endangered Species Act. If required, this Section 7 consultation will be done to support the Surface Transportation Board (STB) requirements under the National Environmental Policy Act and the U.S. Army Corps of Engineers Clean Water Act Section 404 permit. WestLand will incorporate this information into the draft Biological Assessment for STB/Circle Point to review and submit to the USFWS.

WestLand appreciates the opportunity to complete this survey on your behalf. If you have any questions, or we can be of additional assistance, please contact Kim Otero or me at (520) 206-9585.

Sincerely,
WestLand Resources, Inc.

Scott Hart
Project Manager

SDH:pb
Enclosures: Figure 1. Project USGS 7.5' Location Map
Figure 2. Project Aerial Map
Attachment A: USFWS survey recommendation
Attachment B: 2007 SWFL Survey Form

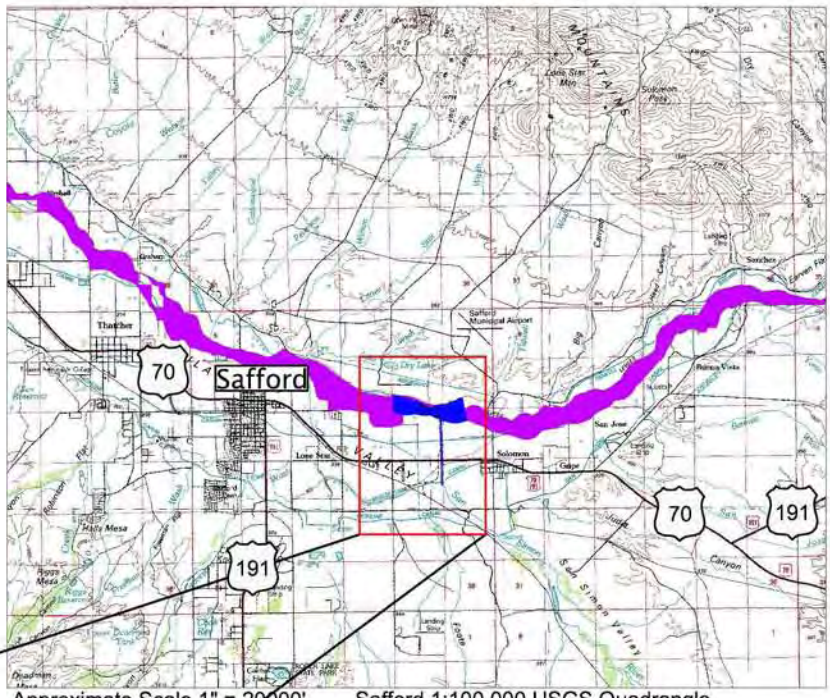
ARIZONA

Proposed Railway Alignment

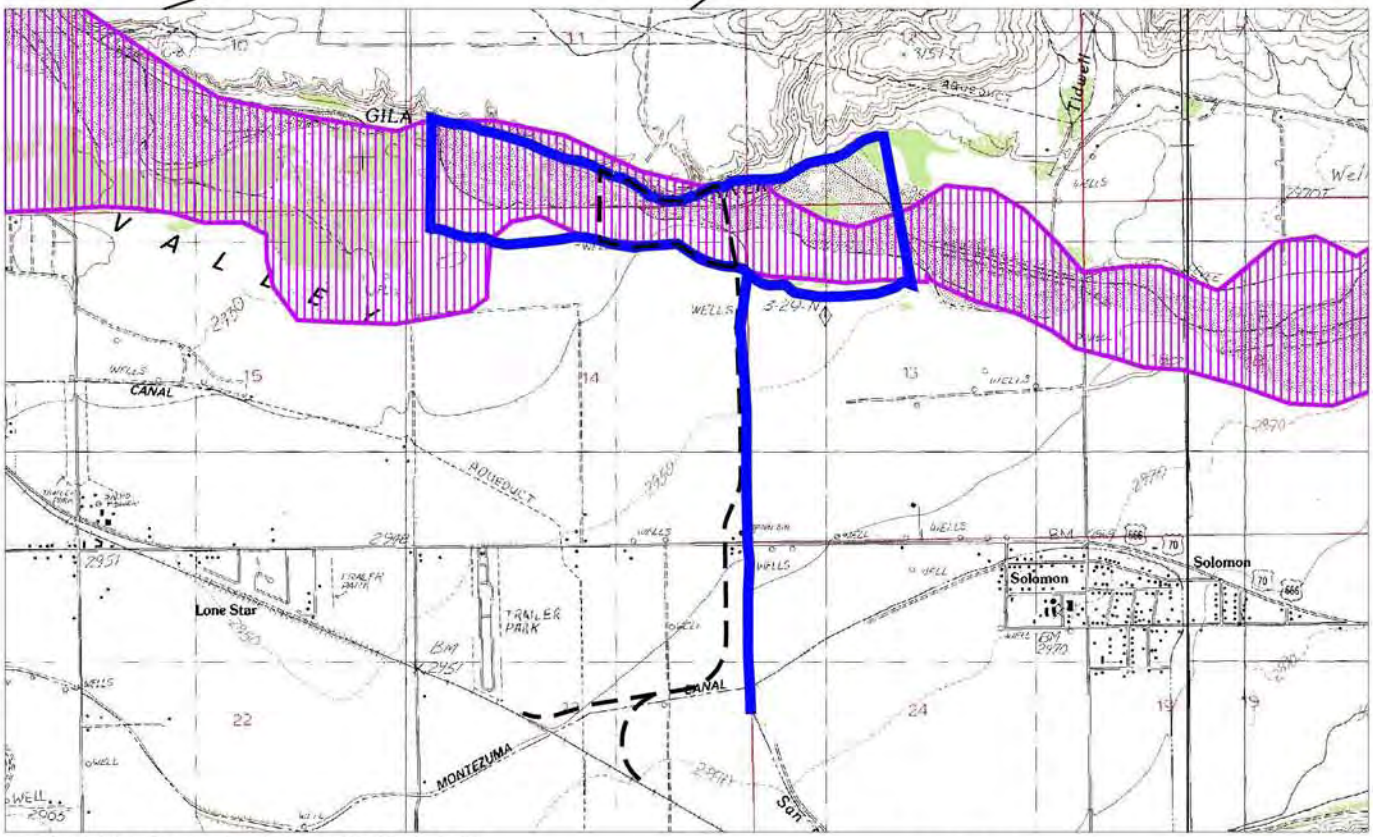
SWWFL Survey Area

SWWFL Critical Habitat

Portion of Graham County



Approximate Scale 1" = 20000' Safford 1:100,000 USGS Quadrangle.



T.7S.,R.26E., Portion Sections 11,12,13,14, & 23.
Graham County, Arizona,
Safford 1:24,000 USGS Quadrangle.

0' 1500' 3000'

APPROX. SCALE: 1" = 3000'

N

W E

S

ARIZONA EASTERN RAILWAY SAFFORD BRANCH PROJECT

2007 Southwestern Willow Flycatcher Survey
VICINITY MAP
Figure 1

WestLand Resources Inc.
Engineering and Environmental Consultants
2343 E. Broadway Blvd. Suite 202
Tucson, Az 85719 (520) 206-9585

DWG FullPath: M:\projects\1378.0117-2007-swwfl\swwfl-crit-hab.dwg

DWG FullPath: M:\projects\1378.01\7-2007-swwfl\UTM-Gila River-San Simone-W-GOOGLE.dwg

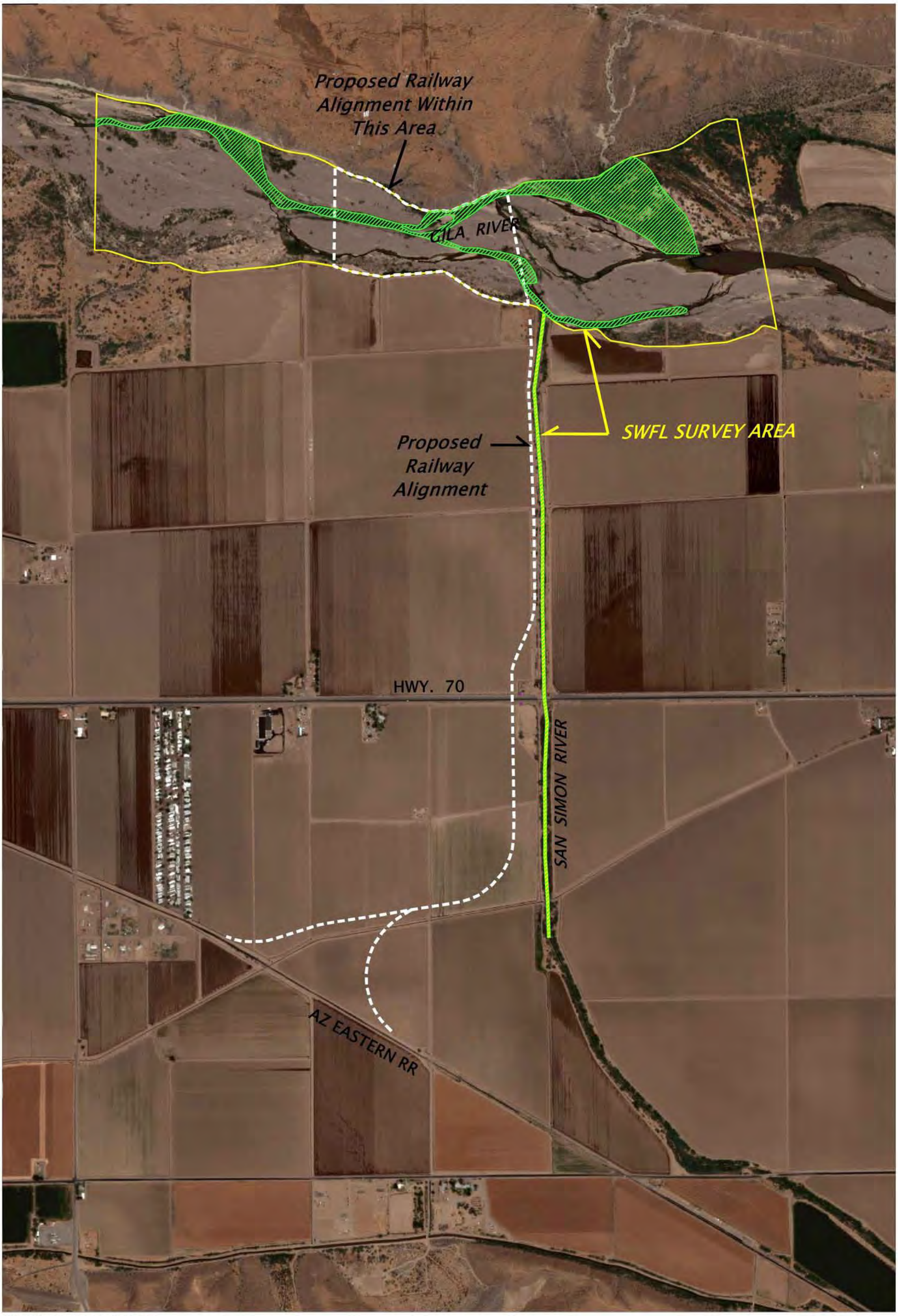


Photo Source: Google Earth Pro.
Google images are not geo-referenced therefore distortion is present in imagery.

WestLand Resources Inc.
Engineering and Environmental Consultants
2343 E. Broadway Blvd. Suite 202
Tucson, Az 85719 (520) 206-9585

0' 500' 1000'
SCALE 1" =1000'

N
W E
S

Vegetation Patches Included in the Survey (other vegetation unsuitable for SWFL)

ARIZONA EASTERN RAILWAY SAFFORD BRANCH PROJECT

2007 Southwestern Willow Flycatcher Survey
AERIAL OVERVIEW
Figure 2

ATTACHMENT A

USFWS
SURVEY
RECOMMENDATION

Scott Hart

From: Jason_Douglas@fws.gov
Sent: Tuesday, May 15, 2007 10:34 AM
To: Scott Hart
Cc: Greg_Beatty@fws.gov; Mike_Martinez@fws.gov; Sherry_Barrett@fws.gov
Subject: WIFL surveys at Gila-San Simon confluence

Scott,

I apologize for taking so long to get back to you on this.

I will reiterate Greg Beatty's recommendation that project clearance-level, FWS protocol WIFL surveys be conducted, within suitable breeding habitat, 0.5 mile up and downstream of the 1,800-foot wide reach of river (presuming this refers to a river reach length, not a lateral extent). The entire reach is also migration/stopover habitat as well. The reach within which the project is situated is also critical habitat for WIFL, so the eventual project analysis will need to consider impacts to the Primary Constituent Elements and the reach's ability to continue functioning for the recovery of the species, regardless of survey results.

The Gila River in that area is also critical habitat for razorback sucker, with the aforementioned areas of consideration also required.

Lastly, and this may not be the forum for this issue, but I feel that the railroad spur is an interdependent, and possibly interreleated action of the Dos Pobres/San Juan Mine, and as such should be considered within the scope of the biological opinion on that project. While there me be some independent utility in terms of other rail line users, it seems unlikely the spur would be built but for transport of materials to and from the mine.

Jason M. Douglas
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Arizona Ecological Services Field Office
201 North Bonita Street, Suite 141
Tucson, Arizona 85745
(520) 670-6150, extension 226 (voice)
(520) 670-6155 (fax)
http://www.fws.gov/southwest/es/arizona/

ATTACHMENT B

2007
SWFL
SURVEY
FORM

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name Solomon NW/San Simon ~~to~~ Gila State AZ County Graham
USGS Quad Name Safford Elevation 2,935 - 2,965' (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 3633503 E 625209 UTM Datum NAD27 (NAD27 preferred)
Stop: N 3633045 E 627188 UTM Zone 12

Coordinates Southern boundary of San Simon: N-3630891 E-626645

***** Fill in additional site information on back of this page *****

Survey # / Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Dan Ginter John Ginter	Date 6/27/06 Start [redacted] 4:50 Stop 9:00 Total hrs 8.10	0	→	→	→	Yes	NO	
2 Dan Ginter John Ginter	Date 7/07/07 Start 5:20 Stop 8:30 Total hrs 6.10	0	→	→	→	Yes	NO	
3 Dan Ginter John Ginter	Date 7/16/07 Start 5:40 Stop 8:20 Total hrs 5.90	0	→	→	→	No	NO	
4	Date Start Stop Total hrs							
5	Date Start Stop Total hrs							

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 20.1	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Dan Ginter Date Report Completed 31 July 2007
US Fish and Wildlife Service Permit # TE-834782-0 AZ Game and Fish Department (or other state) Permit # SP554427

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Pam Winter, Scott Hart Phone # 320-206-9585
Affiliation Westland Resources E-mail Shart@westlandresources.com
Site Name Solomon NW/ San Simon to Gila Date Report Completed 31 July 2007

Did you verify that this site name is consistent with that used in previous years? Yes / (No) (circle one)
If name is different, what name(s) was used in the past? Same - but recorded as two separate surveys in 2006 AGFD survey report
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal (Private)
Name of Management Entity or Owner (e.g., Tonto National Forest) Private

Length of area surveyed: 4.55 Km (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☒ Mixed native and exotic plants (mostly native)

☒ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: SAEX, POFR, SAGO & TACH

Average height of canopy (Do not put a range): 20' (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 5'-25' (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? (Yes) / No (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)
Surface water was present throughout the site during the first visit but during the second visit surface water was only present in the Gila west of the San Simon. However during the third visit water was present along the entire reach of the Gila (recent rains in the area).
Additional birds noted along survey Route: common black Hawk, Song Sparrow, Summer Tanager, Common Yellow throat, Yellow breasted chat, Ash throated Flycatcher, Phainopepla, Bell's Vireo, hooded warbler, Yellow warbler, western Kingbird

WIFL Detection Locations: —

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

APPENDIX D

BRIDGE DESIGN (HDR)

Structure Type Selection Report

MOUNTAIN STATES CONTRACTING

Gila River Railroad Bridge

AZER Phelps Dodge Mine Connection

Safford, Arizona

Prepared for:

Mountain States Contracting
Rail Project No. 06-083

Prepared by:
HDR Engineering, Inc.
5210 East Williams Circle
Tucson, AZ 85711
HDR Job # 55774

June 2007

HDR

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PROJECT DESCRIPTION

Arizona Eastern Railroad (AZER) plans to construct a rail line that will service the new Phelps Dodge Mine located north of the Gila River near Safford, Arizona. The line will connect the mine with the existing AZER mainline track located approximately 1¾ miles south of the Gila River. The proposed track alignment crosses the Gila River and therefore, a new bridge will be built to carry the single track across the river. A Location Map is shown in Figure 1.

GILA RIVER HYDROLOGY & HYDRAULICS

HDR prepared a Hydrology and Hydraulics Memorandum dated May 17, 2007. This memo is included in Appendix A. The Gila River is one of the main watercourses in Arizona, and traverses the width of the state. The River stretches from western New Mexico's Gila Mountains to the Colorado River. The portion of the watershed that encompasses the project site is part of the Upper Gila Watershed, which drains an area of approximately 12,300 square miles at the proposed crossing.

Research was performed of the Federal Emergency Management Agency (FEMA), State of Arizona, and Graham County records. The site has been mapped as being within a FEMA flood zone. In general, encroachments are not allowed into the floodway. Encroachments are occasionally allowed into a floodplain, provided the water surface elevation is not raised a significant amount above the existing floodplain elevation, generally 1-foot or less. Coordination with the appropriate floodplain administrator is recommended in order to verify the allowable encroachment.

A hydraulic model was prepared for the proposed crossing location of the Gila River using USACE's HEC-RAS River Analysis Software program. The model prepared in the Upper Gila River Fluvial Geomorphology study was used as a base, and modified to reflect current conditions and flow regimes. The 100-year event was used for analysis due to the river's location in a FEMA floodplain.

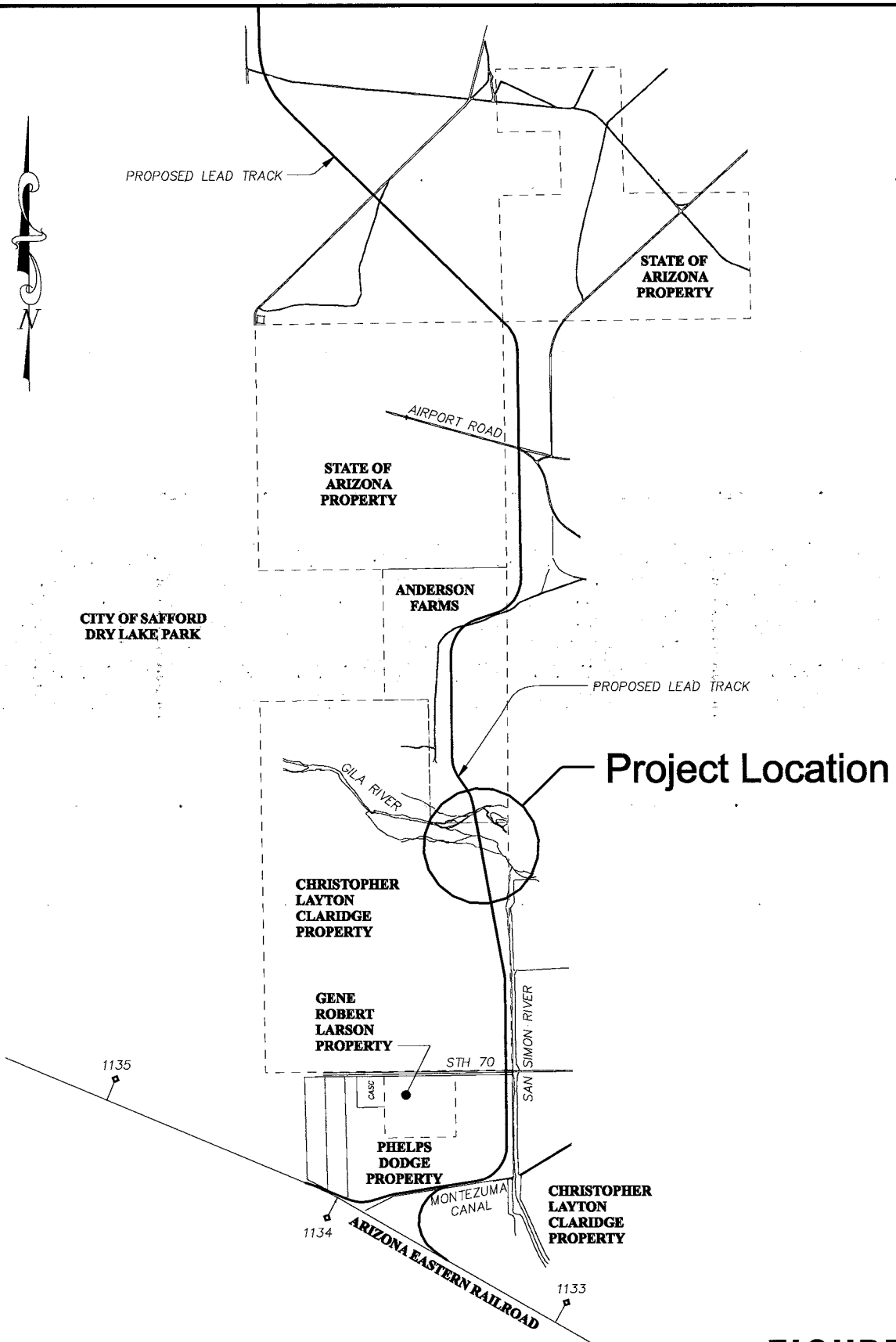
Numerous bridge lengths were input into the model in order to determine a geometry that resulted in no more than a one foot rise in water surface elevation during a 100-year event. The minimum recommended opening width for a new bridge developed with this analysis was 1,500 feet, which results in approximately 1 foot of rise. The total length of the new bridge must then be longer than 1,500 feet so that the opening width between the river banks is at least 1,500 feet including bank protection and/or river training that will be required to protect the bridge abutments from scour.

A summary of the hydraulic information used for determining the bridge geometry is as follows:

- Q_{100} Flow Rate: 144,000 cubic feet per second (CFS)
- Q_{100} High Water Elevation: 2953' +/-
- Q_{100} Local Scour Depth: 30 feet at Piers (Does not include long-term degradation)

TRACK ALIGNMENT

The proposed track alignment is on a horizontal tangent with a bearing of N10°19'20"W and on a vertical tangent with a slope of 1.89% where it crosses the Gila River. There is a 200' long vertical curve that ends just south of the South Abutment and there is a horizontal curve north of the north abutment.



ARIZONA & EASTERN RAILROAD
RAILROAD BRIDGE OF THE GILA RIVER
SERVING PHELPS DODGE SAFFORD MINE

FIGURE 1
Location Map

BRIDGE GEOMETRICS

The proposed bridge structure will be designed to meet the requirements of the 2006 edition of the American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering for a Cooper E-80 live load. AREMA requires an 18 feet wide clearance diagram, 9 feet on each side of the centerline of track. AREMA also requires a 2'-6" minimum width walkway with a handrail on each side of the track. The handrail is required to be outside the clearance diagram and therefore the width of the bridge is proposed to be 19'-0". Using 12" of ballast below the ties, the top of rail will be approximately 2'-4" above the bridge deck.

The length of the bridge will be approximately 1,600 feet. As discussed previously in the hydrology and hydraulics section, the minimum length of the opening below the bridge is required to be 1,500 feet to minimize the increase in water surface elevation during a 100 year flood event. Using 2:1 embankment slopes in front of the abutments with bank protection, a 1,600 feet long bridge is recommended so that the 1,500 feet opening width between river banks is maintained. See Figures 2 through 6.

UTILITIES

No existing utilities have been identified within the vicinity of the proposed bridge. Provision will be made to accommodate the support of utilities such as waterlines or electrical conduit from the bridge if requested during final design.

BRIDGE DRAINAGE

A crowned bridge deck with a minimum 0.5% cross-slope about the centerline of the track will be used in conjunction with a longitudinal track slope of 1.89% to facilitate deck drainage. The drainage will be collected in slotted half-pipe deck drains under the ballast in conformance with typical railroad standard details. The deck drainage will be conveyed off the structure to proper drainage facilities that will be determined during final design. The ballast trough will be waterproofed in accordance with AREMA standards.

SUPERSTRUCTURE

Superstructure Alternatives

Two superstructure systems were considered in depth as part of the preparation of this report:

- Precast Prestressed Concrete I-Girders with Composite Concrete Deck
- Steel Plate Girders with Composite Concrete Deck

Steel trusses and cast-in-place post-tensioned concrete box girders were ruled out as feasible structure types for this site location. Steel trusses are very costly and have higher long-term maintenance costs. Construction of cast-in-place post-tensioned concrete box girders require the use of falsework, which is not recommended given the potential for high flows while the falsework is in place.

For comparison purposes, the following factors were evaluated:

- Structural Requirements
- Geometric Requirements
- Economic Feasibility
- Constructability
- Long Term Serviceability and Maintenance Requirements
- Aesthetics

Alternative 1: Precast, Prestressed, Concrete I-Girders with Composite Concrete Deck.

Structural Requirements: Of the standard I-shaped girders, the Super Type VI girder was chosen because it is the deepest and can therefore accommodate a longer span. The 6'-6" deep girder section is manufactured by most of the precast suppliers in the region. The top flange of the girder is 42" wide, the bottom flange is 26" wide and the web thickness is 8". This girder can accommodate railroad spans of approximately 100 feet. A concrete release strength of 6,500 psi and a final strength of 8,000 psi at 28 days will be required. (Concrete strengths of this magnitude are commonly obtained by precast suppliers when required, however, the higher release strength will require the girders to cure for an additional 8 to 16 hours before the prestressing force is transferred to the girders. For this structure, an 8" structural concrete deck was selected with a girder spacing of 3'-6". With this spacing, the top flanges of adjacent girders will be touching, which is advantageous because it eliminates the need for deck formwork. Four girders will be used per span and are designed to act compositely with the concrete deck for live load only. The total superstructure depth including the concrete deck, buildup and girder is 7'-6". This depth does not include the ballast, ties, track, walkway or handrail.

Geometric Requirements: This superstructure system adequately meets the geometric requirements of the project and provides a minimum 3 feet of freeboard for the 100-year event at the low chord elevation. The distance between the bottom flanges of adjacent girders will be 14 inches, which is fairly narrow but does allow for the steel diaphragms to be bolted into place as the girders are erected.

Economic Feasibility: Precast, prestressed concrete girder systems are traditionally a very economical solution due to prefabrication and redundancy. A cost estimate for this alternative is included on page 10 of this report.

Constructability: The Super Type VI Girder with the proposed 3'-6" spacing has a significant advantage over other systems in that formwork for the deck is not required between girders because the top flanges are touching. Precast girder systems are also advantageous because they do not require shoring during construction. For use on this railroad crossing, the principal benefit of an unshored system is the reduced area of disturbance and amount of time that equipment is required to be within the Gila River floodplain.

Long Term Serviceability and Maintenance Requirements: Precast, prestressed concrete girder systems have excellent long-term serviceability records and typical require no maintenance. Therefore, access to the underside of the bridge is only anticipated for periodic inspections.

Aesthetics: Although aesthetic quality is not an issue, in general, precast concrete I-girder bridges are attractive superstructures due to their simplicity and clean lines.

Alternative 2 – Steel Plate Girders with Composite Deck

Structural Requirements: Steel plate girders were considered because they can be constructed to any practical depth and are therefore not limited to standard shapes like precast, prestressed, concrete I-girders. Steel plate girders are usually more expensive than precast girders of the same span. However, if using steel plate girders would allow fewer piers to be used, then the additional cost of the steel girders might be more than offset by the reduced substructure costs. Therefore, a steel plate girder with a 123-foot span was investigated. This span length requires 12 piers for the 1,600-feet long bridge, which is three less piers than the precast alternative. For this alternative, an 8" composite concrete deck supported by four 7'-3" deep steel plate girders spaced at 3'-6" on center is proposed. The top and bottom flanges are 2" thick by 21" wide and the web thickness is 5/8". All steel is ASTM A572 with a yield strength of 50 ksi. As with the precast alternative, the girders are designed to act compositely with the concrete deck for live load only. The total superstructure depth including the concrete deck, buildup and girder is 7'-11". This depth does not include the ballast, ties, track, walkway or handrail.

Geometric Requirements: This superstructure system meets the geometric requirements of the project and provides a minimum 3 feet of freeboard for the 100-year event at the low chord elevation. The distance between the bottom flanges of adjacent girders will be 21 inches, which provides enough room for installing the steel diaphragms and performing routine maintenance and inspection as may be required.

Economic Feasibility: Although this alternative results in three fewer piers than the concrete alternative, it is still approximately $2 million dollars more costly. This cost is based on a price of $1.55 per pound of structural steel, which is based on recent cost data received from regional steel fabricators. A cost estimate for this alternative is included on page 11. For purposes of comparison, the same size pier as the concrete girder alternative was used for the steel girder alternative even though the piers for the steel alternative will need to be larger due to the larger spans. If the railroad prefers to use a steel girder system, even though it is more expensive, a more thorough analysis of the piers needs to be accomplished to confirm the estimated substructure cost.

Constructability: Similar to the precast alternative, an advantage of the steel girder system is that false work is not required for erection of the superstructure. However, bridge deck forms will be required between girder flanges which makes the constructability of this alternative slightly less advantageous than the precast system.

Long Term Serviceability and Maintenance Requirements: Long term serviceability of a steel girder system is comparable to other systems; however, higher life cycle costs can be associated with this system due to the potential need for repainting. It is generally assumed in this region that repainting will be required at least once within the facility's lifetime. The steel girders will also require more in-depth inspection than a concrete girder bridge due to bolted and welded construction.

Aesthetics: The aesthetics of a steel girder system are similar to those of a precast concrete girder system. Since there are fewer piers with this alternative, it may arguably result in the more attractive alternative.

SUBSTRUCTURE

A Preliminary Geotechnical Design Memorandum has been prepared by HDR Engineering which included surface geologic reconnaissance & mapping and analysis of seismic refraction surveys that were prepared by AMEC Earth & Environmental. This memorandum is included in Appendix B. It should be noted that test borings were not taken at this bridge site and therefore a more thorough geotechnical analysis will need to be performed for final design. Preliminary geotechnical recommendations indicate that deep foundations (drilled shafts) will be the most appropriate foundation system at both the piers and abutments. Shallow foundations are not advisable due to scour and driven piles are not expected to effectively penetrate the coarse-grained subsurface materials to a sufficient depth. Anticipated seismic loading, along with known soil conditions in the area indicate that drilled shaft foundations should be socketed into the lower basin fills in order to provide necessary axial and lateral capacity.

Abutments: The abutments will consist of a concrete abutment beam supported by a single line of two drilled shafts. A two to one embankment slope in front of the abutment with bank protection is recommended. The two to one embankment slope is advantageous because it eliminates the need for full-height abutment walls which are more costly to construct. Based on preliminary geotechnical information, it is estimated that 5 or 6-feet diameter drilled shafts will be required and will have embedment depths of 60 feet at the north abutment and approximately 115 feet at the south abutment.

Piers: The piers vary in height from approximately 20 feet at the southernmost pier (Pier 1) to 61 feet at the northernmost pier (Pier 15). A 16-foot wide by 5-feet thick pier wall will be used to support the superstructure. The pier wall will transition to 12-feet wide beginning 4 feet below the top of the pier. The wall will be supported on a drilled shaft cap that is set approximately 5 feet below the existing grade of the river or floodplain. The design of an economical pier foundation is challenging because of the large longitudinal force that the piers are required to resist. This force is caused by the traction and braking of the train and is applied in the longitudinal direction of the bridge (i.e. parallel to the track). In addition to shear, this force creates a large bending moment at the base of the pier walls. The following configurations of drilled shafts were investigated to determine the most economical foundation system:

Pier Foundation Alternative 1:

This alternative consists of a 5 feet thick by 21'-6" square drilled shaft cap supported on four 5 feet diameter drilled shafts spaced at 15 feet on center. It is anticipated that the drilled shafts will be embedded approximately 81 feet below the drilled shaft cap on average. The advantages of this configuration are that the shafts can resist the longitudinal bending moment at the base of the pier through a force-couple that creates axial load in the shafts instead of pure bending. Another advantage is that relatively small diameter drilled shafts can be used. The cost of this type of foundation system per pier is estimated as follows:

Pier Foundation Alternative 1 – Cost Estimate				
Item	**Unit**	**Quantity**	**Unit Price**	**Amount**
Pier Wall Concrete	CU. YD.	82	$750.00	$61,500
Drilled Shaft Cap Concrete	CU. YD.	86	$750.00	$64,500
Reinforcing Steel	LB.	42,000	$0.90	$37,800
Drilled Shafts (5' Diam.)	L. FT.	324	$650.00	$210,600
			Total Average Cost Per Pier:	**$374,400**

Pier Foundation Alternative 2:

This alternative consists of a 5-feet thick by 13'-0" wide x 25'-6" long drilled shaft cap supported on two 6 feet diameter drilled shafts spaced at 18 feet on center. The spacing of the shafts is longitudinal to the bridge in order to take advantage of the force-couple system to resist longitudinal railroad loading. The drilled shafts will be embedded approximately 91 feet below the drilled shaft cap on average. The advantages of this configuration are that only two shafts are required. The cost of this type of foundation system per pier is estimated as follows:

Pier Foundation Alternative 2 – Cost Estimate				
Item	**Unit**	**Quantity**	**Unit Price**	**Amount**
Pier Wall Concrete	CU. YD.	82	$750.00	$61,500
Drilled Shaft Cap Concrete	CU. YD.	62	$750.00	$46,500
Reinforcing Steel	LB.	37,000	$0.90	$33,300
Drilled Shafts (6' Diam.)	L. FT.	182	$925.00	$168,350
			Total Average Cost Per Pier:	**$309,650**

Pier Foundation Alternative 3:

This alternative consists of a 5-feet thick by 13-feet square drilled shaft cap supported on a single 10 feet diameter drilled shaft. The drilled shaft will be embedded approximately 96 feet below the drilled shaft cap on average. The advantages of this configuration are that only one drilled shaft is required per pier. The disadvantage is that the shafts must be adequately sized to resist all of the bending moments that occur at the base of the pier wall in pure bending. Because of this, a 10-feet diameter shaft will likely be required. The cost of this type of foundation system per pier is estimated as follows:

Pier Foundation Alternative 3 – Cost Estimate				
Item	**Unit**	**Quantity**	**Unit Price**	**Amount**
Pier Wall Concrete	CU. YD.	82	$750.00	$61,500
Drilled Shaft Cap Concrete	CU. YD.	32	$750.00	$24,000
Reinforcing Steel	LB.	31,00	$0.90	$27,900
Drilled Shafts (10' Diam.)	L. FT.	96	$2,100.00	$201,600
			Total Average Cost Per Pier:	**$315,000**

Pier Foundation Alternative 2 is recommended because it has the lowest cost. It should be noted that the foundation sizes were estimated based on loads applied to the tallest pier. A more refined analysis will be performed for all of the piers during final design. It is expected that the configuration and size

of each pier will vary based on the actual height. Without additional geotechnical information, it is not beneficial to further refine the pier design at this time.

CONSTRUCTION CONSIDERATIONS

The presence of the two low flow channels within the Gila River flood plain and the tall piers required at this location create significant construction challenges, especially when considering girder erection.

The following sequence of construction is intended to present one way that the new bridge could be constructed.

1. Construct a temporary access road parallel to the new bridge within the Gila River flood plain. Precast suppliers recommend a 30 to 40 foot wide access road so that their trucks and equipment can be easily maneuvered.

2. Install temporary pipe culverts to carry the normal flows of the Gila River and backfill over the pipes to provide access across the low flow channels.

3. A cofferdam may need to be constructed using dewatering techniques or a diversion system will need to be put into place within the low flow channel adjacent to the bluff on the north side of the river so that the northernmost pier foundation can be constructed.

4. Once the access road is complete, drill rigs can access all of the pier locations by entering the site from the south.

5. After the pier walls have been built, precast girders can be delivered to the site and erected. It is anticipated that two cranes will be required to erect each girder. Both cranes can be located within the flood plain on the temporary access road for erection of all but the northernmost span.

   The last span is more challenging because it is located well above the river within the bluff. There is a dirt road near the north abutment that the contractor may be able to set one of his cranes on to make the final pick to complete the girder erection. The second crane will most likely remain in the river channel near the last span.

6. Once the girders are erected, the concrete deck can be placed using concrete pumps set up along the temporary access road.

Clearly, the above construction approach will have to take into account the contractor's means and methods and any constraints related to the environmental approval process.

RECOMMENDATIONS

Based on the foregoing discussions, it is recommended that the superstructure type for the new bridge over the Gila River be a Precast, Prestressed, Super Type VI Concrete Girder with a cast-in-place concrete deck and walkways.

The total cost of $9.5 million is $2 million less than the steel plate girder alternative. The key elements of this system are summarized as follows:

- Bridge will be designed to meet the 2006 Edition of the American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering. Live loading will be Cooper E-80.
- Total structure length between centerline bearing of abutments will be 1,600 feet, will consist of sixteen 100-feet spans.
- Total structure width will be 19'-0" includes a 2'-6" wide raised concrete walkway with handrail on each side of the bridge and a 14-feet wide deck.
- Precast Prestressed Super Type VI Concrete Girders with a cast-in-place concrete deck. Four girders per span will be used. The total superstructure depth including the 6'-6" deep girder, 8" structural concrete deck, 4" concrete buildup, and 0.5% deck cross-slope is 7'-6 3/8". The total depth from top of rail to bottom of girder will be approximately 9'-10". The Concrete deck will be designed to act compositely with the precast girders to support live loads. Girders will be placed with their top flanges touching so that deck formwork will not be required except along the outer edge of the deck and walkways.
- Piers will be a solid 5-feet thick concrete wall with a variable width and rounded nose. The walls will be 16-feet wide at the top and then transition down to 12-feet wide. Pier heights vary from 20 feet to 61 feet.
- The pier walls will be supported on drilled shaft caps that will distribute the loads to drilled shaft foundations.
- The final configuration of the drilled shaft foundations has not been determined, but will likely be the two-shaft configuration shown in the plans. A combination of two or three configurations and shaft sizes may be used depending on the height of the piers. Additional geotechnical information including soil borings as well as structural analysis is needed to finalize the foundation designs.

COST ESTIMATES

The following are estimates of the probable cost of construction of the new bridge.

Alternative 1- Precast, Prestressed, Super Type VI Concrete Girders **(Recommended Alternative)**

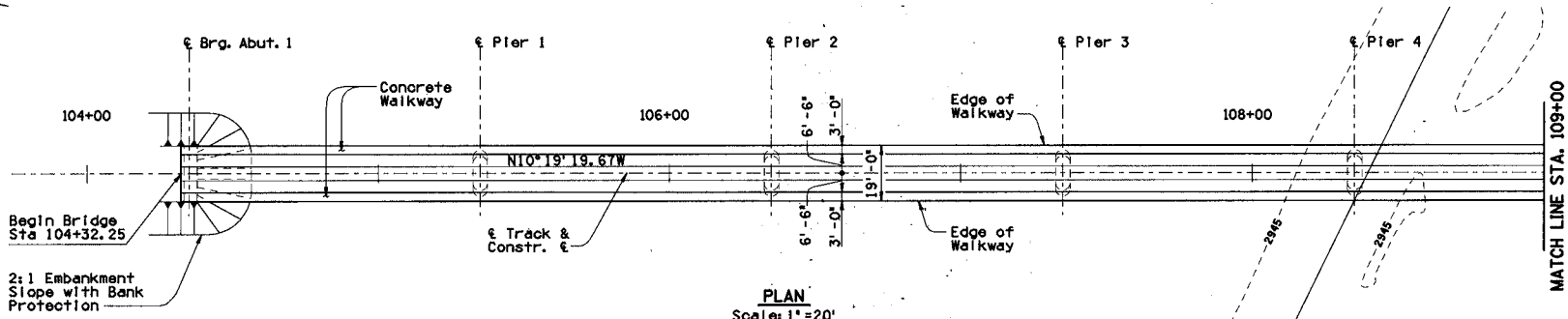
ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
STRUCTURAL EXCAVATION	CU.YD.	430	$ 25.00	$10,750
STRUCTURE BACKFILL	CU.YD.	15	$ 60.00	$890
STRUCTURAL CONCRETE (CLASS S) (F'C = 4,000)	CU.YD.	2289	$ 750.00	$1,716,840
STRUCTURAL CONCRETE (CLASS S) (F'C = 4,500)	CU.YD.	1011	$ 775.00	$783,680
DECK JOINT ASSEMBLY (STEEL PLATE)	L.FT.	221	$ 175.00	$38,680
PRECAST, P/S MEMBER (AASHTO SUPER TYPE 6 GIRDER)	L.FT.	6400	$ 230.00	$1,472,000
BEARING ASSEMBLIES (BOLTS, PADS, PLATES, ETC.)	EACH	128	$ 500.00	$64,000
REINFORCING STEEL	LB.	724000	$ 0.90	$651,600
STRUCTURAL STEEL	LB.	65280	$ 1.55	$101,180
HANDRAIL	L.FT.	3200	$ 40.00	$128,000
WATERPROOFING	SQ.FT.	24000	$ 30.00	$720,000
DECK DRAINAGE SYSTEM	L.SUM	1	$ 15,000.00	$15,000
TEMPORARY ACCESS ACROSS LOW FLOW CHANNELS	SQ.FT.	12500	$ 75.00	$937,500
LUMP SUM STRUCTURE	**L. SUM**			**$6,640,130**
DRILLED SHAFT FOUNDATION (60")	L.FT.	350	$ 650.00	$227,500
DRILLED SHAFT FOUNDATION (72")	L.FT.	2730	$ 925.00	$2,525,250
SUB-TOTAL DRILLED SHAFTS	**L. SUM**			**$2,752,750**
TOTAL LUMP SUM STRUCTURE	**L. SUM**			**$9,392,880**
CONTINGENCY (15%)				$1,408,932
TOTAL LUMP SUM STRUCTURE WITH CONTINGENCY				**$10,801,812**

BRIDGE LENGTH	1600	FT
BRIDGE WIDTH	19	FT
BRIDGE AREA	30400	SQ.FT.
COST/SQ.FT.	**$308.98**	(Does not Include Contingency)

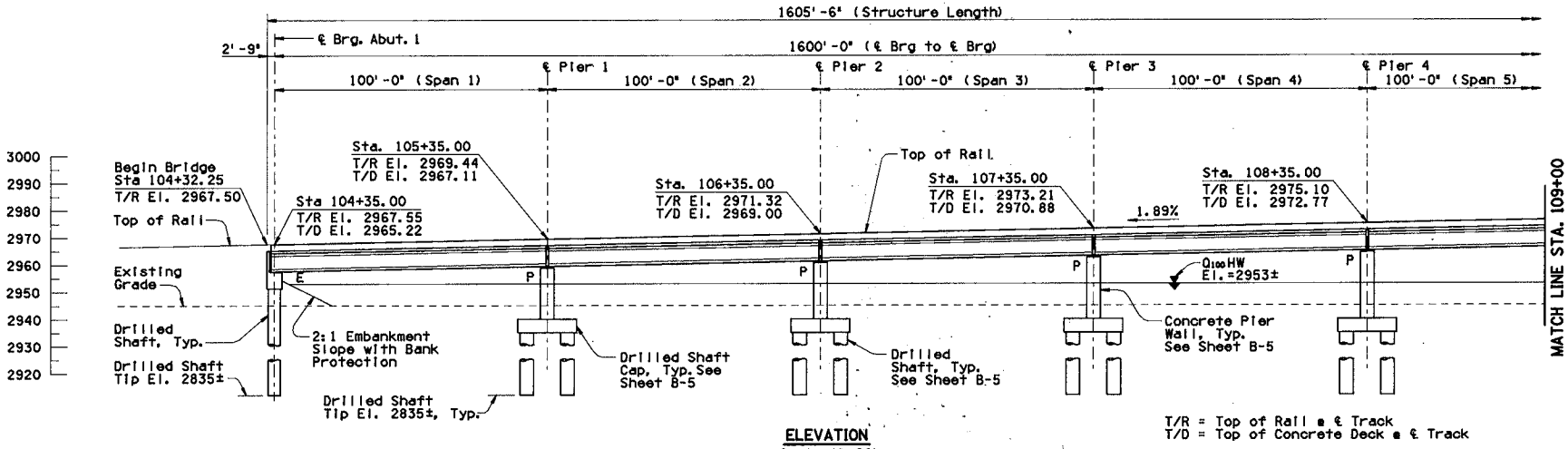
Alternative 2 – Steel Plate Girders

ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
STRUCTURAL EXCAVATION	CU.YD.	400	$ 25.00	$10,000
STRUCTURE BACKFILL	CU.YD.	15	$ 60.00	$900
STRUCTURAL CONCRETE (CLASS S) (FC = 4,000)	CU.YD.	1905	$ 750.00	$1,428,640
STRUCTURAL CONCRETE (CLASS S) (FC = 4,500)	CU.YD.	1011	$ 775.00	$783,680
DECK JOINT ASSEMBLY (STEEL PLATE)	L.FT.	221	$ 175.00	$38,680
BEARING ASSEMBLIES (BOLTS, PADS, PLATES, ETC.)	EACH	128	$ 500.00	$64,000
REINFORCING STEEL	LB.	627000	$ 0.90	$564,350
STRUCTURAL STEEL	LB.	3089268	$ 1.55	$4,788,370
HANDRAIL	L.FT.	3200	$ 40.00	$128,000
WATERPROOFING	SQ.FT.	24000	$ 30.00	$720,000
DECK DRAINAGE SYSTEM	L.SUM	1	$ 15,000.00	$15,000
TEMPORARY ACCESS ACROSS LOW FLOW CHANNELS	SQ.FT.	12500	$ 75.00	$937,500
LUMP SUM STRUCTURE	**L. SUM**			**$9,479,120**
DRILLED SHAFT FOUNDATION (60")	L.FT.	350	$ 650.00	$227,500
DRILLED SHAFT FOUNDATION (72")	L.FT.	2160	$ 925.00	$1,998,000
SUB-TOTAL DRILLED SHAFTS	**L. SUM**			**$2,225,500**
TOTAL LUMP SUM STRUCTURE	**L. SUM**			**$11,704,620**
CONTINGENCY (15%)				$1,755,693
TOTAL LUMP SUM STRUCTURE WITH CONTINGENCY				**$13,460,313**

BRIDGE LENGTH	1600	FT
BRIDGE WIDTH	19	FT
BRIDGE AREA	30400	SQ.FT.
COST/SQ.FT.	**$385.02**	(Does not Include Contingency)



PLAN
Scale: 1"=20'
New 16 Span Precast Prestressed
AASHTO Super Type VI Girder Bridge
Skew 00°00'00"
5' Contour Interval



ELEVATION
Scale: 1"=20'

T/R = Top of Rail @ ℄ Track
T/D = Top of Concrete Deck @ ℄ Track

FIGURE 2

BRIDGE PLAN & ELEVATION

REVISION NO.	DESCRIPTION	DATE	BY
No. 1			

DESIGNED BY	ERM/MJD	DATE	06-07
DRAWN BY	TRK	DATE	06-07
CHECKED BY	TWB	DATE	06-07
CADFILE FILE NAME XREF XREF LMAN			

BRIDGE PLAN & ELEVATION
SERVING PHELPS DODGE SAFFORD MINE
ARIZONA EASTERN RAILROAD
SAFFORD, ARIZONA

ARIZONA & EASTERN RAILROAD
MILE POST 115A.17
SAFFORD, GRAHAM Co., ARIZONA

HDR Engineering, Inc.

RAIL PROJECT NO. 06-083

SHEET NUMBER **B-1**

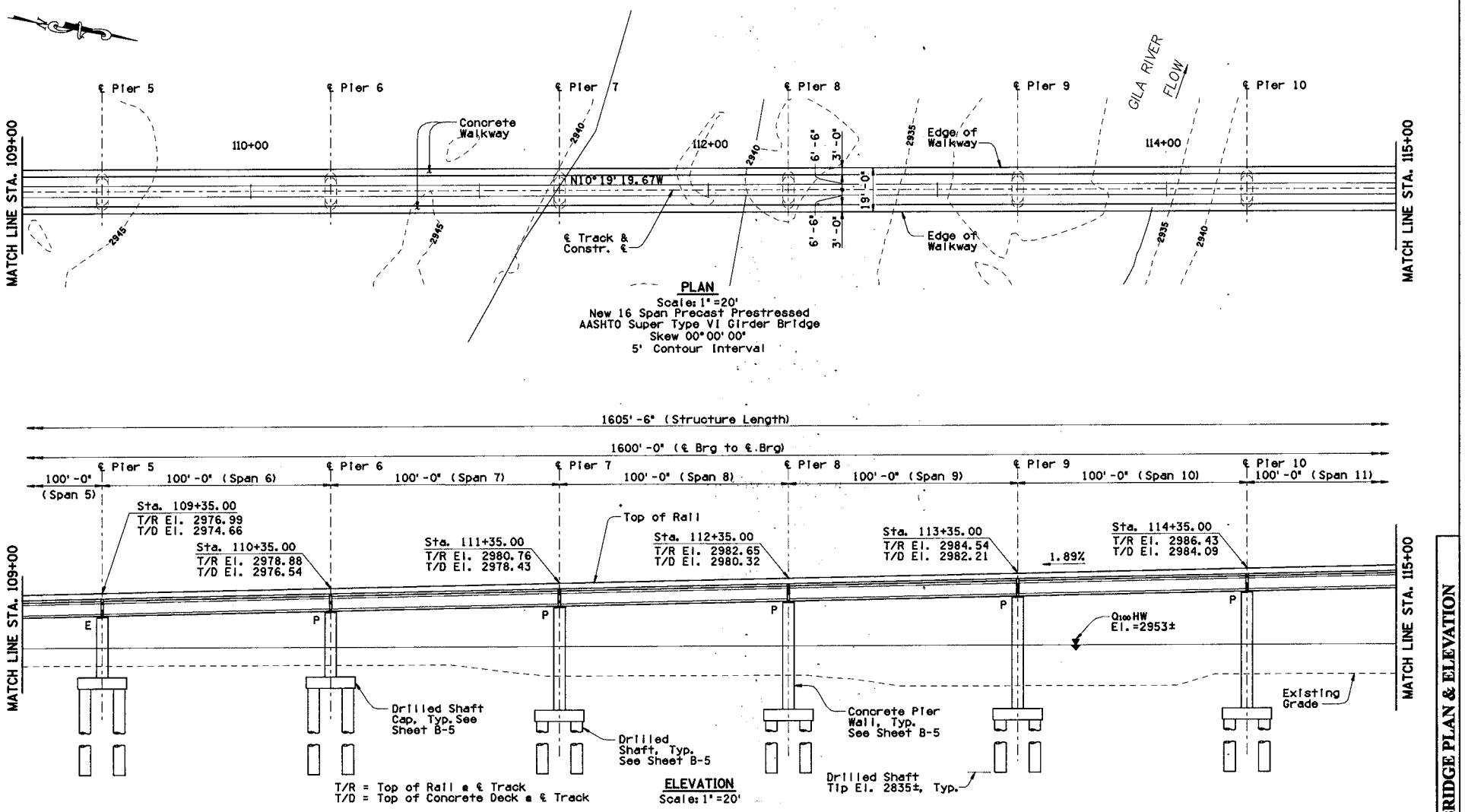


FIGURE 3

BRIDGE PLAN & ELEVATION

REVISION NO.	DESCRIPTION	DATE	BY
No. 1			

DESIGNED BY	ERM/MJD	DATE	06-07
DRAWN BY	TRK	DATE	06-07
CHECKED BY	TWB	DATE	06-07
CADFILE FILE NAME XREF XREF LMAN			

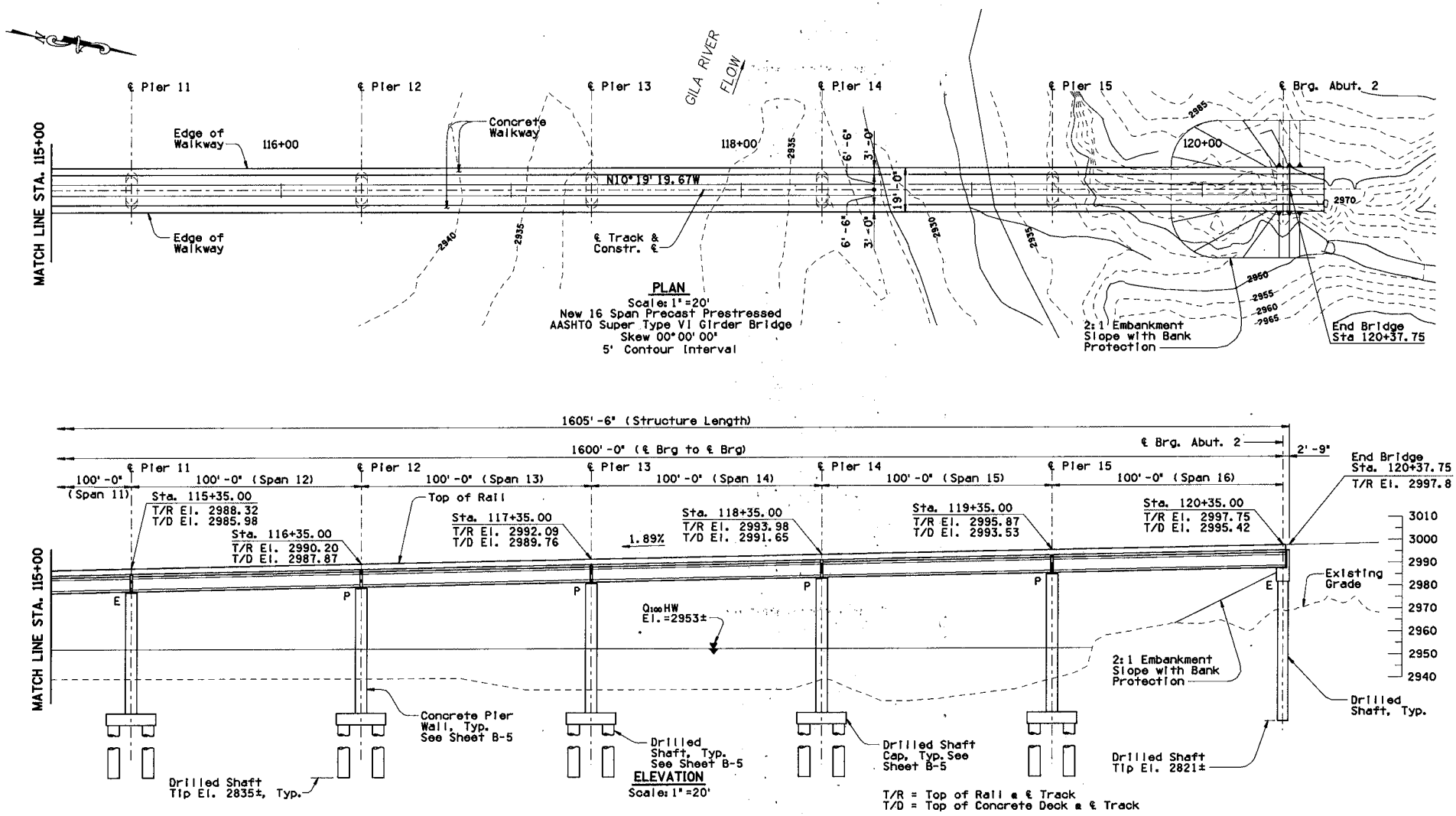
BRIDGE PLAN & ELEVATION
SERVING PHELPS DODGE SAFFORD MINE
ARIZONA EASTERN RAILROAD
SAFFORD, ARIZONA

ARIZONA & EASTERN RAILROAD MILE POST 115A.17 SAFFORD, GRAHAM Co., ARIZONA

HDR Engineering, Inc.

RAIL PROJECT NO. 06-083

SHEET NUMBER **B-2**



BRIDGE PLAN & ELEVATION

FIGURE 4

REVISION NO.	DESCRIPTION	DATE	BY
No. 1			

DESIGNED BY	ERM/MJD	DATE	06-07
DRAWN BY	TRK	DATE	06-07
CHECKED BY	TWB	DATE	06-07
CADFILE FILE NAME XREF XREF LMAN			

BRIDGE PLAN & ELEVATION
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ARIZONA EASTERN RAILROAD
SAFFORD, ARIZONA

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SAFFORD, GRAHAM Co., ARIZONA

HDR Engineering, Inc.

RAIL PROJECT NO. 06-083

SHEET NUMBER **B-3**

GENERAL NOTES:

Design Specifications:

American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering, 2006.

American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges 17th Edition, 2002.

Construction Specifications (Materials & Methods):

American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering, 2006.

Construction Specification - Arizona Department of Transportation (ADOT) Standard Specifications for Road and Bridge Construction, 2000 Edition AND the Special Provisions.

Design Loads:

Dead Load:

Includes maximum of 30" of ballast.

Track:	200 lbs. per linear foot of track
Ballast:	120 lbs. per cubic foot
Concrete:	150 lbs. per cubic foot
Steel:	490 lbs. per cubic foot
Waterproofing:	12 lbs. per square foot

Live Load:

AREMA Cooper E-80 and Alternate Live Load with Impact for rolling equipment without hammer blow.

Temperature:

Mean:	75°F
Rise:	30°F for concrete
Fall:	40°F for concrete

Seismic:

Peak Horizontal Acceleration:	To be determined
Soil Profile Type:	To be determined

Wind:

On Structure:	45 psf
On live load:	300 plf

Earth Pressure:

At rest:	To be determined
Active:	To be determined
Passive:	To be determined

Hydraulic Design Criteria:

Exist. Thalwag El.=2930.0± Near North Bank
Q_{100} = 144,000 CFS High Water El.=2953.00±
Q_{100} Scour Depth = 30' ± (Does not include long term degradation)

Other:

All other applicable loads in accordance with the requirements of AREMA Manual for Railway Engineering and AASHTO unless noted otherwise.

Materials of Construction:

Reinforcing Steel:

Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.

All bends and hooks shall meet the requirements of AREMA Chapter 8 Section 2.4.

All bend dimensions for reinforcing steel shall be out-to-out of bars.

All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

All reinforcing steel shall have 2" clear cover unless noted otherwise.

All mechanical splices of reinforcing steel shall develop 125% of the yield of the reinforcing steel and approved for use (poduct and location) in writing by the Engineer.

Materials of Construction (Continued):

Concrete:

All concrete shall be ADOT Class 'S', unless noted otherwise, with the following minimum compressive strengths at 28 days:

Stresses:

Superstructure	f'c	=	4,500 psi
Substructure	f'c	=	4,000 psi
Prestressed Girders	f'c	=	8,000 psi
	f'ci	=	6,000 psi
All other Class "S" concrete	f'c	=	3,000 psi
Grade 60 Reinforcing	fs	=	24,000 psi
Prestressing steel (0.6" diam. 7-wire Low Relaxation Strand)	f's	=	270,000 psi

Structural Steel:

Structural steel shall conform to ASTM A36, unless noted otherwise. All structural steel angles, connection plates and bent plate diaphragms shall be galvanized according to ASTM A123.

Anchor bolts shall be high strength bolts conforming to ASTM F1554 Grade 105, unless noted otherwise.

All material, workmanship and arc welding shall be as per Chapter 15 of the current AREMA manual for Railway Engineering. All welding to be approved in writing by the Engineer.

Bearings:

Girders to be supported on reinforced elastomeric bearings.

Waterproofing:

Prior to placing the ballast, the railroad bridge concrete deck shall be waterproofed. Ballast trough to be waterproofed with butyl membrane. Abutments to be dampproofed with bitumen.

Foundations:

Abutments and Piers to be supported on drilled shafts. See Getechnical Design Memorandum by HDR Engineering, Inc. dated June 22, 2007.

Coordination:

Contractor shall coordinate all existing conditions during construction of project. Any utility information shown on the bridge drawings may not be complete or accurately depict the location of the facilities shown. The Contractor shall coordinate the location of all existing, new, relocated and abandoned utilities with the project plans and notify respective owners before commencing the work of excavation, including any temporary piling or drilling. Conflicts shall be brought to the attention of the Engineer and resolved prior to proceeding with the work. See track and utility drawings for additional information.

Dimensions:

Dimensions shall not be scaled from drawings.
Vertical dimensions are measured plumb, unless noted otherwise.

Horizontal dimensions are measured level.

The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

Girders:

Precast prestressed AASHTO Super Type VI girders. Design is composite for live load and superimposed live load only.

Temporary Works:

The Contractor shall be responsible for providing temporary shoring and bracing as required for protection of workers, or as otherwise needed to accomplish the work. Shoring and bracing may include, but not be limited to, the use of soldier piles and lagging, tiebacks, or deadmen and may require footing adjustments to accommodate staged construction. Shoring and bracing shall conform to the design and construction specifications noted in the General Notes.

Contractor to submit a plan outlining shoring requirements and construction procedures, and the design to the Engineer and the Railroad for review and approval prior to proceeding with the work. See Standard Specifications and Special Provisions for additional information.

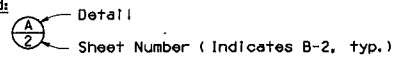
Structural Submittals:

The Contractor shall submit all shop drawings (working drawings) and other structural submittals in accordance with the project plans, the Standard Specifications and the Special Provisions. The contract plans are to be supplemented by the shop drawings (working drawings) and shall be approved by the Engineer before any work involving such drawings is performed.

Construction Joints:

Sandblast all construction joints in concrete prior to placement of concrete. See Standard Specifications and Special Provisions.

Legend:



Chamfer:

All exposed corners shall be chamfered ¾" unless noted otherwise.

Abbreviations:

Abut.	Abutment
@	at
Brg.	Bearing
Bott.	Bottom
℄	Centerline
Conc.	Concrete
Constr.	Construction
Cont.	Continuous
Dtl.	Detail
Diam.	Diameter
El.	Elevation
Exist.	Existing
E	Expansion
Fin.	Finish
HW	Highwater
lbs.	Pounds
Max.	Maximum
Min.	Minimum
P	Pinned
Typ.	Typical

GENERAL NOTES

FIGURE 5

REVISION NO.	DESCRIPTION	DATE	BY
No. 1			

DESIGNED BY	ERM/MJD	DATE	06-07
DRAWN BY	TRK	DATE	06-07
CHECKED BY	TWB	DATE	06-07
CADFILE FILE NAME	XREF XREF LMAN		

GENERAL NOTES
SERVING PHELPS DODGE SAFFORD MINE
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SAFFORD, ARIZONA

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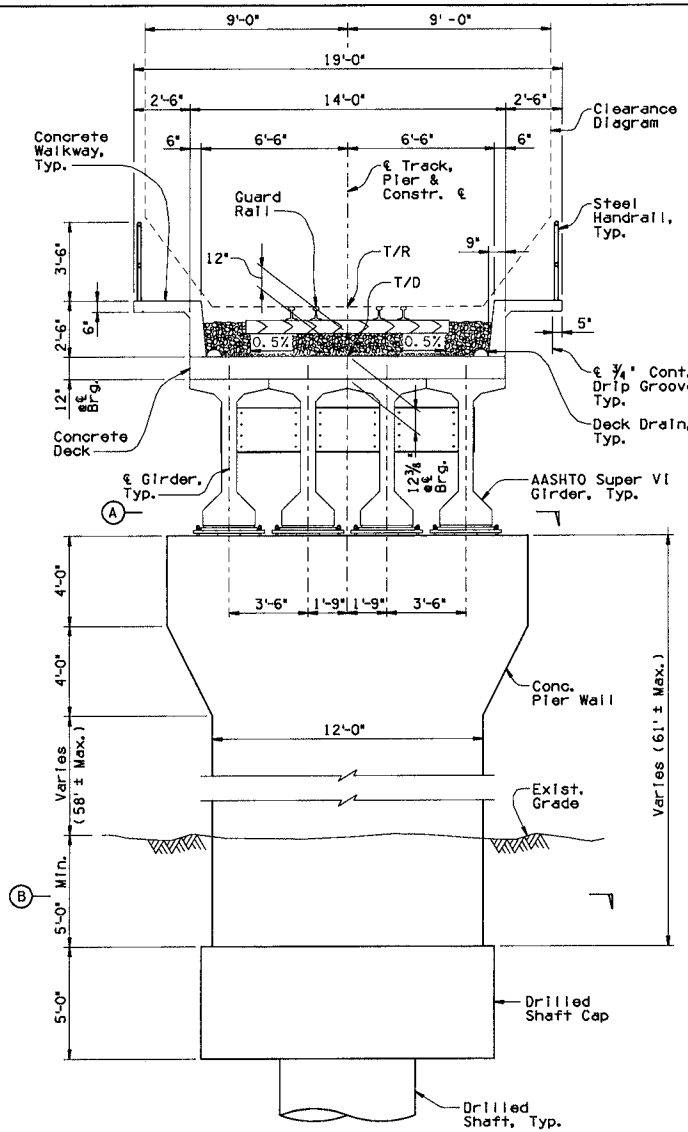
SAFFORD, GRAHAM Co., ARIZONA

HDR Engineering, Inc.

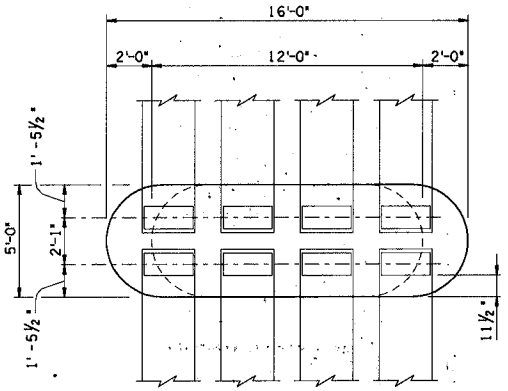
RAIL PROJECT NO. 06-083

SHEET NUMBER **B-4**



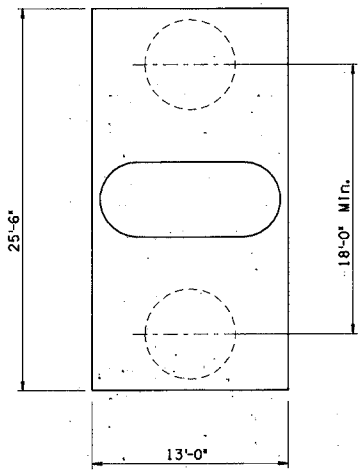
TYPICAL SECTION

⅜" = 1'-0"



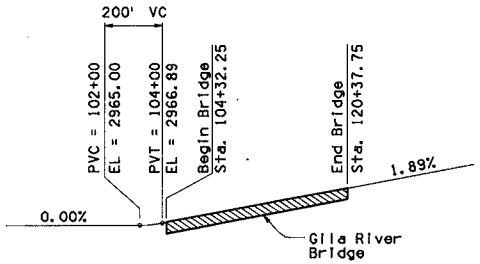
SECTION ℄ TOP OF PIER Ⓐ

⅜" = 1'-0"



SECTION - DRILLED SHAFT CAP Ⓑ

¼" = 1'-0"



Note:

1. The Profile Grade Line is at the top fo the rail.

PROFILE GRADE LINE

No Scale

FIGURE 6

TYPICAL SECTION & DETAILS

REVISION NO.	DESCRIPTION	DATE	BY
No. 1			

DESIGNED BY	ERM/MJD	DATE	06-07
DRAWN BY	TRK	DATE	06-07
CHECKED BY	TWB	DATE	06-07
CADFILE FILE NAME XREF XREF LMAN			

TYPICAL SECTION & DETAILS
SERVING PHELPS DODGE SAFFORD MINE
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SAFFORD, GRAHAM Co., ARIZONA

HDR Engineering, Inc.

RAIL PROJECT NO. 06-083

SHEET NUMBER B-5

APPENDIX A

DRAFT HYDROLOGY AND HYDRAULICS MEMORANDUM

APPENDIX B

DRAFT GEOTECHNICAL DESIGN MEMORANDUM

APPENDIX E

CWA 401 WATER QUALITY CONDITIONS ARIZONA DEPARTMENT OF WATER QUALITY MEMO (SEPTEMBER 27, 2007)

Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Stephen A. Owens
Director

September 27, 2007

RS307:059

Applicant: WestLand Resources, Inc.
Ms. Kimberly A. Otero, Senior Project Manager
2343 E. Broadway Road; Suite 202
Tucson, Arizona 85719

OCT - 4 2007

Subject: Possible CWA 401 Water Quality Certification Conditions for the proposed **Arizona Eastern Railroad Spur** (for new Phelps-Dodge Mine) **Gila River bridge** Upper Gila River Watershed, Safford, Graham County, Arizona.

Dear Ms. Otero:

I've reviewed your Technical Memo (9/18/07) and notes from our August 28th meeting regarding the subject project. This letter is not a 401 Certification, but merely aids in the design, contracting and construction of the bridge by providing examples of conditions likely to be placed upon this project as part of a 401 certification should such an application be received today.

As we discussed at the meeting, while most of the spur line will likely fall under a Clean Water Act (CWA) 404 Nationwide Permit with the included 401 Certification (if agreed to by the U.S. Army Corps of Engineers [CoE]), the Gila River bridge will require an individual 401 certification due to the unique nature of the project vs. the general nature of the NWP 401 conditions; i.e., the project would essentially be prohibited under the NWP 401 conditions.

The Gila River at and immediately upstream and downstream of the bridge site is not listed as impaired (303[d]-list), Unique (aka Outstanding Arizona Water) nor under a TMDL at this time.

A major point of understanding is the need to move; e.g., blade, streambed material to form construction roadways, pads, dikes, etc. between the Ordinary High Water Marks (OHWM); i.e., in the streambed. The applicant agrees to not bring in fill material for purposes of building these, but to use only that material that is already part of the streambed. Further, the applicant will keep such earthmoving to a minimum and blade as needed; e.g., blade the construction equipment access road only as far as is needed for activities occurring in the following week. The goal is to minimize the potential for erosion and sedimentation should flows increase due to precipitation. Upon completion of construction activities, the applicant will restore the streambed as close to its original contours as possible given the new permanent bridge support structures.

It is further understood that a relatively low flow, an event of approximately two year return interval, is sufficient to cover the streambed bank to bank (which, absent a field survey, approximates the OHWM) at the project site. An event of this magnitude would shut down project activities in the streambed and require the removal of all readily mobile equipment from the streambed.

These understandings are based upon the Technical Memo and our meeting; the following would apply today:

General Conditions

Construction activities disturbing greater than one acre of land will require an AZPDES Stormwater Permit. Prior to the commencement of activities herein certified, the applicant will have available for inspection onsite a copy of the Notice of Intent (NOI) and associated ADEQ authorization letter, and a Stormwater Pollution Prevention Plan as required by the applicable stormwater regulations.

If reclaimed wastewater is used for irrigation or dust control, a Reclaimed Water Permit will be required and an AZPDES Permit may be required if in a WUS. In any case, water used for dust suppression or irrigation shall not contain contaminants that could violate Surface Water Quality Standards.

If dewatering operations are needed, this water shall not be discharged into a WUS without proper permits, including, but not necessarily limited to an AZPDES Permit.

Specific Conditions

1. Any discharge occurring as a result of activities certified for the subject project shall not cause a violation of surface water quality standards. Applicability of this condition is as defined in A.A.C. R18-11-102.
2. As much as practical, and in accordance with the applicant's material submitted as part of the application, activities herein certified shall be performed during periods of low flow; e.g., baseflow or less, in any watercourse or other WUS. No equipment or vehicles shall enter any WUS while flow of a magnitude greater than the capacity of the control measures detailed in the applicant's material submitted as part of the application is present regardless whether flow is in a channel or is surface runoff; e.g., sheetflow, unless all conditions herein are met.
3. Applicant must minimize clearing, grubbing, scraping or otherwise limit exposure of erodible surface to the minimum necessary for each construction phase or location.
4. Except as indicated in the application documents or otherwise allowed herein, if activities certified herein are likely to create an erosion or sedimentation problem, operations shall cease until the problem is resolved or until reasonable control measures have been undertaken.
5. Except as indicated in the application documents or otherwise allowed herein, erosion control, sediment control and/or bank protection measures shall be installed before construction and pre-operation activities, and shall be maintained as necessary during construction and post-construction periods to minimize channel or bank erosion, soil loss and sedimentation. Control measures shall be constructed of material from the streambed.

6. The applicant is responsible for ensuring construction material and/or fill (other than native streambed material temporarily moved within the project area; e.g., leveling of the existing streambed to support construction equipment, or that necessary to support revegetation) including, but not limited to: rock, gabion fill or other uncemented channel-lining materials, placed within the Ordinary High Water Mark (OHWM) of any WUS, shall not include materials; e.g., pollutant-contaminated soil, that can cause or contribute to pollution of a surface water. Material used to support vegetation rooting or growth shall be protected from erosion. Any fill material washing must occur outside of the OHWM of any WUS prior to placement and the rinseate from such washing shall be contained and treated, or otherwise prevented from contributing sediment or causing erosion to any WUS. Other than replacement of native fill, fill placed in locations subject to scour shall contain not more than ten percent (10%) on a dry weight basis of particles finer than 0.25 mm diameter (passing a No. 60 sieve).
7. Except as indicated in the application documents or otherwise allowed herein, upon completion of construction the applicant shall ensure no adverse change due to the subject project has occurred in the stability (with respect to stream hydraulics, erosion and sedimentation) of any WUS including upstream and downstream from the project. If such change has occurred, the applicant shall take steps to restore the pre-project stability of any impacted segments.
8. Except where the activities certified herein are intended to permanently alter any WUS, all disturbed areas shall be restored and (re)vegetated as indicated in the application documents and if approved by the CoE (including offsite mitigation). Denuded areas shall be revegetated as soon as possible. Vegetation shall be maintained on unarmored banks and slopes to stabilize soil and prevent erosion. If approved by the CoE, the applicant may utilize in-lieu fees and/or offsite mitigation as mitigation of impacts to the ephemeral waters portion of the subject project.
9. Where needed to prevent erosion/sedimentation, flows unimpacted by the subject project shall be diverted around work operations. Material and equipment storage areas shall be located outside the OHWM of any WUS. Except as indicated in the application documents or otherwise allowed herein, when flow is present in any WUS within the project area, the applicant and any contractor will not impede, restrict, or stop the flow by any means.
10. When flow greater than baseflow (including sheet flow or other surface runoff) is present within the project area, all activities certified herein shall cease and construction equipment and materials easily transported by flow will be moved outside the flow area and the OHWM of any WUS.

    If this can not be accomplished or flow is sufficient to erode and carry non-native material from work areas into, or further downstream in, any WUS, measures shall be taken to prevent transport of sediment or other pollutants into any WUS and the applicant shall monitor any potentially effected WUS as follows:

    a) Samples shall be analyzed for:

    - **Turbidity** for rapid feedback on site conditions.
      If turbidity measurements indicate an increase due to project activities greater than 0.50 (calculated using the formula below) construction activities shall cease until the applicant has determined the cause and implemented a cure.

Formula: *absolute value of [(usm - dsm) ÷ usm]* where:

usm = measurement upstream from potential source (in Nephelometric Turbidity Units [NTUs]).

dsm = measurement downstream from potential source (in NTUs)

- **Suspended Sediment Concentration** (SSC) samples shall be collected in accordance with and to ensure compliance with state surface water quality standards. However, if discharge is increased above baseflow (or present in an ephemeral waterbody) due to a precipitation event, SSC sampling is unnecessary until 48 hours after the cessation of precipitation.

b) Turbidity shall be measured at least twice per day, both events during work, not break (unless break is due to precipitation event or discharge increase), periods and separated by a period no less than one-half the length of the workday. If required, SSC shall be measured at least once per day, at the same time as one of the turbidity measurements. Samples shall be taken at a minimum of two stations; each within 100-feet (30 meters) upstream and downstream of the disturbed area.

c) The results shall be recorded and made available to any person who so requests including, but not limited to, members of the public and representatives of ADEQ, CoE, county and local governments.

d) If SSC samples are required, the results shall be reported to ADEQ at the address in section IIIA above after the completion of construction activity and any stabilization measures have taken effect. This data shall be provided to ADEQ electronically in an Excel spreadsheet formatted in coordination with the ADEQ contact listed above and will include:

- Waterbody name, sample point name (if applicable) and location of the sample point (latitude/longitude to three decimal places and [if available] UTM coordinates to the nearest meter).
- Date and time of sample collection.
- Sampler information to include name and agency/company or other affiliation.
- The measured turbidity value in Nephelometric Turbidity Units (NTU).
- The measured SSC value for coarse portion in milligrams per liter (mg/l).
- The measured SSC value for fine portion in mg/l.

The sample collection agency will need to demonstrate it followed either the ADEQ "Manual Of Procedures For the Sampling of Surface Waters" found at (http://www.azdeq.gov/environ/water/assessment/monitoring.html click on "Sampling of Surface Waters Procedures Manual") or equivalent for the parameters measured.

11. Work shall be conducted and monitored to ensure that pollution from the activities certified herein including, but not limited to: concrete mixing and placement, and equipment maintenance and washing does not cause an exceedence of Arizona Surface Water Quality Standards in any WUS.
12. If water is used for dust suppression, it shall not contain contaminants that could violate Arizona Surface Water Quality Standards of any WUS.
13. The applicant will erect any barriers, covers, shields and other protective devices as necessary to prevent any construction materials, equipment or contaminants/pollutants from falling, being thrown or otherwise entering any flowing WUS.
14. Upon completion of the activities certified herein (except as noted in condition 27 -concrete curing), areas within the OHWM of all WUS at the project site shall be promptly cleared of all forms, piling, construction residues, equipment, debris or other obstructions. Any debris including, but not limited to: soil, silt, sand, rubbish, cement, bituminous material, oil or petroleum products, organic materials, tires or batteries, derived from the activities certified herein shall not be stored at any site where it may be washed into a WUS and shall be properly disposed of after completion of the work.
15. The applicant must designate area(s) for equipment staging and storage located entirely outside of the OHWM of any WUS. Any equipment maintenance, washing or fueling that cannot be done offsite will be done here. Material specifically manufactured and sold as spill adsorbent/absorbent will be on hand to control small spills. All equipment and workboats shall be inspected for leaks daily and prior to use within the OHWM of any WUS. All leaks shall be repaired immediately. All equipment and workboats will be steam cleaned prior to use in any WUS with flow.
16. The applicant shall have a spill containment plan onsite to ensure that pollutants are contained, removed and properly disposed of. In addition, the applicant must designate areas, located entirely outside of the OHWM of any WUS, for chemical and petroleum storage, and solid waste containment. All materials stored onsite will be stored in appropriate containers or packaging. Any pollutant produced by activities certified herein shall be properly disposed of in accordance with applicable regulations. A spill response kit will be maintained in this (these) area(s) to mitigate a potential spill. The kit will include material specifically manufactured and sold as spill adsorbent/absorbent including booms. The applicant will ensure that whenever there is activity on the site, that there are personnel on site trained in the proper response to spills and the use of spill response equipment.
17. Temporary pipes, and culverted crossings and pads shall be adequately sized to handle expected flow.
18. Acceptable construction materials that will or may contact water in any WUS are: crushed stone, native fill (meeting the requirements in condition 8), concrete, steel, plastic, or aluminum and other materials specifically approved in writing by ADEQ
19. If fully, partially or occasionally submerged structures are constructed of cast-in-place concrete, applicant will take steps; e.g., casings, forms, sheet piling or temporary dams (filled cofferdams are not allowed), to prevent contact between water (instream and runoff) and the concrete until it cures and until any curing agents have evaporated or otherwise cease to be available; i.e., are no longer a pollutant threat.

I hope his gives you the information needed to adequately plan, contract and construct your project in a manner consistent with maintaining the water quality in the Gila River and any other WUS affected by this bridge project.

Sincerely,

Robert J. Scalamera, Hydrologist
Surface Water Section, Water Quality Division

cc: HDR, Ted Buell