



Arizona Department of Transportation

Location / Design Concept Report

Final Report

September, 2006



JE JACOBS CIVIL INC.
Engineers and Constructors

US 93: Wickenburg to Santa Maria River
Kingman - Wickenburg Highway
TRACS No. 093 YV 161 H 4871 01L
Kingman District - Mohave County

ARIZONA DEPARTMENT OF TRANSPORTATION

OFFICE MEMO

INTERMODAL TRANSPORTATION DIVISION

May 5, 2006

TO: MICHAEL KONDELIS, KINGMAN DISTRICT, K600
LARRY DOESCHER, PROJECT MANAGER, 614E
DALLAS HAMMIT, PRESCOTT DISTRICT, P800
MARY VIPARINA, ASSISTANT STATE ENGINEER, 611E


MAY 05 2006
Statewide Project Management

FROM: PAUL O'BRIEN, ROADWAY PREDESIGN, 605E *POB*

SUBJECT: DESIGN MEMORANDUM
93 YV 161.00 H487101L
SANTA MARIA RIVER-WICKENBURG
KINGMAN-WICKENBURG HWY
US 93

RECEIVED
JUN 08 2006
ROADWAY ENGINEERING GROUP

This memorandum is prepared pursuant to Section 3.3 of the ADOT Action Plan for Federal-Aid Highway projects. The proposed major design features for this project are described in the attached Final Location/Design Concept Report.

Your concurrence/approval on the proposed major design features is requested.

Vincent Li
VINCENT LI, ROADWAY PREDESIGN MANAGER, 605E

Concurrence:	<i>Michael Kondelis</i>	<i>6-2-2006</i>
	MICHAEL KONDELIS, KINGMAN DISTRICT, K600	Date
Concurrence:	<i>Larry Doescher</i>	<i>5/8/2006</i>
	LARRY DOESCHER, PROJECT MANAGER, 614E	Date
Concurrence:	<i>Dallas Hammit</i>	<i>5/26/2006</i>
	DALLAS HAMMIT, PRESCOTT DISTRICT, P800	Date
Approved:	<i>Mary Viparina</i>	<i>7/6/06</i>
	MARY VIPARINA, ASSISTANT STATE ENGINEER-ROADWAY, 611E	Date

EXECUTIVE SUMMARY

Introduction

Jacobs Civil Inc. was contracted by the Arizona Department of Transportation (ADOT) to prepare a Location/Design Concept Report (L/DCR) and an Environmental Assessment (EA) addressing proposed improvements to US 60/ US 93 from the junction with State Route (SR) 74 south of Wickenburg to the Santa Maria River. The study includes a proposed ultimate bypass route around the Town of Wickenburg and an investigation of alternatives to relieve the downtown congestion on an interim basis until the bypass can be funded and constructed (See Figure 1-1 for a map depicting the full study limits). Separate study reports were prepared addressing both the interim and ultimate bypass requirements of Wickenburg. This study document presents the results of an investigation of alternatives to improve US 93 from SR 89 to the Santa Maria River.

This Final Location/ Design Concept Report presents the results of the study for future improvements to US 93 from the junction of SR 89 to the Santa Maria River. The project is in Yavapai County and within the ADOT Prescott and Kingman Engineering Districts. The purpose of the Location/ Design Concept study and report is to develop a long-range plan that will guide future decisions regarding the interim and alternate improvements required to modify US 93 to meet the capacity, operational, and safety needs of the motoring public through the year 2025.

Several government agencies have been involved throughout the study process. The Federal Highway Administration (FHWA) served as the lead agency, with the Bureau of Land Management (BLM) serving as the cooperating federal agency. Both agencies, as well as the ADOT's Predesign Section, technical staff, and Prescott and Kingman District staff, have provided input to the alternative identification and evaluation process. Yavapai County engineering and planning staffs as well as participants for Arizona State Land Department (ASLD) have also contributed, as have representatives from the Town of Wickenburg. Other important agency/public involvement activities included an agency and public scoping meetings on June 3, 1999; and a public information meeting on August 22, 2000. In addition, newsletters about the project were distributed in May, 1999, February and October, 2000 and March, 2002.

US 93 Corridor

US 93 is a major rural arterial highway route linking Phoenix to northwestern Arizona and beyond. The corridor is part of the National Highway System and has been designated as a North American Free Trade Agreement (NAFTA) and CANAMEX corridor. The portion of the highway from Milepost (MP) 180 north through the end of the study limits has been designated the Joshua Forest Scenic Road by the State Transportation Board.

The existing roadway is a two-lane facility with a smoothly curving horizontal alignment that follows the landform, a level to gently rolling vertical alignment with limited passing opportunities and substandard shoulder widths. Several passing lanes have been constructed in recent years to improve operation, but capacity and safety remain as important issues as traffic volumes continue to increase. The current Level Of Service (LOS) has been declining since the 1980's and is currently at D or E for much of its length, well below the desirable LOS of B. Consequently, the existing highway must undergo significant improvements to provide for current and future traffic demands. As a result, ADOT has initiated the preparation of this L/DCR and EA to investigate and identify logical, sequential construction projects for progressively improving the corridor.

Location Analysis

In order to systematically describe and analyze corridor and design concept alternatives along US 93, the study route was subdivided into three segments based on the features and conditions peculiar to each. Study Segment A (MP 193.5 to 190.5) covers the beginning segment from the US 89 intersection, across the Matthie Railroad Overpass and ending just north of the Vista Royale residential development; Study Segment B (MP 190.5 to 180.0) includes the SR 71 traffic interchange; Study Segment C (MP 180.0 to 161.5) transitions from the level terrain of Segments A & B into more gently

rolling topography. This segment is entirely within the Joshua Forest Scenic Road and the highway crosses two major drainageways, Date Creek and Big Jim Wash. Segment C and the study ends at the recently completed 4 lane section carrying US 93 over the Santa Maria River. All of the alternative corridors and design concept alternatives are identified by alphanumeric designations associated with the three study segments. The study segments are shown in Figure A below.

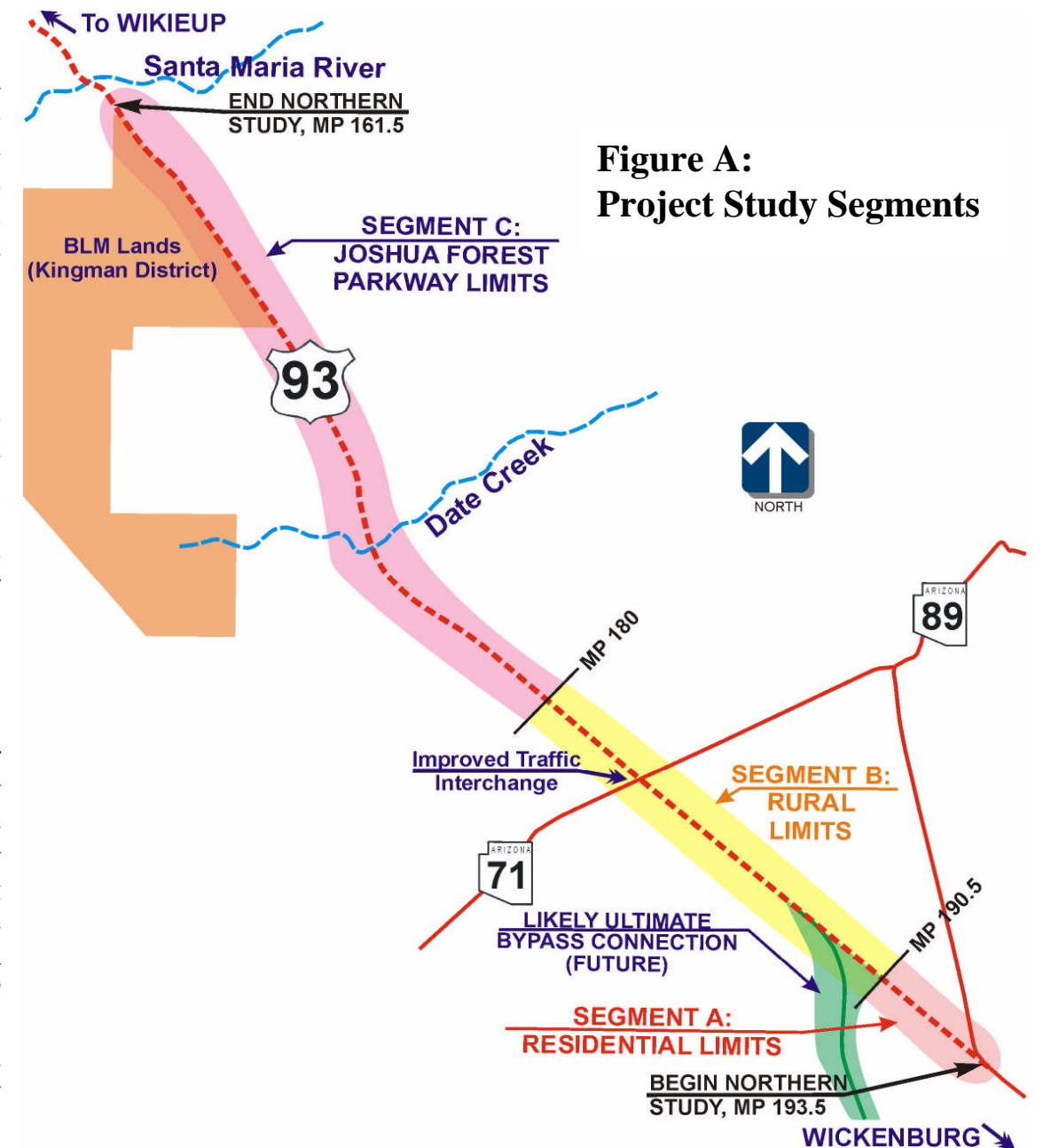


Figure A:
Project Study Segments

In all study segments, locating roadway improvements along the existing alignment and reuse of the existing roadbed were top priorities. Due to the very acceptable horizontal and vertical geometrics throughout the study limits, no major realignment alternatives of the existing roadway were considered. In Segment A and Segment B up to the SR 71 TI, the offset alignment within the existing right of way dictated that the improvements be done on the west side of the existing road, minimizing or eliminating the need for new right of way. Through the rest of Segment B and in Segment C, the existing road is centered within the right of way.

Design Concept Alternatives

The various design concept alternatives studied are briefly described below.

- Widen the existing roadway, resulting in 4-lanes with a narrow paved median.
- Provide a divided highway using the existing roadway as 2-lanes in one direction and constructing a new, parallel 2-lane roadway for the opposite direction.
- Provide a divided highway using the existing roadway as 2-lanes in one direction and constructing a new, 2-lane roadway on a new bifurcated, independent alignment for the opposite direction.

Recommended Alternative

The recommended alternative provides a divided highway using the existing roadway as 2-lanes in one direction and constructing a new 2-lane roadway for the opposite direction. The new lanes are parallel to the existing where R/W is tight, and independent following the landform through the Joshua Forest Parkway.

Cost Summary

The cost summary for the Preferred Alternative is:

Construction:	\$	124,066,320
R/W:	\$	17,500,000
Design:	\$	9,925,306
Utilities	\$	2,400,000
Total:	\$	153,891,626

**Table A:
Implementation Projects**

Access Management Plan

Direct access to US 93 is currently allowed through permit application to the ADOT Prescott or Kingman District. There are no restrictions on the number of turnouts requested or the distance between turnouts, as long as adequate stopping sight distance for entering or leaving the highway is present. However, as the volume of traffic and the proportion of commercial and recreational vehicles increases, some form of access control will be needed as a matter of highway operation and safety. US 93 is within the designated NAFTA/CANAMEX corridor and is currently being proposed for improvement to a four-lane facility. Implementation of access control in conjunction with the improvement to four-lanes will preserve the function of the highway as a safe and efficient transportation corridor.

Preferably, a form of partial access control should be introduced at the outset of the reconstruction program with the understanding and provision that full access control would be implemented as conditions warrant. Accordingly, an access management plan has been prepared, with recommendations for interim (partial) access control, and future full access control.

Interim access control, involving a limited number of right-in/right-out accesses, median crossovers at major intersections, and short frontage roads, will be implemented with each reconstruction segment. Full access control will be initiated along any portion of the reconstructed US 93 at such time when traffic volumes and safety justify the cost of implementation. Direct access to the highway will be permitted only at grade-separated interchanges.

Project No.	Section	Location	Description	Cost	
				Constr:	R/W:
1	Big Jim Wash	MP 161.5 – 166.0	Construct new 2-lane northbound roadway	\$20,140,915 Design: 1,611,273	\$3,600,000 Utilities: 200,000
2	Vista Royale	MP 190.5 – 193.5	Construct new 4-lane divided roadway with access roads	\$11,131,495 Design: 890,520	\$2,000,000 Utilities: 2,000,000
3	Ranchland	MP 166.0 – 170.4	Construct new 2-lane northbound roadway	\$13,133,033 Design: 1,050,643	\$4,500,000 Utilities: 0
4	Tres Alamos	MP 170.4 – 173.5	Construct new 2-lane northbound roadway	\$7,832,314 Design: 626,585	\$3,500,000 Utilities: 0
5	Date Creek	MP 172.8 – 177.8	Construct new 2-lane northbound and southbound roadway sections.	\$16,227,609 Design: 1,298,209	\$2,500,000 Utilities: 0
6	Alamo	MP 177.8 – 181.3	Construct new 2-lane southbound roadway	\$13,324,580 Design: 1,065,966	\$400,000 Utilities: 0
7	Aguila	MP 185.3 – 190.5	Construct new 2-lane southbound roadway	\$17,050,576 Design: 1,364,046	\$500,000 Utilities: 0
8	SR 71 TI	MP 181.3 – 185.3	Construct new 2-lane southbound roadway and interchange over US 60 at SR 71.	\$25,225,797 Design: 2,018,064	\$500,000 Utilities: 200,000

Two future grade-separated interchanges are recommended for conversion of US 93 to a full access controlled facility, and are located at existing and future major intersections. Frontage roads will be provided to ensure that all properties fronting on US 93 will have reasonable access to the highway.

Implementation Plan

It is understood that US 93 will be reconstructed in segments consistent with priorities and funding. The recommended alternative was divided into logical improvement (reconstruction) projects based upon the following priority guidelines:

- Projects that improve safety in high accident areas.
- Sequencing of projects to achieve continuous stretches of four-lane roadway, wherever possible.
- Projects that reconstruct segments having high maintenance costs.
- Projects that improve capacity consistent with need.
- Projects that could experience constructability issues as traffic volumes increase.
- Projects in the \$10 to \$15 million range wherever possible to correlate with expected funding availability.

Table A below summarizes the implementation projects for improving US 93 between MP 161.5 and MP 193.5. Figure B on page iii illustrates the project locations. *NOTE: All costs were based on early 2006 available cost estimates. No escalation values for either the construction or the R/W costs have been added to these estimates.*

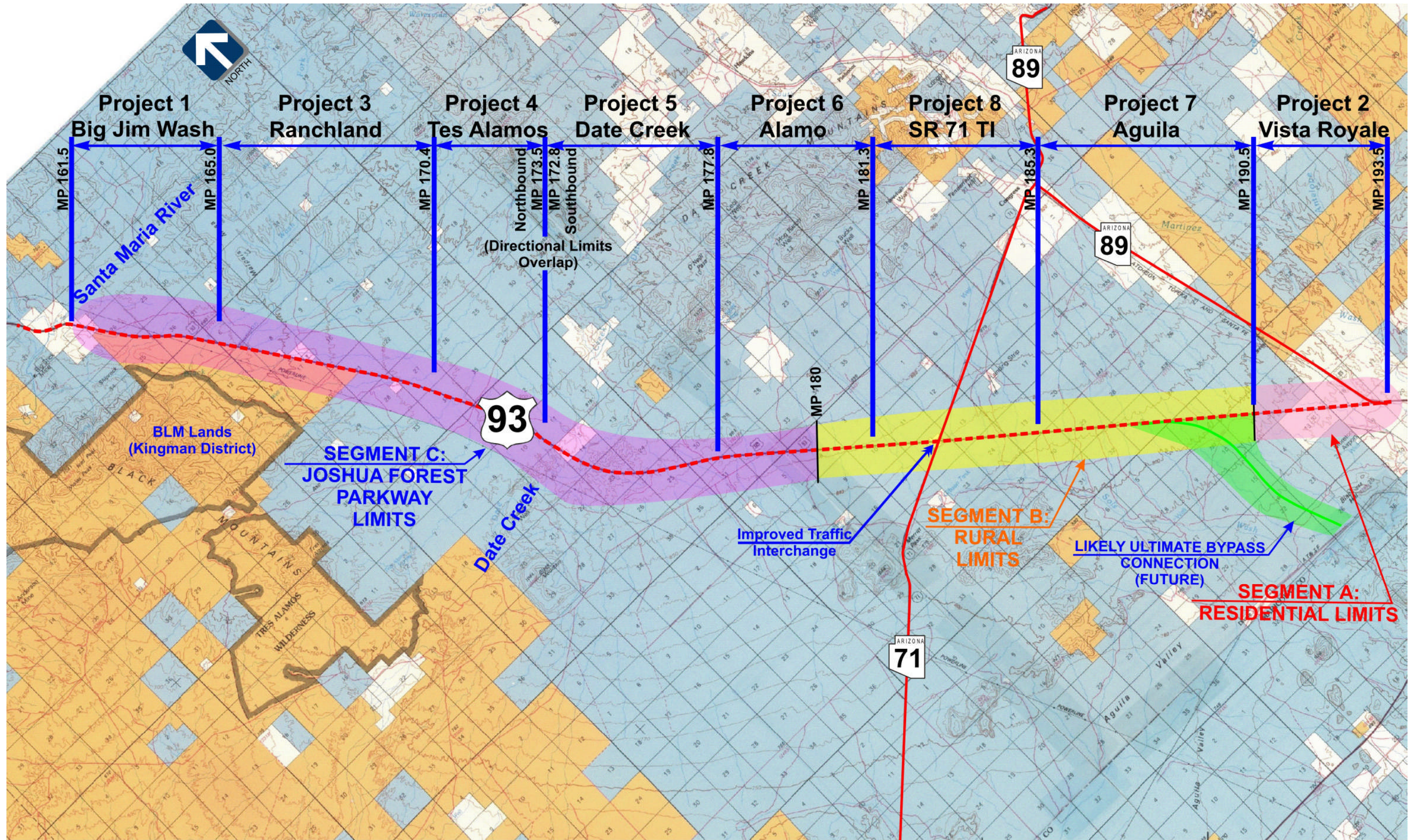


Figure B: Implementation Projects

TABLE OF CONTENTS

	Page		
ENVIRONMENTAL IMPACT MITIGATION MEASURES			
EXECUTIVE SUMMARY	i		
TABLE OF CONTENTS	iv		
Section 1. INTRODUCTION			
1.1 Foreword	1		
1.2 Need for the Project	2		
1.3 Description of the Project			
1.3.1 Project Limits	2		
1.3.2 History of the Project Route	2		
1.3.3 Proposed Improvements	3		
1.4 Project Objectives	3		
1.4.1 The Scoping Process	3		
1.4.2 Issues, Concerns, and Opportunities	4		
1.4.3 Scoping Consensus – Project Objectives	4		
1.4.4 Alternatives Evaluation	5		
1.5 Characteristics of the Corridor	5		
Section 2. TRAFFIC AND ACCIDENT DATA			
2.1 Traffic Analysis	6		
2.1.1 Existing Conditions	6		
2.1.2 Study Sections	6		
2.1.3 Traffic Data	6		
2.1.4 Level of Service Analysis	7		
2.1.5 US 93 / SR 71 TI Analysis	8		
2.1.6 2025 Future Conditions	8		
2.2 Accident Analysis	8		
2.2.1 Corridor Accident Rates	8		
2.2.2 Corridor Accident Types	8		
2.2.3 Conclusions	9		
2.2.4 Recommendations	9		
Section 3. AASHTO CONTROLLING DESIGN CRITERIA			
3.1 Introduction	10		
3.2 Design Speed	10		
3.3 Lane Width and Shoulder Width	10		
3.5 Vertical Alignment and Stopping Sight Distance	10		
3.5 Horizontal Alignment	10		
3.6 Grades	10		
3.7 Cross Slopes	10		
3.8 Vertical Clearance	11		
3.9 Bridge Structures	11		
Section 4. DESIGN CONCEPT ALTERNATIVES			
4.1 Introduction	12		
4.2 Study Segments	12		
4.3 Elimination of Undivided Roadway Section	13		
4.4 Alternative Typical Sections	13		
4.5 Construction of Improvements, East/West of US 93	14		
4.6 Study Segment A Alternatives	15		
4.6.1 Alternatives Identified	15		
4.6.2 Alternatives Considered and Eliminated	15		
4.7 Study Segment B Alternatives	16		
4.7.1 Alternatives Identified	16		
4.7.2 Alternatives Considered and Eliminated	16		
4.8 Study Segment C Alternatives	17		
4.8.1 Alternatives Identified	17		
4.8.2 Alternatives Considered and Eliminated	17		
4.9 Description of Alternatives	18		
4.9.1 Study Segment A, Design Concept A-1a	18		
4.9.2 Study Segment B, Design Concept B-2a	19		
4.9.3 Study Segment C, Design Concept C-3	20		
4.10 Evaluation of Alternatives	21		
4.11 Conclusions	22		
4.11.1 Discussion	22		
4.11.2 Public Opinion	22		
4.11.3 Conclusions	23		
Section 5. MAJOR DESIGN FEATURES			
5.1 Introduction	24		
5.2 Design Controls	24		
5.3 Horizontal and Vertical Alignments	24		
5.4 Access	25		
5.5 Right-of-Way	25		
5.6 Drainage	25		
6.6.1 Existing Conditions	25		
6.6.2 Vegetation	25		
6.6.3 Existing Culverts and Bridges	25		
6.6.4 Hydrology and Hydraulics Methodology	27		
6.6.5 Drainage Requirements	27		
5.7 Section 404 of the Clean Water Act	27		
5.8 Floodplain Considerations	28		
5.9 Earthwork	28		
5.9.1 General Geologic Setting	28		
5.9.2 Site Geology	28		
5.9.3 Groundwater Conditions	29		
5.9.4 Seismic Design Considerations	29		
5.9.5 Excavatability of Site Soils & Bedrock	29		
5.9.6 Collapsible Soils	29		
5.9.7 Earthwork Factors	29		
5.9.8 Preliminary Cut / Fill Slope Factors	29		
5.9.9 Potential Borrow Sources	29		
5.9.10 Preliminary Bridge Foundation Design	30		
5.9.11 Earthwork Balancing	30		
5.10 Constructability and Traffic Control	30		
5.11 Intersections	30		
5.12 Utilities	31		
5.13 New Bridges	31		
5.14 Other Design Considerations	32		
6.14.1 Final Design Details	32		
6.14.2 Wildlife Crossings	32		
5.15 Design Exceptions	32		
Section 6. ITEMIZED COST ESTIMATE			33
Section 7. ACCESS MANAGEMENT PLAN			
7.1 Introduction	34		
7.2 Need for Access Management	34		
7.3 Access Management Plan	34		
7.3.1 Existing Access Management	34		
7.3.2 Access Control	34		
7.3.3 Partial Access Control	34		
7.3.4 Full Access Control	35		
7.3.5 Implementation of Access Control	35		
7.3.6 Frontage Roads / Access Roads	35		
7.4 Description of Access Control	36		
7.4.1 Study Segment A	36		
7.4.2 Study Segment B	36		
7.4.3 Study Segment C	37		
Section 8. IMPLEMENTATION PLAN			
8.1 Introduction	41		
8.2 Implementation Guidelines	41		
8.3 Project Timing	41		
8.3.1 Accidents	41		
8.3.2 Level of Service	41		
8.3.3 Maintenance of Traffic	41		
8.3.4 Funding	41		
8.4 Implementation Issues	42		
8.5 Recommended Implementation Plan	42		
8.6 Existing Roadway Rehabilitation	44		
8.7 Costs	44		
8.8 Implementation Schedule	44		
Section 9. ENVIRONMENTAL IMPACT MITIGATION MEASURES			
9 Environmental Impact Mitigation Measures	45		



APPENDIX

A.	Design Exception
B.	AASHTO Analysis of Existing Roadway Alignment (Horiz./Vert.)
C.	Detailed Cost Estimates
D.	Typical Sections
E.	Plan and Profile Sheets – Preferred Alternatives
F.	Access Management – Full Access Control Concepts
G.	Summary — Hydrology and Required Drainage Structures

FIGURES

Figure No.	Title	Page
1-1	Location Map	2
1-2	Project Vicinity Map	2
2-1	Accident Rate by Milepost Location	9
4-1	Study Zones	12
4-2	Study Alternatives	18
4-3	Embankment Excavation Basins	19
5-1	Drainage Basin Watershed Boundary	26
8-1	Proposed Implementation Projects.....	43

TABLES

Table No.	Title	Page
1-1	Previous Projects within the Study Area.....	5
2-1	US 93 Traffic Volumes	6
2-2	US 93 Roadway Characteristics	7
2-3	Levels of Service for Two-Lane Highways	7
2-4	Levels of Service for Multi-Lane Highways	7
2-5	Existing (2000) Levels of Service	7
2-6	Future (2025) Levels of Service.....	8
2-7	US 93 Accident History for Study Sections	8
2-8	US 93 Accident Type Summary by Study Section.....	8
3-1	Bridge Evaluation Summary	11
4-1	US 93 Study Zones	12
4-2	Alternative Corridor Evaluation Summary	15
4-3	Alternatives Development Summary	21
5-1	Estimated New Right-of-Way.....	25
5-2	Corps of Engineers Jurisdictional Streams and Washes.....	27
5-3	Commercial Pits	30
5-4	Earthwork Summary.....	30
5-5	Major Intersections / Crossovers	31
5-6	Existing Bridges.....	32
6-1	Cost Estimate Summary	33
8-1	Implementation Project Construction Costs	44
8-2	Shoulder Improvements Required.....	44



1. INTRODUCTION

1.1 Foreword

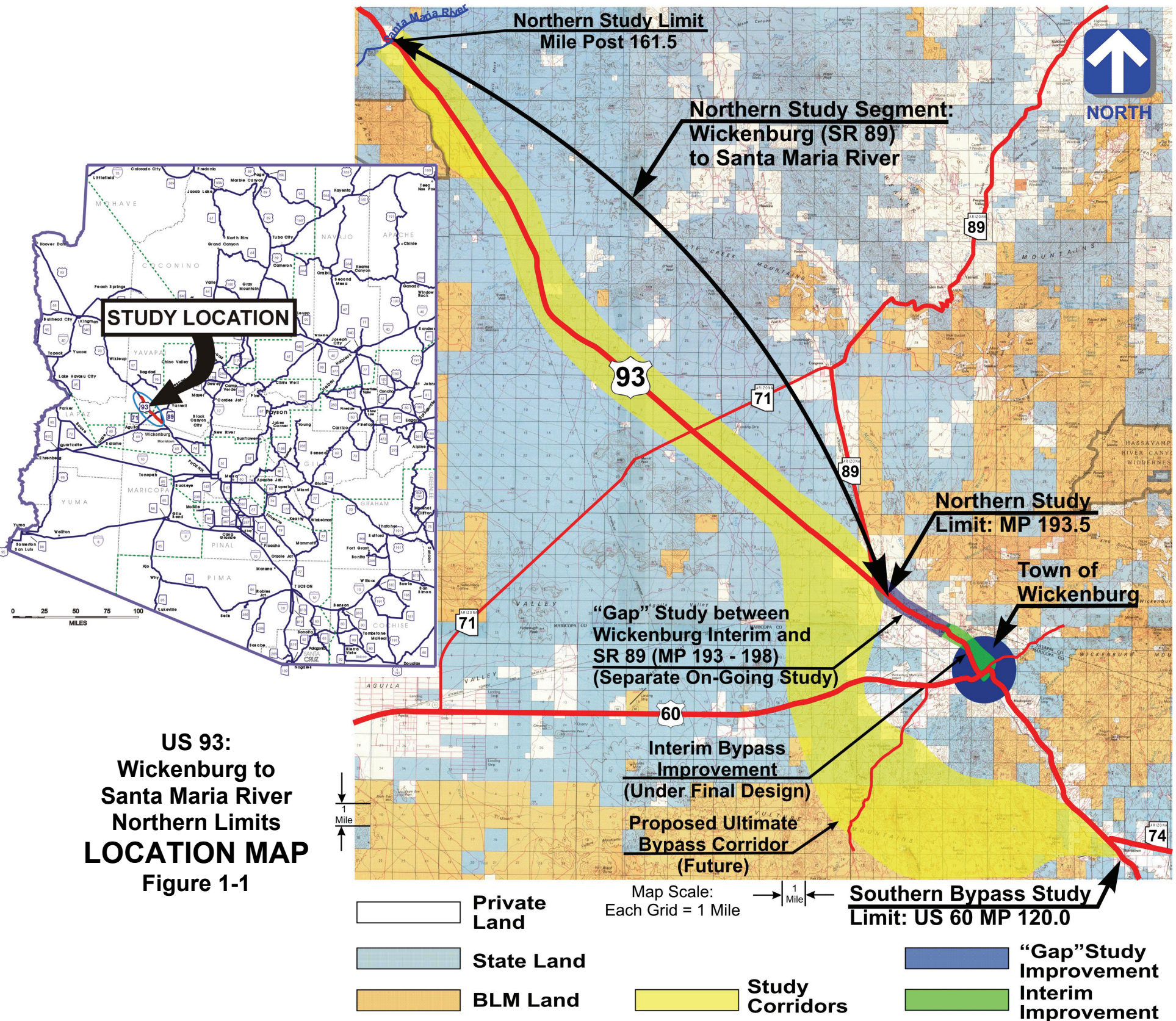
Jacobs Civil Inc. is under contract (Contract 99-12) with the Arizona Department of Transportation (ADOT) to conduct a Location/Design Concept Study regarding future improvements to US 93 from SR 74 south of Wickenburg to the Santa Maria River. The study includes a proposed ultimate bypass route around the Town of Wickenburg, and an investigation of alternatives to relieve the downtown congestion on an interim basis until the US 93 ultimate bypass can be funded and constructed. The study contract also includes an investigation of alternatives to improve US 93 from SR 89 to the Santa Maria River. This report focuses on the later, northern limits of this overall corridor investigation.

This final Location/Design Concept Report (L/DCR) presents the results of the study of improvements to US 93 from SR 89 to the Santa Maria River together with a phased implementation plan that addresses both near-term (initial widening) and long-term (full access control) improvement projects. **Figure 1-1** shows the location of the study corridor with respect to the State, and shows the location of this L/DCR with respect to all of the improvements between Wickenburg and the Santa Maria River.

Several governmental agencies have been involved in the development of the alternatives considered under this project. The Federal Highway Administration (FHWA) is serving as the lead federal agency, with the Bureau of Land Management (BLM) serving as the cooperating federal agency. Both agencies, as well as ADOT’s Pre-design Section, technical staff, Kingman and Prescott District staff, and Arizona State Land Department (ASLD) have provided input and oversight for the alternatives identification and evaluation process. The Yavapai County engineering and planning staffs have also contributed as have representatives from the Town of Wickenburg.

The following reports were produced for the US 93 Location/Design Concept Study or this Initial L/DCR and have been used in the development and evaluation of the improvement alternatives:

- Project Scoping Report, September 1999
- AASHTO Controlling Design Criteria Report, October 2001
- Traffic Analysis/Accident Report, 2003



**US 93:
Wickenburg to
Santa Maria River
Northern Limits
LOCATION MAP
Figure 1-1**

- Drainage Report, 2003
- Visual Resource Assessment, 2003
- Cultural Resources Survey, 2003
- Air Quality Technical Report, 2003
- Noise Study Technical Report, 2003
- Biological Evaluation, 2004
- Final Environmental Assessment, 2005

1.2 Need for the Project

US 93 is a major rural arterial highway route linking Phoenix to northwestern Arizona and beyond. The highway provides regional service to residents and commercial traffic between Wickenburg and Kingman, supports recreational traffic associated with the Colorado River as well as northwestern Arizona, and provides access to the gaming industries of Laughlin and Las Vegas, Nevada. The roadway also serves as a commercial route between metropolitan Phoenix and I-40. US 93 is part of the National Highway System and has been designated as a North American Free Trade Agreement (NAFTA) roadway corridor.

The existing roadway is a two-lane facility with a smoothly curving horizontal alignment that follows the landform, a level to gently rolling vertical alignment, and having a posted speed limit of 65 mph. The highway traverses level terrain from SR 89 (MP 193.5) to MP 177. The remainder of the corridor from MP 177 to the Santa Maria River (MP 161.5) is rolling terrain. Passing opportunities are somewhat limited between MP 177 and the Santa Maria River, even though several segments have been widened to include additional lanes for climbing and passing.

As traffic volumes along the route are continuing to increase, the Level of Service (LOS) is declining. The current LOS is E for the highway in rolling terrain and D for segments in level terrain, both below the LOS B desired for the route. This is due in part to the limited passing opportunities along the route. While passing lanes will help, projected traffic volumes show that a 4-lane roadway is necessary to provide an acceptable level of service with the current mix of commercial and passenger vehicles. Accidents are also a concern. Several locations along the route have relatively high accident rates, with accident types including single vehicle, sideswipe and angle. Local roadway improvement projects, including passing lanes, have not eliminated concerns in these problem areas. These locations will likely experience an increase in accidents as traffic volumes continue to increase, especially since the greatest restrictions though the rugged canyons north of the Santa Maria River have been widened to 4-lane divided roadway sections. It has become evident that the capacity and safety of the highway must

undergo significant improvements to be capable of safely providing for current and ever-increasing traffic volumes.

A long-range plan is needed to guide future decisions regarding possible remedial and interim improvements as well as ultimate improvements on US 93 as funds become available. As a result, ADOT initiated a comprehensive Location/Design Concept Study and an Environmental Assessment to investigate and identify logical, sequential, construction projects and costs for progressively improving the corridor.

1.3 Project Description

1.3.1 Project Limits

Figure 1-2, Project Vicinity Map, defines the limits of the study route, which begins at the junction of SR 89 & US 93 north of Wickenburg (MP 193.5) and extends in a northwesterly direction 32 miles, ending just south of the Santa Maria River (MP 161.5), where it ties into the existing 4-lane roadway. The entire project area is within Yavapai County. Approximately 77% of the study route crosses Arizona State Land, 13% abuts private land, and the remaining 10% is located along land administered by the Bureau of Land Management (BLM).

While the ultimate improvement of US 93 includes a by-pass of Wickenburg that is likely to extend northerly of the existing SR 89 junction with US 93, the bypass will not be constructed for, perhaps, 15 to 20 years. In the meantime, the traffic on existing US 93 is increasing and has already reached the point where a 4-lane highway is needed. Therefore, this study includes the section of US 93 between SR 89 (MP 193.5) and the likely junction of existing US 93 and the by-pass near MP 191, also depicted in **Figure 1-2**. This will provide needed capacity on US 93 until the by-pass is in place and will continue to function as an arterial connection between SR 89 and the by-pass in the ultimate configuration.

1.3.2 History of the Project Route

US 93 north of Wickenburg passes through the old Martinez Mining District in southern Yavapai County. The district was in the southwest region of the Date Creek Mountains, and northwest of Congress. The most productive mine in the region was the Congress Mine, which was a big producer between 1889 and 1910. Date Creek, incidentally, comes from the Spanish word *data*, the fruit of the opuntia cactus (cholla), which grows in clusters like dates.

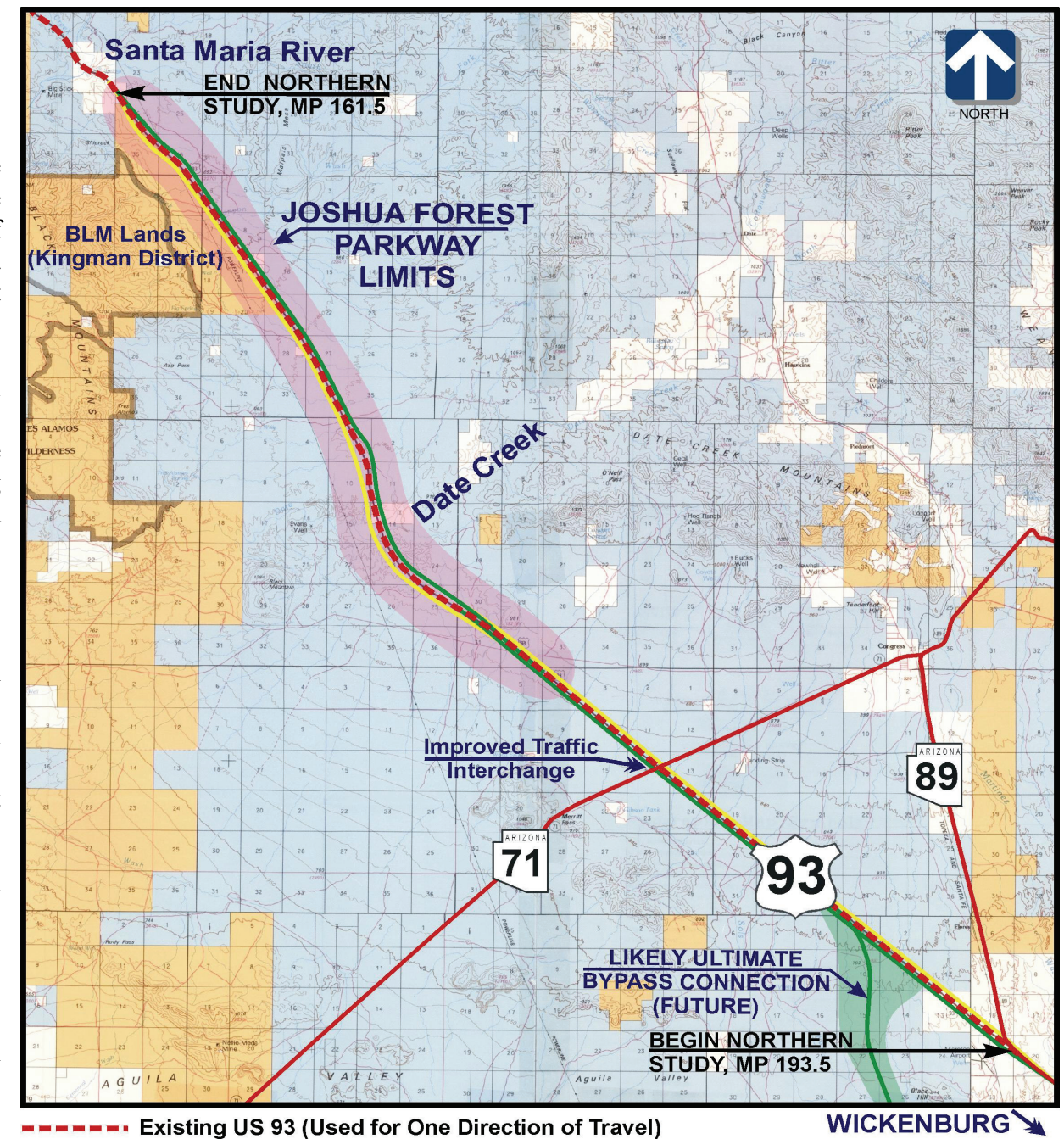


Figure 1-2
Project Vicinity Map

Camp Date Creek, located a few miles north of the highway, was a military post established to protect the road between Ehrenburg and Prescott during the Apache Wars.

The first paved highway between Kingman and Wickenburg was via US 66 to Ash Fork, and then south on US 89 to Wickenburg. US 93 was established from Kingman to US 89 near Wickenburg in 1946. However, traffic was routed on SR 71 to an intersection with US 89 at Congress Junction, and then southerly on US 89 to Wickenburg. The current highway between US 89 and SR 71 was established in the early 1960's when US 93 was constructed between the SR 89/US 93 junction and the SR 71/US 93 junction.

The Santa Maria River is a perennial stream with headwaters in the mountains near Prescott. The Santa Maria River and the Big Sandy River merge west of US 93 at Alamo Lake to form the Bill Williams River, which empties into the Colorado River.

South of the Santa Maria River to Milepost 180, the highway has been designated the Joshua Forest Scenic Road. The State Transportation Board established a 500-foot scenic setback along both sides of US 93 through the Joshua Forest Scenic Road by Resolution in 1963. Joshua trees grow most thickly on the high terraces lying between the Central Highlands to the northeast and a small range of sloping volcanic rocks to the southwest.

1.3.3 Proposed Improvements

Extensive modifications are needed to improve the capacity, operational efficiency, and safety characteristics of the existing US 93 roadway to meet future transportation requirements within the project limits. The purpose of the study is to:

1. Identify the scope and Location/Design Concept for a four-lane divided roadway from the junction of SR 89 and US 93 north of Wickenburg to the Santa Maria River.
2. Identify the scope and Location/Design Concept for improvements to the existing interchange at SR 71.
3. Develop an Access Management Plan to assure that safety and operational efficiency of the highway will be maintained, and that access requirements for recreation, property, and businesses abutting the highway are met, as traffic increases and adjacent properties develop.
4. Identify specific development segments, including cost estimates, for inclusion in future ADOT five-year Highway Construction Programs.

5. Conduct a public involvement program to support the future commitment of State and/or Federal resources.
6. Achieve consensus on the corridor location and design concepts between Federal and State agencies and local jurisdictions.

During development of design concept alternatives and the study documents, several issues were addressed including:

1. Determination of access requirements for recreation, ranching, residential, and commercial property abutting both existing and new rights-of-way with recommendations on how access is to be controlled along the corridor.
2. Documentation of existing drainage conditions on parcels upstream and downstream of the proposed roadway improvements. Drainage solutions were provided that would not negatively impact the existing conditions and environment.
3. Determination of logical construction segments, logical sequencing, and a probable timetable when such upgrades would be most needed based on traffic projections, safety, maintenance problems, re-use of the existing facility, traffic control, constructibility and other factors (To be compiled after the initial DCR is reviewed).
4. Development of typical section(s) within project limits based on capacity, level of service, safety, abutting development, terrain, constructibility, location of the existing highway, design criteria, and other factors. Included with this evaluation was an investigation of ways to generate the necessary embankment material needed between the SR 89 intersection and MP 176, where there is very little excavated material available for embankment.

1.4 Project Objectives

The project study team, in cooperation with participating government agencies, established a number of project objectives at the outset of the study, together with a list of factors to be used in evaluating each of the design concept alternatives. The process involved input from the general public and the various agencies, as outlined below.

1.4.1 The Scoping Process

ADOT initiated the Location/Design Concept Study for US 93 by conducting scoping meetings with the general public and involved federal, state, and local agencies. The scoping meetings covered the entire study corridor from the junction of SR 74, south of Wickenburg to the Santa Maria River.

The agency scoping meeting was held on June 3, 1999, at 1:00 p.m., at the Wickenburg Town Council Chambers. A public scoping meeting was held on the same day at 6:00 p.m. in Wickenburg. The purpose of these meetings was to determine the issues, concerns, and opportunities (ICOs) to be addressed in developing and evaluating alternatives for the project's L/DCR and EA. An Interdisciplinary Team (ID Team) was formed to provide agency policy and procedural direction, validate alternative evaluation criteria, review study findings and work toward a consensus on a preferred alternative. A project Steering Committee was also formed to provide communication and coordination with local community/ government organizations. Meetings were held periodically to review the progress of the study, comment on study results and serve as a sounding board for the study team.

The agency scoping meeting was attended by representatives of the BLM, FHWA, ASLD, Yavapai County, ADOT Headquarters, ADOT Prescott District, Arizona State Land Department (ASLD), the Town of Wickenburg, and the Wickenburg Chamber of Commerce. Numerous ICOs were discussed during the meeting. Wildlife crossings, cultural resources, planned improvements on BLM lands, scenic values, riparian areas, utility impacts and relocations, mining activity in the area, access control, and roadway safety were emphasized.

The public scoping session provided an opportunity for area residents and business people to identify issues and concerns about the existing roadway characteristics as well as to suggest various improvements that could be considered by the project study team. To facilitate discussions at the public meetings, three exhibits were utilized: an exhibit of the entire study corridor, showing existing and possible future parallel improvements, a flow chart depicting the study process, and a diagram of the possible typical sections for the proposed improvements. Attendees were also able to provide current information regarding the locations of private land ownership or leases. Everyone in attendance indicated that US 93 improvements are needed throughout the 48-mile corridor. The public scoping meeting generally focused on the interim and ultimate bypass of Wickenburg. In addition, questions were raised about the study process, funding of the improvements, the accuracy of the traffic projections, and the impact the North America Free Trade Agreement (NAFTA) will have on the route location.

1.4.2 Issues, Concerns, and Opportunities

During the agency and public scoping sessions, the following issues, concerns, and opportunities (ICO's) that pertain to this part of the study corridor that is north of Wickenburg were identified for further evaluation.

1. **Roadway/Design ICO's:** The safe flow of traffic is a major concern for both the public agencies and the general public. Recommendations at the scoping meetings included:
 - Incorporate design measures to preserve the visual character of the scenic highway.
 - Coordinate with the Western Area Power Administration (WAPA) regarding potential conflicts with power lines that cross the current alignment near the Santa Maria River.
 - Create passing opportunities throughout the corridor.
 - Limit the number of left and right turns from the roadway through access control to increase safety and operational efficiency.
2. **Social and Economic ICO's:** The following recommendations were made:
 - Maintain access to public lands.
 - Consider subsurface federal mining rights on land managed by the ASLD and the BLM.
 - Consider temporary measures to assist grazing lessees during construction such as fencing and maintenance of access.
 - Consider impact of access control measures on state land, as well as private properties already developed within the corridor.
 - If physical improvements (corrals, barns etc.) on state land are affected, the lessees will require compensation since they own these facilities.
3. **Environmental ICO's:** The following concerns and issues were raised:
 - Avoid Cactus Ferruginous Pygmy Owl habitat if present.
 - Minimize visual impacts in the designated Joshua Forest Scenic Road scenic highway. Consider using weathered steel guardrail, stained concrete structures, contoured slope treatments, rock staining, rock sculpting, and revegetation/seedling blend the roadway with the surrounding terrain and appearance.
 - Avoid prehistoric sites that are located along US 93.

- Avoid impacts to riparian areas and wildlife habitat. Removal of riparian vegetation due to roadway widening or bridge construction should be minimized as these areas provide habitat to indigenous wildlife.
- Wildlife crossing locations need to be identified and accommodated. This will require coordination with the Arizona Game and Fish Department.
- Avoidance of impacts on the Sonoran desert tortoise and the Southwestern willow flycatcher habitats and mitigation.
- Provisions for salvaging Arizona native plants are to be included in construction plans.
- Cultural resources need to be delineated and evaluated for their prehistoric and historic significance.

The ICOs identified above will be addressed by the study and will be included in factors used to evaluate alternatives.

1.4.3 Project Objectives

Following a review of the information received at these initial scoping meetings, the following ICOs and evaluation factors will be addressed in the study.

Design ICOs

1. **Roadway Safety:** US 93 should be improved to current design standards as specified in ADOT's Roadway Design Guidelines (RDG).
 - Proposed improvements should be developed to improve safety and relieve congestion:
 - o Use a design speed of 70 mph.
 - o Provide a 4-lane divided highway typical section throughout.
 - o Provide enough separation in the median to allow for added future capacity and travel lanes, especially when the highway becomes access controlled.
 - Maintain or develop wildlife and livestock crossings to minimize animal/vehicle conflicts.
 - Improve existing intersections, especially those angled intersections that currently exist at SR 71 and SR 89.
 - Consolidate turnouts and intersections that are close together by use of access roads, such as the area between MP 191 and 193.5.
 - Implement partial access control as an interim measure and full access control as the ultimate condition.

2. **Make maximum use of the existing roadway:** The existing roadway should be used for one direction of travel to the maximum extent practical. While realignment will not be necessary, simple widening of the existing shoulders may be necessary as a separate widening project, either concurrent with the adjacent construction improvements, or as a separate, follow-up project after the divided roadway is completed.
3. **Accommodate needs of existing and future development on public and private land wherever possible.**
4. **Minimize impacts on drainage channels.** Drainage solutions should minimize sediment transport and degradation of water quality.
5. **Avoid/minimize impact to identified environmental resources.**
 - A salvage plan for protected Arizona native plants should be developed.
7. **Enhance views of Joshua Trees through the Scenic Road.**
8. **Available staging sites should be identified on the plans when possible.**
9. **The volume of excavated material and embankment material should be balanced to the extent practical.**

Social and Economic ICOs

1. **Right-of-Way:**
 - Minimize the need for new right-of-way.
 - Residential displacements should be avoided or minimized.
 - Right-of-way for potential interchange locations and access roads for full access control should be identified.
 - Hazardous materials concerns will be identified and impacts avoided or mitigated.
2. **Regional Impacts on Economy:**
 - Identify improvement alternatives with specific attention to construction staging and traffic control concepts to avoid traffic delays during construction.
 - Develop an access management plan to meet the immediate and long-term needs of US 93. The plan must have a balance between regional transportation efficiency and reasonable access to properties adjacent to the highway.
3. **Construction costs should be minimized.**
4. **Proposed US 93 improvements should accommodate adjacent improvements.**

Environmental ICOs

1. Wildlife Habitat:
 - Wildlife crossings should be identified and provided for throughout the corridor.
 - The presence of threatened and endangered species needs to be determined and the potential adverse effects avoided or mitigated.
 - Encroachment into sensitive species habitat must be avoided or minimized.
 - Impacts to Arizona native plant species need to be minimized and mitigated. A salvage plan will be developed.
 - Encroachments into riparian habitats should be minimized.
 - Maintain the value of the upstream habitat at drainage crossings.
2. Cultural Resources:
 - Historic/pre-historic sites should be avoided or the impact minimized.
3. Maintain Water Quality:
 - Minimize encroachments at existing drainage crossings.
 - Implement strict erosion/sedimentation controls to protect watercourses both upstream and downstream of the improvements.
 - Delineate Section 404 jurisdictional waters of the U. S. and integrate the NEPA-404 merger process with other agencies early in the process.
4. Construction Impacts:
 - Potential water sources need to be identified.
 - Earthwork should be balanced to minimize need for off-site borrow/waste.
 - Staging area availability and restrictions should be identified.
 - Abandoned roadway segments will be obliterated and reclaimed (primarily at crossroad relocations and at SR 71 traffic interchange).
 - Temporary effects on air, noise, traffic, etc., during construction are unavoidable, but will be minimized.
 - Hazardous material sites will be identified and impacts avoided or mitigated.
5. Visual Impacts:
 - Visual impacts will be assessed according to FHWA Standards.
 - The median width will be varied throughout the Scenic Road to enhance views of Joshua Trees.

6. Noise Impacts from Additional Traffic:
 - Noise through residential areas may be increased where improvements are moved closer to receptors. Impacts will be analyzed and mitigated per ADOT’s Noise Abatement Policy.

1.4.4 Alternative Evaluation Factors

The following factors have been established for comparative evaluation of the improvement alternatives.

- Geometrics
- Use of existing roadway
- Right-of-way
- Provides needed capacity
- Access control
- Drainage
- Cost
- Constructibility and traffic control
- Impact on improved property
- Wildlife habitat
- Cultural Resources
- Visual impact

1.5 Characteristics of the Corridor

Table 1-1 lists previous projects constructed within the improvement section and brief descriptions of those projects.

Existing travel lane widths are adequate for the length of this study. However, much of the existing roadway has inadequate shoulder widths. Section 3.3 discusses information on existing travel lane and shoulder widths.

The vertical alignment of existing US 93 from MP 193.6 to 161.5 has 75 vertical curves with curve lengths varying from 200 feet to 4,000 feet; All of these curves meet 1990 AASHTO recommendations for stopping sight distances. The existing speeds, stopping sight distances, and associated mileposts (MP) for each of the vertical curves are discussed in Section 3.4 and provided in Appendix B.

The horizontal alignment of US 93 from MP 193.6 to 161.5 has 13 horizontal curves, five of which have superelevation rates less than the AASHTO recommended minimums. The existing speeds and associated MPs for each of the horizontal curves are discussed in Section 3.5 and provided in Appendix B.

The existing grade at one location along the level terrain and one location along the rolling terrain between MP 193.6 and 161.0 exceeds the maximum recommended AASHTO values.

There are four bridges present within the project limits. The capacity of the Big Jim Wash Bridge (structure no. 00548, MP 165.54) is HS 12.2 which is less than recommended (HS-20). The bridge rails meet current standards. The SR 71 traffic interchange overpass structure is functionally obsolete because the vertical clearance is 15’-1”. Detailed information on each structure is listed in Section 3.9.

The existing highway R/W varies in width from 100-feet to 335-feet on the west side and from 100-feet to 262-feet on the east side from centerline. In addition, a 500-foot wide scenic setback has been established on both sides of the existing US 93 centerline through the Joshua Forest Scenic Road. The details of this scenic setback are detailed in our Visual Resource Assessment.

Table 1-1 – Previous Projects Within the Study Area

Project No.	Begin MP	End MP	Const Date	Description
F-FG-035-1(4)	192.43	193.73	1962	Jct. 89 – Matthe Overpass, grade, drain, pave, bridge
F-035-1(3)	183.38	192.43	1962	Grade and drain
F-035-1(5) Units 1 & 2	182.43	193.43	1963	Matthe Overpass-SR 71, pave: SR 71 TI, grade, drain, pave, bridge
F-035-1(7)	177.04	182.43	1964	Grade, drain, pave
DS 242(4)	171.97	177.04	1957	Grade, drain, pave
Non FAS 52(1954) A	173.97	174.45	1954	Date Creek Bridge
BRF-035-1(20)	174.2		1995	Date Creek Bridge
DS 242(6)	165.87	171.97	1958	Grade, drain, pave
F-035-1-544	167.74	169.18	1997	Construct NB & SB passing lanes
DS 242(8)	160.78	165.87	1958	Grade, drain, pave, Big Jim S 242(7) Wash Bridge

2. TRAFFIC AND ACCIDENT DATA

2.1 Traffic Analysis

2.1.1 Existing Conditions

Existing US 93 between SR 89 and the Santa Maria River is generally a two-lane, rural principal arterial roadway with good horizontal and vertical alignment. The terrain is considered level along US 93 within the study limits except for approximately 15 miles south of the Santa Maria River, which is classified as rolling terrain. Between SR 71 and the Santa Maria River, there are several segments of US 93 that have been improved to include an additional lane for climbing and passing. The paved shoulder width varies from 5-foot near the north end of the study area to 8-foot through the southerly part of the project. US 93 is a divided 4-lane highway near the junction of SR 89 and near the Santa Maria River. The posted speed limit is 65 mph except near the Santa Maria River Bridge, just north of this project, where the posted speed limit is 55 mph and near the junction of SR 89 where the posted speed limit is also 55 mph. Travel speeds frequently exceed the posted speed limit through this section of highway.

2.1.2 Study Sections

For traffic analysis purposes, the US 93 corridor from MP 193.90 to 161.7 was divided into six sections based on existing traffic characteristics, roadway widths, number of lanes, functional classification, horizontal and vertical alignment, terrain, topography and access conditions.

2.1.3.1 Section 1: MP 193.50 to 193.22

Section 1 consists of a divided highway through the junction of SR 89 and US 93. This rural principal arterial includes 2 traffic lanes in each direction, with a 4-foot wide inside shoulder, and a 10-foot wide outside shoulder.

2.1.3.2 Section 2: MP 193.22 to 182.88

Section 2 begins at the northerly end of the SR 89 intersection channelization and ends at the junction of SR 71. US 93 is classified as a rural principal arterial. The undivided roadway includes a lane of through traffic in each direction and 8-foot shoulders. Approximately 15 percent of the roadway in this

section is designated no-passing zone. This section also includes the SR 71 overpass, Matthie railroad overpass (MP 192.88) and several residential driveways between the railroad overpass and MP 191. The entrance to a large residential subdivision called Vista Royale is located near MP 192.1. The terrain is generally level.

2.1.3.3 Section 3: MP 182.88 to 177.04

This section consists of a rural principal arterial in level terrain beginning at the junction of SR 71. The 40-foot wide undivided roadway section includes a single lane of traffic in each direction with 8-foot shoulders. Beginning at MP 182.68 the roadway section was recently restriped to include two northbound lanes and one southbound lane, each with 2-foot shoulders. This northbound passing lane ends near MP 181.4. A similar southbound passing lane section begins at MP 179.6 and ends near MP 180.6. About 19 percent of the length of the roadway in this section is designated as no-passing. Alamo Road intersects US 93 at MP 178.6 and Date Creek Ranch Road intersects US 93 at MP 177.4. Beginning at MP 180, the road is designated as the Joshua Forest Scenic Road, and continues as such through the balance of the project.

2.1.3.4 Section 4: MP 177.04 to 169.18

This section also consists of a rural principal arterial in rolling terrain. This 34-foot wide undivided section includes one through traffic lane in each direction and 5-foot wide paved shoulders. The existing pavement was re-striped to add a southbound climbing lane from MP 174.3 to MP 175.6 and a northbound climbing lane from MP 173.5 to MP 172.7. About 18 percent of the length of the roadway in this section is designated as no-passing. The section includes the Date Creek Bridge at MP 174.20, and is designated as the Joshua Forest Scenic Road.

2.1.3.5 Section 5: MP 169.18 to 167.74

Section 5 is a 4-lane undivided rural principal arterial in rolling terrain. The 58-foot wide section was constructed in 1998 to provide a mile of passing opportunity, with two 12-foot wide travel lanes in each direction, as well as including 5-foot shoulders.

2.1.3.6 Section 6: MP 167.74 to 161.5

Section 6 begins at the ending of the previous passing lane, and ends at the beginning of the new divided highway section near the Santa Maria River. The section consists of a 2-lane, undivided rural principal arterial highway traversing rolling terrain. The roadway section is 34-foot wide with 12-foot wide travel lanes with 5-foot shoulders. 11 percent of the length is designated as no-passing. The section includes the Big Jim Wash Bridge at MP 165.54 and is within the designated Joshua Forest Scenic Road limits.

2.1.3 Traffic Data

ADOT's Transportation Planning Division provided traffic volume data for existing (2000) and future (2025) design year conditions, peak hour factors (K), directional splits (D), and truck (T) data. Traffic volume information was gathered by Automatic Traffic Recorders (ATR) at MP 169.00 and MP 188.30. Current and projected traffic volumes for US 93 are shown in Table 2-1. The year 2025 is considered the design year for the purposes of this report.

Table 2-1. US 93 Traffic Volumes

Section	2000 ADT	2025 ADT	Growth Rate Per Year (%)
Sections 1& 2	6600	9400	1.42
Sections 3, 4, 5 & 6	6000	8900	1.60

Existing roadway characteristics for each section are summarized in Table 2-2. The K factor was used to determine peak hour volumes (PHVs).

Table 2-2. US 93 Roadway Characteristics

Roadway Characteristics	Section					
	1	2	3	4	5	6
Des. Hr. Factor (K)	14	14	14	14	14	14
Direct. Factor (D)	50	50	50	50	50	50
Truck Percentage	28	28	28	28	28	28
RV Percentage	1.5	1.5	1.5	1.5	1.5	1.5
No Pass Percentage	-	15	19	18	-	11
Pk. Hr. Factor (PHF)	0.94	0.94	0.94	0.94	0.94	0.94
Des. Spd. (mph)	70	70	70	65	65	65
2000 PHV (vph)	920	920	840	840	840	840
2025 PHV (vph)	1320	1320	1250	1250	1250	1250
Terrain	L	L	L	R	R	R
Typical Section	4-ln.	2-ln.	2-ln.	2-ln.	4-ln.	2-ln.

2.1.4 Level of Service Analysis

The method used for describing and determining highway capacity and traffic operating conditions in this study is outlined in the Highway Research Board’s Highway Capacity Manual (HCM), 3rd Edition, and has been expressed in terms of Level of Service (LOS). For the analysis of two-lane highways, the LOS is a function of operating speeds, time delays, and passing sight distance. Multilane highway LOS is a function of traffic density – the ability for motorists to maneuver in the traffic stream.

Tables 2-3 and 2-4 briefly describe the different levels of service for two-lane and for multilane highways.

Table 2-3 Levels of Service for Two-Lane Highways

LOS	Two-Lane Highways
A	Average speeds approach 60 mph and passing frequency is not demanding
B	Average speeds of 55 mph can be expected and passing demand becomes significant to maintain speeds; demand equals capacity
C	Noticeable increases in platoon formations with average speeds of 52 mph; flow is stable but susceptible to congestion due to turning
D	Average speeds of 50 mph with unstable traffic flow; passing becomes impossible as demand exceeds capacity
E	Average speeds are below 50 mph with passing virtually impossible
F	Disturbances in flow cause LOS E to rapidly degenerate to LOS F

Table 2-4 Levels of Service for Multilane Highways

LOS	Multilane Highways
A	Free-flow conditions with minor disruptions easily absorbed
B	Average speeds are same as LOS A speeds, but ability to maneuver decreases
C	Affect of density on traffic flow is noticeable; minor disruptions may cause localized deterioration in service
D	Traffic congestion seriously impedes motorists ability to maneuver; minor disruptions cause service to deteriorate to LOS E and F
E	Operations are at or near capacity; flow is unstable and susceptible to queuing
F	Flow breaks down; vehicles experience stop-and-go movements

2.1.4.1 Ideal Conditions

Two-Lane Highways – Ideal conditions for two-lane highways as outlined in the *Highway Capacity Manual* are defined by the following characteristics:

- Capacity of 2,800 passenger cars per hour total, both directions
- Design speeds greater than or equal to 60 mph
- Lane widths greater than or equal to 12 feet
- Clear shoulder width of 6 feet or more
- No “No Passing Zones”
- All passenger cars in the traffic stream
- A 50/50 directional split of traffic
- No impediments to through traffic due to either traffic control or turning vehicles
- Level terrain

Multilane Highways – Ideal conditions for multilane highways as described in the Highway Capacity Manual are defined by the following:

- Capacity of 2,200 passenger cars per hour per lane
- Free flow speeds of 60 mph or greater
- Level terrain
- Lane widths greater than or equal to 12 feet
- Total lateral clearance greater than or equal to 12 feet from the edge of traveled way to obstructions on the edge of pavement or the median (left side plus right side along a roadway in one direction of travel)
- No direct access points along the roadway
- Divided highway
- Only passenger cars in the traffic stream

Ideal highway capacity is adjusted to an actual capacity based on actual roadway characteristics. Highway Capacity Software (HCS) was used to perform highway segment analysis as outlined in Chapters 7 & 8 of the HCM. HCS uses information such as peak hour factor, directional split, heavy vehicle percentages, lane widths and clearances, and access points per mile to determine a roadway’s ability to move traffic for actual or real conditions.

The year 2025 was established as the design year for this study with a Level of Service “B” desired for the mainline and at signalized intersections.

2.1.4.2 Year 2000 Existing Conditions

The estimated levels of service for US 93 from SR 89 to the Santa Maria River are presented in Table 2-5.

Table 2-5 Existing (2000) Levels of Service

Roadway Segment (MP Limits)	Existing LOS	Existing # of Lanes
1 – MP 193.90 to MP 193.22	A/A	4
2 – MP 193.22 to MP 182.88	D	2
3 – MP 182.88 to MP 177.04	D (D/A*)	2 (3)
4 – MP 177.04 to MP 169.18	E (E/A*)	2 (3)
5 – MP 169.18 to MP 167.74	A/A	4
6 – MP 167.74 to MP 161.5	E	2

B/B – Level of service for each direction on multilane highway
* Climbing lane or passing lane sections LOS each direction

Table 2-5 shows that the four lane sections of US 93 in the study area are operating at an acceptable level of service (LOS A). The 2-lane sections are generally operating at LOS D or E. Sections 3 and 4 have passing lane and climbing lane sections. The single lane direction opposite the climbing lane generally operates at the same LOS as the adjacent 2-lane highway section. In the passing lane or climbing lane direction, the LOS is A. The 2-lane segments do not meet the corridor improvement criteria of LOS B.

2.1.5 US 93/SR 71 TI Analysis

Interchange capacity features were reviewed for the US 93/SR 71 TI. The approximate capacity of ramp roadways based on free-flow ramp speeds is delineated in Table 5-6 of the HCM (Special Report 209). This table indicates that a single-lane ramp with a free-flow speed as low as 20 mph has a capacity of approximately 1,800 passenger cars per hour per lane (pcphpl). The horizontal and vertical alignment of the ramps meets current design standards, but the ramp width is substantially less than currently required. The width of the ramps is 16-feet while current guidelines require 22-feet. The free-flow speed of each ramp is assumed to be well over 20 mph. Thus, the existing capacity of all ramps is estimated to be at least 1,800 pcphpl. All ramps exhibit adequate capacity for the design-year ADT.

2.1.6 2025 Future Conditions

Future (2025) levels of service were estimated based on future traffic volume projections provided by ADOT (see Table 2-1). The roadway characteristics were assumed to be the same for the 2025 design hour as they currently exist. The results of this analysis provided an estimation of future traffic operations under “no build” conditions. Levels of service for year 2025 conditions are presented in Table 2-6.

Table 2-6 Future (2025) Levels of Service

Roadway Segment	Future LOS	Existing # of Lanes (no-build)
1 – MP 193.90 to MP 193.22	A/A	4
2 – MP 193.22 to MP 182.88	E	2
3 – MP 182.88 to MP 177.04	E (E/A*)	2 (3)
4 – MP 177.04 to MP 169.18	F (F/A*)	2 (3)
5 – MP 169.18 to MP 167.74	A/A	4
6 – MP 167.74 to MP 161.5	F	2

B/B – Level of service for each direction on multilane highway
 * Climbing lane or passing lane sections LOS each direction

Table 2-6 shows that the four lane rural segments of US 93 in the study area will operate at LOS A in 2025. The 2-lane segments on US 93, including the single lane direction opposite climbing lanes, will generally operate at LOS E or F. In the passing lane or climbing lane direction, the LOS is A. The 2-lane rural segments (2-4, and 6) do not meet the desired LOS B.

2.2 Accident Analysis

Accident data was provided by the Accident Records Branch of the Traffic Engineering Section, Arizona Department of Transportation. The available data was for the time period from May 1st 1997 through April 30th 2002. The accident data was reviewed and analyzed in order to identify potential high accident locations or accident trends. Accident rates were derived for US 93 by section and by milepost. The following equation was used to calculate the accident rates:

$$R_s = \frac{[\text{No. of Accidents} \times 10^6]}{[365 \text{ days} \times \text{No. of years of data} \times \text{Average Daily Traffic} \times \text{Length of Roadway Segment}]}$$

The units of this equation are in accidents per million vehicle miles traveled (acc/MVM).

2.2.1 Corridor Accident Rates

Table 2-7 and Figure 2-1 summarizes the average annual accident rates calculated for US 93, by section, over the last five years.

Table 2-7. US 93 Accident History for Study Sections (May 1997 through April 2002)

Section & Milepost	Dist. (miles)	ADT	Terrain	Number of Acc.	Acc. Rate*
1- MP 193.90 to MP 193.22	0.68	6,595	Level	6	0.73
2- MP 193.22 to MP 182.88	10.34	6,595	Level	52	0.42
3- MP 182.88 to MP 177.04	5.84	6,016	Level	42	0.66
4- MP 177.04 to MP 169.18	7.86	6,016	Rolling	63	0.73
5- MP 169.18 to MP 167.74	1.44	6,016	Rolling	15	0.95
6- MP 167.74 to MP 161.5	6.04	6,016	Rolling	40	0.60

*Number of accidents per million vehicle miles per year

Of the 15 accidents that occurred in Section 5, 8 of them occurred prior to completion of the 4-lane roadway in May 1998. From May 1998 through April 2002, just 7 accidents occurred in that section of roadway.

Of the 6 accidents that occurred in Section 1, 5 of them were collisions with another vehicle. This section is entirely within the area of the US 93/SR 89 intersection.

2.2.2 Corridor Accident Types

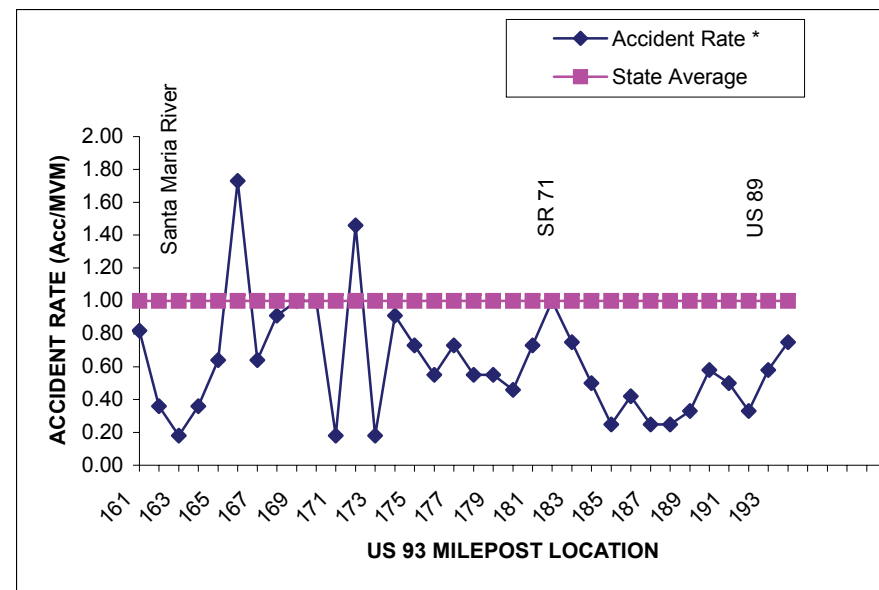
Table 2-8 summarizes selected types of accidents that occurred for each section on US 93 for the time period between May 1997 and April 2002.

Table 2-8 US 93 Accident Type Summary by Study Section

Roadway Section	1	2	3	4	5	6
Total Accidents	6	52	42	63	15	40
Single Vehicle	1	31	27	40	7	25
Sideswipe	1	6	2	8	0	6
Collision	0	5	2	3	0	3
Rear End	0	8	9	8	7	6
Head On	0	1	2	4	1	0
Left Turn	1	0	0	0	0	0
Angle	3	1	0	0	0	0
Total Injuries	4	21	44	47	3	28
Total Fatalities	0	2	3	4	3	0

The most common type of accident for US 93 within the study limits is the single vehicle accident, which accounts for approximately 60 percent of the total number of accidents. Many of the single vehicle accidents (approximately 17%) involved wild game or livestock.

Figure 2-1 Accident Rate by Milepost Location
1997-2002



The accident rates calculated for each milepost indicate areas with relatively high accident rates (greater than 1.0 acc/MVM). These areas are summarized as follows:

- US 93 MP 166 – 1.73 acc/MVM: There are no obvious physical features that could contribute to accident hazard except perhaps the long continuous grade at 3 to 5 percent. Most of the accidents were single vehicle type. Rear-end and sideswipe accidents also occurred. 19 injuries resulted from accidents.
- US 93 MP 172 – 1.46 acc/MVM: Mile 172 includes a rest stop on the inside of a horizontal curve. Most of the accidents were single vehicle. Rear-end and sideswipe accidents also occurred.

The number of accidents in each of the years from 1997 to 2002 remained fairly constant with an average 44 accidents per year on US 93.

2.3 Conclusions

US 93 between the intersection with SR 89 and the crossing of the Santa Maria River consists primarily of a undivided, rural 2-lane highway. Without improvement, the 2-lane roadway sections will deteriorate to a LOS of either E or F during the peak hour by the year 2025. Widening the existing 5-foot paved shoulder width to 8 feet in Sections 4 and 6 will improve the LOS to level E, which would still be below the desired LOS of B.

Passing lanes are provided and assist in the dispersal and breakup of traveling platoons of vehicles on the 2-lane highway. If located appropriately, they can improve the overall level of service of the highway. While the HCM methodology does not quantify the affects to LOS of climbing lanes and passing lanes on the 2-lane rural highways as a whole, the localized effects can be quantified. Climbing lanes have been added to Section 4 on either side of Date Creek and passing lanes have been striped in Section 3. Adding a southbound climbing lane in Section 6 from the Santa Maria River south would help traffic flow up a long continuous incline and improve LOS in the southbound direction, as well as improve safety by avoiding the need to make the potentially hazardous passing movement against opposing traffic. However, the LOS of the northbound traffic may decrease due to the installation of no-passing striping adjacent to the southbound climbing lanes.

The existing 2-lane segments of US 93 generally have adequate horizontal and vertical alignments and the no-passing zones are minimal (11 to 34 percent). The only way to improve the level of service on these sections is to add an additional traffic lane in each direction. The result achieves LOS A for the entire study area of US 93 (Sections 1-6) for 2025 traffic.

2.4 Recommendations

US 93, from the Junction of SR 89 to the Santa Maria River, is essentially an undivided, two-lane rural highway. The level of service analysis and review of accident data indicate that the highway already performs at LOS D and E during the peak hour, and will deteriorate to LOS E and F without improvement. It is recommended that the roadway be widened to a four-lane divided highway. A divided facility is a safer roadway than a non-divided roadway as it separates opposing traffic and does not necessitate passing opportunities using opposing lanes. The divided roadway also offers the opportunity to control turning traffic (median crossovers) for increased safety and operational efficiency. Finally, the divided highway provides better access control than a non-divided highway, which will accommodate the ultimate desire of ADOT to make US 93 a fully access-controlled facility in the future.

3. AASHTO CONTROLLING DESIGN CRITERIA

3.1 Introduction

The existing design features of US 93 between SR 89 and the Santa Maria River (MP 193.5 to 161.5) were examined and evaluated relative to the American Association of State Highway and Transportation Officials (AASHTO) Controlling Criteria outlined in *A Policy on Geometric Design of Highways and Streets* (1990 edition), commonly referred to as the “AASHTO Green Book”. ADOT’s *Procedural Guide for Review of the AASHTO Controlling Design Criteria on Existing ADOT Roadways*, dated May 1997, was also used to evaluate the existing design features on US 93. ADOT’s *Roadway Design Guidelines* (1996 edition) was utilized for additional design reference. A complete presentation of the data and evaluation is available in the *AASHTO Controlling Design Criteria Report, US 93 – Wickenburg to Santa Maria River*, Contract No. 99-12, TRACS No. 093 YV 161, H 4871 01 L (October 2001). Horizontal and vertical data summaries are provided in Appendix B. ***These are not intended to be the design criteria applied to new roadway designs, but rather only a review of established guidelines for retaining existing roadways. All criteria for new improvements are shown in Chapter 5.***

3.2 Design Speed

The study route’s classification, use, and terrain determine the appropriate design speed to be used for evaluating the existing and proposed roadway. The existing facility is a rural principal arterial highway in both level and rolling terrain. The AASHTO Green Book and ADOT Roadway Design Guide suggest a design speed of 60 to 70mph in level terrain and 50 to 60 mph in rolling terrain. A design speed of 60 mph in level terrain, and 50 mph in rolling terrain, was used to evaluate the existing alignment.

3.3 Lane Width and Shoulder Width

US 93 is primarily a two-lane roadway with 12-foot lanes and paved shoulders varying from 0.5 to 8 feet. A short 4-lane divided roadway section is located at the beginning of this study section, through the SR 89/US 93 intersection, as well as at the end of the study, where it ties to the existing Santa Maria Bridge improvements. Several passing lanes are located through the study area, such as:

- Northbound passing lane from MP 181.8 to 180.8.
- Southbound passing lane from MP 180.0 to 178.9.
- Southbound passing lane from MP 175.6 to 174.3.
- Northbound passing lane from MP 173.5 to 172.7.
- Northbound/Southbound passing lanes from MP 169.2 to 167.7.

The lane widths on this study route meet AASHTO recommendations. However, the minimum recommended shoulder width is not satisfied for more than half of the route (MP 161.5 – 177). Roadways with narrow shoulders provide poor service and may experience higher accident rates due to the absence of recovery areas for errant vehicles and refuge areas for disabled vehicles. The AASHTO Green Book suggests that a two-lane rural arterial highway have 12-foot travel lanes with 8-foot paved shoulders when the projected design hourly volumes exceed 200 vph for all design speeds.

If the recommended roadway improvements are implemented, most of the existing roadway provides for both the desired travel lane widths and two-lane, one-way shoulder widths (4-foot inside and 8-foot outside shoulders). Only the following segments of the existing roadway may require two- to three-feet of minor widening to provide the full, desired shoulder widths:

- MP 161.5 – 167.7
- MP 169.2 – 172.7
- MP 173.5 – 174.3
- MP 175.6 – 177.1

All lane and shoulder widths used in developing typical sections for the new roadway to be constructed will conform to current design recommendations.

3.4 Vertical Alignment and Stopping Sight Distance

75 vertical curves are located within the study route. All of these vertical curves meet AASHTO recommendations for stopping sight distance when evaluated relative to the AASHTO recommended minimum design speed of 60 mph for level terrain and 50 mph for rolling terrain.

A listing of the vertical curve analysis is provided in Appendix B.

3.5 Horizontal Alignment

The existing alignment contains 13 horizontal curves, all of which meet the AASHTO recommendation for maximum degree of curve. A listing of the horizontal curve analysis is included in Appendix B. Based on as-built plans, the following generally describes the horizontal alignment:

- All 13 curves meet the AASHTO recommendation for maximum degree of curve (5 degrees, 15 minutes) for 60-mph design speed in level terrain and (8 degrees, 15 minutes) for 50-mph design speed in rolling terrain.
- Five curves have superelevation rates less than the of AASHTO recommended minimum.

3.6 Grades

The AASHTO Green Book and ADOT Roadway Design Guidelines recommend a 3% maximum grade for rural arterial highways in level terrain with 60-mph design speeds and a 5% maximum grade for rural highways in rolling terrain with 50-mph design speeds. Grades at 2 existing vertical curves located near MP 183 and MP 173 exceed the maximum value.

3.7 Cross Slopes

Cross slopes are 1.5% throughout the study route and conform to current design recommendations.

3.8 Vertical Clearance

The AASHTO Green Book recommends that existing structures provide a minimum 14-foot clearance over the entire roadway width. The SR 71 Traffic Interchange Overpass has a vertical clearance of 15-feet, 2-inches over SR 71, which meets the requirement for an existing structure to remain. If the structure is reconstructed, or if a new structure is constructed over the highway, a 16-foot clearance is required. Consideration could be given to lowering the crossroad grade by 10-inches to provide the required vertical clearance.

In addition to roadway structures, there is a railroad crossing over the Burlington Northern Santa Fe railroad near MP 192.9. The AASHTO Green Book recommends that structures provide a minimum 23-foot clearance over the entire railway width. The existing structure exceeds this clearance. The new structure required parallel to the existing must be constructed over the railroad with a minimum 23-foot clearance.

3.9 Bridge Structures

Four bridges are located within the project limits. The description and evaluation of each are shown in Table 3-1.

Table 3-1. Bridge Evaluation Summary

Structure Name	Struct. No.	US 93 MP	Year Built	Suff. Rate*	Bridge Structure		Bridge Rail		
					Width, Curb To Curb (ft)	Capacity	Type	Geom. OK	Struct. OK
Matthie Railroad Overpass	00780	192.88	1963	96.5	40.4'	HS 26.7	Std. - Conc. Barrier	Yes	Yes
Highway 71 Overpass	00842	182.88	1964	F 93.7	52'	HS 21.7	Std. - Conc. Barrier	No	No
Date Creek Bridge	02366	174.20	1995	80.0	44'	HS 20	Std. - Conc. Barrier	Yes	Yes
Big Jim Wash Bridge	00548	165.54	1959	S 49.3	30'	HS 12.2	Std. - Conc. Barrier	No	No

Source: ADOT Bridge Management Section Bridge Evaluation Data, May 1999.

* In the Suff. Rate column: Numbers preceded by an "S" indicate Structurally Deficient bridges, while numbers preceded by an "F" indicate Functionally Obsolete bridges.

The AASHTO Green Book recommends a bridge structure capacity of HS 20.0. The Big Jim Wash Bridge (Struct. No. 00548) is deficient in capacity. The vertical clearance of the SR 71 Overpass (Struct. No. 00842) is also listed as deficient, although it meets AASHTO Criteria for a bridge to remain. The AASHTO Green Book recommends a minimum of 28 feet bridge width for bridges to remain in place.

4. DESIGN CONCEPT ALTERNATIVES

4.1 Introduction

The improvement of US 93 requires construction of two additional lanes to provide needed capacity and to improve the safety and operation of the highway through the design year 2025. Major goals for the improvement as outlined in Chapter 1 include utilizing the existing roadway to the maximum extent possible and minimizing the need for new right-of-way.

Widening US 93 to a 4-lane divided highway facility within the existing corridor is consistent with the major goals. The existing corridor already provides a direct route between the intersection with SR 89 and the Santa Maria River through level to moderate rolling terrain. Property adjacent to the highway is largely undeveloped, except for the rising residential development north of SR 89 between MP 191.0 to 193.5. For most of the route, only some isolated ranch turnouts and a few public roads intersect the existing highway. Outside of these few private parcels, ASLD owns most of the property adjacent to the highway, with the BLM managing the lands west of the existing highway between MP 162 – 168.5.

Investigation of alternatives outside of the existing highway corridor was considered during the scoping phase, however, as just noted, keeping the improvements within the existing US 93 corridor accomplished many project goals established by the project stakeholders. Since there were no compelling reasons to relocate the highway in a new corridor, and since there were successful alternatives identified that accomplished all of the project objectives, no new corridors on completely new alignments outside of the existing corridor were considered. Other factors that influenced this decision include:

- A new corridor would not make use of the existing roadway, requiring significantly more new right-of-way.
- The existing roadway’s vertical and horizontal alignments primarily meet current standards. Where current standards are not met, upgrading the existing roadway would be more economical than constructing a new alignment.
- Maintaining the existing roadway for one direction of travel will reduce impacts on adjacent property, retain access to existing drives and turnouts, and will minimize environmental impacts.
- Constructing only two new lanes for one direction of travel will cost much less than fully constructing two roadway sections.

4.2 Study Segments

In order to systematically describe and analyze improvement alternatives along US 93, the study route was subdivided into three study segments based on features or conditions unique to each zone. Designations and limits of the three study segments are shown in **Table 4-1, US 93 Study Segments** and **Figure 4-1, Study Segments**.

The design concept alternatives are identified by alpha numeric designations associated with the three study segments. Concept alternatives used varying typical sections, and were evaluated by implementing the improvements on either side of the existing roadway. For these variations, the alternatives were assigned the following identifying names:

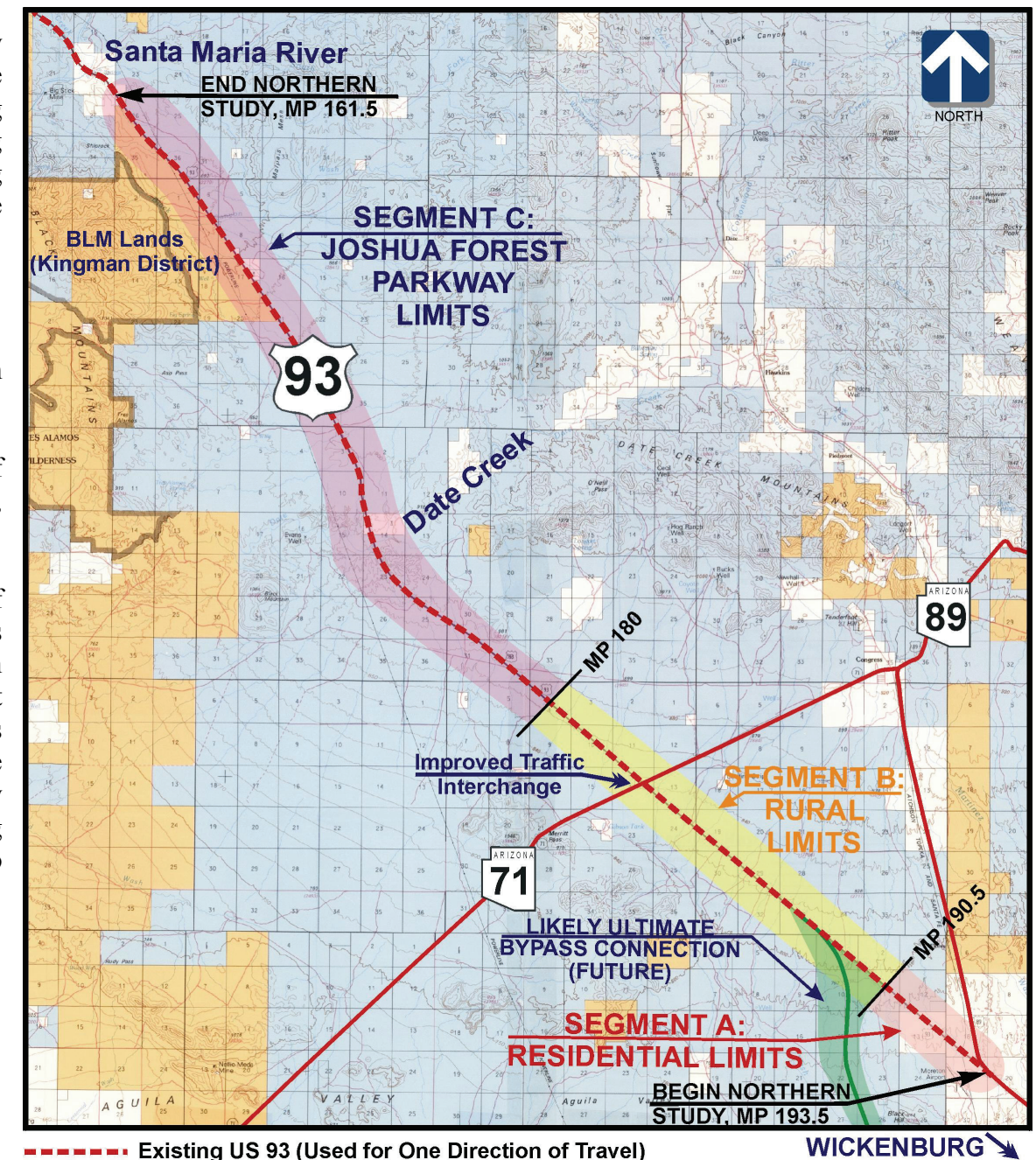
Alternative A-1a, where:

- A** The first capital letter identifies which Study Segment is being considered.
- 1** The first number corresponds to the type of typical section applied (either section 1, 2, or 3).
- a** The final letter corresponds to which side of the existing roadway the improvements were constructed. If they were improved on the west side, “a” was used. On the east side, “b” was used. If the improvements were constructed on the west side of the existing roadway for part of the Study Segment and on the east side of the existing roadway for part of the Study Segment, no final suffix was provided.

**Table 4-1
US 93 Study Segments**

Designation	Defining Characteristic	Milepost Location
A	Residential	193.5 – 190.5
B	Rural	190.5 – 180.0
C	Scenic	180.0 – 161.5

**Figure 4-1
Study Segments**



4.3 Elimination of the Undivided Roadway Section—All Study Segments

A preliminary evaluation based on the project objectives established in Chapter 1 shows that widening the existing roadway and providing a paved median will not provide the desired improvement and should be dropped from further consideration:

- The narrow median does not provide an adequate recovery zone for out-of-control vehicles and would require a barrier to prevent crossover, head-on accidents.
- The rural character of the project area, with very little development, does not constrain the width of right-of-way to the existing width. Through much of the project the existing right-of-way width is adequate to allow construction of a divided highway without acquiring additional right-of-way. Through the portions of the project where additional right-of-way is required, the necessary widening of the right-of-way can be limited to just one side of the roadway. Costs of undeveloped, rural property for widened right-of-way will not be excessive and will not override the benefits of wider medians.
- Even through the residential area in Study Segment A, an undivided roadway section would be inconsistent to what the residents and the State desire south of the SR 89 intersection. From the future highway bypass to the north, through the SR 89 intersection area, and ultimately south to approximately Ricon Road, a divided roadway section is desired to provide some form of access control and retain the separation of opposing traffic.
- Traffic through the construction zones would be impacted significantly because widening construction would take place immediately adjacent to traffic. Separated roadways will ease construction, minimize traffic delays, and provide wider separation between traffic and construction forces, thereby making the divided roadway construction zone safer.
- The terrain is level to moderate rolling, which allows a wider roadway section without excessive increase in construction costs.
- An undivided roadway widening does not allow the flexibility to adjust the new roadway profile to help balance the project earthwork.
- Future expansion is not accommodated. Future widening would have to be done on the outside of the roadway rather than in the median, which would require reconstruction of intersections, access roads and drainage facilities.

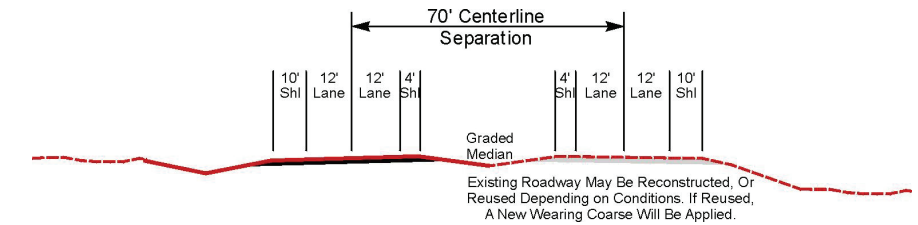
4.4 Alternative Typical Sections

The project study goals concur with what ADOT has been implementing across the State on major rural highways with heavy traffic volumes; a divided roadway section with two lanes in each direction is desirable when considering design, traffic, and construction benefits. This approach is also supported by the capacity information provided in Chapter 2, where the traffic projections, passing needs, and safety concerns all suggest that US 93 be widened to a 4-lane divided roadway section. The advantages to this type of roadway include:

- Providing a more natural appearance of a rural highway, especially through this scenic roadway corridor. Large medians retain the experience of driving one-way through the landscape with little concern for on-coming or even passing traffic. Undivided or narrow medians have the appearance of freeways and are not as pleasant for the driver or passenger to enjoy.
- Separation of opposing traffic for increased safety. Clear zones are maintained not only to the outside lanes, but to the inside as well.
- Independent alignments permit the new roadway section to be adjusted to best fit the landforms, thus minimizing earthwork and impacts on adjacent landscaping as well.
- Variation in the width of the separation between opposing roadways. This variation can result in desirable landscaping, scenic features, and unusual land forms being retained in the median by widening the separation. Conversely, impacts to adjacent private properties can be reduced through the residential developments by reducing the separation.
- Use of the existing roadway for one direction of travel, both during construction, and for the ultimate facility, reduces the construction costs, as long as the existing roadway meets the current roadway standards (some shoulder widening is required).
- Building only one new roadway reduces the amount of R/W to purchase, and reduces the impacts to the environment as one side of the roadway remains untouched.

For these reasons, only divided roadway concepts were incorporated into the development of the design alternatives.

Three alternative typical sections were developed and considered for use in each of the three Study Segments. Descriptions and characteristics of each of the typical sections follow (See Appendix D for a larger size exhibit of all three typical sections):



Typical Section 1: Narrow Median (70-ft Centerline Separation)

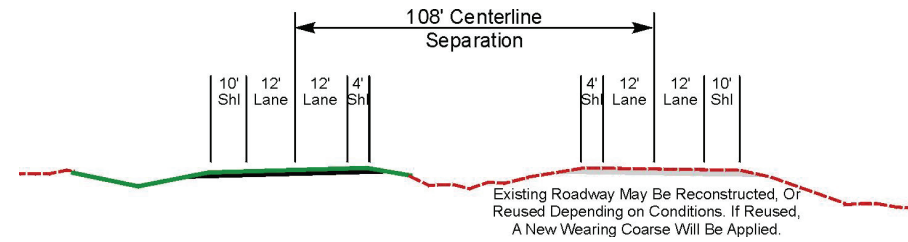
A 70-foot center-to-center separation of the roadway centerlines provides a 46-foot, graded median. This typical section is the minimum divided highway section to be used in rural areas (Section 304, ADOT Roadway Design Guidelines). This section should be used only where a wider separation has significant undesirable impacts.

Advantages of this section include:

- Requires the least amount of right-of-way for a divided highway.
- Results in the least impact on adjacent developed property for a divided highway.
- Provides adequate recovery area for out-of-control vehicles.
- Provides access control by separating opposing traffic and allowing access only at designated cross overs.
- Accommodates future expansion by providing room for added lanes in the median. If this should occur, it would require a median barrier to be installed between the two future lanes.

Disadvantages of this section include:

- Minimum opportunity for independent grades.
- No opportunity for retention of natural drainage features or vegetation in the median. The full width of the median is graded and has the appearance of a continuous ditch.
- Headlight glare from oncoming traffic is not screened as much as that provided by a wider median.
- Left turn bays are difficult to design. The roads are too close together to allow perpendicular storage of the turning vehicle in the median. As such, the opposing left turn bays are offset from each other, creating a large, paved median area, and no opportunities for trucks to make a U-Turn.



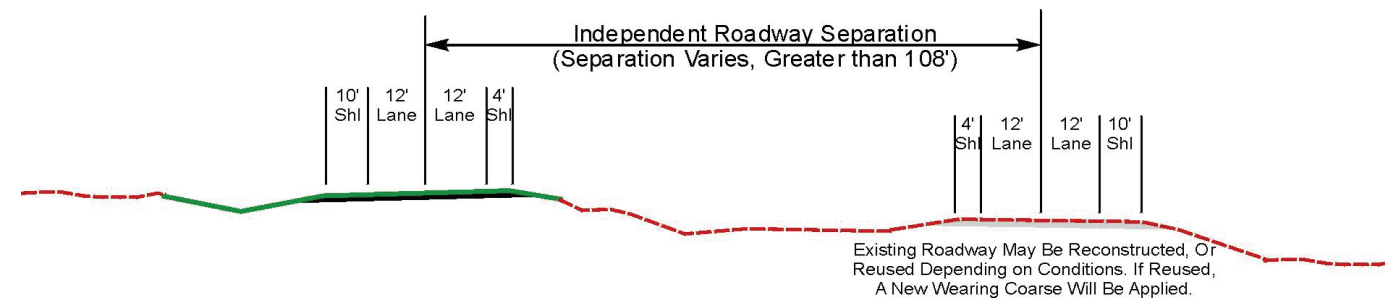
Typical Section 2: Standard Divided Median (108-ft Centerline Separation). A 108-foot center-to-center separation of the roadway centerlines provides an 84-foot median width. This typical section is designated by ADOT as the desirable, divided highway typical section to be used on rural roadways. This section is recommended where wider separation is feasible, and there is either existing or potential development likely adjacent to the highway.

Advantages of this section include:

- Provides a wide median recovery area for out-of-control vehicles.
- Accommodates future expansion without the need for median barrier.
- Allows a greater range of independent profile grades than a narrower median.
- Provides a landscape area in the median to improve aesthetics, especially on this project where the adjacent topography is not very abrupt and the profiles are rather flat.
- The impacts to the environment may actually be reduced from the narrow median as less ground disturbance may result if a natural median can be preserved.
- A standard left or inside turn bay can be provided adjacent to the inside lane, and still provide adequate storage in the median for a vehicle to stop in between the turn bays. With this design, even trucks can make a full turn.
- The wider median allows better flexibility with the drainage design than with a narrower median. Box culverts and pipes, for example, can open and daylight in the median with the roadways separated by this distance.

Disadvantages of this section include:

The only disadvantage with this typical section is that it requires more right-of-way than the minimum width, narrow typical section. However, in the rural, undeveloped areas that exist adjacent to the current highway, the additional new right-of-way that will be required is not considered significant, especially when the advantages of this section are compared to the narrow section.



Typical Section 3: Variable Width, Divided Median (120-ft or more Centerline Separation). With this typical section, the center-to-center separation of the roadway centerlines is so great that typically the two roadways are seen as completely independent roadways with a full, natural median located between them. This typical section is generally desired by many government land agencies through parks, forests, and scenic areas as to give the traveler the sense there is no opposing traffic, or any other obstructions for the other direction of travel. This section is recommended where wider separation is feasible, the cost for the R/W is not significant, and there is very little potential for development adjacent to the highway.

Advantages of this section include:

- Provides completely independent vertical and/or horizontal alignments to best fit the terrain. This results in savings in construction cost by providing a much better chance for a balanced earthwork design, and significantly reduced traffic control efforts.
- Independent alignments can be used to enhance aesthetic treatments such as improving views from the roadway or allowing natural vegetation to remain in the median. Existing features that would otherwise be in the way of the roadway can be avoided by simply going around them.
- Use of independent alignments will not significantly increase right-of-way cost or impact on adjacent property, especially if public agencies agree that there is a benefit to protecting the native vegetation and support providing the wider roadway easement or R/W.

Disadvantages of this section include:

The only disadvantage with this typical section is that it could result in significantly more right-of-way costs if the adjacent land is viewed as developable property. However, especially through the Joshua Forest Scenic Road, development is not likely adjacent to the current highway. Still, the land is managed by the ASLD, and the cost of the wider roadway section must be weighed against the benefits.

All of these typical sections meet the aforementioned goals for the improvement of US 93. The determination of which typical section is used will be based on an analysis of conditions throughout the length of the project.

4.5 Construction of Improvements to the East / West side of Existing US 93.

As discussed in Section 4.1, the existing roadway will be retained for one direction of travel. The determination of whether the new roadway should be constructed on the east or the west side of the existing roadway will depend on an analysis of conditions throughout the length of the project. Factors to be considered include the following:

- The best use of existing right-of-way.
- Minimize impact to existing improved properties adjacent to the highway, and those that could potentially be improved.
- Minimize environmental impacts.
- Minimize impacts on existing drainage facilities and natural drainage features, especially those that are parallel to the existing roadway and not necessary perpendicular to the roadway improvements.
- Enhancement of aesthetic treatment or preservation of natural features.
- Retaining the improvements on one side to avoid a construction/traffic control cross-over. Shifting the improvements from one side of the existing roadway to the other makes construction traffic control difficult; it could result in delays to the traffic and the contractor, and typically results in more difficult earthwork operations. If possible, these costs should be considered if the improvements shift from one side of US 93 to the other.

4.6 Study Segment A Alternatives

Study Segment A, MP 193.5 to MP 190.5, includes the SR 89 intersection, the Burlington Northern Santa Fe (B.N.S.F) Railroad crossing (known as the Matthie Railroad Overpass), the Vista Royale residential subdivision, other existing residential properties, and several county roads.

Terrain through Study Segment A is nearly level and there are no distinguishing natural features. Drainage channels adjacent to the existing corridor are minor and are similar on both sides of the existing highway. With most of the horizontal alignment located on the same tangent, the existing highway follows an excellent alignment.

4.6.1 Alternatives Identified – Study Segment A

Study Segment A begins at the intersection of US 93 and SR 89, two major highways that exist on the northern fringe of the Wickenburg developed area. There have been discussions with the ADOT Prescott District of potential development in this area that would necessitate the development of a full grade-separated traffic interchange for the intersection of these two major highways. However, development of such alternatives would require evaluation of improvements far south of this intersection, as well as improvements and possible relocations of SR 89 itself and realignment of many local roads. For the purposes of this study, it was concluded that any development in the area would keep US 93 on the same alignment as the existing highway section. None of the recommendations ultimately presented in this study will conflict with the future improvements as the crossing over the Matthie Railroad Overpass would be the same in any scenario. The Prescott District will initiate a separate design concept study to evaluate potential improvements to both the SR 89/US 93 intersection, and to continue the improvements to US 93 south from the intersection to the connection with the recently completed interim bypass improvements in Wickenburg that end just south of Rincon Road.

The following alternatives were identified to achieve the 4-lane divided roadway in Study Segment A:

A-1a Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction on the west side of the existing roadway using a 46-foot median width.

A-1b Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction on the east side of the existing roadway using a 46-foot median.

A-2a Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction on the west side of the existing roadway using an 84-foot median width.

A-2b Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction on the east side of the existing roadway using an 84-foot median width.

A-3a Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction using a variable width median on the west side of the existing roadway, which allows development of independent alignments.

A-3b Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction using a variable width median on the east side of the existing roadway, which allows development of independent alignments.

4.6.2 Alternatives Considered and Eliminated – Study Segment A

There are three factors through Study Segment A that influence the placement of the new 2-lane roadway on the west side of the existing roadway:

- Existing right-of-way is substantially wider on the west side of US 93 than on the east side (see **Table 4-2**). Construction of the new 2-lane roadway on the west side of US 93 will utilize the wider right-of-way and avoid having to acquire additional right-of-way.
- Existing residential development between MP 192.3 and MP 191.4 is located approximately 50-feet from the east right-of-way line and within 100-feet of the west right-of-way line. Construction of the new 2-lane roadway on the west side of US 93 will have less impact on the residential properties than construction on the east side.

- Through the residential development on the east side of US 93, there are several turnouts serving individual residences that create conflicts between turning traffic and through traffic. A frontage road will be considered to collect traffic from the multiple residential properties and connect them to US 93 at local road intersections. If the new 2-lane roadway were constructed on the east side of US 93, the right-of-way would have to be widened which would require acquisition of several properties including residences, to construct both the new US 93 roadway and the frontage road. Construction of the new 2-lane roadway on the west side of US 93 will reduce the amount of right-of-way required on the west side since only the frontage road will have to be constructed on that side.

Based on the above factors, it is proposed that the existing roadway will be used for the northbound roadway and a new 2-lane southbound roadway will be constructed on the west side of the existing roadway through Study Segment A. This will minimize impact on existing residential properties along the highway. Therefore, alternatives **A-1b**, **A-2b** and **A-3b** were eliminated from further consideration.

**Table 4-2
Existing Right-of-Way Width**

US 93 Mile Post	West Side	East Side
MP 193.5 (Begin Project) to MP 193.25	200 ft.	100 ft.
MP 193.25 to MP 191.4	150 ft.	100 ft.
MP 191.4 to MP 183.2	250 ft.	150 ft.
MP 183.2 to MP 183.08	250 ft.	200 ft.
MP 183.08 to MP 182.8	Variable (SR 71 TI)	Variable (SR 71 TI)
MP182.8 to MP 179.2	200 ft.	200 ft.
MP 179.2 to MP 177.7	100 ft.	100 ft.
MP 177.7 to MP 174.0	200 ft.	200 ft.
MP 174.0 to MP 161.9	100 ft.	100 ft.
MP 161.9 to MP161.5	Varies 208 ft. min. to 335 ft. max.	
MP161.9 to MP 161.7		100 ft.
MP 161.7 to MP 161.5		Varies 150 ft. min. to 262 ft. max.

A-2a The existing right-of-way on the west side of US 93 through the majority of study segment A is 150-foot wide. Construction of an 84-foot median width will require substantially more right-of-way than the narrower median proposed with Alternative A-1a, especially from the existing residential development that is located along both sides of US 93 from MP 192.3 to MP 191.4. With so much development occurring within this segment, and since this roadway will not be part of the ultimate US 93 highway when the Wickenburg Bypass is eventually constructed, it does not appear necessary to construct such a wide median and cause so many damages to the adjacent properties. Therefore alternative **A-2a** was eliminated from further consideration.

A-3a A variable width median can be justified where an independent alignment would be a better fit to the existing terrain resulting in savings in construction cost, or where scenic features can be preserved or enhanced by using independent alignments. Neither of those conditions exists in study segment A. Independent alignments would require additional right-of-way and would adversely impact existing residential properties. Therefore alternative **A-3a** was eliminated from further consideration.

4.7 Study Segment B Alternatives

Study Segment B (MP 190.5 to MP 180.0) includes the SR 71 traffic interchange. Nearly all of the property adjacent to the highway is managed by the ASLD.

Like Study Segment A, the terrain through Study Segment B is nearly level and there are no distinguishing natural features. The existing US 93 horizontal alignment throughout this study zone is a single tangent roadway. The vertical alignment is nearly flat, with a maximum gradient of 1.25%. Drainage channels are minor and are similar on both sides of the existing highway. All drainage flows are crossing the roadway from the north to the south, and are nearly perpendicular to the highway.

Throughout this study segment, the existing right-of-way is wider on the west side than the east side, up to the SR 71 traffic interchange (TI) located at MP 183.08 (see **Table 4-2**). The right-of-way is the same width on both sides of existing US 93 from the northerly side of the SR 71 TI at MP 182.8 to the end of Study Segment B at MP 180.0. While the R/W is symmetrical about the

existing centerline north of the TI, the R/W fence on the east side of the existing roadway was constructed at a 100-ft offset.

There are no significantly developed areas on either side of US 93 through Study Segment B. There is private property and development at the TI on both the east and west sides of the highway.

4.7.1 Alternatives Identified – Study Segment B

B-1a Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction on the west side of the existing roadway using a 46-foot median width.

B-1b Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction on the east side of the existing roadway using a 46-foot median width.

B-2a Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction on the west side of the existing roadway using an 84-foot median width.

B-2b Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction on the east side of the existing roadway using an 84-foot median width.

B-3a Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction using a variable width median on the west side of the existing roadway, which allows development of independent alignments.

B-3b Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction using a variable width median on the east side of the existing roadway, which allows development of independent alignments.

4.7.2 Alternatives Considered and Eliminated – Study Segment B

The existing right-of-way continues to be wider on the west side of existing US 93 than on the east side through most of this study zone. There is virtually no development on either side of US 93 and the topography and vegetation through this study segment are similar on both sides of the existing road.

Since there are no factors that override the advantages of maximizing the use of existing right-of-way, it is proposed that the existing roadway will be used for the northbound roadway and a new 2-lane southbound roadway will be constructed on the west side of the existing roadway through study segment B. Therefore, alternatives **B-1b**, **B-2b** and **B-3b** were eliminated from further consideration.

B-1a The existing right-of-way width through Study Segment B is at least 200-foot wide on the west side of US 93 and there is virtually no development along the highway. Therefore, the rationale for using the minimum divided highway section allowed does not apply through Study Segment B. A wider median can be constructed within existing right-of-way throughout the study zone. Alternative **B-1a**, which provided a narrow, minimum median, was eliminated from further consideration.

B-3a A variable width median can be justified where an independent alignment would be a better fit to the existing terrain resulting in savings in construction cost, or where scenic features can be preserved or enhanced by using independent alignments. Neither of those conditions exist in study segment B since the terrain is essentially level and there are no scenic features that would be enhanced by independent alignments. Independent alignments that increase the median width beyond the 84-foot median provided in alternative B-2a would require additional right-of-way. Therefore alternative **B-3a** was eliminated from further consideration.

4.8 Study Segment C Alternatives

Study Segment C (MP 180.0 to MP 161.5) begins at the southern boundary of the Joshua Forest Scenic Road and continues northerly, tying into the existing 4-lane divided highway just south of the Santa Maria River. US 93 is designated as the Joshua Forest Scenic Road for the entire length of study segment C. Scenic setbacks of 500-ft on both sides of the existing roadway were established by Transportation Board Resolution from approximately MP 178 to the Santa Maria River.

Alamo Lake Road and Date Creek Ranch Road are major roadway intersections within Study Segment C. Several primitive roads that serve undeveloped areas on both sides of US 93 also intersect the highway, as well as turnouts to a few private property parcels. Most of them are gated turnouts.

The existing right-of-way continues to be symmetrical about the existing centerline from the beginning of Study Segment C to MP 161.9; however the width varies from 200-feet to 100-feet each side of the existing highway centerline. From MP 161.9 to the end of Study Segment C the right-of-way width varies to accommodate the existing 4-lane divided roadway (see **Table 4-2**).

US 93 crosses several drainage channels within Study Segment C, two of which are major bridged washes. US 93 crosses Date Creek at MP 174.2 and Big Jim Wash at MP 165.54. In addition to these perpendicular crossings, there are several minor washes that either parallel the existing highway for a short distance, or cross the ultimate R/W at a flat skew.

Terrain through Study Segment C is rolling, and is similar on both sides of US 93 from the beginning of the study zone to approximately MP 173. From MP 173 to the end of the project, the terrain is more severe on the west side of the roadway than the east. The existing highway follows an excellent alignment that fits the rolling terrain well through the entire section.

Two WAPA transmission lines cross over US 93 at MP 163.3. The WAPA structure nearest the east side of US 93 is for a 345 kv line (the Mead-Liberty line) and is designated as tower 162-3. The parallel line, located east of the Mead-Liberty line is a 500kV, Mead-Perkins line.

4.8.1 Alternatives Identified – Study Segment C

For this study zone, only the standard median width and varying median width sections were considered as there was no benefit of considering the narrow median within the Joshua Forest Scenic Road.

- C-2a.** Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction on the west side of the existing roadway using an 84-foot wide median.
- C-2b.** Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction on the east side of the existing roadway using an 84-foot wide median.
- C-3a.** Provide a divided highway using the existing roadway as 2-lanes northbound and constructing a new 2-lane roadway for the southbound direction on the west side of the existing roadway using a variable width median.
- C-3b.** Provide a divided highway using the existing roadway as 2-lanes southbound and constructing a new 2-lane roadway for the northbound direction on the east side of the existing roadway using a variable width median.
- C-3.** Use the existing 2-lane roadway for one direction of travel and construct a new 2-lane roadway for the opposite direction of travel, providing a variable width median to make available a divided highway. Vary the location of the new roadway from the west side of the existing road to the east side of the existing road through the Study Segment. The new 2-lane roadway would be on the west side of the existing roadway at the beginning of Study Segment C to match the roadway section used in Study Segment B. The new 2-lane roadway will shift from the west side of the existing roadway to the east side where the terrain changes from level to rolling. Through the remainder of segment C, the location of the new roadway will vary with respect to the existing roadway to best fit the terrain.

4.8.2 Alternatives Considered and Eliminated – Study Segment C

Both alternatives C-2a and C-2b include a constant 84-foot wide median. Within the scenic roadway limits, there are visual elements that should be enhanced from the view of the vehicle occupants, as well as significant vegetation that should be preserved with a varying width median. The constant width median limits the ability to enhance the scenic aspects of the area and would not allow the retention of an appreciable amount of vegetation in the median. Therefore neither of these alternatives is acceptable. Both alternative **C-2a** and **C-2b** were eliminated from further consideration.

Alternatives C-3a and C-3b both maintain the new 2-lane roadway on one side of the existing 2-lane roadway through the length of the study segment; C-3a on the west side of the existing lanes, and C-3b on the east side of the existing lanes.

The existing right-of-way is symmetrical about the centerline of existing US 93 through the length of Study Segment C, so there is no advantage to maintaining the location of the new 2-lane roadway on one side or the other of the existing roadway.

Segment C has a variety of topographical, drainage, and scenic challenges on both sides of the existing roadway. Maintaining the location of the new 2-lane roadway only on one side or the other of the existing roadway for the full length of Study Segment C, while desirable from a traffic control and constructability perspective, limits the ability of the new alignments to truly best fit the rolling terrain and to avoid the existing drainage features. The opportunities to enhance visual features and retain desirable vegetation through the length of Study Segment C are also limited if the new roadway is retained exclusively on one side of the existing roadway. Since alternative C-3 provides the needed flexibility in designing the new roadway that best fits the terrain on both sides of the roadway, alternatives **C-3a** and **C-3b** were eliminated from further consideration.

4.9 Description of Selected Alternatives

Each of the design concept alternatives shown in **Figure 4-2, Study Alternatives**, was developed in detail based on the project objectives outlined in Section 1.4.3 using the design controls stipulated in Section 5.2. A narrative description of each design concept alternative is presented below. Plan and profile sheets for the preferred alternatives are provided in Appendix E.

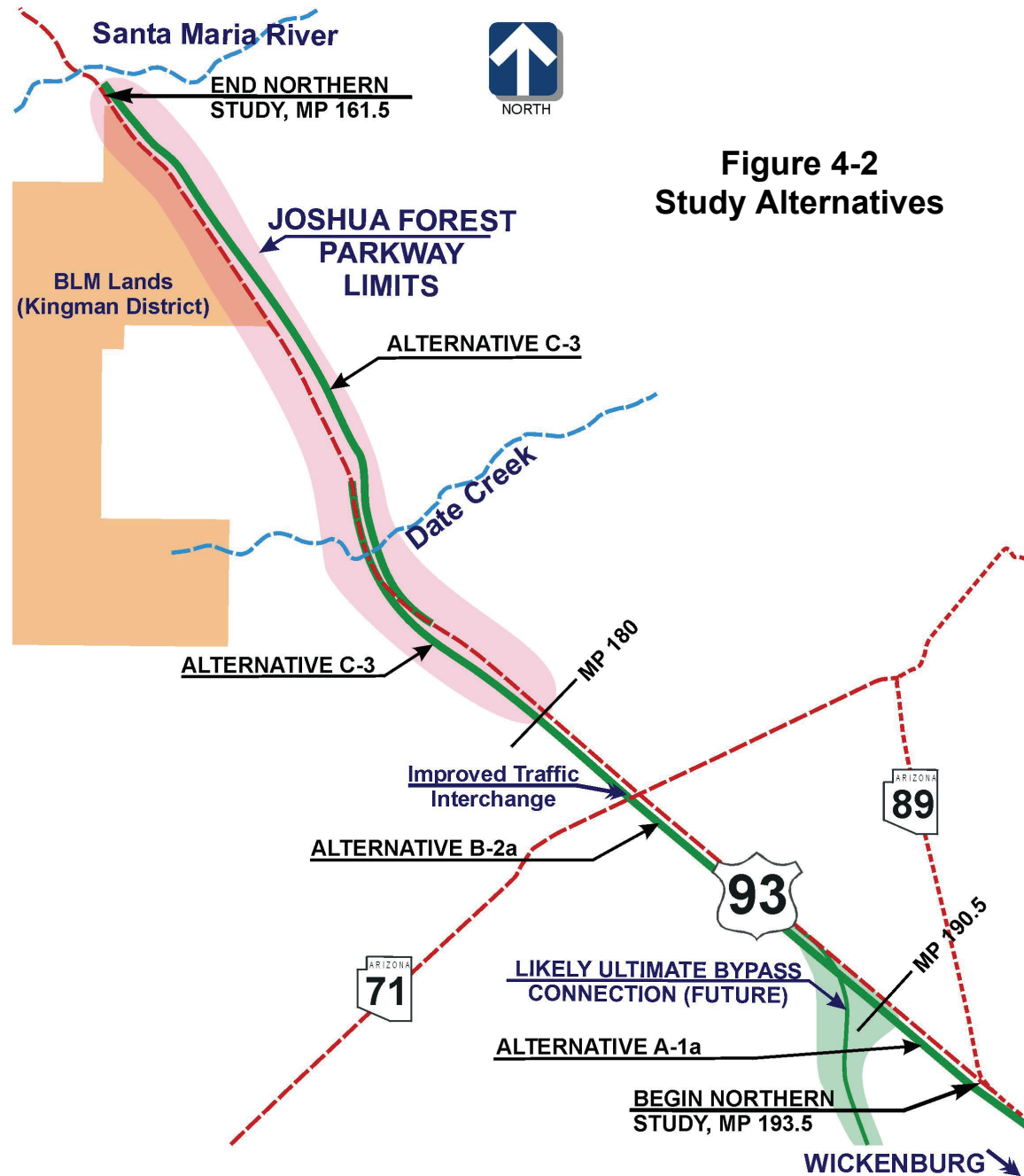


Figure 4-2
Study Alternatives

4.9.1 Study Segment A Design Concept Alternative A-1a (MP 193.5 to MP 190.5) (Sta. 104+00 to Sta. 270+00)

Alternative A-1a begins at the Junction of US 93 and SR 89 and continues northerly along the existing US 93 alignment across the Matthe Railroad Overpass over the BNSF railroad, ending just north (west) of existing residential development.

At the beginning of the project, existing US 93 is a divided 4-lane roadway with a 100-foot center-to-center roadway centerline separation. Immediately north of the SR 89 intersection, the existing southbound lane tapers into the northbound alignment and both northbound and southbound roadways taper from 2-lanes to 1-lane. For the purposes of this study, the southern limits and improvements will tie into this divided section of highway just north of the intersection. The improvement to the intersection itself is the subject of a separate study evaluating US 93 from MP 188 to 193.5, the “Gap” study.

Therefore, Alternative A-1a continues the divided roadway concept already developed at the intersection. The existing roadway will continue to be used for the northbound lanes. New southbound lanes will be constructed parallel to and west of the existing roadway. The roadway separation will be reduced from 100-feet to 70-feet to keep the new 2-lane roadway within the existing right-of-way. The transition from 100-feet to 70-feet will occur through the initial curve between the SR 89 intersection and the Matthe Railroad Overpass.

A new 2-lane BNSF overcrossing bridge will be constructed for the southbound lanes west of the existing bridge. The existing overpass will remain in place for the northbound roadway.

There are residential developments on both sides of US 93 beginning at approximately MP 192.3, just west of Moreton/Nine Irons Ranch Road. The residences on the east side are located quite close to the existing right-of-way line and have turnouts directly onto US 93. Vista Royale, a residential

subdivision directly across US 93 on the west side, utilizes a single entrance for access to the highway. Through the residential developments to the end of Alternative A-1a, continuation of the 70-foot separation of the divided roadways is justified to construct the new 2-lane roadway on the west side of the existing roadway within existing right-of-way.

Ultimately, all regional US 93 traffic will be relocated off of this section of road to use the ultimate Wickenburg Bypass that ties to existing US 93 near MP 191. However, it is expected that the bypass will not be constructed for 15-20 years. From the present time until the bypass is available, US 93 will continue to occupy the existing alignment between SR 89 and the future connection to the bypass alignment. Interim improvements to provide a 4-lane roadway on the existing US 93 alignment are necessary to provide a safe and efficient transportation facility until the ultimate bypass is completed. Partial access control will be included in improvements in Study Segment A. However, it is anticipated that the Wickenburg bypass will be complete by the time full access control is needed.

Partial access control will be achieved in this area by consolidating the many individual residence turnouts and county roads to use combined access crossovers at either end of this developed area, and one at the entrance to the Vista Royale subdivision. With the use of access roads on the east side, all access between MP 191.5 to 192.6 will be consolidated to better meet the requirements of providing partial access control in the area (See Chapter 7).

Detailed access would be implemented as follows:

- Retain the Quail Run intersection on the east side of US 93 at MP 192.6 as a right in/right out intersection with no median crossover.
- A two-way frontage road will be constructed on the east side of US 93 from Quail Run (MP 192.6) to MP 191.5. Nine Irons Ranch Road and the eight existing residential turnouts will connect to the frontage road. Connections between the frontage road and US 93 will be provided at Quail Run (MP 192.6), Nine Irons Ranch Road (MP 192.4), Caballero Drive (MP 192.1) and at MP 191.5.
- The skewed intersections of US 93 with Moreton Road on the west side and Nine Irons Ranch Road on the east side of US 93 at MP 192.4 will be realigned to provide a 90-degree intersection with US 93 including a median crossover.

- An at-grade intersection with median crossover will be constructed on the west side of US 93 at Caballero Drive (MP 192.1) to provide access to the Vista Royale subdivision.
- The gated emergency access to Vista Royale on the west side of US 93 at MP 191.5 will be realigned to a 90-degree turnout opposite the access to the frontage road on the east side of US 93. A median crossover will be provided.

North of MP 191.5, where currently there is no development, the roadway separation is maintained at the 70-ft centerline separation to maintain a uniform roadway appearance until the ultimate Wickenburg Bypass is constructed. When the bypass is finally developed, the current US 93 roadway is expected to be re-aligned beginning near MP 191, to curve towards the southwest and form an interchange with the new Bypass.

With the close proximity of the residences and the tight R/W restrictions, there is not much flexibility in the vertical design of the roadway. The profile is constrained by the existing road throughout in order to provide desirable crossover profiles and allow offsite drainage to pass through the corridor. While drainage and utilities must be adjusted to fit the new access roads, no major design issues exist that impact the alignment design.

4.9.2 Study Segment B Design Concept Alternative B-2a (MP 190.5 to MP 180.0) (Sta. 270+00 to Sta. 620+00)

Alternative B-2a begins with a 70-foot separation between roadways, matching the improvements from Study Segment A. The roadway section will immediately transition to a wider, more desirable 108-foot separation, with the new 2-lane southbound roadway remaining on the west side of the existing roadway, to take full advantage of the existing R/W. The existing R/W on the west side of US 93 throughout this study zone will accommodate the wider median. The very fact that the existing roadway was located asymmetrically within the R/W and that there is ample room to build the improvements on the west side lends support to this roadway configuration.

The transition to the wider roadway will be accomplished using 0-degree, 15-minute reversing horizontal curves to complete the transition with little disruption to the driver. Aesthetically, the large

radius curves and resulting shift in separation will also not be as noticeable to the passenger.

The 108-ft roadway separation will allow the new southbound roadway to be developed with an independent vertical profile. As most of the terrain is nearly flat, the only major vertical objective is to clear the many drainage culverts that cross under the existing roadway prism. The frequency of the culvert crossings, however, nearly forces the entire roadway embankment to be constructed on embankment. Without any available excavated material, this could result in significant borrow costs for this segment of roadway.

To provide some embankment material, several added “basins” were excavated on the downstream (west) side of the new southbound roadway. These basins are large, shallow swales located between major drainage crossings that may provide enough embankment material to avoid hauling borrow for long distances. The basins will be designed as not to capture water, but to allow it to slowly gravity drain to an existing downstream drainageway. Seeding and relocating salvaged plants can mitigate the appearance of these basins. A cross section of this concept is shown in **Figure 4-3**.

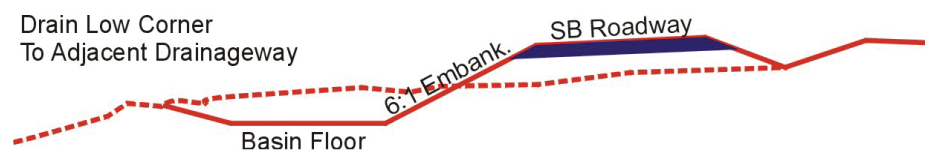


Figure 4-3: Embankment Excavation Basins

The traffic interchange at the junction of US 93 and SR71 will be reconstructed to accommodate the 4-lane roadway on US 93, and to bring the interchange ramps to current standards. Initially, a new 2-lane overcrossing structure was considered for the new southbound lanes west of the existing bridge. The existing raised median will be removed from the existing bridge and the bridge rail will be brought to current standards. However, while this concept would be relatively easy to construct, it would require a significant amount of embankment material to raise southbound US 93 over SR 71. In addition, the existing vertical profile for the northbound roadway does not meet the proposed design speed. Therefore, it too would need to be reconstructed over SR 71. As there is very little excavation material available in this segment, most of this material would need to be hauled in as borrow.

An alternative to building US 93 over SR 71 is to reverse the grade-separation, and build SR 71 over US 93. With this concept, only 1/3 of the earthwork would be required to raise the minor cross highway over the US 93 mainline, reducing the construction costs considerably. Only one bridge structure, SR 71, would be necessary. The primary roadway would remain at grade, and have the greatest benefit of the vertical stopping sight distance. Lastly, the infield areas between the ramps and mainline could be depressed to form small retention basins to supply additional material for the mainline roadway embankment. The area does not experience significant rainfall, the soils are susceptible to percolation, and the water captured by the basins could be used by the salvaged vegetation that can be planted within these areas to return the site to a more natural appearance.

Through the interchange area new right-of-way will be required along the four interchange ramps. The existing ramps do not provide adequate ingress and egress geometry for the higher speed roadway, and do not provide adequate intersection sight distance at the terminals with SR 71. The ramps proposed in the DCR concept plans have been established following the Roadway Design Guidelines, providing a maximum skew at the intersection with SR 71 of 10-degrees.

Full access control has been established through the interchange area on US 93. Access control along SR 71 will be modified to incorporate current requirements for access control at ramp terminals. Per the desires of ADOT’s Right-of-Way and Roadway Design Groups, access control will extend from the radius returns of the interchange to points at least 600-ft beyond the radius returns. This will require relocation of some of the existing access points into the properties adjacent to the interchange today.

North of the SR 71 interchange, the terrain continues to be nearly level. The existing right-of-way width, unlike the right-of-way south of the TI, is now symmetrical about the existing roadway centerline, and 200-ft wide on both sides (see Table 4-2). The horizontal alignment of the existing roadway remains on a straight tangent from the SR 71 interchange to the end of Study Segment B at MP 180.0 and there are no significant differences between terrain or drainage features on either side of the highway. Therefore, there are no reasons to vary the alignment of the new 2-lane roadway from its location 108-feet west of the existing roadway within Study Segment B. The new 2-lane roadway can be constructed within existing right-of-way between the SR 71 interchange at

approximately MP 182.8 and the end of Study Segment B at MP 180.0.

While there is adequate room to build the improvements within the existing right-of-way north of the TI, there is not as much flexibility in excavating additional material adjacent to the roadway to gain the material needed for the new roadway embankment section. The new profile will need to be designed to barely clear the drainage features to ensure there is adequate material to build the new embankment without significant borrow material being trucked in.

Most of this segment abuts ASLD lands. Minor access points through this segment of the project will be accommodated as described in Section 7.

4.9.3 Study Segment C Design Concept Alternative C-3 (MP 180.0 to MP 161.5) (Sta. 620+00 to Sta. 1620+00)

Alternative C-3 begins as a continuation of the 108-foot centerline separation between roadways, with the existing roadway used for northbound travel and a new 2-lane southbound roadway constructed parallel to and on the west side of the existing roadway.

The beginning of this study segment corresponds with the southerly boundary of the Joshua Forest Scenic Road. As this scenic designation continues beyond the Santa Maria River, all of the improvements have been developed to protect this special highway designation.

The new 2-lane roadway on the west side of existing US 93 can be constructed within existing right-of-way between MP 180.0 and MP 179.2 where the existing right-of-way narrows to 100-feet on each side of the centerline of the existing roadway. Additional right-of-way will be required on the west side of the existing right-of-way for the new 2-lane roadway north of MP 179.2.

Alamo Road intersects US 93 on the west side at MP 178.6 and a primitive road intersects US 93 on the east side diagonally across from Alamo Road. Alamo Road will require minor realignment to provide a right angle intersection with the new US 93 roadway.

Following MP 178, the existing highway incorporates a gradual left turn. The new southbound roadway also incorporates a gradual

0-degree, 30-minute turn to the left, but also concurrently incorporates a transition to a wider roadway separation of 200-ft. This change was implemented to retain more native vegetation in the median as the density of Joshua trees increases.

Date Creek Ranch Road intersects US 93 on the east side at MP 177.4 and a primitive road intersects US 93 diagonally across from Date Creek Ranch Road. The primitive road on the west side of US 93 will require minor realignment to provide a single right angle intersection with the new US 93 roadway.

At approximately MP 176 the terrain gradually changes from nearly level to rolling. The natural vegetation continues to change with the density of Joshua Trees increasing along the roadway. Parallel to and on either side of the existing roadway, existing drainage ravines appear that ultimately lead to Date Creek. Maintaining a constant centerline offset from the existing roadway would not allow the new southbound alignment to best fit the terrain. The southbound alignment, while similar to the existing northbound roadway, follows a ridge that exists between two drainage ravines, located approximately 200- to 300-feet west of the existing.

Date Creek, a major drainage channel, crosses the highway at approximately MP 174.2. The separation between the roadways will be increased to about 600-feet at MP 174, which allows both natural vegetation and the natural channel for Date Creek to be retained in the median. Another reason for the wider median is to build the new roadway on a single, continuous curve from MP 176 to 173, avoiding the “broken back” combination of smaller curves and a short tangent used on the existing roadway.

From approximately MP 173 northerly to the end of the project the terrain becomes more severe on the west side of existing US 93 than on the east side. Impacts on existing drainage channels are also reduced by constructing the new roadway on the east side of the existing roadway through this more severe terrain. Therefore, the alignment of the new roadway is shifted from the west side of the existing highway to the east side at approximately MP 173, which allows the vertical and horizontal alignment to better fit the terrain. This shift occurs such that the new southbound curve follows the foothills of the adjacent slopes west of the existing road to align with the existing highway near MP 173. At the section line near MP 173.25, the new northbound alignment departs from the existing alignment through a curve to be located parallel to and 200-ft east of the existing roadway. Making the shift at this location also avoids

encroaching into private property and an air field located on the east side of the existing roadway south of MP 173.25.

At MP 172.8, there is an existing roadside table. While the table provides a stopping point used by many travelers, located on the inside of a curve, it has been the source of many accidents as well. ADOT has requested that this roadside table be removed, however, the ability to stop and safely pull off the roadway is still desired for emergencies. As a mitigation measure, ADOT has agreed to provide safety pullouts on both directional roadways in this location. The roadways will also be the location of the emergency cell phone the Kingman District has provided in this area. As such, the location is dependant on cell phone service and good stopping sight distance for the pulloff.

Between MP 173 and MP 172, and generally up to MP 168, the northbound roadway alignment is similar to the existing, but the separation between roadways varies from a 200-ft minimum to 600-ft to retain large outcroppings of Joshua Trees and avoid natural drainage channels. Specifically at MP 172.5 and 169.7, the roadway was moved significantly to allow natural drainageways to remain in the median. The transitions were accomplished with large curves and gentle transitions to give the roadway a smooth appearance through the scenic roadway. The greater separation also shields the motorist from the opposing traffic, enhancing the driving experience through this reach of roadway.

From MP 168 northerly to MP 165, the separation between roadways is again reduced to 200-feet to minimize impact to the D.G. Ranch and crossings of both Hackberry Wash and Big Jim Wash. The 200-foot separation still retains natural vegetation in the median and allows the profiles to follow the landform through this area.

While most of the existing drainage and bridge structures are maintained under the existing roadway, the existing bridge across Big Jim Wash is structurally deficient. Therefore the existing bridge will be removed and replaced with a new bridge as part of this improvement project.

From MP 165.1 the separation between roadways again gradually increases to approximately 430-feet to align the new northbound roadway to pass between WAPA transmission towers near mid-span to avoid impacting the transmission line and maximize the clear distance between the roadway and towers on both sides of the roadway. The vertical clearance between the roadway profile and the WAPA transmission lines will be one of the first constraints for

the profile, as the elevation of the power lines vary with temperature. Once the minimum height of the existing lines is established, it forms the basis for the roadway profile. Once past the WAPA towers, the separation between roadways reduces to 108-feet by MP 162.5.

As the improvements approach the Santa Maria River, a transition will be necessary to shift the improvements from the east side of the existing roadway, to the west side to match the recently completed roadway improvements beginning at MP 161.5. Transitions were investigated through the curves at MP 163 and at 161.5. The landform feature that helped make this selection was the drainage channel that crosses the existing roadway on a flat skew near MP 161.8. To best avoid this feature, the southbound transition from the existing 2-lane two-way roadway to the newly completed existing 2-lane, one-way roadway must occur between MP 161.5 and 161.9. This new transition would replace the reversing curves that currently transition the new southbound roadway to tie into the existing two-way roadway. Similarly, the new northbound roadway would parallel this new transition, keeping the two roadways 108-feet apart.

Access to three ranch properties along US 93 and to the network of primitive roads serving public and private land away from the highway will be accommodated initially and ultimately as described in Chapter 7, the Access Management Plan.

When full access control is implemented on US 93, a traffic interchange and access roads will be required to provide access between US 93 and both Alamo Road and Date Creek Ranch Road. The proposed location of the traffic interchange is MP 178.2. Other traffic interchanges and access roads are proposed at MP 171.2 and at MP 162.5 to provide access to the three ranch properties along US 93 and to the network of primitive roads serving public and private land away from the highway.

4.10 Evaluation of Alternatives

Each design concept alternative developed was based upon the project objectives and evaluation factors described in Sections 1.4.3 and 1.4.4. The evaluation began first from a corridor perspective, considering if major shifts or changes to the existing corridor should be implemented. After concluding that the existing roadway was sufficient for use as one direction of travel, and that there was no reason to locate the roadway outside of the existing corridor, several alternatives were considered to make improvements adjacent to the existing roadway.

The alternatives were developed in a progressive manor. As changes or improvements to previous alternatives were considered, they were implemented to the preferred alternatives being developed. The merits or flaws of each alternative considered were identified within the alternative description. The evaluations of these concepts were discussed in Sections 4.3 through 4.9. All alternatives considered are summarized in **Table 4-3, Alternatives Development Summary**.

Table 4-3: Alternatives Development Summary

Project Limits	Study Segments	Improvement Alternatives	Design Concept Alternatives	Preferred Alternative
Project Limits: MP 193.5 - 161.5 SR 89 to Santa Maria River	Segment A MP 193.5 - 190.5 SR 89 to north of Vista Royale	A-1a (carried forward) A-1b (eliminated) A-2a (eliminated) A-2b (eliminated) A-3a (eliminated) A-3b (eliminated)	A-1a MP 193.5 - 190.5 preferred	A-1a B-2a C-3
	Segment B MP 190.5 - 180.0 North of Vista Royale to Joshua Forest Scenic Road	B-1a (eliminated) B-1b (eliminated) B-2a (carried forward) B-2b (eliminated) B-3a (eliminated) B-3b (eliminated)	B-2a MP 190.5 - 180.0 preferred	
	Segment C MP 180.0 - 161.5 Joshua Forest Scenic Road to the Santa Maria River	C-1a (eliminated) C-1b (eliminated) C-2a (eliminated) C-2b (eliminated) C-3 (carried forward)	C-3 MP 180.0 - 161.5 preferred	

4.11 Conclusions

4.11.1 Discussion

US 93 from SR 89 to the Santa Maria River must be improved to meet the transportation needs of the State, the region, and the local residents as well. After starting with several feasible typical sections and with opportunities to build on either side of the existing roadway, three, well defined alternatives, matching the goals and objectives of the study process, have evolved as preferred alternatives. All that remains is to compare the advantages and impacts for the Build vs. No-Build Alternative, as there are no options that remain to compare within the three study segments.

- **No Build vs. Build Alternatives**

The No-Build Alternative involves no expenditure of funds and no apparent change to the environmental factors along US 93. However, the No-Build Alternative:

- Will require continuing expenditures to rehabilitate and maintain the existing, aging roadway. However, all of the improvement alternatives will require some form of rehabilitation and maintenance of the existing roadway since it will be retained for one direction of travel.
- Will not reduce traffic congestion and the number of accidents along the corridor,
- Will not fulfill the primary goal of improving the capacity, safety, and traffic operational characteristics of the route.

Therefore, the No-Build Alternative is unacceptable.

Conclusion: **The No-Build Alternative is not recommended** and has been eliminated from consideration.

4.11.2 Public Opinion

In addition to the public scoping meeting held on June 3, 1999, a public information meeting was held at the Wickenburg Community Center from 6:00 to 8:00 p.m. on August 22, 2000. The meeting was advertised in the Wickenburg Sun and the Arizona Republic two weeks prior to the meeting. Three hundred forty-three people signed in at the meeting.

The meeting began with an explanation of the study process and how it had progressed since the public scoping meeting. The alternatives for widening US 93 from north of Wickenburg to the Santa Maria River were presented. It was explained that the existing roadway would be retained for one direction of travel and widening would occur to either side to provide a four-lane divided facility. Forms were made available at the meeting to allow the public to submit written comments.

Comments received regarding the project were generally in support of improving the roadway due to perceived unsafe conditions on the existing roadway. Concerns were expressed about visual impacts, impacts to businesses, avoiding wildlife and vegetation, improving the US 93/SR 89 and US 93/SR 71 junctions, accommodating new development, noise impacts, and maintaining access to adjacent properties. In addition, several people expressed opposition to the widening because they believed that the bypass southwest of Wickenburg should be the first priority for US 93 improvements in the Wickenburg vicinity.

At the conclusion of the study process, a Public Hearing was held to present the results of the study and the Environmental Assessment. The meeting was held on November 17, 2004 at the Wickenburg Community Center from 6:00 to 8:00 p.m. The meeting was advertised in the Wickenburg Sun and the Arizona Republic two weeks prior to the meeting. Over 120 people signed in at the meeting. A summary of the comments follows (the number of comments received in a given summary are shown in parenthesis):

With respect to the Date Creek Ranch area (39 comments total), the following comments were made:

- Provide turn lanes at various specified access points (11)
- Turning radius at access points needs to accommodate cattle trucks, tractor-trailers, and equestrian trailers (10)
- Maintain existing access points (5)
- Install a turn lane in the northbound roadway at Date Creek Ranch Road to accommodate customers turning into the orchard (3)
- The median at Date Creek Ranch Road is hazardous for horse crossings (2)
- Concerned about the noise levels at ranch headquarters (1)

With respect to the Roadside Rest Area (8 comments total):

- The removal of the rest stop will increase trash dumping and human waste on properties adjacent to US 93. A rest stop facility is needed in this area, or some means of stopping for breaks. (8)

With respect to the Grazing/Cattle Improvements and impacts to these lands (26 comments total):

- Box culverts installed for cattle crossing should accommodate horses where lands are used for grazing(6)
- Maintain access to pasture/cattle crossings under new roadway (5)
- Concerned about impacts and access to improvements that are within or immediately adjacent to the proposed R/W (5)
- Allow grazing in median at Date Creek (3)
- The existing cattle crossings have filled with sand and need maintenance (2)
- Maintain and protect washes that cross the highway because they provide water for cattle operations (2)
- Maintain water lines at approximately MP 177.5 and MP 176.0 (2)
- R/W takes the majority the my north end of my ranch (1)

With respect to the Vista Royale neighborhood impacts (15 comments total):

- Use rubberized asphalt for noise mitigation (3)
- Existing noise level is too high, especially because of truck traffic (2)
- Concerned about impact on residential area (2)
- Need to improve access onto US 93 for residents of Vista Royale (2)
- Need a left turn lane at Matthie Ranch Road (2)
- Sound walls are necessary (1)
- Noise abatement of some type is necessary (1)
- Need to better inform area residents of planned improvements (1)
- Provide lighted intersection at Vista Royale entrance, with turn lane (1)

With respect to the general and US 93 comments:

- Build it soon (2)
- No elected officials attended the hearing (1)
- Study is a waste of tax money (1)
- We were told that the existing scenic corridor setbacks would not be changed when road improvements are performed (1)
- Concerned about how far north the bypass will be built from Vista Royale area (1)

4.11.3 Conclusions

Several alternatives have been developed and evaluated for improving US 93 from SR 89 to the Santa Maria River. These improvements will enhance the safety and traffic operational characteristics of the roadway, and will allow it to meet current and future traffic needs. In addition, implementation of these improvements will enhance the roadway appearance while protecting the scenic roadway designation it has already achieved.

In conclusion the following recommendations are made:

- **Construct a four-lane divided roadway throughout the US 93 corridor.**
- **Retain the existing highway for one direction of travel, however make the existing highway compliant with current design standards with respect to width and safety.**
- **Provide a variable width median through the Joshua Tree National Parkway.**
- **Sequentially listed, construct the improvements as described by Alternatives A-1a, B-2a, and C-3.**

5. MAJOR DESIGN FEATURES

5.1 Introduction

This section describes the major design features associated with the recommended alternative. The recommended alternative is comprised of design concept alternative segments A-1a, B-2a and C-3 as described in section 4.6 and shown on the plan sheets in Appendix E.

5.2 Design Controls

The following design controls were used in the development of the design concept for the selected alternative. All criteria is based on “Rural” standards as no portion of the roadway studied qualifies for “Urban” standards.

- Design Year: 2025
- Design Speed:
 - New mainline roadway design speed:
 - 75 mph.
 - Access Roads and local roads will be designed to modified ADOT RC typical section. An IGA with the County to maintain these facilities after construction will be required.
 - Frontage road design speed: 50 mph.
 - Realigned local road connections design speed: 50 mph.
 - Realigned SR 71, over the US 93 Mainline: 45 mph. (*This speed was selected to retain access to adjacent properties after the new profile over US 93 is developed.*)
- Typical Sections
 - Four-lane Divided Rural Highway (Section RA, ADOT Roadway Design Guidelines):
 - Lane Width: 12-ft
 - Shoulder Width: 10-foot outside shoulder
4-ft inside shoulder
 - New Bridges: Shoulder plus 2 feet to face of barrier
 - Number of Lanes: Two lanes each direction
 - Median Width: Varies 46 ft to 600 ft

- Two-lane Undivided Rural Roadways (Access Roads & Local Roads) (Section RC, ADOT Roadway Design Guidelines, Modified):
 - Lane Width: 12 ft
 - Shoulder Width: 2 ft.
 - New Bridges: 32 ft.
 - Number of Lanes: One lane each direction

- Slope Criteria:
 - US 93 Mainline roadway section, ADOT Standard C-02 series as appropriate. No embankment slopes for any roadway section are to be steeper than 2:1 (2 horizontal to 1 vertical). Where feasible 4:1 embankment slopes should be constructed in lieu of guard rail. Frontage and Local Roads follow ADOT Standard C-02.30.
- Maximum Gradient:
 - US 93 Mainline:
 - Level terrain - 3 % (MP 176 – MP 193.5)
 - Rolling Terrain – 4% (MP 161.5 – MP 176)
 - Frontage and Local Roads: 7 %
 - Intersection approach grade for side roads: 3%
- Maximum Rural Superelevation: 0.10 ft/ft (ADOT Roadway Design Guidelines recommend 0.10 ft/ft for elevations below 4,000 ft.
- Maximum Degree of Curve (based on superelevation rates specified above):

Design Speed (mph)	Degree of Curve
75	2° 54'

- Median crossovers associated with the divided roadway alternatives were provided at locations of obvious need (major intersections, turnouts to developed properties) and are shown on the recommended design concept alternative plans. However, the median crossovers are to be considered as interim access provisions only. See Section 7, Access Management Plan, for further details.

- Guardrail: Provide per ADOT Criteria and/or AASHTO Roadside Design Guide.

5.3 Horizontal and Vertical Alignments

The horizontal and vertical alignments of the recommended alternative were set to follow the existing route and use the existing roadway for one direction of travel through the entire length of the project:

- For maintenance of traffic during construction.
- To mitigate the impact on the environment by minimizing the construction area.
- To maintain existing access to adjoining properties.
- For overall economy of the proposed improvements.

The existing horizontal and vertical alignment provides a usable roadway throughout the length of the project. Although the existing roadway does not meet new construction criteria for shoulder width, and has minor deviations from AASHTO criteria for superelevation and grades, it will meet the needs for one direction of travel for many years. Improvement of the existing shoulder width can be constructed in phases over several years to allow reasonable funding levels to be programmed while still providing the needed capacity and safety improvements necessary to handle projected increases in traffic.

Minor adjustments of the horizontal and vertical alignments of the new roadway as presented herein will be necessary during final design to minimize impacts to existing development and to achieve an optimum earthwork balance (see Section 5.9.9 for a discussion on earthwork balancing).

5.4 Access

Full control of access is recommended along US 93 to enhance traffic operation and safety as well as to preclude uncontrolled future access and random strip development. Initially, partial access control will be implemented. Access roads will serve as collector roads in areas having numerous, closely spaced turnouts. Right-in right-out provisions will be provided for isolated situations. Later, as traffic increases, the median crossovers will be replaced with traffic interchanges resulting in a fully access controlled highway, See Section 7, Access Management Plan, for details.

5.5 Right-of-Way

Of the property presently (2004) fronting the highway, approximately 78 percent is State land, approximately 16 percent is private land, with the remainder being BLM land. The width of existing right-of-way along US 93 varies from 100 feet to more than 300 feet on the west side and from 100 feet to more than 250 feet on the east side. An additional width to provide a 500 foot scenic setback on both sides of the existing centerline is present throughout the Joshua Forest Scenic Road section (See the Visual Assessment for additional information on this setback).

The recommended alternative will require additional right-of-way from private property, ASLD, and BNSF Railroad. Table 5-1 lists the County Assessor's parcel number, parcel ownership, and estimated additional right-of-way required, for the various design concept alternatives. The design concept plans in Appendix E identify new right of way needs with a Plans Reference Number (A101, A116, etc.), which is keyed to the plan's reference number column in Table 5-1.

Table 5-1: Estimated New Right-of-Way

Plans Ref.	Parcel Number			Owner	Approx Take (Acres)
	BK	Map	Par.		
S100				State of Arizona	
A100	201	06	001G	Wvdl Ui & Boyd, Alwxander Ui	2.66
A101	201	06	001F	Petroleum Inc.	0.00
A102	201	02	002N	Wvdl Ui & Boyd, Alwxander Ui	0.08
A103	201	02	002P	Petroleum Inc.	0.00
A104	201	02	002A	Demers Kerry Louise Ss & Cossey Judith Kathleen Ss	3.29
A105	201	02	151V	Mader Craig G & Deborah A Trustees / Mader Graig Family Trust	7.45
A106	201	13	035C	Cramer Randal M & Suzanne G.	0.20
A107	201	13	035B	Macias Frank & Ranea Rs	1.09

Table 5-1: Estimated New Right-of-Way

Plans Ref.	Parcel Number			Owner	Approx Take (Acres)
	BK	Map	Par.		
A108	201	13	030	Coughanour David V & Laura B Jt	0.77
A109	201	13	028	North Dale Kings	0.82
A110	201	13	026	Rockwood Richard W & Sandra L Rs	1.09
A111	201	13	014	Owen John W & Valerie Y Rs	0.87
A112	201	13	013D	Urias-Soto Pedro & Stormie Jt	1.73
A113	201	13	013C	Meier Joyce W Living Trust Ui & Meier J J Living Trust Ui	0.15
A114	201	13	048	Russell Paul M & Patricia A Jt	0.65
A115	201	13	065	Jensen Rodney L & Sharon K Jt	0.55
A116	201	13	064	Cobasky George Lee & Charlotte Rs	0.61
A117	201	13	017G	Putnam Donald & Geraldine	0.62
A118	201	13	017F	Douthat John M & C Denise Jt	0.62
A119	201	13	017D	Sadowski David & Donna Jt	0.62
A120	201	13	063	Brink Rober T.	0.61
A121	201	13	062	Coughanour Davis V & Laura B Jt	0.61
A122	201	13	164	Vista Royale Llc	0.52
A123	201	13	163		0.52
A124	201	13	162		0.52
A125	201	13	161		0.52
A126	201	13	017B	Richards Sharon J & Rockwell Carol H Jt	1.13
A127	201	13	019E	Pitt Sharlet	0.49
A128	201	13	019F	Dierks Norman F.	0.65
A129	201	13	019C	Canary Christopher N. & Stacey A.	0.52
A130	201	13	021B	Overley Muriel M.	0.59
A131	201	13	160	Vista Royale Llc	0.82
A132	201	13	158	Vista Royale Llc	1.67
A134	201	13	021	Stoddard Roy K. & Doris A.	0.60
A135	201	13	157	Echols Mark A & Vickie S Rs	1.96
A136	201	13	155		0.88
A137	201	02	151C		0.22
A138	201	13	015	Simms Arlyn H & Stevenson Carol S Jt	1.03
B100	201	18	009	Billings Donald Q. & Laura D.	0.01
B101	201	19	008	Cornerstone Propane Lp	0.48
B102	201	20	005	Cornerstone Propane Lp	0.63
B103	201	21	006	Scott Linda Joan	0.00
B104	201	22	007	Brown Forest W	1.76
C100	200	09	001	Goodchild Sid	2.45
C101	200	09	001C	Way Robert & Lea Rs	0.00
C102	200	13	003	Craig Terry A And Rothermel Frederic M And Susan S Jt	29.09
C103	200	14	002	Pingitore Family Trust	14.26
C104	200	15	002	Pingitore Family Trust	0.00
C105	200	16	001	Pingitore Family Trust	0.00
C106	200	16	001A	Pingitore Family Trust	6.39
C107	200	16	001A	Barnes Erik & Tina Jt / Santa Maria Ranch	0.00

As much of the R/W is quickly developing, especially adjacent to the Vista Royal subdivision, new R/W impacts will need to be determined during final design for an accurate inventory of subdivided parcels.

Drainage has been evaluated in a separate report for this study entitled "Final Drainage Report; US 93, US 89-Santa Maria River, June, 2004".

5.6.1 Existing Conditions

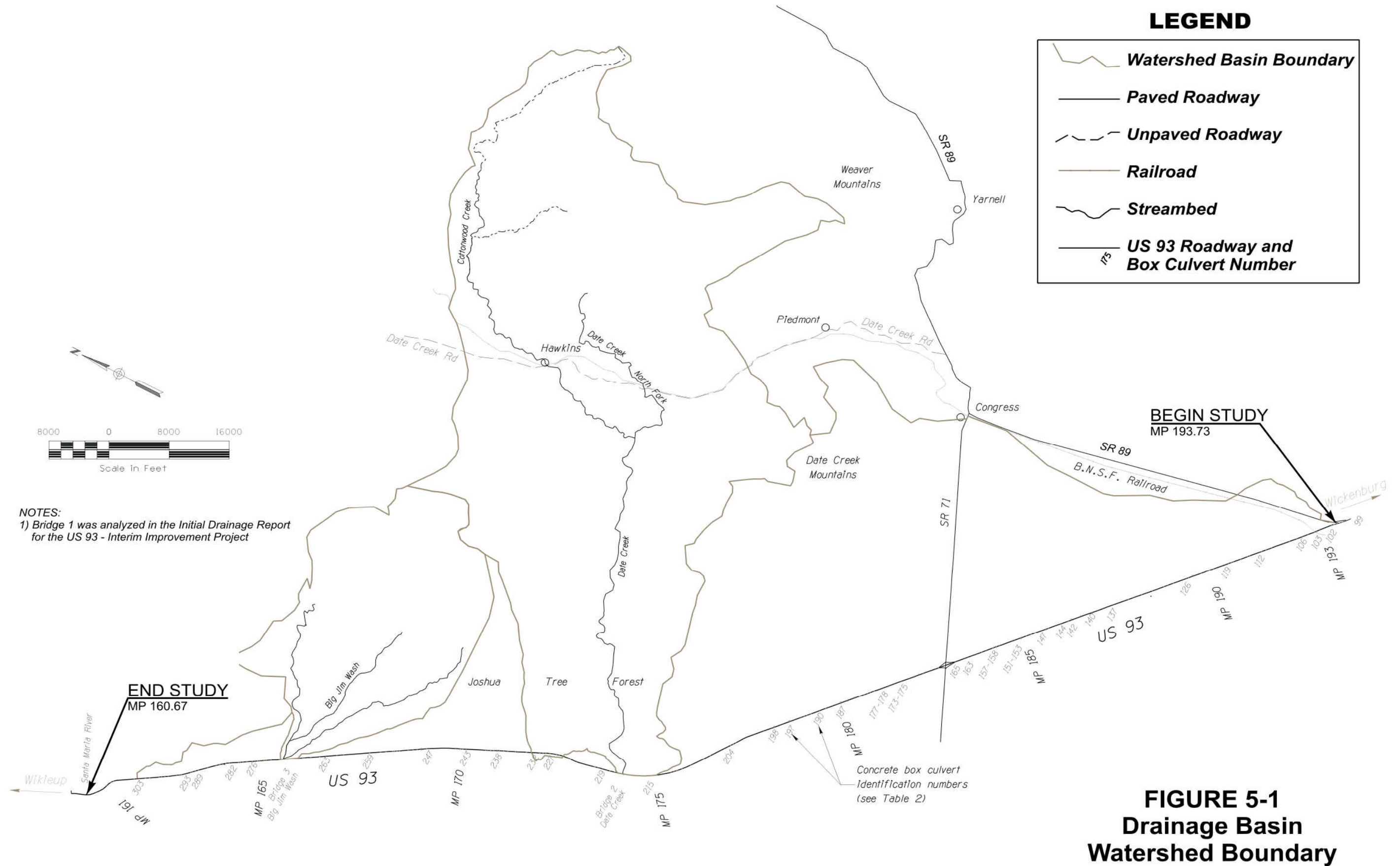
The US 93 roadway is oriented from northwest to southeast through the northern study area, and generally forms the southern / western boundary of the watershed (**Figure 5-1**). The Date Creek watershed is bounded by US 93 on the west, the Date Creek Mountains on the south, the Weaver Mountains on the east, and a lesser mountain range approximately seven miles north of the Date Creek Mountains. The Date Creek watershed is the largest runoff area in the study and generally drains to the southwest. Big Jim Wash (formerly named Black Canyon Wash) is the second largest area and generally drains to the west. The Date Creek Mountains also form the northern watershed boundary for the various south-flowing runoff basins between Date Creek and the US 89 intersection. The runoff areas that are located north of the Date Creek bridge drain westward, with a few minor exceptions.

5.6.2 Vegetation

The rolling foothills area from MP 161 to MP 177 is dominated by Joshua trees, Cat-claw Acacia, Desert Broom, Creosote, Chain Cholla, and range grasses. The upper elevations of the watershed are sparsely vegetated with Gamble Oak, varieties of holly, and Jojoba bush. Creosote bush is the primary foliage in the flat desert areas, with range grasses, desert broom, cat-claw acacia, and several varieties of cacti. Mesquite trees are prevalent along the banks of most of the intermittent streambeds. Palo Verde trees are sporadically distributed on many of the hillsides and ridges. The upper Date Creek Mountains had stands of dense brush vegetation between the rock outcrops.

5.6.3 Existing Culverts and Bridges

Existing cross drainage structures within the study limits include two bridges (Date Creek and Big Jim Wash), 78 concrete box culverts, and 125 pipe culverts. The culvert numbering starts with 100 at the US 89 interchange and ends with 304 at MP 161.73. Culverts 98 and 99, which are located just southeast of the US 89 interchange, were added later to the study.



Nearly all of the culverts directly convey storm water runoff under the existing highway. The only existing drainage structures that exist that consolidate drainage are located as follows:

- A diversion channel on the east side of the road between MP 191.4 and MP 192.5 diverts flows to Culvert No. 106.
- Minor roadside channels on both sides of US 93 near MP 198 divert runoff into cross culverts (Culvert Nos. 252 – 257).

State Route 71 is oriented from southwest to northeast and has 9 major culvert crossings located upstream of US 93. The SR 71 roadway profile is very low and does not provide significant storm water detention upstream. The culverts are expected to pass all runoff without attenuation.

The Burlington Northern Santa Fe (BNSF) railroad and SR 89 are oriented along a north to south ridge. Runoff that cannot be passed by the adjacent US 93 culverts (103 & 104), flows along the railroad fill and passes through the concrete railroad overpass at MP 192.88.

5.6.4 Hydrology and Hydraulics Methodology

• Hydrology

The basins (and sub-basins) were originally delineated using digital 1:24,000 USGS topographic maps. The range of sub-basin areas is 0.25 and 4.34 square miles. As the 2-foot contour interval aerial mapping became available, the rational basins and sub-basins adjacent the roadway were revised. The ADOT Highway Drainage Design Manual, Hydrology, was used for the drainage analysis. This analysis included using the Rational Method for drainage areas less than 160 acres and the Corps of Engineers’ HEC-1 hydrologic computer modeling software for larger watersheds. Certain small sub-basins (less than 160 acres) were modeled in HEC-1 because they are part of a larger basin. The peak flows from each drainage basin have been summarized in Appendix G. This information was taken from the May 2003 Initial Hydrology Report, US 93 – SR 89 to the Santa Maria River, Project No. 093 YV 161, TRACS No. H 4871 01L.

• Hydraulics

The existing culverts were analyzed using CulvertMaster® computer software. The relative culvert invert elevations and roadway elevations (overtopping wier) were taken from ADOT as-built roadway plans. The inlet configuration was selected using the photographs of the inlet area. All culverts were modeled with no blockages, damage, or clogging factor applied.

5.6.5 Drainage Requirements

Appendix G summarizes the drainage structures required for each of the design concept alternatives. These structures were only designed for the offsite drainage requirements. The culvert quantities and project estimates do not include specific provisions for onsite culverts or special ditches as these features are assumed to be included with the contingency estimate. **Note: The hydraulics analysis for this report is preliminary in nature. A final hydraulic study will be required for the final design of the selected alternative.**

5.7 Section 404 of the Clean Water Act

Coordination with the U.S. Army Corps of Engineers (COE) during project design will be necessary to ascertain the need for any nationwide or individual permits required under Section 404 of the Clean Water Act. Any deposition of fill material or excavation waterward of the ordinary high water mark will require a permit. Construction activities that will require permits include, but are not limited to, bridge pier construction, culvert installations, replacements, and/or extensions requiring excavation and placement of fill material, and roadway embankment widenings.

Based on information received from the COE, 83 streams and washes are crossed by the various design concept alternatives that must be investigated for a Section 404 permit. The following table lists the streams and washes along each alternative by Station (refer to plan and profile sheets in Appendix E) that fall under COE jurisdiction.

**Table 5-2
CORPS OF ENGINEERS
JURISDICTIONAL STREAMS AND WASHES**

Design Concept Alternative	Location (MP)	Description
A-1a	193.31	CBC, Un-named Wash
A-1a	192.91	CBC, Un-named Wash
A-1a	192.52	CBC, Un-named Wash
A-1a	191.36	CBC, Un-named Wash
B-2a	190.45	CBC, Un-named Wash
B-2a	190.19	CBC, Un-named Wash
B-2a	189.40	CBC, Un-named Wash

**Table 5-2
CORPS OF ENGINEERS
JURISDICTIONAL STREAMS AND WASHES**

Design Concept Alternative	Location (MP)	Description
B-2a	188.69	CBC, Un-named Wash
B-2a	188.31	CBC, Un-named Wash
B-2a	186.85	CBC, Un-named Wash
B-2a	186.56	CBC, Un-named Wash
B-2a	186.30	CBC, Un-named Wash
B-2a	186.03	CBC, Un-named Wash
B-2a	185.49	CBC, Un-named Wash
B-2a	184.93	CBC, Un-named Wash
B-2a	184.77	CBC, Un-named Wash
B-2a	184.71	CBC, Un-named Wash
B-2a	184.17	CBC, Un-named Wash
B-2a	184.01	CBC, Un-named Wash
B-2a	183.74	CBC, Un-named Wash
B-2a	183.41	CBC, Un-named Wash
B-2a	183.16	CBC, Un-named Wash
B-2a	182.62	CBC, Un-named Wash
B-2a	182.20	CBC, Un-named Wash
B-2a	181.92	CBC, Un-named Wash
B-2a	181.70	CBC, Un-named Wash
B-2a	181.54	CBC, Un-named Wash
B-2a	181.40	CBC, Un-named Wash
B-2a	181.36	CBC, Un-named Wash
B-2a	181.13	CBC, Un-named Wash
B-2a	180.98	CMP, Un-named Wash
B-2a	180.88	CMP, Un-named Wash
B-2a	180.81	CMP, Un-named Wash
B-2a	180.71	CMP, Un-named Wash
B-2a	180.58	CMP, Un-named Wash
B-2a	180.45	CBC, Un-named Wash
B-2a	180.41	CBC, Un-named Wash
B-2a	180.09	CBC, Un-named Wash
C-3	179.86	CBC, Un-named Wash
C-3	179.51	CBC, Un-named Wash
C-3	179.24	CBC, Un-named Wash
C-3	179.02	CBC, Un-named Wash
C-3	178.85	CBC, Un-named Wash
C-3	178.71	CBC, Un-named Wash
C-3	178.29	CBC, Un-named Wash
C-3	178.01	CBC, Un-named Wash

Table 5-2
CORPS OF ENGINEERS
JURISDICTIONAL STREAMS AND WASHES

Design Concept Alternative	Location (MP)	Description
C-3	177.46	CBC, Un-named Wash
C-3	177.24	CMP, Un-named Wash
C-3	177.02	CBC, Un-named Wash
C-3	176.32	CBC, Un-named Wash
C-3	175.83	CBC, Un-named Wash
C-3	175.12	CBC, Un-named Wash
C-3	174.22	Bridge, Date Creek
C-3	173.97	CMP, Un-named Wash
C-3	173.85	CMP, Un-named Wash
C-3	173.76	CBC, Un-named Wash
C-3	173.65	CBC, Un-named Wash
C-3	173.35	CBC, Un-named Wash
C-3	172.44	CMP, Un-named Wash
C-3	172.34	CBC, Un-named Wash
C-3	172.10	CMP, Un-named Wash
C-3	171.91	CBC, Un-named Wash
C-3	171.46	CBC, Un-named Wash
C-3	170.94	CBC, Un-named Wash
C-3	170.16	CBC, Un-named Wash
C-3	169.21	CBC, Un-named Wash
C-3	169.03	CBC, Un-named Wash
C-3	168.69	RCP, Un-named Wash
C-3	168.47	RCP, Un-named Wash
C-3	168.41	RCP, Un-named Wash
C-3	168.13	RCP, Un-named Wash
C-3	167.06	CMP, Un-named Wash
C-3	166.61	CBC, Un-named Wash
C-3	166.45	CMP, Un-named Wash
C-3	166.23	RCP, Un-named Wash
C-3	165.53	Bridge, Big Jim (Black Canyon) Wash
C-3	165.05	CMP, Un-named Wash
C-3	164.75	CBC, Un-named Wash
C-3	164.61	CBC, Un-named Wash
C-3	164.51	CMP, Un-named Wash
C-3	163.37	CBC, Un-named Wash
C-3	163.06	CBC, Un-named Wash
C-3	161.85	CBC, Un-named Wash

5.8 Floodplain Considerations

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map panels for the project area were reviewed. US 93 intersects or is adjacent to the 100-year floodplain in 11 locations within the project limits. The preferred alternative would require the extension of existing culverts, construction of new culverts, construction of new bridges, and construction of roadway embankment within the 100-year floodplain. The preferred alternative would be designed to minimize floodplain encroachments to the extent possible and ensure that the flood-carrying capacity of the drainages crossing the project area would not be impaired, as described in the project drainage report.

5.9 Earthwork

A preliminary geotechnical assessment for US 93 was conducted for this project, and is contained in a report entitled "Preliminary Geotechnical Assessment, Design Concept Study of US 93, Santa Maria River - Wickenburg" dated July 2001. The assessment and report were based on a research review of available information and a site reconnaissance. Portions of the report data are included in the following discussion on earthwork.

5.9.1 General Geologic Setting

The US Highway 93 alignment from the Santa Maria River to Wickenburg is located within the Basin and Range Physiographic Province (Basin and Range) near its boundary with the Arizona Transition Zone, which separates the Basin and Range from the Colorado Plateau to the north. The Basin and Range is characterized by rugged isolated fault-bounded mountain ranges separated by broad alluvium-filled valleys. Mountain ranges in the Basin and Range generally trend in a northwesterly direction.

The area from the Santa Maria River to Wickenburg is characteristic of the Basin and Range with relatively subdued rolling terrain. The existing and proposed widening of the alignment traverses alluvial valleys between several mountain blocks. From the Santa Maria River, US 93 gradually climbs from the river basin along the northern foothills of the Black Mountains, which are located immediately southwest of the current roadway alignment. US 93 continues southeast in an alluvial basin area between the Black Mountains and Malpais Mesa, crosses as Big Jim Wash, then climbs the large northwesterly to westerly sloping alluvial fans of the Date Creek Mountains. As US 93 approaches Date Creek, the highway descends into the relatively shallow and broad Date Creek Drainage

where shallow Precambrian granitic rocks and Tertiary sedimentary rocks may be encountered. The drainages flow predominantly to the west and/or northwest between the Santa Maria River and Date Creek. As the alignment leaves the Date Creek Drainage, it climbs onto relatively large, south to southwest sloping alluvial fans originating from the Date Creek Mountains to the east of the highway. The drainages along this segment of the alignment are predominantly tributaries of Sols Wash spaced at approximately ¼-mile intervals. The tributaries flow from the alluvial fans southwest to Sols Wash. Sols Wash flows towards the southeast; parallel to US 93 until they both reach Wickenburg and the Hassayampa River. This terrain is generally subdued and sloping towards the southeast and Wickenburg.

5.9.2 Site Geology

The main geologic units exposed along the corridor to be widened are Tertiary and Quaternary sedimentary units deposited from the erosion of the surrounding mountain ranges. These Tertiary and Quaternary sedimentary units consist, from oldest to youngest, of Quaternary/Tertiary sedimentary rocks, Quaternary alluvial fan and Quaternary active stream channel deposits. The mountain ranges typically are composed of a crystalline basement of metamorphic and plutonic rocks of Proterozoic and Cretaceous age, unconformably overlain by a sequence of Tertiary volcanic and sedimentary rocks. These older units can be observed from the highway alignment at several locations but they are not exposed on the alignment itself, with the exception of granites observed on the north abutment of the Date Creek Bridge. The Granite from the Date Creek Mountains is exposed at the surface of the alignment at the crossing of Date Creek (approximate MP 182.9). The granite will most probably be encountered at a shallow depth from the creek to a couple miles to the north of it (to approximate MP 172).

- Date Creek Granite (gr) – The granite exposed on the northern abutment of Date Creek Bridge is a light to medium gray coarse-grained granite with crystals of up to 1-inch in diameter. It is predominantly moderately to highly weathered to locally decomposed and very closely to closely fractured near the surface. The granite was soft where decomposed and moderately hard where moderately to highly weathered.
- Quaternary/Tertiary Sedimentary Rx (QTs) – The Quaternary/Tertiary sedimentary rocks consist of a relatively undeformed sequence of interbedded sandstone and conglomerate with varying degrees of cementation.

- Quaternary alluvial fan and Quaternary active stream channel deposits – The Quaternary alluvial fan and active stream channel deposits are relatively unconsolidated deposits that can vary in particle size distribution from very fine-grained silty and/or clayey sands within floodplains and terraces to coarse-grained sand, gravel and cobbles within active stream channels. Old stream and pediment deposits have strongly developed clay and calcium carbonate-rich soils while the younger deposits typically consist of sands with minimal to some calcium carbonate development and are prone to flooding events. The eolian/alluvial deposits consist of wind deposited or a mix of wind and water deposited material that are found on both the basin floor and the bedrock pediments. Typically, these deposits consist of relatively well sorted sands that locally cover coarser grained sand and gravel deposits.

Available subsurface characterization data is limited to the existing bridge foundation as-builts obtained from ADOT's engineering records and from SCS maps. Depth of investigations for the bridge as-builts varied from approximately 6 to 80 feet, while the SCS map information is provided for a total depth of 5-feet.

5.9.3 Groundwater Conditions

Due to the length and variable nature of the geology and topography along the study corridor, depth to groundwater throughout the proposed alignment is highly variable. Shallow groundwater levels will probably be encountered within the existing valley lows and drainage pathways. The depth to groundwater noted on two of the borings for the Date Creek Bridge Foundation as-built data sheets is approximately 20 and 50 feet.

A natural spring is located immediately west of the US 93 alignment at approximate MP 166.7, outside of the proposed roadway improvements.

5.9.4 Seismic Design Considerations

The southern end of the project corridor is located within the Sonoran Seismic Zone. At approximate US93 MP 175, the corridor transitions into the Arizona Mountain Seismic Zone. The Sonoran Seismic Zone represents a tectonically stable area distinguished by its paucity of earthquakes, few short Quaternary faults, mature physiography, thin crust, gravity anomalies, and magnetic trends. The Arizona Mountain Zone distinguishes itself from the rest of the seismic ones in the state of Arizona due to its higher level of seismicity, abundant Quaternary faults and northwesterly trends and

physiography. The Arizona Mountain Zone is an area of active block faulting being broken off and downfaulted from the Colorado Plateau, however, the seismic sources within this zone are discrete and faulting displays a slow rate. The nearest active features to the project corridor within the Arizona Mountain Zone are the Wagoner and Date Faults located at approximately 20-miles northeast and 10-miles east, respectively, of the town of Wickenburg and US 93 MP 170. The length, slip rate and age of latest movement for these faults are not known, however their maximum credible earthquake is 6.5 for both of the faults.

Based on seismic acceleration contour maps developed by Euge and others (1992) for ADOT, the expected horizontal acceleration in bedrock with a 90 percent probability of non-exceedance in 50 years is 0.03g from approximately MP 120 on US 60 to 0.04 towards the northern end of the project at approximate MP 161.

5.9.5 Excavatability of Site Soils & Bedrock

In general, the Tertiary to Quaternary sedimentary units throughout the project should be readily excavatable, although areas of varying degree of cementation may be encountered. Granitic rocks are anticipated to be very shallow near Date Creek. It is anticipated that the granitic rocks will be moderately weathered to decomposed near the surface and may be marginally rippable using heavy duty excavation equipment, however the need for blasting may arise in some areas. In areas where blasting is needed, controlled blasting techniques should be utilized in accordance with ADOT criteria.

5.9.6 Collapsible Soils

Due to the proximity of the proposed alignments to mountain flanks and their associated alluvial fans, the potential for collapsible soils exists. Further investigation and detailed mapping should be performed to determine the areal extent of the hazard as well as to better characterize these deposits for final roadway design.

5.9.7 Expansive Soils

Areas along the alignment from MP 165.0 to 165.4; 166.6 to 167.5; and 178.6 to 186.0 may have deposits of expansive clays that may require mitigation in the form of over excavation or other mitigation/stabilization techniques. The noted areas should be studied in more detail during final investigations to identify the limits and type of treatment that may be required.

5.9.8 Earthwork Factors

Based on professional experience with similar soil types, the shrink factor for the native soils throughout the project will be approximately 5% to 10%. The existing embankment materials will neither shrink nor swell where used for construction of new roadway embankment.

A swell factor for rock excavation of approximately 15% is recommended.

Ground compaction during the construction of the roadway embankments is likely to occur within the fine-grained, young sediments deposited on the basin floors and the fine-grained alluvial fans of the lower piedmonts. On average, soils within the project corridor will experience 0.2 feet of ground compaction prior to earthwork activities.

5.9.9 Preliminary Cut and Fill Slope Recommendations

For preliminary cut slope design, slopes of 1(h): 1(v) can be used, however, as most of the cuts were minor in height and material was needed, a 2:1 standard backslope was the steepest cut section applied. Stability of cut slopes in bedrock encountered at the cut areas will be dependent upon fracture orientations and weathering conditions encountered within the rock mass. A more detailed study on a cut-by-cut basis should be performed for final design.

All non-stabilized fill slopes should be constructed no steeper than 2(h):1(v). Should steeper slopes be required within drainages or near existing structures, use of mechanically stabilized embankments is recommended. In areas of potential excessive fill erosion, treatment of slopes with geosynthetics should be considered.

5.9.10 Potential Borrow Sources

A review of borrow pit information available at ADOT's Materials Section revealed a large number of borrow pits that have been historically used by ADOT along the US 93 highway corridor. No current ADOT-leased (deeded or granted) sources were identified. For an ADOT-leased pit to be considered a potential material source, the lease agreement between ADOT and the landowner has to be active and an environmental permit has to be issued.

One commercial pit was identified within the project limits and two additional commercial pits were identified within 15-miles of the southerly end of the project.

Table 5-3: COMMERCIAL PITS

Site ID	Location	Company	Materials Produced
CM 101	US 60 MP 115	Wickenburg Concrete & Materials	AB, Sand, Rip Rap
CM 237	US 60 MP 117	Wickenburg Concrete & Materials	MA, AB, Sand, Rip Rap, Borrow
CM 404	US 93 MP 174	Way's Drilling, Inc.	AB, Sand, Rip Rap, Borrow, Water

5.9.11 Preliminary Bridge Foundation Design

Existing bridges along US 93 within the project limits are the Big Jim Wash Bridge (Str. No. 00548), the Date Creek Bridge (Str. No. 02366), the SR 71 TI Overpass (Str. No. 00842) and the Matthie Railroad Overpass (Str. No. 00780). The expansion of US 93 to a four lane divided highway will use the existing bridges for one direction of travel and require that new bridges be constructed for the new 2-lane roadway in the opposite direction of travel.

At the Big Jim Wash Bridge site, it appears that drilled shafts or driven piles would likely be the best alternatives for support of the structure, based on the as-built plans and foundation data information. However, spread-type footings or a box culvert type structure may be a viable alternative if a cutoff wall or some other type of scour protection is utilized.

At the Date Creek Bridge site, it appears that drilled shafts socketed into bedrock or spread-type footings with rock bolts or keyed into bedrock would likely be the best alternatives for support of the structure, based on the as-built plans and foundation data information. However, according to the foundation data information, bedrock is at a depth of 15 to 20 feet below grade, which may make spread-type footings uneconomical due to the amount of excavation that would be required. Spread-type footings or a box culvert type structure bearing on shallow streambed and alluvial soils may be a viable alternative if a cutoff wall or some other type of scour protection is utilized.

At the SR 71 TI Overpass site and the Matthie Railroad Overpass site, it appears that drilled shafts, driven piles or spread-type footings would likely be the best alternatives for support of the

structures, based on the as-built plans and foundation data information.

Test drilling at each foundation element for each structure during the final investigation should clearly indicate which foundation type is best suited to each location.

5.9.12 Earthwork Balancing

The excavation, embankment, and balance values shown in Table 5-4 are a result of applying the slope criteria listed in Section 5.2. The earthwork factors shown in Section 5.9.8 were considered, but not directly applied at this time. For the purposes of this study, the earthwork was considered “balanced” if the cut/fill balance was within 5%. Once the projects are divided into final design segments, the final balancing of earthwork can be achieved by minor adjustments to the profile grade or side slopes. An absolute balance of earthwork was not attempted at this time because of the unavailability of detailed geotechnical information.

Only the mainline roadway sections were evaluated for earthwork calculations. The material required for the frontage/access roads and median cross-overs was considered incidental to the overall volume of material excavated.

**Table 5-4
EARTHWORK SUMMARY
Cubic Yards [cy]**

Design Concept Alternative	Excavation cy	Embankment cy	Balance cy
A-1a	165,000	135,000	30,000
B-2a Mainline	345,000	365,000	(20,000)
B-2a TI / Ramps For SR 71 Undercrossing	165,000	135,000	30,000
Total: B-2a	510,000	500,000	10,000
C-3 Southern SB	440,000	420,000	20,000
C-3 NB Alignment	635,000	610,000	25,000
C-3 Northern SB	20,000	16,000	4,000
Total: C-3	1,095,000	1,046,000	49,000

An extensive geotechnical investigation will be required during final design of the recommended alternative to:

- Establish site-specific shrink and swell factors based on field investigation and testing;
- Establish cut/fill slope requirements based on a field investigation of materials; and
- Prepare detailed geologic mapping to predict areas of potential slope failure in deep cuts.

5.10 Constructability and Traffic Control

Maintenance of traffic through the work zone will be a critical element associated with implementation of the recommended alternative. Routes for rerouting traffic are limited and major detours must receive advance agreement. As a result, maintenance of traffic and traffic control during construction may determine the overall phasing and local staging of construction and relate directly to the constructability of the project.

One of the goals established at the outset of the study was to maximize the use of the existing roadway as part of the traffic control plan. This goal has been achieved throughout the project. New construction parallels the existing roadway to easily reroute traffic between roadways during the phasing and staging of the work. In areas where the new roadway crosses from one side of the existing roadway to the other, temporary connections and minor detours may be required.

The reconstruction of the mainline and ramps at the SR 71 traffic interchange will require phased construction and minor detours to maintain traffic through the interchange during construction.

5.11 Intersections

Table 5-5 lists 19 intersections identified along US 93 where interim access crossovers will be located (see also Chapter 7, Access Management Plan). The design concept plans address only left-turn lane requirements at crossover locations based upon current data. Additional traffic analyses will be needed during final design to determine the turning lane requirements at each intersection.

**Table 5-5
MAJOR INTERSECTIONS / CROSSOVERS**

Milepost	Intersection Description
162.35	
165.3	
167.1	
168.9	
171.3	
174.0	Date Creek Residence Area
175.9	
177.3	
178.6	Alamo Road
181.2	Stock Tank
182.9	SR 71 Traffic Interchange
184.4	
186.2	
187.5	
190.0	
191.5	
192.1	Vista Royale Subdivision Entrance
192.6	Moreton Road / Nine Irons Road
193.5	SR 89 Intersection

5.12 Utilities

Contact was made with all known utility companies between SR 89 and the Santa Maria River crossing, requesting utility information and an indication of possible conflicts with the recommended alternative. The following information was gathered:

Western Area Power Administration (WAPA): Two WAPA transmission lines cross US 93 at MP 163.3; the Mead- Liberty 345 kV line and the Mead-Perkins 500kV line. The WAPA tower located nearest to the east side of US 93 is for the 345kV line, and is designated as 162-3.

One tower for each of the two lines will be located in the median of the divided highway. Access will be permitted. No conflicts are anticipated at the crossing area.

Access to the WAPA transmission lines is via primitive roads that intersect US 93 in several locations. The existing roads will be retained during Partial Access Control, so there will be no impact on access to the WAPA lines. When full access control is implemented, most of the access to the WAPA lines will be from the interchange crossroads. However, if access is needed in addition to that provided at interchanges, permits can be given to WAPA or the land owner

(usually ASLD on this project) for gated and locked access points that will not be available to the public. No conflicts are anticipated.

Contact is:

Chuck McEndree, Project Manager
Western Area Power Administration
Desert Southwest Region
615 S. 43rd Avenue
Phoenix, AZ 85009
Telephone : (602) 352-2790

Arizona Public Service Company (APS): An overhead powerline is located within ADOT R/W on the east side of US 93 from MP 193.9 to MP 192.1. There will probably be a conflict between this line and the proposed frontage road serving the residential area on the east side of US 93.

An underground powerline crosses US 93 at MP 192.4 (vicinity of Nine Irons Ranch Road). It is likely that this line may be in conflict with the new 2-lane road to be constructed on the west side of existing US 93.

An underground powerline crosses Quail Run parallel to US 93 at approximate MP 192.6. It is likely that this line will be in conflict with the proposed frontage road serving the residential area on the east side of US 93.

Contact was:

Dave D’Angio
125 E.Apache
Wickenburg, AZ 88390
Telephone: (623) 932-6675

Qwest Communications (Qwest): Qwest occupies the APS poles from SR 89 junction to MP 192.1. Qwest lines then go underground. They have a buried cable inside the R/W on the east side of US 93 through the residential area to approx. MP 191.5 There is a buried cable under US 93 at MP 192.0. The buried cable crosses US 93 to serve the subdivision on the west side (Vista Royale), and it continues northerly on the west side of US 93 through the Vista Royale subdivision to approx. MP 191.5 .

The Qwest lines on the APS poles and the buried line running along the east side of US 93 will conflict with the frontage road that is proposed to provide access to the residential area.

The buried Qwest lines under US 93 at MP 192 and the buried lines within the R/W on the west side of US 93 may be in conflict with the new 2-lane road proposed on the west side of US 93.

Contact is:

Tom Meador, Area Engineer
6350 S. Maple Ave., Room 125
Tempe, AZ 85283
Telephone: (602) 630 1425

There are no other utilities within the project limits—no cable, no gas. We checked with both Districts and with APS with respect to utilities at SR 71 TI. There are no records of any facilities within the R/W.

Contact was made with Citizens Telephone (Jeff Mathiesen). They have no facilities south of Wikieup.

Contact was made with Tabletop Communications (Linda Feidt, Network Engineering Manager). They have no facilities along US 93. They serve areas near Congress and Bagdad.

5.13 New Bridges

New bridges will be required for the new two lane roadway at two drainage crossings, the SR 71 traffic interchange, and one Railroad overcrossing as described in Table 5-6. The existing bridge at Big Jim Wash is structurally deficient and will be replaced as part of this project. The existing bridges at the other locations will remain since the existing roadway will be used for traffic in one direction of travel.

Table 5-6 NEW BRIDGES

Location	Station	No. Bridges	Bridge Length & Type*	Comments
Matthie Railroad Overcrossing	143+00	1	155', 3-span, Continuous Steel Girder (Type VI Precast AASHTO also possible, but will not likely provide required clearance.	Exist. Bridge to remain. Exist. Bridge will require a deck sealant. New SB bridge to be constructed.
SR 71 TI Undercrossing	670+00	1	280' long, 47' wide, 2-span, Type VI Precast Prestressed Conc. Girder	Exist. Bridge to be replaced. New bridge to be constructed over the improved US 93 highway. Interchange to be re-configured
Drainage Crossing Bridge (MP 178.3)	715+00	2	160' 3-span Continuous Slab	New bridges to replace existing multi-cell RCBC.
Date Creek Bridge	928+50	1	216', 3-span, Type III Precast Prestressed Conc. Girder	Exist. Bridge to remain. New SB bridge to be constructed.
Big Jim Wash Bridge	1393+00	1	275', 7-span Continuous Slab	Exist. Bridge to be replaced. New NB bridge to be constructed.

*All bridges are 45-ft wide unless noted otherwise. Bridge types shown are initial assumptions only. Bridge type and span arrangements will be determined during final design.

5.14 Other Design Considerations

5.14.1 Final Design Details

The development of several design details must be coordinated with several entities during final design.

- Location of turn-outs, acceleration/deceleration lanes, median cross-overs, and access roads – ASLD, Department of Public Safety, ADOT Kingman and Prescott Districts, Yavapai County, and private property owners. These will likely change as development continues within and adjacent to the corridor. (See also Section 8, Implementation Plan).
- Slope treatment, including slope rounding, slope warping, and rock roughening/rounding, - ADOT Roadside Development Section, ADOT Prescott and Kingman Districts.
- Fencing and cattle guards - ASLD, Yavapai County, ADOT Prescott and Kingman Districts.

5.14.2 Wildlife Crossings

The need for wildlife crossings was evaluated in consultation with the Arizona Game and fish Department. Based upon the agency’s record of animal “strikes” and recommendations for wildlife crossing provisions, no exclusive wildlife crossings were identified along this portion of the US 93 corridor. There was agreement that no existing box culverts would be reduced in size if either replaced or extended, as many of the boxes are used for cattle passes.

5.15 Design Exceptions

No design exceptions are required for the proposed new construction elements.

Two aspects of the existing roadway do not meet current design standards. They include shoulder width at three locations, and the superelevation of the roadway through one curve. In discussions with ADOT’s Kingman and Prescott Districts, it was decided to postpone the decision of adding shoulder widening to the existing roadway at this time. To provide the greatest flexibility, a Design Exception has been obtained for retaining the existing shoulders until such time that other improvements are required on the existing roadway. With respect to the superelevation issue, a Design Exception has been acquired for the area where superelevation rate is below the AASHTO recommended minimums for the existing roadway to remain in place (MP 177.46 to MP 177.64). This will avoid reconstructing the existing roadway where there is no history of roadway related accidents due to the cross section of the roadway.

Most of the grades in excess of the AASHTO recommended maximum are corrected by construction of the preferred alternative. The only exception to this is from MP 166.6 to 167.3, where the existing grades exceed 4% and reach 5%. While these grades do not meet the current design standards for 75 mph, they do exceed the minimums for reconstructing an existing roadway, and therefore reconstruction has not been recommended.

A copy of the approved Design Exception is included in Appendix A.

6. ITEMIZED COST ESTIMATE

A detailed cost estimate has been prepared for the preferred alternatives (Appendix C). The unit prices are based on recent ADOT bid results with adjustments made to reflect the project location and the difficulty of the work anticipated. Detailed cost estimates for the Implementation Projects also appear in Appendix C.

The basis for the quantity estimates and unit prices is summarized below.

- **Clearing and Grubbing per Acre**—Construction area quantities were computed and listed as part of the Microstation computer output during design development. An average price of \$2,500/acre was used based on previous bid prices statewide.
- **Removal of Structures and Obstructions per Lump Sum**—Quantities were based on anticipated removals (i.e., existing box and pipe culverts, bridges, etc.) and priced according to type and difficulty of removal.
- **Remove AC per Square Yard**—Asphalt Concrete removal was itemized separately and not included in the Roadway Excavation or Obliterate Roadway items. The quantity was based on the area of existing pavement removed.
- **Obliterate Roadway per Square Yard**—The portions of the existing roadway that will no longer remain in use and are to be abandoned were assumed to be scarified, regraded as necessary, and revegetated. Asphalt removal is included under the item “Remove AC.”
- **Roadway Excavation per Cubic Yard**—Quantities were provided as part of the InRoads computer output using the appropriate typical section, 3-D topo files, and calculated at 50-foot intervals. Shrink and swell factors were applied as recommended by the Geotechnical Report (see Section 5.9, Earthwork).

- **Structural Roadway Section**—The structural section was derived from a review of previous projects in the area. Quantities were based upon the initial structural sections provided by ADOT’s Materials Section, as displayed on the typical sections presented in Appendix D. The unit price for AC includes aggregate, prime/tack coats, and asphalt cement.
- **Pipe Culverts per Foot**—Pipe sizes and locations were derived from the preliminary drainage analysis. Lengths were measured between the cut/fill lines as plotted on the plan/profile sheets (see Appendix E). Pipe culverts for ditch drainage at turn-outs and for nuisance water are not listed in the Appendix. The quantities for headwalls are included under the items for structural concrete and reinforcing steel.
- **Reinforced Concrete Box Culverts RCBC**—RCBC sizes and locations were derived from the preliminary drainage analysis. Lengths were measured between the cut/fill lines as plotted on the plan/profile sheets. The quantities are shown as structural concrete per cubic yard and reinforcing steel per pound (including wingwalls and aprons) with prices adjusted to include structural excavation and backfill.
- **Riprap per Cubic Yard**—Quantities were estimated based on needs as indicated in the preliminary drainage analysis.
- **Fencing per Foot**—Quantities were based on parallel fencing each side of the roadway. In the final analysis, fencing may not be required in some areas.
- **Seeding per Acre**—The quantities for seeding and revegetation outside the roadway prism were determined by measuring the cut and fill surfaces outside the roadway surface.
- **Guardrail per Foot**—Quantities were based on approximate design locations for guardrail as required by fill height.
- **Signing and Pavement Marking**—An average cost was determined for signing and pavement marking based on recently

completed ADOT projects. The average cost per mile was used to determine the lump sum cost for each alternative.

- **Bridges per Square Foot**—Quantities were based on width and length of structure determined for each site. Price per square foot was consistent through the corridor as many of the bridges were similar with respect to access and the site location, height of piers, and environmental constraints expected to be imposed on the construction.
- **Maintenance of Traffic** (percent of construction cost) —The percentage varied depending on the anticipated difficulty of maintaining traffic through the construction zone, need for construction staging to accommodate traffic, and need for detours.
- **Environmental Impact Mitigation Measures**—Mitigation costs are included as a percentage of the construction cost, and include special landscaping and the SWPPP costs.

A summary of the costs associated with each preferred alternative is presented in Table 6-1.

**Table 6-1
COST ESTIMATE SUMMARY***

Design Concept Alternative	Construction (\$)	Design (\$)	Right-of-Way (\$)	Total (\$)
A-1a	\$11,131,495	\$890,520	\$2,000,000	\$16,022,015
B-2a	\$46,539,801	\$3,723,184	\$1,128,000	\$51,590,985
C-3	\$66,395,024	\$5,311,602	\$14,372,000	\$86,278,626

* Cost Estimates are based on early 2006 unit prices

The summary cost for the preferred alternative(s) is:

Construction:	\$ 124,066,320
R/W:	\$ 17,500,000
Design:	\$ 9,925,306
Utilities	\$ 2,400,000
Total:	\$ 153,891,626

7. ACCESS MANAGEMENT PLAN

7.1 Introduction

The Access Management Plan presents the results of a study of access management requirements along US 93 between SR 89 and the Santa Maria River, within Yavapai County and ADOT's Kingman and Prescott Districts.

The purpose of the Access Management Plan is to document the need for access management and provide a plan that identifies access management features needed to protect the safety and function of US 93 while providing access between US 93 and adjacent properties that will accommodate anticipated uses of the properties. This Access Management Plan presents access Control features to accomplish the above requirements.

The Initial Access Management Plan will be used to present recommendations to the BLM, the State Land Department, Yavapai County, major utility owners and the public. After review of the proposed plan, a Final Access Management Plan will be prepared to provide a document for establishment of access control by the State Transportation Board.

7.2 Need for Access Management

Major transportation corridors such as US 93 are intended to allow commerce to take place and the public to travel safely and efficiently over large distances. Properties adjacent to major transportation corridors are attractive to developers, commercial businesses and the public for development of land use activities that are dependent upon vehicular access to the corridor. Over time, increasing numbers of crossroads and turnouts intersecting the highway and the increasing volume of vehicles entering and leaving the highway will cause conflicts with through traffic that result in loss of capacity and diminished safety. As the travel congestion increases, the level of service provided by the major transportation facility will decrease.

Management of access by restricting the number of access points and by locating and designing permitted access points to minimize conflicts with through traffic is a successful strategy for maintaining a high level of service on the highway while accommodating increasing numbers of vehicles to and from adjacent developments.

US 93 is within the designated NAFTA/CANAMEX corridor and is planned for ultimate construction as an access controlled facility. Improvements will be accomplished over an extended period of time, perhaps 15 or more years, and will involve numerous reconstruction segments. The section of US 93 within the study limits of this project is currently being proposed for improvement to a four-lane facility. Implementation of access control in conjunction with the improvement to four-lanes will preserve the function of the highway as a safe and efficient transportation corridor.

Access rights are subject to reasonable regulation by ADOT for the protection of public health, safety, and welfare. Direct access between a property and a highway may be closed and replaced with alternative access via an access road or another public road abutting the property.

7.3 Access Management Plan

The Access Management Plan prepared and presented in this section describes the provisions necessary to transition from the existing, uncontrolled access situation to a partial access control, and ultimately to full access control.

7.3.1 Existing Access Management

Direct access to US 93 is currently allowed through permit application to the ADOT District under the authority of ADOT Administrative Rule R-17-3-702, Encroachment in Highway Rights-of-Way. There are no restrictions on the number of turnouts requested or the distance between turnouts, as long as adequate stopping sight distance for entering or leaving the highway is present.

Permit applications and granting of direct access to the existing two-lane US 93 will generally continue as currently administered. However, it is recommended that the minimum allowable distance between driveways be set at 1/4 mile. Exceptions would be granted where existing, contiguous properties could not meet these criteria due to narrow frontages along US 93. The exception would not be granted to accommodate the future subdividing of existing large properties into smaller parcels fronting the highway. All permits

are subject to revocation when the access provisions are converted to partial or full access control.

7.3.2 Access Control

Access control can be categorized as either **Partial Access Control** or **Full Access Control**. Partial access control will be implemented as an interim measure and full access control will be implemented on a project-by-project basis, as development along the corridor progresses to the extent that full control is necessary to preserve the safety and function of US 93.

Partial access control permits some crossings at-grade and some private driveway connections. Frontage/access roads may be required to serve as collector roads in areas where parcels with small frontage along the highway would result in multiple access points that are too close together to provide a safe roadway for both through and local traffic.

Full access control means that properties abutting a highway do not have direct access to the highway and access is provided only at grade-separated interchanges. However, gated and locked access may be allowed by permit to provide access for utility companies or public agencies for intermittent use only. Full access control is implemented subsequent to the designation of a controlled access highway by the State Transportation Board.

7.3.3 Partial Access Control

Partial access control will be established as an interim control that will allow needed access to adjacent properties while protecting the function of US 93 as a major transportation corridor. Partial access control will be implemented as part of the reconstruction of US 93 to four-lanes.

All properties fronting on US 93 will continue to have reasonable access to the new highway. Direct access turnouts will be right-in/right-out only, spaced no closer than 1/4 mile. At-grade median crossovers will be provided at major intersections. Intermediate median crossovers will be provided as requested by the Arizona Department of Public Safety and to provide reasonable access from all directions to right-in/right-out turnouts, subject to a minimum one mile spacing. Frontage/access roads may be constructed as part

of the reconstruction to serve as collector roads in areas that cannot meet the ¼ mile minimum spacing (see Section 7.3.6). The partial access control features are shown on the plans for the recommended alternative in Appendix E.

Applications for direct access onto US 93 that are received after partial access control has been implemented will be subject to the above criteria and will be subject to revocation when access provisions are converted to full access control. If future subdivision of adjacent properties results in frontages along US 93 that cannot meet the minimum ¼ mile spacing, they may be interconnected by access roads to a common entrance onto US 93. In these instances, the access roads will be constructed outside the US 93 right-of-way. It will be necessary for ADOT and the public agency having jurisdiction over developments and subdivisions to cooperate to see that properties are subdivided in such a way that access to US 93 will meet the ¼ mile spacing, sight distance requirements, and safety requirements.

7.3.4 Full Access Control

When full access control is implemented along any portion of reconstructed US 93, all turnout permits existing along the affected section of US 93 will be revoked and direct access to the highway will be permitted only at traffic interchanges. Frontage roads or access roads will be provided to ensure that all properties fronting on US 93 will have reasonable access to the highway (see Section 7.3.6). Responsibility for traffic interchanges and access roads required to implement full access control will be determined based on factors that trigger the need for full access control. As an example, if full access control is required by a combination of increased traffic on US 93 and new development along US 93, ADOT and the Developers may share financial responsibility for required improvements.

Generally, new grade-separated interchanges will be located near major intersections that have at-grade intersections under the partial access control provisions. Frontage/access roads will be extended or added to ensure that all properties fronting on US 93 at the time of conversion have access to the nearest traffic interchange (terrain permitting). An economic analysis and/or a feasibility study may be required to determine if access via a frontage/access road can be provided or if access rights to US 93 should be acquired by ADOT, in which case no access to US 93 would be provided. It may be more economical to purchase some parcels than to maintain access. If more than one access location is desired by property owners, or if properties are later subdivided and require new access, the cost for the additional access will be borne by the property owner(s). Three

future traffic interchanges are recommended for implementation of full access control for the entire length of this study project. They are illustrated schematically within **Appendix F**. The future traffic interchanges and access roads required for conversion of partial access control to full access control are shown as dashed lines on the design concept plans in Appendix F.

Agreement on the approach and implementation of access control requires that all participating agencies agree to the guidelines proposed in this study document. While there is concurrence from all the agencies that the plan is reasonable, there was not full agreement to the final placement of the future TIs with respect to ASLD. Separate meetings were held with representatives of ASLD, ADOT Management, and FHWA to address these concerns. Appendix F includes a summary of those meetings, and the approach proposed for this corridor. Unless directed otherwise, all design should proceed using the recommendations of this study as the controlling document. ADOT will continue dialogues with ASLD as the acquisition of property for the proposed improvements continues.

Applications for direct access to US 93 that are received after full access control has been implemented will be permitted only by access roads that connect to a traffic interchange, with all costs for construction of the access roads to be borne by the property owner(s). In these instances, the access roads must be constructed outside the US 93 right-of-way.

7.3.5 Implementation of Access Control

Implementation of the access management plan described herein is contingent upon the following:

- Designation of US 93, as described herein, as a Full Access Controlled highway by the State Transportation Board;
- Acquisition of rights-of-way for interchanges and access roads, and acquisition of access rights, where required, from properties abutting US 93.

After US 93 is designated to be an access controlled highway by the Transportation Board the issuance of permits, by ADOT's Kingman District or Prescott District, as appropriate, for access to US 93 will be the vehicle for implementation of partial access control under the authority of ADOT Administrative Rule R17-3-702, Encroachments in Highway Right-of-Way.

Partial access control will be implemented as the construction to provide a 4-lane roadway is completed on a project-by-project basis.

Access rights will be acquired from private property owners and revocable access permits will be granted to maintain access until full access control is implemented.

Full access control will be implemented along any section of US 93 as required to preserve the safety and level of service as traffic volumes increase and development occurs along the corridor.

Proposed US 93 rights of way delineated on the design concept plans includes property needed for partial access control. Right of way required for full access control is shown on the proposed Full Access Control Plans included in Appendix F as "Future Right of Way."

7.3.6 Frontage Roads/Access Roads

Frontage roads needed to implement partial or full access control will be constructed parallel to US 93 within ADOT right-of-way. Access roads other than frontage roads needed to provide access when partial or full access control is implemented will typically be constructed on privately or publicly owned property to replace current access roads under permit or agreement. Access roads will be constructed to match existing access roads. For example an access road tying into an existing primitive road will be constructed as a grader road without surfacing, paving or drainage facilities.

Frontage roads or access roads constructed for initial implementation of partial access control as an interim measure will be constructed by ADOT in accordance with the design standards identified in Chapter 5. Drainage requirements are determined by the County for the type of facility being constructed. In the future, when US 93 is converted from partial access control to full access control, all frontage roads or access roads necessary to implement full access control will also be constructed by ADOT.

Following construction, the process to transfer frontage road right-of-way and maintenance responsibilities to Yavapai County will be initiated in accordance with the State Transportation Board Policy 16. Turnback of State Routes Policy. ADOT Right-of-Way plans should identify the right-of-way required for US 93 and the right-of-way required for the frontage roads or access roads separately to facilitate turnback to the County.

Following construction, access roads on privately or publicly owned property will be returned to the owner for operation and maintenance.

ADOT will not assume responsibility for providing additional right-of-way and construction of additional access roads to serve property subdivision and development that occurs after partial or full access control has been established.

All access roads installed by property owners after access control has been implemented will typically be located outside the US 93 right-of-way. If owners of adjacent properties intend that the County assume maintenance responsibilities, the access road and associated rights-of-way must be dedicated to the County. Roadway and drainage construction and right-of-way widths must meet County standards in effect at the time.

7.4 Description of Access Control

Existing local roads and turnouts that intersect US 93 within this section of highway have been identified in the following narrative. A preliminary analysis has been made to determine access points necessary to maintain access to adjacent properties for both partial and full access control. Due to the new R/W required for construction of the preferred alternative, a total of 588.2 acres of land on 51 parcels would be permanently incorporated into ADOT R/W (Table 5-1). The preferred alternative would generally minimize impacts on adjacent land uses by following the existing roadway corridor and avoiding developed properties. In addition, the preferred alternative would maintain access to adjacent properties and accommodate future traffic volumes associated with continued development in the project area.

In the vicinity of the SR 71 Interchange, there will be additional R/W acquired. The added R/W is necessary to construct a revised interchange configuration, with the US 60 mainline remaining at grade, and SR 71 constructed over the mainline. The added R/W in this area is required not only for the construction of the ramps and overpass, but to restrict access in the immediate areas of the ramps in accordance with revised ADOT policies.

The project description is broken into three study segments. Study Segment A includes the developed residential areas near the beginning of the project; Study Segment B includes the undeveloped areas through primarily level terrain north of the residential areas, and Study Segment C includes that section of US 93 that has been designated as the Joshua Forest Scenic Road where the terrain is rolling and the area is much more scenic.

7.4.1 Study Segment A; MP 193.5 to MP190.5

Study Segment A begins at the Junction of US 93 and SR 89 and proceeds northerly across the Matthie Railroad Overpass at MP 192.88, and through a residential development, ending north of the residential area. Major features in segment A include the channelization for the intersection of US 93 and SR 89, the Matthie Railroad Overpass at MP 192.9, and the residential development along US 93 from MP 192.6 to MP 191.5

Property adjacent to US 93 in segment A is in private ownership from the Beginning of Project at MP 193.5 to MP 191.4. From MP 191.4 to the end of the study zone at MP 190.5 the adjacent property is State Trust Land.

7.4.1.1 Partial Access Control

This project will not change the intersection of SR 89 and US 93. Access between SR 89 and US 93 will remain as currently exists.

Existing access points between US 93 and adjacent property include several County roads and residential driveways north of the Matthie Railroad Overpass between MP 192.6 and MP 190.5.

- Quail Run intersects US 93 on the east side of US 93 at MP 192.6.
- Moreton Road intersects US 93 on the west side and Nine Irons Ranch Road intersects US 93 on the east side diagonally opposite each other at MP 192.4.
- Caballero Drive, which is the entrance to the Vista Royale residential subdivision, intersects US 93 on the west side at MP 192.1. Vista Royale is a developing subdivision with several homes completed and several more under construction.
- Between MP 192.1 and 191.6, 8 existing residential turnouts provide access to 12 lots on the east side of US 93.
- A gated access on the west side of US 93 at MP 191.5 provides emergency access to the Vista Royale subdivision.
- A gated access on the west side of US 93 at MP 190.6 provides access to a corral and primitive roads.

Implementation of Partial Access Control will provide the following access points:

- Retain the Quail Run intersection on the east side of US 93 at MP 192.6 as a right in/right out intersection with no median crossover.
- A two-way frontage road will be constructed on the east side of US 93 from Quail Run (MP 192.6) to MP 191.5. Nine Irons Ranch Road and the eight existing residential turnouts will connect to the frontage road. Connections between the frontage road and US 93 will be provided at Quail Run (MP 192.6), Nine Irons Ranch Road (MP 192.4), Caballero Drive (MP 192.1) and at MP 191.5.
- The skewed intersections of US 93 with Moreton Road on the west side and Nine Irons Ranch Road on the east side of US 93 at MP 192.4 will be realigned to provide a 90-degree intersection with US 93 including a median crossover.
- An at-grade intersection with median crossover will be constructed on the west side of US 93 at Caballero Drive (MP 192.1) to provide access to the Vista Royale subdivision.
- The gated emergency access to Vista Royale on the west side of US 93 at MP 191.5 will be realigned to a 90-degree turnout opposite the access to the frontage road on the east side of US 93. A median crossover will be provided.
- A gated right-in/right-out turnout will be provided on the west side of US 93 at MP 190.6 to provide access to a corral and primitive roads.

No other access points will be provided for the initial implementation of partial access control.

7.4.1.2 Full Access Control

It is anticipated that the planned Wickenburg Bypass will be in operation when full access control is required through Study Segment A. The partial access control features will remain in place for existing US 93 between SR 89 and the Bypass connection. Full access control will be implemented on the Bypass.

7.4.2 Study Segment B: MP 190.5 to MP 180.0

Study Segment B begins at the end of Study Segment A and proceeds northerly through essentially level terrain with very little development, ending at the southerly limit of the Joshua Forest Scenic Road.

The major access feature in Study Segment B is the junction of US 93 (MP 182.9) with SR 71 where a diamond traffic interchange provides access between the two highways.

Property adjacent to US 93 in this study zone is Arizona State Land except for several small parcels adjacent to the junction of US 93 and SR 71 that are privately owned. Tracts of private property that access US 93 through State Lands are located away from the highway.

7.4.2.1 Partial Access Control

There are seven access points between US 93 and adjacent property within Study Segment B:

- A gated access on the east side of US 93 at MP 190.0 provides access to primitive roads.
- A turnout on the west side of US 93 at MP 187.5 provides access to gravel stockpiles and State land
- Gated access points on both sides of US 93 at MP 186.2 provide access to primitive roads.
- A gated access on the west side of US 93 at MP 184.5 provides access to primitive roads.
- An access road with a cattleguard on the east side of US 93 at MP 184.4 provides access to primitive roads.
- The existing diamond interchange at the junction of US 93 (MP 182.9) and SR 71 provides access between the two State highways.
- A gated access on the east side of US 93 at MP 181.2 provides access to a stock tank and corral on State land.

Implementation of partial access control will provide the following access points:

- A gated right-in/right-out turnout will be provided on the east side of US 93 at MP 190.0 to provide access to primitive roads.
- A gated right-in/right-out turnout will be provided on the west side of US 93 at MP 187.5 to provide access to State land. The gravel stockpiles will be removed.
- Gated turnouts on both sides of US 93 and a median crossover will be provided at MP 186.2 to provide access to primitive roads.
- The existing gated access road with on the west side of US 93 at MP 184.5 will be realigned to intersect US 93 at MP 184.4 opposite the existing access road with cattle guard on the east side of US 93. A median crossover will be provided.
- The existing diamond traffic interchange at the junction of US 93 and SR 71 (MP 182.9) will be reconstructed as part of the 4-laning of US 93. Full Access Control, which has been implemented within the limits of the existing interchange, will

be retained with the reconstructed interchange. Existing access to SR 71 that lies within a minimum of 600 feet of the interchange ramp terminals will be closed and access will be provided to private properties by access roads that will tie back into SR 71 beyond the access control limits. An economic analysis should be made to determine if ADOT should acquire the private property in lieu of providing access

- A gated turnout on the east side of US 93 and a median crossover will be provided at MP 181.2.

No other access points will be provided for the initial implementation of partial access control.

7.4.2.2 Full Access Control

The SR 71 traffic interchange, which will be reconstructed during the four-laning of US 93, will continue to provide access to US 93 when full access control is implemented.

The gated access point at MP 190.0 will be south of the future connection of the Wickenburg Bypass to the existing US 93 corridor. It will remain.

The gated access point at MP 187.5 will be removed and access will be provided at the connection between the Wickenburg Bypass and US 93.

Access points at MP 186.2 and MP 184.4 will be removed. The existing primitive roads on the west side of US 93 tie into a network of roads that will be served by connections to the traffic interchange at the connection of the Wickenburg Bypass and US 93. The existing road network currently ties into SR 71. The existing primitive roads on the east side of US 93 opposite the above roads tie into SR 71 east of US 93.

The access point at MP 181.2 is a short (approx. 1,000 feet) primitive road that serves a stock pond. It will be removed. Access can be provided to this area from either SR 71 or the Alamo Road traffic interchange described in Study Segment C at MP 178.7.

Median crossovers at MP 186.2, MP 184.4, and MP 181.2 will be removed.

7.4.3 Study Segment C: MP 180.0 to MP 161.5

Study Segment C begins at the southerly limit of the Joshua Forest Scenic Road and continues to the end of project at MP 161.5.

Major access points within Study Segment C are the intersection of US 93 with Alamo Road at MP 178.6 and with Date Creek Road at MP 177.4. There are three ranch properties adjacent to US 93, and a network of primitive roads intersect US 93 at several locations providing access to large areas of State land, BLM Wilderness Areas, and isolated tracts of private land.

Property adjacent to the east side of US 93 within Study Segment C is State land except for the following three areas of private ownership:

- MP 174.0 to MP 173.5.
- MP 167.1 to MP 166.2.
- MP 162.0 to the end of project at MP 161.5.

Property adjacent to the west side of US 93 within Study Segment C is State land and BLM land except for the following four areas of private ownership:

- MP 174.0 to MP 173.5.
- MP 169.2 to MP 169.1.
- MP 167.1 to MP 166.2 - three small parcels in private ownership.
- MP 162.0 to the end of project at MP 161.5.

Two WAPA transmission lines cross over US 93 at MP 163.3. The WAPA structure nearest the east side of US 93 is for the 345 kv line and is designated as 162-3. Two major drainage channels cross US 93 in segment C: Date Creek crosses US 93 at MP 174.2 and Big Jim Wash crosses at MP 165.5.

7.4.3.1 Partial Access Control

There are eighteen access points to US 93 from adjacent property within Study Segment C.

- A gated access on the east side of US 93 at MP 178.7 provides access to State Lands and private property. Private property located away from the highway in Sections 21, 22, 27 and 28, T10N, R7W, has been subdivided into small acreages. The most direct access appears to be from US 93.
- Alamo Road intersects US 93 on the west side at MP 178.6 and provides access to a large area including private property, State Land, BLM land, the WAPA transmission line and recreational property.
- A gated turnout on the west side of US 93 at MP 177.6 provides access to corrals immediately west of the highway.
- The Date Creek Road intersects US 93 on both sides at MP 177.4. On the west side Date Creek Road intersects Alamo Road approximately 0.6 miles west of US 93. On the east side Date Creek Road provides access to the Date Creek Ranch and State Land.
- A gated access road on the west side of US 93 at MP 175.9 provides access to the WAPA transmission line and State Land.
- A gated turnout on the west side of US 93 at MP 174.0 provides access to a primitive road serving a small area adjacent to Date Creek.
- A gated turnout on the east side of US 93 at MP 174.0 provides access to a ranch area including buildings, corrals and a dirt landing strip.
- Roadside tables with a shelter and portable toilets are located on the west side of US 93 at MP 172.6
- Gated at-grade intersections on both sides of US 93 at MP 171.3 provide access to primitive roads that serve State Land on the east side and to State, BLM, private land and the WAPA transmission line on the west side of US 93.
- A gated turnout on the west side of US 93 at MP 169.4 provides access to private land with buildings, the WAPA transmission line, State land and BLM land.
- A gated access on the west side of US 93 at MP 167.8 provides access to the WAPA transmission line and BLM property.
- A turnout on the east side of US 93 at MP 167.0 is the entrance to the D G Ranch.
- A gated access on the west side of US 93 at MP 165.2 provides access to BLM land and the WAPA transmission line.
- A gated access on the east side of US 93 at MP 165.2 provides access to State land and private property.
- A gated access on the west side of US 93 at MP 163.6 provides access to the WAPA transmission line.

- A gated access on the east side of US 93 at MP 163.6 provides access to the WAPA transmission line.
- A gated access on the west side of US 93 at MP 163.1 provides access to BLM property and State land.
- A gated access on the east side of US 93 at MP 162.3 provides access to State land, the WAPA transmission line and private property.

Implementation of partial access control will provide the following access points:

- The access road on the east side of US 93 at MP 178.7 will remain as a gated, right-in/right-out intersection.
- Alamo Road on the west side of US 93 at MP 178.6 will be realigned to approximately MP 178.5. A median crossover of US 93 will be provided at Alamo Road.
- The gated turnout on the west side of US 93 at MP 177.6 will be removed. Access to the corrals will be provided from Date Creek Road.
- Date Creek Road will be realigned on the west side of US 93 to intersect the 4-lane roadway at MP 177.2, opposite the intersection on the east side. A median crossover of US 93 will be provided.
- A gated access with a median crossover will be provided on the west side of US 93 at MP 175.9 to provide access to primitive roads serving the WAPA transmission line and State Land.
- A gated turnout with a median crossover will be constructed on the east side of US 93 at MP 174.0 to provide access to a ranch area.
- The roadside table and turnouts at MP 172.6 will be removed.
- At-grade intersections with a median crossover will be provided on both sides of US 93 at MP 171.3 to provide access to State land on the east side and to State, BLM and private land, and the WAPA transmission line on the west side of US 93.
- A gated right-in/right-out access will be provided on the west side of US 93 at MP 169.4 to serve private land, the WAPA transmission line, State land and BLM land.
- A median crossover will be constructed at MP 168.9 to provide u-turn capability.
- A gated right-in/right-out access will be provided on the west side of US 93 at MP 167.8 to serve the WAPA transmission line and BLM property.
- A turnout with a median crossover will be constructed on the east side of US 93 at MP 167.0. The entrance to the D G Ranch will be modified to fit the new US 93 roadway.
- Gated turnouts with a median crossover will be provided on both sides of US 93 at MP 165.2. The existing road on the east

side of US 93 will require minor realignment to connect to the grade intersection.

- The gated turnout on the west side of US 93 at MP 163.6 will remain as a right-in/right-out turnout to provide intermittent access to the WAPA transmission line.
- Access to the two WAPA towers that will be located in the median of the 4-lane roadway will be permitted.
- A gated right-in/right-out turnout will be constructed on the east side of US 93 at MP 163.3 to provide intermittent access to the WAPA transmission line.
- A gated right-in/right-out access will be retained on the west side of US 93 at MP 163.1 that provides access to BLM property and State Land.
- A gated at-grade intersection with a median crossover will be constructed on the east side of US 93 at MP 162.4 to provide access to State land, the WAPA transmission line and private property.

No other access points will be provided for the initial implementation of partial access control.

7.4.3.2 Full Access Control

When full access control is implemented, access to lands now being served by at-grade intersections or turnouts from US 93 will need access to traffic interchanges or the access rights to the highway will have to be acquired.

7.4.3.2.1 Traffic Interchange – Alamo Road

Access between US 93 and Alamo Road on the west side of US 93, and between US 93 and Date Creek Road on the east side of US 93 will have to be maintained since those local roads serve large areas on both sides of US 93. A traffic interchange will be required to provide the necessary access.

Since Alamo Road and Date Creek Road are only about 1.3 miles apart, a single interchange with access road connections to the local roads would be more economical than constructing two interchanges, while providing efficient service to both crossroads.

In determining a recommended location for the interchange, consideration was given to locating it near the Alamo Road intersection or locating it near the Date Creek Road intersection.

- Alamo Road is a graded and maintained road that serves Alamo Lake State Park in addition to other areas. Recreational traffic from the Phoenix area contributes to the use of this road, making it a heavier traveled road than the other local roads in this immediate vicinity. Location of the traffic interchange near the existing intersection of US 93 and Alamo Road would accommodate the larger traffic volumes.
- An archaeological site that is located just west of US 93 near MP 177.7 may be impacted by an interchange located near Date Creek Road intersection. A location near Alamo Road intersection will minimize impact on the archaeological site.
- A stock pond and corrals are located close to the west side of US 93 near the westerly extension of Date Creek Road that may be impacted by an interchange located near the Date Creek Road intersection. A location near Alamo Road would minimize impact on the stock pond and corrals.
- Drainage channels cross US 93 at several locations that would be affected by any of the interchange locations. However, two of the larger drainages are located near the intersection of US 93 and Alamo Road and would have to be crossed by the interchange ramps if an interchange is located near Alamo Road. Preliminary analysis indicates both of these drainages will require 5-barrel box culverts while smaller drainage channels near Date Creek Road will require 2-barrel culverts.

After considering the above factors, a diamond interchange with a US 93 underpass is recommended near the Alamo Road intersection at MP 178.2. Alamo Road will be realigned to meet the interchange crossroad. Access to the stock pond and corrals will be provided from Alamo Road. An access road will be required along the easterly side of US 93 from the interchange crossroad at MP 178.2 to the Date Creek Road at MP 177.2, and from the local road on the east side of US 93 at MP 178.5 to the interchange crossroad at MP 178.2.

7.4.3.2.2 Traffic Interchange – MP 171.3

From the recommended traffic interchange near Alamo Road near MP 178.2 to the recommended traffic interchange near the Santa Maria River at MP 162.7 there are three ranch properties with access to US 93, and several minor intersections that provide access to networks of primitive roads serving large areas on both sides of US 93. The access provided under partial access control will allow properties served by primitive roads to develop over time. By the time full access control is needed to preserve the safety and function of US 93, it is likely that access to properties within this northerly sixteen-mile segment of study segment C will be required.

Consideration of the location of one or more interchanges to provide access to US 93 within northerly part of the study segment included the following items:

- The ranches are spread out to the point that it would require multiple interchanges to provide access close to their present access.
- Access to the Alamo Road interchange from any of the existing access points north of Date Creek would require crossing Date Creek which is located at approximately MP 174.2.
- Between Date Creek and Big Jim Wash, there are three ranch properties located adjacent to US 93 and three additional access points serve properties away from US 93.
- Date Creek and Big Jim Wash are located about 9 miles apart. Two interchanges could be located between the two drainage channels; one at MP 172.5 and one at 168.0. A total of approximately 6.5 miles of access road would be required to replace existing access. Existing primitive roads could be used for part of the distance.
- A single interchange could be placed between Date Creek and Big Jim Wash at MP 171.3, which is the location of existing access points on both sides of US 93. A total of approximately 8.8 miles of access road would be required to replace existing access. Existing primitive roads could be used for part of the distance for this location also.

Based on the above considerations, and the savings in construction cost of a single interchange vs. two interchanges, a diamond traffic interchange with a US 93 underpass located at MP 171.3, with unsurfaced access roads to serve existing access points is recommended. The gated at-grade intersections and median crossover at MP 171.3 will be closed. Consideration should be given to acquiring access rights from properties adjacent to US 93 if further studies indicate it is more economical to acquire access rights than to provide access.

7.4.3.2.3 Traffic Interchange – Santa Maria River

A proposed interchange at MP 162.7 is included in the Access Management Plan for US 93, Santa Maria River to Wikieup to serve properties near the Santa Maria River. This interchange will also serve adjacent properties along US 93 north of Big Jim Wash (MP 165.5).

Factors that were considered in locating a traffic interchange at MP 162.7 included the following.

- A traffic interchange will have to be located away from the Santa Maria River to minimize impact on riparian habitat and aquatic areas.

- The extremely rugged terrain north of the Santa Maria River will preclude construction of either access roads or a traffic interchange north of the Santa Maria River to serve the Barnes property, State Land and BLM land on both the east and west sides of US 93.
- A large hill rises above the west side of US 93 from MP 161.5 to MP 160.7 which would require a very large cut to construct a traffic interchange close to the existing access point. The terrain becomes more moderate to the south and an interchange could reasonably be constructed.
- A traffic interchange at MP 162.7 will provide access to areas south of the Santa Maria River and to areas north of Big Jim Wash (MP 165.5).

7.4.3.2.4 Other Considerations for Full Access Control

Additional access considerations for full access control within this study segment are:

- The gated turnout on the west side of US 93 and the median crossover at MP 175.9 will be removed. Access to the primitive roads and State Land will be from Alamo Road. The network of primitive roads serving this area currently intersects Alamo Road.
- The gated right-in/right-out turnout on the west side of US 93 at MP 174.1 will be removed.
- The median crossover at MP 173.1 proposed to be in place for partial access control will be removed.
- The gated access on the west side of US 93 at MP 169.4 will be closed. The unsurfaced frontage road to be constructed from the proposed interchange at MP 171.3 will tie into the existing access road.
- The median crossover at MP 168.9 will be removed.
- The gated access on the west side of US 93 at MP 167.8 will be retained as a right-in/right-out turnout for intermittent access to the WAPA transmission line.
- The turnout on the east side of US 93 and the median crossover at the D G Ranch (MP 167.0) will be removed. An access road will be provided from the traffic interchange at MP 171.3. The existing primitive road may be used for part of the access road.
- An access road will be constructed on the west side of US 93 from the interchange at MP 162.5 southerly to tie into the existing primitive road intersecting US 93 at MP 165.2. Consideration should be given to using the existing primitive road along the WAPA transmission line as the access road.
- The existing access on the east side of US 93 and the median crossover at MP 165.2 will be closed and access will be from primitive roads that tie into the interchange.

- The gated turnouts on the west side at MP 163.6 and on the east side at MP 163.3 that provide access to the WAPA transmission line will be closed and access will be provided from primitive roads that tie into the interchange. Access to the two WAPA towers that will be located in the median of the 4-lane roadway at MP 163.5 will be permitted.
- The gated access on the west side at MP 163.1 will be closed and access will be provided from the access road being constructed from the interchange to the south.
- The gated turnout with a median crossover on the east side of US 93 at MP 162.4 will be closed and the median crossing will be closed. Access will be provided at the interchange crossroad.
- A 2-way access road will be constructed on the east side of US 93 between the traffic interchange at MP 162.7 and the existing Santa Maria Road south of the Santa Maria River. A wash parallels US 93 on the east side from approximately MP 161.8, where it crosses from the west side of US 93, to the Santa Maria River. If the access road ran parallel and adjacent to US 93 it would require constructing a new channel. Because of the potential impact on riparian habitat and aquatic areas it is proposed that the access road from the interchange at MP 162.7 stay to the east of the wash until it gets near the existing access point at MP 160.9, where it will cross the wash and connect to the existing Santa Maria Road serving the Barnes property and public properties to the east.

8. IMPLEMENTATION PLAN

8.1 Introduction

It is understood that US 93 will be reconstructed in segments as priorities and funding permits. This section discusses the goals and issues relative to implementing the proposed improvements and recommends various construction projects consistent with policy and the route needs.

The selected alternative has been divided into logical improvement (reconstruction) projects, based upon the guidelines and evaluations presented in this section. Each improvement project can be correlated to the plan and profile sheets in Appendix E by milepost and station designations.

8.2 Implementation Guidelines

The following guidelines were established and used in evaluating and recommending the series of projects for improving US 93.

- Priority was given to projects that improve safety in high accident rate areas.
- Priority was given to projects that reconstructed portions of US 93 that currently require frequent and costly maintenance.
- Priority was given to sequencing projects to achieve contiguous stretches of four-lane roadway, wherever possible.
- Priority was given to projects that improve capacity consistent with need.
- Priority was given to projects that would later experience constructibility issues as traffic volumes increased.
- Project construction size was targeted between \$7 million and \$15 million dollars wherever possible to correlate with expected funding availability. Termini were selected accordingly.

8.3 Project Timing

Several factors were considered in establishing the sequencing of the various projects:

- Rate of deterioration of the existing pavement.
- Accident rates and types of accidents along the route;
- Current and projected Levels of Service;
- Maintenance of traffic along the route; and
- Other circumstances (e.g., social, political, economic, etc.) that could influence project timing.

8.3.1 Accidents

Since the entire route cannot be upgraded as a single project, high accident areas were investigated to determine if remedial projects could improve driving conditions in the near term. This information was also used to prioritize the sequencing of reconstruction projects.

Figures 2-7 depicts the number of accidents and accident rates along US 93 as recorded over the period from May 1997 through April 2002. The figures indicate that the stretch of highway between approximately MP 169.2 to MP 167.7 has the highest collective incident of accidents of the study route. Other high accident areas are near MP 193, and MP 177 to 169.2.

In reviewing the highway section between MP 169.2 and MP 167.7, it was learned that the roadway through this section was widened to 4-lanes with construction being complete in May 1998. 8 of 15 accidents that were recorded during the five year review period occurred prior to May 1998. In the four years after the 4-lane roadway was completed just 7 accidents were recorded. Since the roadway improvement has significantly reduced the accident rate in this section it will not have a high priority for further improvement.

A review of the accidents near MP 193 shows that 5 of the 6 accidents recorded within that section were collisions with another vehicle. This section is within the area of the US 93/SR 89

intersection. Remedial measures at the intersection should be investigated.

The high accident area from MP 177 to 169.2 should be taken into consideration when prioritizing the ultimate reconstruction segments, or as alternative, remedial projects should be investigated.

8.3.2 Level of Service

Level of Service (LOS) B has been established for this route. Within the study limits, the 2-lane sections of US 93 are currently operating at LOS D & E and are eligible for capacity improvements throughout. Using only traffic projections and LOS as indicators, it appeared that the 2-lane sections of US 93 should be widened progressively from north to south. Improvements to separate the existing 4-lane roadway from MP 169.2 to MP 167.7 would have a lower priority.

8.3.3 Maintenance of Traffic

Projects should be programmed to minimize possible impact to traffic. Preferably no more than two major projects should be underway simultaneously and adjacent to one another to avoid adverse traffic impacts. In programming projects with this in mind, consideration was given to the duration of projects and the potential overlap of project construction schedules.

8.3.4 Funding

The current 2007-2011 Five Year Transportation Facilities Construction Program does not include any funding for this reach of US 93.

8.4 Implementation Issues

Each improvement project will require the resolution of one or more issues prior to construction. Typically, these issues are related to clearances for right-of-way, utilities, or environmental mitigation, and regulatory agency coordination and approval. The following list of implementation issues must be considered for every project.

- On-site geotechnical investigations will be required for all projects. It is anticipated that some adjustment to the horizontal and vertical alignments will be necessary to optimize the project geometry as well as to meet the earthwork balancing goals. The drainage analysis for the corridor was limited to design concept level only. Summary information on all major design features can be found in Section 5.
- All projects will require new or additional right-of-way from either the BLM (access easements or TCEs primarily) or ASLD, as well as from private ownerships.
- Final locations of turnouts, acceleration/deceleration lanes, median crossovers, and access roads should be coordinated with the ASLD, Department of Public Safety, ADOT Kingman and Prescott Districts, Yavapai County, ADOT R/W, local agencies, and adjacent property owners.
- The final design shall incorporate the environmental mitigation measures outlined in the corridor Environmental Assessment included in Chapter 9 of this report.
- Provisions for wildlife and livestock crossings, fencing, and cattleguards should be coordinated with the BLM, ASLD, Arizona Game and Fish, and the ADOT Prescott and Kingman Districts.
- Visual mitigation features will be design considerations throughout the route. Details for slope treatment (including slope reseeding), slope warping, and rock roughening/rounding must be coordinated with the BLM and ADOT's Roadside Development Section.
- All plans and specifications must be reviewed by the BLM (where they apply within BLM jurisdiction).

- All private property parcels are likely to have changed significantly since completion of the DCR, especially through implementation project 2, as the area is experiencing significant growth. R/W and property disturbances need to be re-evaluated during final design.
- As noted in Appendix F, there was no resolution with ASLD on access control during the development of the final DCR. Resolution on each Segment of the project must be resolved to address the purchase of access control rights prior to construction, as well as resolution of future access to the highway.
- Coordination is required with the Corps of Engineers and the BLM prior to and during final design. The following items must be addressed and resolved prior to construction of each improvement project.
 - o Nationwide General Permits (NGP) will be required from the COE under Section 404 of the Clean Water Act at several locations. Specific locations are identified in Table 5-2.
- All improvement projects scheduled for construction three years or more following FHWA's FONSI will require a reevaluation of the Final EA by ADOT's Environmental & Enhancement Group.

8.5 Recommended Implementation Plan

An implementation concept is presented on the following pages. This schedule was developed in concert with ADOT Management, Districts, and technical groups.

It should be noted that all costs shown on the implementation plan are current-day costs, and have not been adjusted to reflect inflation, or grant an estimated timeline for construction. Only the priority of projects was discussed at the development of this document, as ADOT was not able to predict when the majority of the projects will be scheduled.

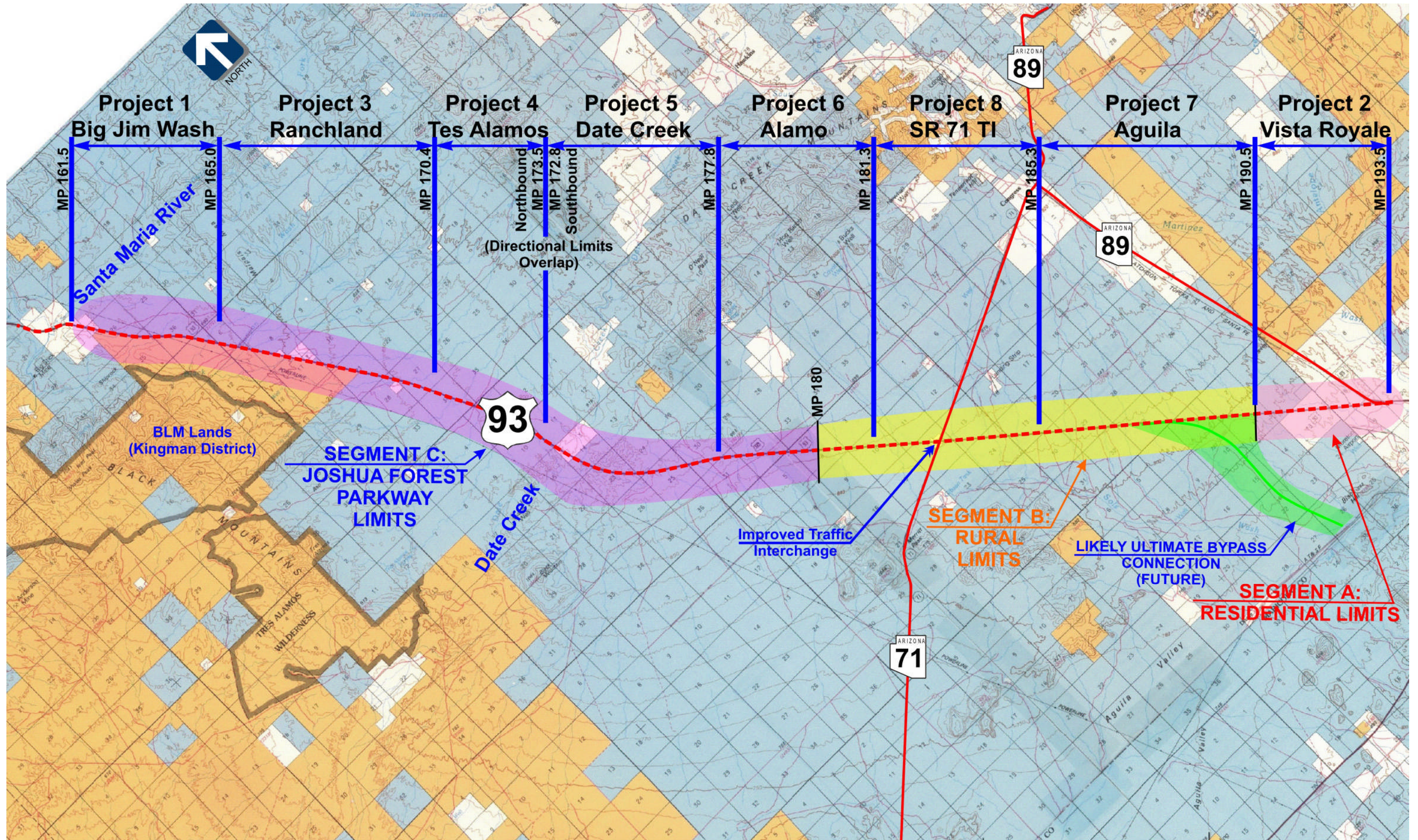


Figure 8-1: Proposed Implementation Projects

Table 8-1: Implementation Project Construction Costs

Project No.	Section	Location	Description	Cost			
				Constr:	Design:	R/W:	Utilities:
1	Big Jim Wash	MP 161.5 – 166.0	Construct new 2-lane northbound roadway	\$20,140,915	1,611,273	\$3,600,000	200,000
2	Vista Royale	MP 190.5 – 193.5	Construct new 4-lane divided roadway with access roads	\$11,131,495	890,520	\$2,000,000	2,000,000
3	Ranchland	MP 166.0 – 170.4	Construct new 2-lane northbound roadway	\$13,133,033	1,050,643	\$4,500,000	0
4	Tres Alamos	MP 170.4 – 173.5	Construct new 2-lane northbound roadway	\$7,832,314	626,585	\$3,500,000	0
5	Date Creek	MP 172.8 – 177.8	Construct new 2-lane northbound and southbound roadway sections.	\$16,227,609	1,298,209	\$2,500,000	0
6	Alamo	MP 177.8 – 181.3	Construct new 2-lane southbound roadway	\$13,324,580	1,065,966	\$400,000	0
7	Aguila	MP 185.3 – 190.5	Construct new 2-lane southbound roadway	\$17,050,576	1,364,046	\$500,000	0
8	SR 71 TI	MP 181.3 – 185.3	Construct new 2-lane southbound roadway and interchange over US 60 at SR 71.	\$25,225,797	2,018,064	\$500,000	200,000

8.6 Existing Roadway Rehabilitation

As described in Chapter 4, the existing roadway was retained for one direction of travel. While the geometry of the existing roadway meets minimum AASHTO design standards, the shoulder widths and safety features (slopes, guardrail) of the existing roadway require enhancement as part of the roadway improvements. This is primarily required where the existing roadway width is less than 40-foot wide, as shown in the following table.

Table 8-2: Shoulder Improvements Required

Milepost Limits	Existing Outside Shoulder	Required Outside Shoulder	Widening Required
161.3 – 172.7	6 ft	10 ft	4 ft
173.5 – 174.4	6 ft	10 ft	4 ft
175.6 – 177.0	6 ft	10 ft	4 ft

The shoulder width of the existing roadway appears sufficient to provide the needed width for the inside shoulder of a divided highway throughout the study corridor.

Based on discussions about implementation with ADOT's Kingman and Prescott Districts, it was determined that the decision to rehabilitate shoulders will be made in the future. Shoulder widening could be completed when the adjacent improvements are constructed, or completed as separate projects at a later date. To provide the greatest flexibility, a Design Exception has been obtained for retaining the existing shoulders until such time that other improvements are required on the existing roadway. No funding for widening the shoulders have therefore been included in the implementation costs.

8.7 Costs

Preliminary cost estimates were prepared for each improvement project. Unit prices were based upon recent (2006) ADOT bid results with adjustments made to reflect the location of the project and the difficulty of the work anticipated. The basis for the quantity estimate and unit prices is explained in Section 6, Itemized Cost Estimates. These costs are all in present day values, and have not been adjusted for inflation.

8.8 Implementation Schedule

A recommended schedule for design, right of way acquisition and construction for each improvement project cannot be accurately developed at this time due to uncertainties regarding time of available funding.

9. ENVIRONMENTAL IMPACT MITIGATION MEASURES

The effects of the recommended build alternative have been assessed and are documented in the project's Final EA. The findings of the Final EA and the mitigation commitments made therein will remain in effect for three years following FHWA's Finding of No Significant Impact (FONSI). For all design segments of the recommended alternative subsequent to the post-FONSI three-year period, project reevaluations must be conducted to confirm the final design is in accordance with the provisions stipulated in the Final EA. If a design change is proposed, supplemental documentation must be prepared as part of a Design Change Reevaluation to assure compliance with NEPA requirements and FHWA guidelines.

The mitigation commitments provided below have been taken from the Final EA. This list applies to all segments of the recommended alternative for the proposed widening of US 93 between SR 89 (MP 193.5) to the recently completed improvements just east of the Santa Maria River (MP 161.5). Where required, site specific mitigation measures must be developed through consultation between ADOT and the BLM, ASLD, and local residents. ADOT will implement the mitigation measures by incorporating details into the construction plans, specifications, and special provisions, and by construction monitoring. The BLM will approve plans and specifications for improvements within their jurisdictional lands, and will monitor construction on BLM land. On private and State land, ADOT will provide a comparable level of effort to adhere to the agreed-upon ADOT/BLM standards of resource protection. ADOT will also direct all activities performed by the construction contractor(s).

In addition to the mitigation commitments, some techniques used to accomplish the mitigation objectives are also listed. Best management practices appropriate to this project that have been used successfully on other US 93 corridor projects have also been incorporated. An erosion control plan and a reclamation/revegetation plan must be prepared during the design of all segments of the recommended alternative. The plans will be implemented by ADOT during construction, and monitored by ADOT and any partnering agencies following construction.

Design Responsibilities:

1. ADOT will provide a roadside pulloff facility for both directions of traffic in the vicinity of the existing roadside table (if provisions for a permanent rest facility have not been defined in or near the area). Each facility will include a trash receptacle, parking area, and emergency phone call box. The final locations of the facilities will be determined during design.
2. For each project design segment, ADOT will coordinate with affected landowners, land management agencies, and lease holders to identify opportunities and specific design measures to minimize impacts on livestock/farming operations. Coordination efforts will consist of, but not be limited to, a meeting with affected landowners and/or lease holders during the design kickoff phase, and a follow-up meeting at the 60 percent design phase addressing the concerns identified during the early coordination.
3. To minimize impacts on adjacent land use, existing cattle crossings under US 93 will be maintained or relocated. To maintain existing cattle crossings, existing box culverts that are 6 feet in height or greater will not be downsized and will be designed to function as cattle passes where feasible. If during design it is determined that the existing cattle passes cannot be retained, ADOT will contact the affected land managing agency for information on cattle crossing needs and arrange for the development of improved crossing locations or the provision of new livestock water sources. The number of cells/barrels to a culvert crossing is dependant on the drainage requirements.
4. During final design, ADOT will review the project plans to verify the extent of encroachment within the 100-year floodplain and will obtain the required floodplain construction permits from the Yavapai County Flood Control District.
5. During final design, the project plans will be reviewed to verify the extent of encroachment into waters of the US. As appropriate, mitigation plans will be developed and certifications and permits required under Sections 401 and 404 of the Clean Water Act will be obtained by ADOT prior to construction.
6. ADOT Roadside Development Section will determine who will prepare the Storm Water Pollution Prevention Plan.
7. A survey for loggerhead shrike nests will be performed by a qualified biologist during final design. The survey will be conducted in areas that will be disturbed by construction activities and are located on or within one mile of BLM lands. If loggerhead shrike nests are found, ADOT will coordinate with the BLM regarding potential impacts to the species.
8. A survey for western burrowing owls will be performed by a qualified biologist during final design. The survey will be conducted in areas that will be disturbed by construction activities and are located on or within one mile of BLM lands. If western burrowing owls are found, ADOT will coordinate with the BLM regarding potential impacts to the species.
9. Game fence consistent with ADOT Game Fence Specification (barbed wire game fence with a smooth bottom wire) will be installed along the right-of-way line in all portions of the project that are not immediately adjacent to developed areas.
10. ADOT will include the Arizona Game and Fish Department in the design partnering process to address wildlife movement issues. During design, Arizona Game and Fish Department representatives will be requested to provide input in discussions about wildlife opportunities and the development of appropriate wildlife-sensitive design measures at locations identified as important for wildlife connectivity and movement, including the Date Creek and Big Jim Wash bridges. In conjunction with the wildlife-sensitive design efforts, further examination of available wildlife strike data for the project area will be conducted.
11. ADOT Roadside Development Section will notify the Arizona Department of Agriculture at least 60 days prior to the start of construction to afford commercial salvagers the opportunity to remove and salvage any plants that are not included in the plant salvage plan.

12. A plan for the inventory, salvage, storage, and transplantation of native plants, including saguaro, agave, and Joshua trees, will be developed by ADOT Roadside Development Section during final design. Healthy, salvageable native plants within the area of disturbance will be salvaged and transplanted to the extent practicable to replicate the surrounding vegetative density.
13. Disturbed areas will be seeded with a seed mix consisting of native species selected for the site and will be revegetated with salvaged plants. During final design, ADOT will develop the seed mix. Revegetation plans will identify, where applicable, the need for mulching, salvaging, placement of salvaged surface soils, and other necessary treatments to promote successful plant establishment.
14. During final design, ADOT Natural Resources Section will survey the project area for invasive species. If invasive species are found, ADOT Natural Resources Section will treat these species according to an invasive species management plan and any necessary treatments will continue following completion of construction.
15. During final design, the variable-width median and roadway centerline will be tweaked to minimize visual impacts and maximize travelers' experience within the Joshua Forest Scenic Road.
16. Vegetation within the median area will be protected in-place to the extent possible in areas where the median width will be greater than 84 feet.
17. The cottonwood trees located in the vicinity of MP 166.8 will be protected in-place.
18. Seeding of disturbed areas will occur in a progressive manner as the slopes are completed.
19. Newly exposed rock faces will be shaped to blend with natural rock features by incorporating characteristics of the adjacent natural rock to include color, scale, shape, slope, and fracturing to the extent that is practical and feasible as identified through geotechnical testing and constructability reviews.
20. Rock outcrops will be left in place after construction if they are determined to be stable; will blend into the surrounding terrain; and will not create a hazard to the traveling public, interfere with construction, or look out of place in the natural landscape.
21. At the intersections of cuts and natural grades, slopes will be adjusted and warped to flow into each other or transition into the natural ground surfaces without noticeable breaks.
22. Cut and fill slopes will be designed with varied slope ratios to leave an irregular, undulating, or roughened appearance rather than a uniform grade to simulate the terrain of the surrounding area. The slope ratios will vary from the top to the bottom of the slope face and from station to station.
23. The project plans will identify remnants of landforms to be modified to make them appear more natural and to avoid leaving uncharacteristic fin-shaped landforms in the median.
24. Any riprap material will blend with the surrounding rock and exposed soil color.
25. Erosion control matting will be composed of a natural, earth-tone material.
26. During final design, ADOT will evaluate the use of staining exposed rock to reduce the color contrast with the existing landscape.
27. Bridges, concrete barriers (outside limits), retaining walls, and highly visible culvert headwalls and endwalls will be constructed with color and/or texture qualities that blend with the existing landscape.
28. Where guardrail is required, natural-appearing metal guardrail material, such as naturally weathered steel, will be installed to blend with the landscape.
29. During final design, copies of the construction documents will be provided to the Parkway, Historic, and Scenic Roads Advisory Committee for review and comment.
30. During final design, the Federal Highway Administration's Visual Prioritization Process (1994) or its equivalent will be used to identify site-specific measures to reduce impacts to visual resources through the Joshua Forest Scenic Road. While these impacts cannot be avoided, proof that the proposed design solution addresses these concerns shall be provided.
31. All asphalt not reused as part of the project will be removed from the site or incorporated into roadway embankments under a minimum of 3-foot cover, and the roadbed will be reshaped, scarified, and revegetated. All abandoned sections of old roadway will be obliterated and made to blend with the existing landscape.
32. Within the designated limits of the Joshua Forest Scenic Road, signing and other roadside elements, such as reflectors, delineators, and object markers, will be limited to those essential to ensure efficient traffic operations and driver safety.
33. If possible, any new roadway signs will be placed to avoid obstructing northbound motorists' views of the Shiprock formation between mileposts 166.0 and 164.0. ADOT will field-verify the placement of roadway signs before installation.
34. An Initial Site Assessment will be conducted during final design to assess hazardous materials concerns associated with right-of-way acquisition at the US 93/State Route 71 junction. If necessary, remedial measures will be implemented based on the results of the assessment.
35. During final design, ADOT will conduct assessments to determine the presence of asbestos within any bridge structure that will be altered or modified as a result of construction. ADOT will also conduct assessments to determine the presence of Resource Conservation and Recovery Act metals (e.g., lead-based paint) on these structures.
36. The stipulations contained in the Programmatic Agreement between ADOT, Federal Highway Administration, BLM, and State Historic Preservation Office will be fully satisfied prior to the beginning of construction.
37. During design, ADOT will administer a public involvement program for the design segment including the State Route 89 junction and Vista Royale area in order to give area residents the opportunity to provide input on specific design issues. The program will include, but not be limited to, a meeting with area residents during the design kickoff phase, and a follow-up meeting or newsletter, as appropriate, at the 60 percent design stage addressing the concerns identified during the early coordination.

Prescott and Kingman District Responsibilities:

1. The District would submit the Notice of Intent and the Notice of Termination to the Arizona Department of Environmental Quality.
2. A construction notice would be provided to adjacent residents and businesses at least two weeks prior to construction.

Contractor Responsibilities:

1. Permanent cross-drainage structures shall be installed at the earliest possible phase of construction to minimize potential erosion throughout the duration of construction.
2. The contractor shall submit the Notice of Intent and the Notice of Termination to the Arizona Department of Environmental Quality.
3. The contractor shall employ a qualified biologist to provide instructional materials regarding the protection of chuckwalla and desert rosy boa to all supervisory construction personnel prior to performing any ground-disturbing activities related to construction of the project.
4. A desert tortoise survey shall be conducted by a qualified biologist 15 days prior to the beginning of construction in areas of suitable tortoise habitat that will be disturbed.
5. Because Sonoran desert tortoises occur within the project area, the contractor shall comply with the Arizona Game and Fish Department's Tortoise Handling Guidelines if specimens are encountered during construction.
6. The contractor shall salvage and replant native plants within the area of disturbance in accordance with the plant salvage and revegetation plans.
7. Disturbed areas shall be seeded with a seed mix consisting of native species selected for the site and shall be revegetated with salvaged native plants.
8. All earth-moving and hauling equipment shall be washed at the contractor's storage facility prior to entering the construction site to prevent the introduction of invasive species.

9. If invasive species are found within the project area, the contractor shall be required to wash all earth-moving and hauling equipment prior to leaving the construction site in order to prevent the spread of invasive species to uncontaminated areas.
10. The contractor shall stake the clearing limits for Arizona Department of Transportation Engineer's approval prior to the start of clearing. These limits shall be irregular where possible, and straight clearing lines shall be avoided by varying the width of the area to be cleared or by leaving selected clusters of vegetation near the edge of the clearing limits.
11. The contractor shall remove trees only when specifically authorized to do so by ADOT Engineer and shall protect in-place the vegetation outside the specified clearing limits.
12. Vegetation within the median area shall be protected in-place to the extent possible in areas where the median width will be greater than 84 feet.
13. The contractor shall protect in-place the cottonwood trees located in the vicinity of milepost 166.8.
14. Seeding of disturbed areas shall occur in a progressive manner as the slopes are completed.
15. Any riprap material shall blend with the surrounding rock and exposed soil color.
16. Erosion control matting shall be composed of a natural, earth-tone material.
17. The contractor shall protect in-place existing rock and landforms outside the clear zone during construction.

18. All asphalt not reused as part of the project shall be removed from the site or incorporated into roadway embankments under a minimum of 3-foot cover, and the roadbed shall be reshaped, scarified, and revegetated, all in accordance with ADOT standard specifications. All abandoned sections of old roadway shall be obliterated and made to blend with the existing landscape.
19. If asbestos and/or heavy-metal materials are found as a result of the assessments of bridge structures conducted by ADOT, the contractor shall prepare a plan detailing the proper procedures for the demolition or modification of the structures and the disposal or abatement of the asbestos and/or heavy-metal materials. In addition, the contractor shall obtain any permits required for demolition of the structures or disposal of the asbestos or heavy-metal materials.

Appendix A
DESIGN EXCEPTION
MEMORANDUM



Arizona Department of Transportation

ROADWAY ENGINEERING GROUP

MEMORANDUM

To: Mary Viparina, 611E
Assistant State Engineer
Roadway Engineering Group

Date: February 24, 2006

From: Vincent Li, 605E *VL*
Manager
Roadway Predesign Section

Subject: Design Exception Request
Project 093 YV 161 H4871 01L
US 93 – Wickenburg to Santa Maria River
Kingman-Wickenburg Highway

The implementation phase of this Design Concept study has not been programmed for construction but listed as design phase in FY 2006 in the 2006-2010 ADOT Five-Year Transportation Facilities Construction Program.

US 93 is a major rural arterial highway linking Phoenix to northwestern Arizona and beyond. The existing roadway between SR 89 and the Santa Maria River is a two-lane facility. The traffic on existing US 93 is increasing and has already reached the point where a four-lane highway is needed. This project is intended to provide needed capacity on US 93. A new two-lane roadway is proposed to serve as the southbound lanes and will be built per current Roadway Design Guidelines. The existing two-lane roadway will serve as the northbound lanes.

Design Exceptions are hereby requested for improvements on the existing two-lane roadway for shoulder width at three locations and superelevation at one location as per the attached AASHTO Controlling Design Criteria Report (November 2005). An Accident Evaluation Report has also been prepared for the project and is also attached.

Reasons for requesting the design exceptions are as follows:

1. Superelevation: The existing superelevation rate of 0.015'/ft is 0.015'/ft less than the AASHTO recommended rate of 0.030'/ft from MP 177.46 to MP 177.64. The calculated speed of the curve based on AASHTO Method 2 is 85 mph with a posted speed of 65 mph and therefore, no improvements to the superelevation are recommended.
2. Shoulder Width: The existing shoulder width is 6' (2' less than the AASHTO recommended minimum width of 8') from MP 161.30 to MP 172.70, MP 173.50 to MP 174.40, and MP 175.60 to MP 177.00. Per as-builts, the typical rates of side slopes are 6:1 which can be negotiated by a vehicle with a good chance of recovery. Also, implementation of full shoulders in rolling terrain (from MP 161.5 to MP 177.0) will be a major expenditure.

The Accident Analysis Report states that there are no indications that the existing roadway geometrics contributed to any of the reported accidents on US 93 in the segments selected for the design exceptions during the five-year evaluation period.

Approved:

Mary Viparina
Mary Viparina

8/29/06
Date

cc Project Manager, ^{Harry Doescher} ~~Steve Mishler~~ (w/attachments)
Contracts & Specifications, Barry Crockett (w/o attachments)
Predesign Records Retention (w/attachments)
FHWA, Robert Hollis, Attn: Aryan Lirange (w/o attachments)

Appendix B
AASHTO ANALYSIS OF EXISTING
ROADWAY ALIGNMENT (HORIZ. & VERT.)

FEDERAL REFERENCE NO.: (Unassigned)
TRACS No. 093 YV 161 H 4871 01L

US 93: WICKENBURG TO SANTA MARIA RIVER

US 93, MP 161.5 TO MP 193.5

**AASHTO CONTROLLING
DESIGN CRITERIA REPORT**

November 2005
(Revised from October 2001)

Prepared for

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY ENGINEERING GROUP
ROADWAY PREDESIGN SECTION

Prepared by

JACOBS CIVIL INC.
875 W. Elliot Road
Suite 201
Tempe, Arizona 85284

TABLE OF CONTENTS

	Page
Title Sheet	i
Table of Contents	ii
List of Existing Design Features Requiring Design Exceptions	iii
SUMMARY OF CRITERIA (Rural – Undivided)	1-3
SUMMARY OF CRITERIA (Rural – Divided)	4-5
Attachment No. 1 - VERTICAL CURVE DATA	6-9
Attachment No. 2 - HORIZONTAL CURVE DATA	10-11

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
MAIN LINE SUMMARY (UNDIVIDED)**

PROJECT NUMBER: 093 YV 161 H487101L BEGINNING MP: 193.50 ENDING MP: 161.50
 FUNCTIONAL CLASSIFICATION: Principal Arterial Other - Rural
 HIGHWAY SECTION: Wickenburg-Kingman Highway ROUTE: US 93
 HIGHWAY LOCATION: Wickenburg to Santa Maria River

I. LANE AND SHOULDER WIDTHS

WIDTH OF TRAVELED LANE: Travel Lanes (Number)	EXISTING	PROPOSED	AASHTO RECOMMENDED	LIMITS	
	Feet	Feet	MINIMUM (Feet)	MP	MP
12 (2)	12 (2)	12 (4)	12	193.5	182.4
12 (3)	12 (3)	12 (4)	12	182.4	181.4
12 (2)	12 (2)	12 (4)	12	181.4	180.6
12 (3)	12 (3)	12 (4)	12	180.6	179.6
12 (2)	12 (2)	12 (4)	12	179.6	175.6
12 (3)	12 (3)	12 (4)	12	175.6	174.4
12 (2)	12 (2)	12 (4)	12	174.4	173.5
12 (3)	12 (3)	12 (4)	12	173.5	172.7
12 (2)	12 (2)	12 (4)	12	172.7	169.2
12 (4)	12 (4)	12 (4)	12	169.2	167.7
12 (2)	12 (2)	12 (4)	12	167.7	161.5

WIDTH OF USABLE SHOULDER:

EXISTING	PROPOSED	AASHTO RECOMMENDED	LIMITS	
Feet	Feet	MINIMUM (Feet)	MP	MP
8	10	6	193.5	183.4
10	10	6	183.4	182.4
2	10	6	182.4	181.4
8	10	6	181.4	180.6
2	10	6	180.6	179.6
8	10	6	179.6	177.0
5*	10	6	177.0	175.6
0.5	10	6	175.6	174.4
5*	10	6	174.4	173.5
0.5	10	6	173.5	172.7
5*	10	6	172.7	161.5

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
MAIN LINE SUMMARY (UNDIVIDED)**

PROJECT NUMBER: 093 YV 161 H487101L BEGINNING MP: 193.50 ENDING MP: 161.50
 FUNCTIONAL CLASSIFICATION: Principal Arterial Other - Rural
 HIGHWAY SECTION: Wickenburg-Kingman Highway
 HIGHWAY LOCATION: Wickenburg to Santa Maria River

II. DESIGN SPEED:

AASHTO Recommended Minimum	Posted Speed	Terrain	MP Limits
(mph)	(mph)		
60	55	Level	193.5 193.0
60	65	Level	193.0 175.5
50	65	Rolling	175.5 161.5

III. GRADES

Existing Maximum Grade:	AASHTO Maximum Allowable Grade is:	MP Limits
4.00%	3.00%	193.5 175.5
5.09%	5.00%	175.5 161.5

IV. CROSS SLOPE

As-Built Cross Slope: 1.50% AASHTO Allowable Range is: 1.5% - 2.0%

V. TRAFFIC VOLUMES AND FACTORS

Existing 1999 ADT (VPD) 5,600	Program Year 2004 ADT (VPD) 6,800	Design Year 2020 ADT (VPD) 10,000	Traffic Factors:		
			K=	D=	T=
MP 193.50 TO 182.88			10.00%	56.00%	27.00%
MP 182.88 TO 161.50			10.00%	56.00%	27.00%

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
MAIN LINE SUMMARY (UNDIVIDED)**

PROJECT NUMBER: 093 YV 161 H487101L BEGINNING MP: 193.50 ENDING MP: 161.50
 FUNCTIONAL CLASSIFICATION: Principal Arterial Other - Rural
 HIGHWAY SECTION: Wickenburg-Kingman Highway ROUTE: US 93
 HIGHWAY LOCATION: Wickenburg to Santa Maria River

VI. VERTICAL CLEARANCE

Structure	Milepost	Preconstruction Clearance	Postconstruction Clearance	AASHTO Minimum Allowable Clearance
N/A				

VII. STRUCTURES

Str. No	Structure	Milepost	Existing Bridge		Recommended Bridge		Bridge Rail		Existing Structural Capacity	Recommended Structural Capacity
			Width	Width	Width	Width	Geometry Adequate	Structural Capacity		
780	Matthie RR OP	192.88	40	40			Yes	HS 26.7	HS 20	
842	HWY 71 TI OP	182.88	52	52			No	HS 21.7	HS 20	
2366	Date Creek Bridge	174.2	44	28			Yes	HS 20	HS 20	
548	Big Jim Wash Bridge	165.54	30	28			No	HS 12.2*	HS 20	

VIII. VERTICAL ALIGNMENT AND STOPPING SIGHT DISTANCE:

See Attachment No. 1

IX. HORIZONTAL ALIGNMENT, SUPERELEVATION, AND STOPPING SIGHT DISTANCE:

See Attachment No. 2 *

X. REMARKS:

* Does not meet AASHTO recommended values.

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
MAIN LINE SUMMARY (DIVIDED)**

PROJECT NUMBER: 093 YV 161 H487101L BEGINNING MP: 193.90 ENDING MP: 193.22
 FUNCTIONAL CLASSIFICATION: Major Rural Arterial
 HIGHWAY SECTION: Wickenburg-Kingman Highway ROUTE: US 93
 HIGHWAY LOCATION: Wickenburg to Santa Maria River

I. LANE AND SHOULDER WIDTHS

	EXISTING (Feet)	PROPOSED (Feet)	AASHTO RECOMMENDED MINIMUM (Feet)
WIDTH OF TRAVELED LANE:			
Northbound Travel Lanes (Number)	12 (2)	12 (2)	12
Southbound Travel Lanes (Number)	12 (2)	12 (2)	12
WIDTH OF USABLE SHOULDER:			
Northbound Outside Shoulder	10	10	8
Northbound Inside Shoulder	4	4	3
Southbound Outside Shoulder	10	10	8
Southbound Inside Shoulder	4	4	3

II. DESIGN SPEED:

AASHTO Recommended Minimum (mph)	Posted Speed (mph)	Terrain
60	55	Level

III. GRADES

Existing Maximum Grade:	AASHTO Maximum Allowable Grade is:	Terrain
2.34%	3.00%	Level

IV. CROSS SLOPE

As-Built Cross Slope: 1.50%
 AASHTO Allowable Range is: 1.5% - 2.0%

**SUMMARY OF AASHTO CONTROLLING DESIGN CRITERIA
MAIN LINE SUMMARY (DIVIDED)**

PROJECT NUMBER: 093 YV 161 H487101L BEGINNING MP: 193.90 ENDING MP: 193.22
 FUNCTIONAL CLASSIFICATION: Major Rural Arterial
 HIGHWAY SECTION: Wickenburg-Kingman Highway
 HIGHWAY LOCATION: Wickenburg to Santa Maria River ROUTE: US 93

V. TRAFFIC VOLUMES AND FACTORS

Existing Structure	Program Year	Design Year	Traffic Factors:
1999	2004	2020	K= 10.00%
ADT (VPD)	ADT (VPD)	ADT (VPD)	D= 56.00%
7,900	9,600	14,500	T= 27.00%

VI. VERTICAL CLEARANCE

Structure	Milepost	Preconstruction Clearance	Postconstruction Clearance	AASHTO Minimum Allowable Clearance
N/A				

VII. STRUCTURES

Structure	Milepost	Existing Bridge Width	Recommended Bridge Width	Bridge Rail Geometry Adequate	Existing Structural Capacity	Recommended Structural Capacity
N/A	N/A	N/A	N/A	N/A	N/A	N/A

VIII. VERTICAL ALIGNMENT AND STOPPING SIGHT DISTANCE:

See Attachment No. 1

IX. HORIZONTAL ALIGNMENT, SUPERELEVATION, AND STOPPING SIGHT DISTANCE:

See Attachment No. 2 *

X. REMARKS:

* Does not meet AASHTO recommended values.

**ATTACHMENT 1
VERTICAL CURVE INVENTORY**

"AS-BUILT" VERTICAL CURVE INFORMATION

Project No.: SVC JOB NO.: 014164
 Project Name: US 93: Santa Maria River to Wickenburg

Curve No.	As-Built Plans Information						Vertical Curve Summary:							
	Station (eng)	Elevation (feet)	Grade In (%)	Grade Out (%)	Length (feet)	VPC (eng)	VPT (eng)	VPI Station	VPC	Mile Posts	Curve Length	Approach	Grades	Departure
							(eng)							
US 93														
1	164+50	2454.66	2.3422%	-0.6492%	1600.00	156+50.00	172+50.00	164+50.0	193.66	193.36	1600.00	2.3422%	-0.6492%	-0.6492%
2	184+00	2442.00	-0.6492%	3.0000%	1500.00	176+50.00	191+50.00	184+00.0	193.28	193.00	1500.00	-0.6492%	3.0000%	3.0000%
3	199+00	2487.00	3.0000%	-1.0000%	1400.00	192+00.00	206+00.00	199+00.0	192.99	192.73	1400.00	3.0000%	-1.0000%	-1.0000%
4	216+00	2470.00	-1.0000%	1.8700%	1200.00	210+00.00	222+00.00	216+00.0	192.65	192.42	1200.00	-1.0000%	1.8700%	1.8700%
5	248+00	2529.84	1.8700%	0.3105%	2400.00	236+00.00	260+00.00	248+00.0	192.16	191.70	2400.00	1.8700%	0.3105%	0.3105%
6	277+50	2539.00	0.3105%	1.5226%	800.00	273+50.00	281+50.00	277+50.0	191.45	191.30	800.00	1.5226%	1.5226%	1.5226%
7	300+50	2574.02	1.5226%	0.5842%	1200.00	294+50.00	306+50.00	300+50.0	191.05	190.82	1200.00	0.5842%	1.1176%	0.5842%
8	327+00	2589.50	0.5842%	1.1176%	800.00	323+00.00	356+50.00	327+00.0	190.51	190.36	800.00	1.1176%	1.1176%	1.1176%
9	352+50	2618.00	1.1176%	0.1000%	800.00	348+50.00	375+00.00	352+50.0	190.03	189.88	800.00	0.1000%	0.9646%	0.9646%
10	371+00	2619.85	0.1000%	0.9646%	800.00	367+00.00	399+00.00	371+00.0	189.68	189.53	800.00	0.9646%	0.5932%	0.5932%
11	395+00	2643.00	0.9646%	0.5932%	800.00	391+00.00	429+00.00	395+00.0	189.22	189.07	800.00	0.5932%	0.4071%	0.4071%
12	429+00	2663.17	0.5932%	0.4071%	0.00	429+00.00	458+50.00	429+00.0	188.50	188.50	0.00	0.4071%	0.4622%	0.4622%
13	458+50	2675.18	0.4071%	0.4622%	0.00	458+50.00	531+00.00	458+50.0	187.94	187.94	0.00	0.4622%	-0.0300%	-0.0300%
14	527+00	2706.84	0.4622%	-0.0300%	800.00	523+00.00	555+00.00	527+00.0	186.72	186.57	800.00	-0.0300%	0.2000%	0.2000%
15	555+00	2706.00	-0.0300%	0.2000%	0.00	555+00.00	570+00.00	555+00.0	186.12	186.12	0.00	0.2000%	0.1000%	0.1000%
16	570+00	2709.00	0.2000%	0.1000%	0.00	570+00.00	590+00.00	570+00.0	185.83	185.83	0.00	0.1000%	0.2500%	0.2500%
17	590+00	2711.00	0.1000%	0.2500%	0.00	590+00.00	614+00.00	590+00.0	185.45	185.45	0.00	0.2500%	-0.1000%	-0.1000%
18	610+00	2716.00	0.2500%	-0.1000%	800.00	606+00.00	627+00.00	610+00.0	185.15	185.00	800.00	-0.1000%	0.4565%	0.4565%
19	625+00	2714.50	-0.1000%	0.4565%	400.00	623+00.00	648+00.00	625+00.0	184.83	184.75	400.00	0.4565%	0.3600%	0.3600%
20	648+00	2725.00	0.4565%	0.3600%	0.00	648+00.00	665+00.00	648+00.0	184.36	184.36	0.00	0.3600%	0.5300%	0.5300%
21	665+00	2731.12	0.3600%	0.5300%	0.00	665+00.00	695+00.00	665+00.0	184.03	184.03	0.00	0.5300%	0.5878%	0.5878%
22	695+00	2747.02	0.5300%	0.5878%	0.00	695+00.00	715+00.00	695+00.0	183.47	183.47	0.00	0.5878%	3.0014%	3.0014%
23	713+00	2757.60	0.5878%	3.0014%	400.00	711+00.00	718+62.75	713+00.0	183.16	183.09	400.00	3.0014%	0.0000%	0.0000%
24	725+13	2794.00	3.0014%	-2.0000%	1300.00	718+62.75	477+50.00	725+12.8	183.02	182.77	1300.00	-2.0000%	0.6000%	0.6000%
25	471+00	2794.00	-2.0000%	0.6000%	1300.00	479+00.00	483+00.00	471+00.0	182.74	182.67	1300.00	0.6000%	0.7441%	0.7441%
26	481+00	2774.00	0.6000%	0.7441%	400.00	490+00.00	490+00.00	481+00.0	182.53	182.53	400.00	0.7441%	0.6000%	0.6000%
27	490+00	2779.40	0.7441%	0.5294%	0.00	490+00.00	515+00.00	490+00.0	182.17	182.06	0.00	0.5294%	0.7441%	0.7441%
28	512+00	2795.77	0.5294%	0.3341%	600.00	509+00.00	551+00.00	512+00.0	181.53	181.38	600.00	0.3341%	0.5294%	0.5294%
29	547+00	2814.30	0.5294%	0.3341%	800.00	543+00.00	589+00.00	547+00.0	181.38	181.38	800.00	0.3341%	0.1485%	0.1485%
30	586+00	2827.33	0.3341%	0.1485%	600.00	583+00.00	609+00.00	586+00.0	180.77	180.66	600.00	0.1485%	0.3280%	0.3280%
31	606+00	2830.30	0.1485%	0.3280%	600.00	603+00.00	631+00.00	606+00.0	180.40	180.28	600.00	0.3280%	0.2000%	0.2000%
32	631+00	2838.50	0.3280%	0.2000%	0.00	631+00.00	651+00.00	631+00.0	179.86	179.86	0.00	0.2000%	0.1250%	0.1250%
33	651+00	2842.50	0.2000%	0.1250%	0.00	651+00.00	1220+00.00	651+00.0	179.49	179.49	0.00	0.1250%	0.2496%	0.2496%

File Name: UPDATED AASH_RPT.xls
 Sheet Name: As-Built VA

Page 7 of 11
 Printed on 12/2/2005 at 10:36 AM

"AS-BUILT" VERTICAL CURVE INFORMATION

Project No.: SVC JOB NO.: 014164
 Project Name: US 93: Santa Maria River to Wickenburg

Curve No.	As-Built Plans Information						Vertical Curve Summary:							
	Station (eng)	Elevation (feet)	Grade In (%)	Grade Out (%)	Length (feet)	VPC (eng)	VPT (eng)	VPI Station	VPC	Mile Posts	Curve Length	Approach	Grades	Departure
							(eng)							
34	691+00	2847.50	0.1250%	0.4800%	800.00	687+00.00	695+00.00	691+00.0	178.80	178.65	800.00	0.1250%	0.4800%	0.4800%
35	714+00	2858.54	0.4800%	-0.6571%	1000.00	709+00.00	719+00.00	714+00.0	178.39	178.20	1000.00	-0.6571%	0.8247%	-0.6571%
36	731+00	2847.37	-0.6571%	0.8247%	1400.00	724+00.00	738+00.00	731+00.0	178.10	177.84	1400.00	0.8247%	0.8247%	0.8247%
37	748+00	2861.39	0.8247%	0.9600%	600.00	745+00.00	781+00.00	748+00.0	177.71	177.59	600.00	0.9600%	0.6284%	0.6284%
38	780+00	2881.50	0.9600%	0.9600%	200.00	779+00.00	781+00.00	780+00.0	177.06	177.02	200.00	0.9600%	0.9600%	0.9600%
39	794+00	2894.94	0.9600%	1.5000%	400.00	792+00.00	796+00.00	794+00.0	176.82	176.74	400.00	1.5000%	0.9600%	0.9600%
40	802+00	2906.94	1.5000%	-0.2097%	800.00	798+00.00	806+00.00	802+00.0	176.70	176.55	800.00	-0.2097%	1.5000%	1.5000%
41	818+50	2903.48	-0.2097%	1.8922%	600.00	815+50.00	821+50.00	818+50.0	176.37	176.26	600.00	1.8922%	1.8922%	1.8922%
42	841+50	2947.00	1.8922%	-3.1765%	4000.00	821+50.00	861+50.00	841+50.0	176.26	175.50	4000.00	-3.1765%	-3.1765%	-3.1765%
43	875+50	2839.00	-3.1765%	-3.2400%	0.00	875+50.00	875+50.00	875+50.0	175.24	175.24	0.00	-3.2400%	-3.2400%	-3.2400%
44	895+00	2775.82	-3.2400%	-1.8200%	600.00	892+00.00	898+00.00	895+00.0	174.92	174.81	600.00	-1.8200%	1.8200%	1.8200%
45	907+00	2753.98	-1.8200%	-2.6295%	400.00	912+50.00	909+00.00	907+00.0	174.68	174.60	400.00	-2.6295%	-2.6295%	-2.6295%
46	916+50	2729.00	-2.6295%	0.0000%	800.00	912+50.00	927+50.00	916+50.0	174.53	174.38	800.00	0.0000%	0.0000%	0.0000%
47	930+00	2729.00	0.0000%	2.2400%	500.00	927+50.00	947+50.00	930+00.0	174.25	174.16	500.00	2.2400%	2.2400%	2.2400%
48	942+50	2757.00	2.2400%	-1.4091%	1000.00	937+50.00	947+50.00	942+50.0	174.05	173.86	1000.00	-1.4091%	2.2400%	2.2400%
49	953+50	2741.50	-1.4091%	2.9512%	600.00	950+50.00	956+50.00	953+50.0	173.80	173.69	600.00	2.9512%	2.9512%	2.9512%
50	974+00	2802.00	2.9512%	5.0909%	400.00	972+00.00	976+00.00	974+00.0	173.40	173.32	400.00	5.0909%	5.0909%	5.0909%
51	979+50	2830.00	5.0909%	4.1077%	600.00	976+50.00	982+50.00	979+50.0	173.31	173.20	600.00	4.1077%	4.1077%	4.1077%
52	995+00	2893.67	4.1077%	0.3331%	1200.00	989+00.00	1001+00.00	995+00.0	173.10	172.87	1200.00	0.3331%	0.3331%	0.3331%
53	1008+00	2898.00	0.3331%	1.8125%	600.00	1005+00.00	1011+00.00	1008+00.0	172.79	172.68	600.00	1.8125%	1.8125%	1.8125%
54	1016+00	2912.50	1.8125%	0.0357%	800.00	1012+00.00	1020+00.00	1016+00.0	172.66	172.51	800.00	0.0357%	0.0357%	0.0357%
55	1030+00	2913.00	0.0357%	1.6923%	600.00	1027+00.00	1033+00.00	1030+00.0	172.38	172.26	600.00	1.6923%	1.6923%	1.6923%
56	1043+00	2935.00	1.6923%	1.1540%	400.00	1041+00.00	1045+00.00	1043+00.0	172.11	172.03	400.00	1.1540%	1.6923%	1.6923%
57	1048+00	2940.77	1.1540%	1.1535%	0.00	1048+00.00	1048+00.00	1048+00.0	171.97	171.97	0.00	1.1535%	1.1540%	1.1540%
58	1057+25	2951.44	-0.3435%	-0.3435%	600.00	1054+25.00	1060+25.00	1057+25.0	171.85	171.74	600.00	-0.3435%	-0.3435%	-0.3435%
59	1076+00	2945.00	0.8636%	-2.1591%	1000.00	1071+00.00	1081+00.00	1076+00.0	171.53	171.34	1000.00	-2.1591%	0.8636%	0.8636%
60	1087+00	2954.50	-2.1591%	-0.1471%	1200.00	1081+00.00	1093+00.00	1087+00.0	171.34	171.12	1200.00	-0.1471%	-0.1471%	-0.1471%
61	1109+00	2907.00	-0.1471%	-3.0882%	400.00	1107+00.00	1111+00.00	1109+00.0	170.85	170.77	400.00	-3.0882%	-3.0882%	-3.0882%
62	1126+00	2904.50	-3.0882%	-0.0882%	1000.00	1121+00.00	1131+00.00	1126+00.0	170.59	170.40	1000.00	-0.0882%	-0.0882%	-0.0882%
63	1143+00	2852.00	-0.0882%	-2.3416%	1000.00	1138+00.00	1148+00.00	1143+00.0	170.26	170.07	1000.00	-2.3416%	-2.3416%	-2.3416%
64	1160+00	2850.50	-2.3416%	-1.9908%	800.00	1156+00.00	1188+00.00	1160+00.0	169.92	169.77	800.00	-1.9908%	-1.9908%	-1.9908%
65	1185+00	2791.96	-1.9908%	0.2496%	600.00	1182+00.00	1206+50.00	1185+00.0	169.43	169.32				

"AS-BUILT" VERTICAL CURVE INFORMATION

Project No.: SVC JOB NO.: 014164

Project Name: US 93: Santa Maria River to Wickenburg

Curve No.	As-Built Plans Information						Vertical Curve Summary						
	Station (eng)	Elevation (feet)	Grade In (%)	Grade Out (%)	Length (feet)	VPC (eng)	VPT (eng)	VPI Station	Mile Posts VPC	VPT	Curve Length	Approach	Grades Departure
68	1233+00	2713.00	-2.5000%	-2.0786%	400.00	1231+00.00	1235+00.00	1233+00.0	168.50	168.43	400.00	-2.5000%	-2.0786%
69	1275+00	2625.70	-2.0786%	-3.1700%	600.00	1272+00.00	1278+00.00	1275+00.0	167.73	167.61	600.00	-2.0786%	-3.1700%
70	1285+00	2594.00	-3.1700%	-2.0000%	400.00	1283+00.00	1287+00.00	1285+00.0	167.52	167.44	400.00	-3.1700%	-2.0000%
71	1293+00	2578.00	-2.0000%	-4.5813%	1000.00	1288+00.00	1298+00.00	1293+00.0	167.42	167.23	1000.00	-2.0000%	-4.5813%
72	1301+00	2541.35	-4.5813%	-2.1462%	600.00	1298+00.00	1304+00.00	1301+00.0	167.23	167.12	600.00	-4.5813%	-2.1462%
73	1320+50	2499.50	-2.1462%	-5.0000%	800.00	1316+50.00	1324+50.00	1320+50.0	166.88	166.73	800.00	-2.1462%	-5.0000%
74	1329+00	2457.00	-5.0000%	-3.0000%	600.00	1326+00.00	1332+00.00	1329+00.0	166.70	166.59	600.00	-3.0000%	-2.0000%
75	1337+00	2441.00	-2.0000%	-3.0000%	600.00	1334+00.00	1340+00.00	1337+00.0	166.55	166.44	600.00	-3.0000%	-3.0000%
76	1362+00	2366.00	-3.0000%	-1.5556%	400.00	1360+00.00	1364+00.00	1362+00.0	166.06	165.98	400.00	-2.0000%	-1.5556%
77	1371+00	2352.00	-1.5556%	-4.0000%	1000.00	1366+00.00	1376+00.00	1371+00.0	165.95	165.76	1000.00	-1.5556%	-4.0000%
78	1385+00	2296.00	-4.0000%	-0.1714%	800.00	1381+00.00	1389+00.00	1385+00.0	165.66	165.51	800.00	-4.0000%	-0.1714%
79	1402+50	2293.00	-0.1714%	-1.9286%	800.00	1398+50.00	1406+50.00	1402+50.0	165.33	165.18	800.00	-0.1714%	-1.9286%
80	1416+50	2266.00	-1.9286%	-2.2857%	800.00	1412+50.00	1420+50.00	1416+50.0	165.06	164.91	800.00	-2.2857%	-2.2857%
81	1437+50	2218.00	-2.2857%	0.9804%	600.00	1434+50.00	1440+50.00	1437+50.0	164.65	164.53	600.00	0.9804%	0.9804%
82	1463+00	2243.00	0.9804%	-2.5424%	1200.00	1457+00.00	1469+00.00	1463+00.0	164.22	163.99	1200.00	-2.5424%	-2.5424%
83	1522+00	2093.00	-2.5424%	-0.8080%	800.00	1518+00.00	1526+00.00	1522+00.0	163.07	162.91	800.00	-0.8080%	-0.8080%
84	1537+00	2080.88	-0.8080%	-2.9968%	1200.00	1531+00.00	1543+00.00	1537+00.0	162.82	162.59	1200.00	-2.9968%	-2.9968%
85	1574+00	1970.00	-2.9968%	-3.4493%	800.00	1570+00.00	1578+00.00	1574+00.0	162.08	161.93	800.00	-3.4493%	-3.4493%
86	1601+00	1876.87	-3.4493%	-2.8713%	400.00	1599+00.00	1603+00.00	1601+00.0	161.53	161.46	400.00	-2.8713%	-2.8713%
US 93 SB													
87	164+00	2453.48	2.3420%	-0.5400%	1400.00	157+00.00	171+00.00	164+00.0	193.65	193.39	1400.00	2.3420%	-0.5400%

ATTACHMENT 2 HORIZONTAL CURVE INVENTORY

"AS-BUILT" HORIZONTAL CURVE INFORMATION

Project No.: SVC JOB NO.: 014164
Project Name: US 93: Wickenburg to Santa Maria River

Curve No.	Bearing In	Spiral In		Degree	Length	Total Curve		Spiral Out ST/PT Station	Bearing Out	Hor. PI Station	Curve Summary:		Exist. Super	Exist. Deg. of Curve.
		Length	TS/PC Station			Tangent	English PI Station				Super El.	Length		
US 93 1 (NB) 2 3 4 5 6 7 8 9	N 48 17 30 W	161+54.96		0°16'	1691.67	846.27	170+01.23	178+46.63	N 52 48 10 W	170+01.2	193.56	193.24	0.015 /ft	0°16'
	N 52 48 10 W	207+09.70		0°16'	838.54	419.32	211+29.02	215+48.24	N 50 34 00 W	211+29.0	192.70	192.55	0.015 /ft	0°16'
	N 50 04 50 W	748+69.69	200.00	1°00'	925.27	463.14	753+32.83	757+94.96	N 57 20 00 W	753+32.8	177.64	177.46	0.015 /ft	1°00'
	N 57 30 40 W	833+33.93		0°24'	10761.46	5648.97	889+82.90	940+95.39	N 14 27 55 W	889+82.9	176.03	174.00	0.015 /ft	0°24'
	N 14 27 55 W	985+77.13		0°45'	1585.00	795.31	993+72.44	1001+62.13	N 02 34 40 W	993+72.4	173.15	172.85	0.015 /ft	0°45'
	N 02 34 40 W	1003+67.73		0°45'	3184.44	1615.69	1019+83.42	1035+52.17	N 26 27 40 W	1019+83.4	172.82	172.21	0.015 /ft	0°45'
	N 26 27 40 W	1164+17.92		0°15'	3026.67	1515.54	1179+33.46	1194+44.59	N 34 01 40 W	1179+33.5	169.77	169.19	0.015 /ft	0°15'
	N 34 01 40 W	1456+39.19		0°30'	2296.67	1152.19	1467+91.38	1479+35.86	N 45 30 40 W	1467+91.4	164.23	163.80	0.015 /ft	0°30'
	N 45 30 40 W	1518+24.35		0°30'	2226.67	1116.85	1529+41.20	1540+51.02	N 34 22 40 W	1529+41.2	163.06	162.64	0.015 /ft	0°30'
US 93 SB 10 11 12 13 14	N 48 17 30 W	143+89.40		1°00'	757.5	379.3	147+68.70	151+46.90	N 34 08 00 E	147+68.7	193.89	193.75	0.015 /ft	1°00'
	N 34 08 00 E	151+46.90		1°00'	757.50	379.30	155+26.20	159+04.40	N 48 17 30 W	155+26.2	193.75	193.61	0.015 /ft	1°00'
	N 48 17 30 W	161+59.36		0°16'	300.00	150.00	163+09.36	164+59.36	N 40 54 17 E	163+09.4	193.56	193.50	0.015 /ft	0°16'
	N 40 54 17 E	164+59.36		1°00'	500.00	250.16	167+09.52	169+59.36	N 44 05 43 W	167+09.5	193.50	193.41	0.015 /ft	1°00'
	N 44 05 43 W	171+22.24		1°00'	870.75	436.22	175+58.46	179+92.99	N 52 48 10 W	175+58.5	193.38	193.21	0.015 /ft	1°00'

Milepost limits have been adjusted to coincide with the distance indicated by as-built beginning and ending stations.

Appendix C
DETAILED
COST ESTIMATES

WICKENBURG TO SANTA MARIA RIVER

SvC Project No. 014164

PRELIMINARY ESTIMATE

PROJECT: A-1a

From Sta: 104+00.00
To Sta: 270+00.00
Length: 3.1 miles

ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
CLEAR AND GRUB	Acre	71	\$ 2,500	\$ 177,500
REMOVAL OF STRUCT. & OBSTRUCT.	L.Sum	1	\$ 15,000	\$ 15,000
REMOVE AC	Sq. Yd.	0	\$ 3	-
MILL EXIST AC	Sq. Yd.	0	\$ 2	-
ROADWAY EXCAVATION	Cu. Yd.	155000	\$ 6	\$ 930,000
BORROW	Cu. Yd.	0	\$ 6	-
ABC	Cu. Yd.	30675	\$ 28	\$ 858,900
AC (INCL. ASPH. CEMT.)	Ton	32295	\$ 55	\$ 1,776,225
AR-ACFC (INCL. ASPH. CEMT.)	Ton	4555	\$ 75	\$ 341,625
CHIP SEAL COAT (INCL. ASPH. CEMT.)	Cu. Yd.	305	\$ 150	\$ 45,750
PIPE CULVERT (24" CMP)	Ft.	507	\$ 70	\$ 35,490
PIPE CULVERT (30" CMP)	Ft.	413	\$ 75	\$ 30,975
PIPE CULVERT (36" CMP)	Ft.	412	\$ 90	\$ 37,080
PIPE CULVERT (42" CMP)	Ft.	282	\$ 100	\$ 28,200
PIPE CULVERT (48" CMP)	Ft.	0	\$ 120	-
PIPE CULVERT (54" CMP)	Ft.	186	\$ 150	\$ 27,900
PIPE CULVERT (60" CMP)	Ft.	0	\$ 180	-
PIPE CULVERT (72" CMP)	Ft.	0	\$ 200	-
STORM DRAIN (18")	Ft.	0	\$ 70	-
STORM DRAIN (24")	Ft.	0	\$ 75	-
STORM DRAIN (30")	Ft.	0	\$ 85	-
STRUCTURAL CONCRETE	Cu. Yd.	944	\$ 400	\$ 377,600
STRUCTURAL STEEL	Lb.	135550	\$ 1.10	\$ 149,105
RIPRAP (DUMPED)	Cu. Yd.	259	\$ 100	\$ 25,900
RAIL BANK PROTECTION	Ft.	0	\$ 400	-
CHANNEL EXCAVATION	Cu. Yd.	0	\$ 9	-
FENCING	Ft.	42000	\$ 3.00	\$ 126,000
SEEDING	Acre	29	\$ 2,500	\$ 72,500
GUARD RAIL	Ft.	1500	\$ 18	\$ 27,000
CATTLE GUARD	Ea.	7	\$ 8,000	\$ 56,000
SIGNING AND PAVEMENT MARKING	L. Sum	1	\$ 141,500	\$ 141,500
LANDSCAPING	L. Sum	1	\$ 100,000	\$ 100,000
BRIDGES	Sq. Ft.	7200	\$ 100	\$ 720,000
CONSTRUCTION COST SUBTOTAL:				\$ 6,100,250
ENVIRONMENTAL IMPACT MITIGATION:	4%:		\$	244,010
WATER SUPPLY AND DUST PALLIATIVE:	3%:		\$	183,008
CONTRACTOR QUALITY CONTROL	2%:		\$	122,005
CONSTRUCTION SURVEY AND LAYOUT	2%:		\$	122,005
MAINTENANCE OF TRAFFIC:	8%:		\$	488,020
MOBILIZATION:	10%:		\$	610,025
ROADWAY & STRUCTURES SUBTOTAL:				\$ 7,869,323
CONTINGENCY:	20%:		\$	1,573,865
CONSTRUCTION ENGINEERING	15%:		\$	1,180,398
CONSTRUCTION CONTINGENCY	5%:		\$	393,466
AC MATERIALS QUALITY	Ton	32,295	\$ 1.50	\$ 48,443
AC SMOOTHNESS INCENTIVE	Lane-Mile	6.0	\$ 11,000	\$ 66,000
CONSTRUCTION TOTAL:				\$ 11,131,495
DESIGN:	8.0%:		\$	890,520
RIGHT-OF-WAY:			\$	2,000,000
UTILITY RELOCATIONS:			\$	2,000,000
TOTAL COST:				\$ 16,022,015

WICKENBURG TO SANTA MARIA RIVER

SvC Project No. 014164

PRELIMINARY ESTIMATE

PROJECT: B-2a

From Sta: 270+00.00
To Sta: 620+00.00
Length: 10.4 miles

ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
CLEAR AND GRUB	Acre	164	\$ 2,500	\$ 409,900
REMOVAL OF STRUCT. & OBSTRUCT.	L.Sum	1	\$ 31,000	\$ 31,000
REMOVE AC	Sq. Yd.	0	\$ 3	-
MILL EXIST AC	Sq. Yd.	0	\$ 2	-
ROADWAY EXCAVATION	Cu. Yd.	288800	\$ 6	\$ 1,732,800
BORROW	Cu. Yd.	326400	\$ 6	\$ 1,958,400
ABC	Cu. Yd.	105636	\$ 28	\$ 2,957,808
AC (INCL. ASPH. CEMT.)	Ton	115180	\$ 55	\$ 6,334,900
AR-ACFC (INCL. ASPH. CEMT.)	Ton	15979	\$ 75	\$ 1,198,425
CHIP SEAL COAT (INCL. ASPH. CEMT.)	Cu. Yd.	165	\$ 150	\$ 24,750
PIPE CULVERT (24" CMP)	Ft.	678	\$ 70	\$ 47,452
PIPE CULVERT (30" CMP)	Ft.	1569	\$ 75	\$ 117,678
PIPE CULVERT (36" CMP)	Ft.	1031	\$ 90	\$ 92,808
PIPE CULVERT (42" CMP)	Ft.	786	\$ 100	\$ 78,552
PIPE CULVERT (48" CMP)	Ft.	0	\$ 120	-
PIPE CULVERT (54" CMP)	Ft.	0	\$ 150	-
PIPE CULVERT (60" CMP)	Ft.	0	\$ 180	-
PIPE CULVERT (72" CMP)	Ft.	0	\$ 200	-
STORM DRAIN (18")	Ft.	0	\$ 70	-
STORM DRAIN (24")	Ft.	0	\$ 75	-
STORM DRAIN (30")	Ft.	0	\$ 85	-
STRUCTURAL CONCRETE	Cu. Yd.	12659	\$ 400	\$ 5,063,792
STRUCTURAL STEEL	Lb.	1734780	\$ 1.10	\$ 1,908,258
RIPRAP (DUMPED)	Cu. Yd.	3361	\$ 100	\$ 336,132
RAIL BANK PROTECTION	Ft.	0	\$ 400	-
CHANNEL EXCAVATION	Cu. Yd.	0	\$ 9	-
FENCING	Ft.	123180	\$ 3.00	\$ 369,540
SEEDING	Acre	63	\$ 2,500	\$ 157,800
GUARD RAIL	Ft.	1240	\$ 18	\$ 22,320
CATTLE GUARD	Ea.	9	\$ 8,000	\$ 72,000
SIGNING AND PAVEMENT MARKING	L. Sum	1	\$ 638,732	\$ 638,732
LANDSCAPING	L. Sum	1	\$ 232,000	\$ 232,000
BRIDGES	Sq. Ft.	17658	\$ 100	\$ 1,765,800
CONSTRUCTION COST SUBTOTAL:				\$ 25,550,847
ENVIRONMENTAL IMPACT MITIGATION:	4%:		\$	1,022,034
WATER SUPPLY AND DUST PALLIATIVE:	3%:		\$	766,525
CONTRACTOR QUALITY CONTROL	2%:		\$	511,017
CONSTRUCTION SURVEY AND LAYOUT	2%:		\$	511,017
MAINTENANCE OF TRAFFIC:	8%:		\$	2,044,068
MOBILIZATION:	10%:		\$	2,555,085
SUBTOTAL:				\$ 32,960,593
CONTINGENCY:	20%:		\$	6,592,119
CONSTRUCTION ENGINEERING	15%:		\$	4,944,089
CONSTRUCTION CONTINGENCY	5%:		\$	1,648,030
AC MATERIALS QUALITY	Ton	115,180	\$ 1.50	\$ 172,770
AC SMOOTHNESS INCENTIVE	Lane-Mile	20.2	\$ 11,000	\$ 222,200
CONSTRUCTION TOTAL:				\$ 46,539,801
DESIGN:	8.0%:		\$	3,723,184
RIGHT-OF-WAY:			\$	1,128,000
UTILITY RELOCATIONS:			\$	200,000
TOTAL COST:				\$ 51,590,985

WICKENBURG TO SANTA MARIA RIVER

SvC Project No. 014164

PRELIMINARY ESTIMATE

PROJECT: C-3

From Sta: 620+00.00

To Sta: 1620+00.00

Length: 18.9 miles

ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
CLEAR AND GRUB	Acre	371	\$ 2,500	\$ 927,600
REMOVAL OF STRUCT. & OBSTRUCT.	L.Sum	1	\$ 119,000	\$ 119,000
REMOVE AC	Sq. Yd.	18044	\$ 3	\$ 54,132
MILL EXIST AC	Sq. Yd.	0	\$ 2	\$ -
ROADWAY EXCAVATION	Cu. Yd.	993200	\$ 6	\$ 5,959,200
BORROW	Cu. Yd.	81600	\$ 6	\$ 489,600
ABC	Cu. Yd.	161924	\$ 28	\$ 4,533,872
AC (INCL. ASPH. CEMT.)	Ton	178595	\$ 55	\$ 9,822,725
AR-ACFC (INCL. ASPH. CEMT.)	Ton	28366	\$ 75	\$ 2,127,450
CHIP SEAL COAT (INCL. ASPH. CEMT.)	Cu. Yd.	0	\$ 150	\$ -
PIPE CULVERT (24" CMP)	Ft.	1549	\$ 70	\$ 108,438
PIPE CULVERT (30" CMP)	Ft.	2720	\$ 75	\$ 203,997
PIPE CULVERT (36" CMP)	Ft.	2701	\$ 90	\$ 243,072
PIPE CULVERT (42" CMP)	Ft.	1584	\$ 100	\$ 158,448
PIPE CULVERT (48" CMP)	Ft.	0	\$ 120	\$ -
PIPE CULVERT (54" CMP)	Ft.	0	\$ 150	\$ -
PIPE CULVERT (60" CMP)	Ft.	296	\$ 180	\$ 53,280
PIPE CULVERT (72" CMP)	Ft.	0	\$ 200	\$ -
STORM DRAIN (18")	Ft.	0	\$ 70	\$ -
STORM DRAIN (24")	Ft.	0	\$ 75	\$ -
STORM DRAIN (30")	Ft.	0	\$ 85	\$ -
STRUCTURAL CONCRETE	Cu. Yd.	6676	\$ 400	\$ 2,670,208
STRUCTURAL STEEL	Lb.	877958	\$ 1.10	\$ 965,754
RIPRAP (DUMPED)	Cu. Yd.	1914	\$ 100	\$ 191,368
RAIL BANK PROTECTION	Ft.	1745	\$ 400	\$ 698,000
CHANNEL EXCAVATION	Cu. Yd.	0	\$ 9	\$ -
FENCING	Ft.	206960	\$ 3.00	\$ 620,880
SEEDING	Acre	192	\$ 2,500	\$ 479,700
GUARD RAIL	Ft.	12335	\$ 18	\$ 222,030
CATTLE GUARD	Ea.	8	\$ 8,000	\$ 64,000
SIGNING AND PAVEMENT MARKING	L. Sum	1	\$ 881,468	\$ 881,468
LANDSCAPING	L. Sum	1	\$ 468,000	\$ 468,000
BRIDGES	Sq. Ft.	43167	\$ 100	\$ 4,316,700
CONSTRUCTION COST SUBTOTAL:				\$ 36,378,922
ENVIRONMENTAL IMPACT MITIGATION:	4%:		\$	1,455,157
WATER SUPPLY AND DUST PALLIATIVE:	3%:		\$	1,091,368
CONTRACTOR QUALITY CONTROL	2%:		\$	727,578
CONSTRUCTION SURVEY AND LAYOUT	2%:		\$	727,578
MAINTENANCE OF TRAFFIC:	8%:		\$	2,910,314
MOBILIZATION:	10%:		\$	3,637,892
SUBTOTAL:				\$ 46,928,809
CONTINGENCY:	20%:		\$	9,385,762
CONSTRUCTION ENGINEERING	15%:		\$	7,039,321
CONSTRUCTION CONTINGENCY	5%:		\$	2,346,440
AC MATERIALS QUALITY	Ton	178,595	\$ 1.50	\$ 267,893
AC SMOOTHNESS INCENTIVE	Lane-Mile	38.8	\$ 11,000	\$ 426,800
CONSTRUCTION TOTAL:				\$ 66,395,024
DESIGN:	8.0%:		\$	5,311,602
RIGHT-OF-WAY:			\$	14,372,000
UTILITY RELOCATIONS:			\$	200,000
TOTAL COST:				\$ 86,278,626

WICKENBURG TO SANTA MARIA RIVER

SvC Project No. 014164

PRELIMINARY ESTIMATE

SUM OF PROJECTS

ITEM	UNIT	QUANTITY	UNIT PRICE	AMOUNT
CLEAR AND GRUB	Acre	606	\$ 2,500	\$ 1,515,000
REMOVAL OF STRUCT. & OBSTRUCT.	L.Sum	1	\$ 165,000	\$ 165,000
REMOVE AC	Sq. Yd.	18044	\$ 3	\$ 54,132
MILL EXIST AC	Sq. Yd.	0	\$ 2	\$ -
ROADWAY EXCAVATION	Cu. Yd.	1437000	\$ 6	\$ 8,622,000
BORROW	Cu. Yd.	408000	\$ 6	\$ 2,448,000
ABC	Cu. Yd.	298235	\$ 28	\$ 8,350,580
AC (INCL. ASPH. CEMT.)	Ton	326070	\$ 55	\$ 17,933,850
AR-ACFC (INCL. ASPH. CEMT.)	Ton	48900	\$ 75	\$ 3,667,500
CHIP SEAL COAT (INCL. ASPH. CEMT.)	Cu. Yd.	470	\$ 150	\$ 70,500
PIPE CULVERT (24" CMP)	Ft.	2734	\$ 70	\$ 191,380
PIPE CULVERT (30" CMP)	Ft.	4702	\$ 75	\$ 352,650
PIPE CULVERT (36" CMP)	Ft.	4144	\$ 90	\$ 372,960
PIPE CULVERT (42" CMP)	Ft.	2652	\$ 100	\$ 265,200
PIPE CULVERT (48" CMP)	Ft.	0	\$ 120	\$ -
PIPE CULVERT (54" CMP)	Ft.	186	\$ 150	\$ 27,900
PIPE CULVERT (60" CMP)	Ft.	296	\$ 180	\$ 53,280
PIPE CULVERT (72" CMP)	Ft.	0	\$ 200	\$ -
STORM DRAIN (18")	Ft.	0	\$ 70	\$ -
STORM DRAIN (24")	Ft.	0	\$ 75	\$ -
STORM DRAIN (30")	Ft.	0	\$ 85	\$ -
STRUCTURAL CONCRETE	Cu. Yd.	20279	\$ 400	\$ 8,111,600
STRUCTURAL STEEL	Lb.	2748288	\$ 1	\$ 3,023,117
RIPRAP (DUMPED)	Cu. Yd.	5534	\$ 100	\$ 553,400
RAIL BANK PROTECTION	Ft.	1745	\$ 400	\$ 698,000
CHANNEL EXCAVATION	Cu. Yd.	0	\$ 9	\$ -
FENCING	Ft.	372140	\$ 3	\$ 1,116,420
SEEDING	Acre	284	\$ 2,500	\$ 710,000
GUARD RAIL	Ft.	15075	\$ 18	\$ 271,350
CATTLE GUARD	Ea.	24	\$ 8,000	\$ 192,000
SIGNING AND PAVEMENT MARKING	L. Sum	1	\$ 1,661,700	\$ 1,661,700
LANDSCAPING	L. Sum	1	\$ 800,000	\$ 800,000
BRIDGES	Sq. Ft.	68025	\$ 100	\$ 6,802,500
CONSTRUCTION COST SUBTOTAL:				\$ 68,030,019
ENVIRONMENTAL IMPACT MITIGATION:	4%:		\$	2,721,201
WATER SUPPLY AND DUST PALLIATIVE:	3%:		\$	2,040,901
CONTRACTOR QUALITY CONTROL	2%:		\$	1,360,600
CONSTRUCTION SURVEY AND LAYOUT	2%:		\$	1,360,600
MAINTENANCE OF TRAFFIC:	8%:		\$	5,442,402
MOBILIZATION:	10%:		\$	6,803,002
SUBTOTAL:				\$ 87,758,725
CONTINGENCY:	20%:		\$	17,551,746
CONSTRUCTION ENGINEERING	15%:		\$	13,163,808
CONSTRUCTION CONTINGENCY	5%:		\$	4,387,936
AC MATERIALS QUALITY	Ton	326,070	\$ 1.50	\$ 489,105
AC SMOOTHNESS INCENTIVE	Lane-Mile	66.0	\$ 11,000	\$ 715,000
CONSTRUCTION TOTAL:				\$ 124,066,320
DESIGN:	8.0%:		\$	9,925,306
RIGHT-OF-WAY:			\$	17,500,000
UTILITY RELOCATIONS:			\$	2,400,000
TOTAL COST:				\$ 153,891,626

IMPLEMENTATION COST ESTIMATE

ARIZONA DEPARTMENT OF TRANSPORTATION
Estimated Engineering Construction Cost

Project Number: 93 YV 161 H487101L /
Location: SANTA MARIA RIVER - WICKENBURG

	UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 1 Sta 1370+00 to 1620+00				
Alternative 0				
SEGMENT 1 ITEMS				
2010011	CLEARING AND GRUBBING	ACRE	97.00	2,500.00
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	75,000.00
2020029	REMOVAL OF ASPHALTIC CONCRETE PAVEMENT	SQ.YD.	18,044	3.00
2030301	ROADWAY EXCAVATION	CU.YD.	280,000	6.00
3030102	AGGREGATE BASE	CU.YD.	45,650	28.00
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	50,360	55.00
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	6,855	75.00
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	308	70.00
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	370	75.00
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	1,265	90.00
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	1,238	100.00
5010045	PIPE, CORRUGATED METAL, 60"	L.FT.	93	180.00
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	1,019	400.00
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	123,565	1.10
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	213,100.00
8050021	SEEDING	ACRE	75.00	2,500.00
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00
9030013	BARBED WIRE GAME FENCE	L.FT.	50,000	3.00
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	4,000	18.00
9060011	CATTLE GUARD	EACH	2	8,000.00
9130001	RIPRAP (DUMPED)	CU.YD.	220	100.00
9130026	RAIL BANK PROTECTION	L.FT.	1,160	400.00
999X004	NEW BRIDGE	SQ. FT.	23,700	100.00
			SEGMENT 1 ITEMS SUBTOTAL	11,055,579
207XX01	DUST PALLIATIVE (3%)	COST	3%	331,667
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%	884,446
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%	442,223
901XX01	MOBILIZATION (10%)	COST	10%	1,105,558
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%	221,112
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%	221,112
			SUBTOTAL	14,261,696
PROJECT WIDE				
	CONSTRUCTION ENGINEERING (15%)	Cost	15%	2,139,254
	CONTINGENCIES (20%)	Cost	20%	2,852,339
	CONSTRUCTION CONTINGENCY (5%)	COST	5%	713,085
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	9.00	11,000.00
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	50,360	1.50
			SUBTOTAL	5,879,219
OTHER COST				
	Design		8%	1,611,273
	Right of Way	1	3,000,000.00	3,000,000
	Utility Relocations	1	150,000.00	150,000
			SUBTOTAL	4,761,273

Summary For Segment 1 Sta 1370+00 to 1620+00 Alternative 0			
	SEGMENT 1 ITEMS	14,261,696	
	PROJECT WIDE	5,879,219	
	OTHER COST	4,761,273	
	TOTAL PROJECT COST	24,902,188	

ARIZONA DEPARTMENT OF TRANSPORTATION
Estimated Engineering Construction Cost

Project Number: 93 YV 161 H487101L /
Location: SANTA MARIA RIVER - WICKENBURG

	UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 2 Sta 104+00 to 270+00				
Alternative 0				
SEGMENT 2 ITEMS				
2010011	CLEARING AND GRUBBING	ACRE	71.00	2,500.00
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	15,000.00
2030301	ROADWAY EXCAVATION	CU.YD.	155,000	6.00
3030102	AGGREGATE BASE	CU.YD.	30,675	28.00
4040162	COVER MATERIAL	CU.YD.	305	150.00
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	32,295	55.00
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	4,555	75.00
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	507	70.00
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	413	75.00
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	412	90.00
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	282	100.00
5010040	PIPE, CORRUGATED METAL, 54"	L.FT.	186	150.00
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	944	400.00
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	135,550	1.10
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	141,500.00
8050021	SEEDING	ACRE	29.00	2,500.00
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00
9030013	BARBED WIRE GAME FENCE	L.FT.	42,000	3.00
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	1,500	18.00
9060011	CATTLE GUARD	EACH	7	8,000.00
9130001	RIPRAP (DUMPED)	CU.YD.	259	100.00
999X004	NEW BRIDGE	SQ. FT.	7,200	100.00
			SEGMENT 2 ITEMS SUBTOTAL	6,100,250
207XX01	DUST PALLIATIVE (3%)	COST	3%	183,008
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%	488,020
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%	244,010
901XX01	MOBILIZATION (10%)	COST	10%	610,025
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%	122,005
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%	122,005
			SUBTOTAL	7,869,323
PROJECT WIDE				
	CONSTRUCTION ENGINEERING (15%)	Cost	15%	1,180,398
	CONTINGENCIES (20%)	Cost	20%	1,573,865
	CONSTRUCTION CONTINGENCY (5%)	COST	5%	393,466
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	6.00	11,000.00
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	32,295	1.50
			SUBTOTAL	3,262,172
OTHER COST				
	Design		8%	890,520
	Right of Way	1	2,000,000.00	2,000,000
	Utility Relocations	1	150,000.00	150,000
			SUBTOTAL	3,040,520

Summary For Segment 2 Sta 104+00 to 270+00 Alternative 0			
	SEGMENT 2 ITEMS	7,869,322	
	PROJECT WIDE	3,262,171	
	OTHER COST	3,040,520	
	TOTAL PROJECT COST	14,172,014	

ARIZONA DEPARTMENT OF TRANSPORTATION
Estimated Engineering Construction Cost

Project Number: 93 YV 161 H487101L /
Location: SANTA MARIA RIVER - WICKENBURG

	UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 3 Sta 1120+00 to 1370+00				
Alternative 0				
SEGMENT 3 ITEMS				
2010011	CLEARING AND GRUBBING	ACRE	90.00	2,500.00
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	5,000.00
2030301	ROADWAY EXCAVATION	CU.YD.	210,000	6.00
3030102	AGGREGATE BASE	CU.YD.	37,050	28.00
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	40,875	55.00
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	6,855	75.00
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	703	70.00
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	816	75.00
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	561	90.00
5010045	PIPE, CORRUGATED METAL, 60"	L.FT.	113	180.00
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	1,598	400.00
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	201,394	1.10
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	213,100.00
8050021	SEEDING	ACRE	40.00	2,500.00
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00
9030013	BARBED WIRE GAME FENCE	L.FT.	50,000	3.00
9060011	CATTLE GUARD	EACH	1	8,000.00
9130001	RIPRAP (DUMPED)	CU.YD.	464	100.00
9130026	RAIL BANK PROTECTION	L.FT.	585	400.00
999X004	NEW BRIDGE	SQ. FT.		85.00
SEGMENT 3 ITEMS SUBTOTAL				7,183,123
207XX01	DUST PALLIATIVE (3%)	COST	3%	215,494
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%	574,650
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%	287,325
901XX01	MOBILIZATION (10%)	COST	10%	718,312
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%	143,662
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%	143,662
SUBTOTAL				9,266,229
PROJECT WIDE				
	CONSTRUCTION ENGINEERING (15%)	Cost	15%	1,389,934
	CONTINGENCIES (20%)	Cost	20%	1,853,246
	CONSTRUCTION CONTINGENCY (5%)	COST	5%	463,311
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	9.00	11,000.00
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	40,875	1.50
SUBTOTAL				3,866,804
OTHER COST				
	Design		8%	1,050,643
	Right of Way	1	7,000,000.00	7,000,000
	Utility Relocations	1	150,000.00	150,000
SUBTOTAL				8,200,643
Summary For Segment 3 Sta 1120+00 to 1370+00 Alternative 0				
				SEGMENT 3 ITEMS 9,266,229
				PROJECT WIDE 3,866,804
				OTHER COST 8,200,643
TOTAL PROJECT COST				21,333,676

ARIZONA DEPARTMENT OF TRANSPORTATION
Estimated Engineering Construction Cost

Project Number: 93 YV 161 H487101L /
Location: SANTA MARIA RIVER - WICKENBURG

	UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 4 Sta 972+00 to 1120+00				
Alternative 0				
SEGMENT 4 ITEMS				
2010011	CLEARING AND GRUBBING	ACRE	53.00	2,500.00
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	5,000.00
2030301	ROADWAY EXCAVATION	CU.YD.	160,000	6.00
3030102	AGGREGATE BASE	CU.YD.	21,950	28.00
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	24,200	55.00
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	4,060	75.00
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	481	70.00
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	467	75.00
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	180	90.00
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	203	100.00
5010045	PIPE, CORRUGATED METAL, 60"	L.FT.	90	180.00
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	720	400.00
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	91,809	1.10
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	126,100.00
8050021	SEEDING	ACRE	23.00	2,500.00
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00
9030013	BARBED WIRE GAME FENCE	L.FT.	29,600	3.00
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	800	18.00
9060011	CATTLE GUARD	EACH	2	8,000.00
9130001	RIPRAP (DUMPED)	CU.YD.	194	100.00
SEGMENT 4 ITEMS SUBTOTAL				4,280,185
207XX01	DUST PALLIATIVE (3%)	COST	3%	128,406
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%	342,415
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%	171,207
901XX01	MOBILIZATION (10%)	COST	10%	428,018
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%	85,604
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%	85,604
SUBTOTAL				5,521,439
PROJECT WIDE				
	CONSTRUCTION ENGINEERING (15%)	Cost	15%	828,216
	CONTINGENCIES (20%)	Cost	20%	1,104,288
	CONSTRUCTION CONTINGENCY (5%)	COST	5%	276,072
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	6.00	11,000.00
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	24,200	1.50
SUBTOTAL				2,310,875
OTHER COST				
	Design		8%	626,585
	Utility Relocations	1	100,000.00	100,000
SUBTOTAL				726,585
Summary For Segment 4 Sta 972+00 to 1120+00 Alternative 0				
				SEGMENT 4 ITEMS 5,521,438
				PROJECT WIDE 2,310,875
				OTHER COST 726,585
TOTAL PROJECT COST				8,558,899

Project Number: 93 YV 161 H487101L /

Location: SANTA MARIA RIVER - WICKENBURG

	UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 5 Sta 745+00 to 1005+50				
Alternative 0				
SEGMENT 5 ITEMS				
2010011	CLEARING AND GRUBBING	ACRE	95.00	2,500.00
2030301	ROADWAY EXCAVATION	CU.YD.	333,000	6.00
3030102	AGGREGATE BASE	CU.YD.	38,625	28.00
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	42,590	55.00
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	7,145	75.00
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	457	75.00
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	348	90.00
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	85	100.00
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	1,578	400.00
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	220,123	1.10
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	222,000.00
8050021	SEEDING	ACRE	43.00	2,500.00
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00
9030013	BARBED WIRE GAME FENCE	L.FT.	52,200	3.00
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	7,025	18.00
9060011	CATTLE GUARD	EACH	3	8,000.00
9130001	RIPRAP (DUMPED)	CU.YD.	423	100.00
999X004	NEW BRIDGE	SQ. FT.	9,675	100.00
			SEGMENT 5 ITEMS SUBTOTAL	8,889,105
207XX01	DUST PALLIATIVE (3%)	COST	3%	266,673
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%	711,128
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%	355,564
901XX01	MOBILIZATION (10%)	COST	10%	888,911
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%	177,782
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%	177,782
			SUBTOTAL	11,466,946
PROJECT WIDE				
	CONSTRUCTION ENGINEERING (15%)	Cost	15%	1,720,042
	CONTINGENCIES (20%)	Cost	20%	2,293,389
	CONSTRUCTION CONTINGENCY (5%)	COST	5%	573,347
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	10.00	11,000.00
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	42,590	1.50
			SUBTOTAL	4,760,663
OTHER COST				
	Design		8%	1,298,209
	Right of Way	1	1,000,000.00	1,000,000
	Utility Relocations	1	2,000,000.00	2,000,000
			SUBTOTAL	4,298,209

Summary For Segment 5 Sta 745+00 to 1005+50 Alternative 0	
SEGMENT 5 ITEMS	11,466,945
PROJECT WIDE	4,760,663
OTHER COST	4,298,209
TOTAL PROJECT COST	20,525,818

Project Number: 93 YV 161 H487101L /

Location: SANTA MARIA RIVER - WICKENBURG

	UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 6 Sta 560+00 to 745+00				
Alternative 0				
SEGMENT 6 ITEMS				
2010011	CLEARING AND GRUBBING	ACRE	53.00	2,500.00
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	50,000.00
2030301	ROADWAY EXCAVATION	CU.YD.	15,000	6.00
2030901	BORROW	CU.YD.	120,000	6.00
3030102	AGGREGATE BASE	CU.YD.	27,425	28.00
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	30,250	55.00
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	5,075	75.00
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	84	70.00
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	897	75.00
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	510	90.00
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	86	100.00
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	2,589	400.00
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	354,510	1.10
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	157,600.00
8050021	SEEDING	ACRE	16.00	2,500.00
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00
9030013	BARBED WIRE GAME FENCE	L.FT.	37,000	3.00
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	750	18.00
9130001	RIPRAP (DUMPED)	CU.YD.	901	100.00
999X004	NEW BRIDGE	SQ. FT.	14,400	100.00
			SEGMENT 6 ITEMS SUBTOTAL	7,310,191
207XX01	DUST PALLIATIVE (3%)	COST	3%	219,306
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%	584,815
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%	292,408
901XX01	MOBILIZATION (10%)	COST	10%	731,019
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%	146,204
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%	146,204
			SUBTOTAL	9,430,146
PROJECT WIDE				
	CONSTRUCTION ENGINEERING (15%)	Cost	15%	1,414,522
	CONTINGENCIES (20%)	Cost	20%	1,886,029
	CONSTRUCTION CONTINGENCY (5%)	COST	5%	471,507
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	7.00	11,000.00
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	30,250	1.50
			SUBTOTAL	3,894,434
OTHER COST				
	Design		8%	1,065,966
	Right of Way	1	100,000.00	100,000
	Utility Relocations	1	250,000.00	250,000
			SUBTOTAL	1,415,966

Summary For Segment 6 Sta 560+00 to 745+00 Alternative 0	
SEGMENT 6 ITEMS	9,430,146
PROJECT WIDE	3,894,433
OTHER COST	1,415,966
TOTAL PROJECT COST	14,740,546

ARIZONA DEPARTMENT OF TRANSPORTATION

Estimated Engineering Construction Cost

Project Number: 93 YV 161 H487101L /

Location: SANTA MARIA RIVER - WICKENBURG

		UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 7 Sta 270+00 to 545+00					
Alternative 0					
SEGMENT 7 ITEMS					
2010011	CLEARING AND GRUBBING	ACRE	91.00	2,500.00	227,500
2030301	ROADWAY EXCAVATION	CU.YD.	72,000	6.00	432,000
2030901	BORROW	CU.YD.	243,000	6.00	1,458,000
3030102	AGGREGATE BASE	CU.YD.	41,300	28.00	1,156,400
4040162	COVER MATERIAL	CU.YD.	30	150.00	4,500
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	45,410	55.00	2,497,550
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	7,540	75.00	565,500
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	297	70.00	20,790
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	630	75.00	47,250
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	596	90.00	53,640
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	342	100.00	34,200
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	3,922	400.00	1,568,800
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	520,562	1.10	572,618
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	208,300.00	208,300
8050021	SEEDING	ACRE	35.00	2,500.00	87,500
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00	100,000
9030013	BARBED WIRE GAME FENCE	L.FT.	55,800	3.00	167,400
9060011	CATTLE GUARD	EACH	3	8,000.00	24,000
9130001	RIPRAP (DUMPED)	CU.YD.	1,165	100.00	116,500
SEGMENT 7 ITEMS SUBTOTAL					9,342,448

PROJECT WIDE

207XX01	DUST PALLIATIVE (3%)	COST	3%		280,273
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%		747,396
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%		373,698
901XX01	MOBILIZATION (10%)	COST	10%		934,245
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%		186,849
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%		186,849
SUBTOTAL					2,709,310
	CONSTRUCTION ENGINEERING (15%)	Cost	15%		1,807,764
	CONTINGENCIES (20%)	Cost	20%		2,410,352
	CONSTRUCTION CONTINGENCY (5%)	COST	5%		602,588
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	10.00	11,000.00	110,000
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	45,410	1.50	68,115
SUBTOTAL					7,708,128

OTHER COST

Design	8%	1,364,046
SUBTOTAL		1,364,046

Summary For Segment 7 Sta 270+00 to 545+00 Alternative 0	
SEGMENT 7 ITEMS	9,342,448
PROJECT WIDE	7,708,128
OTHER COST	1,364,046
TOTAL PROJECT COST	18,414,622

ARIZONA DEPARTMENT OF TRANSPORTATION

Estimated Engineering Construction Cost

Project Number: 93 YV 161 H487101L /

Location: SANTA MARIA RIVER - WICKENBURG

		UNIT	QUANTITY	UNIT PRICE (\$)	AMOUNT (\$)
Segment 8 Sta 545+00 to 560+00					
Alternative 0					
SEGMENT 8 ITEMS					
2010011	CLEARING AND GRUBBING	ACRE	56.00	2,500.00	140,000
2020001	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	L.SUM	1	15,000.00	15,000
2030301	ROADWAY EXCAVATION	CU.YD.	212,000	6.00	1,272,000
2030901	BORROW	CU.YD.	45,000	6.00	270,000
3030102	AGGREGATE BASE	CU.YD.	55,560	28.00	1,555,680
4040162	COVER MATERIAL	CU.YD.	135	150.00	20,250
406X003	ASPHALTIC CONCRETE (INCL. ASPH. CEMENT)	TON	60,090	55.00	3,304,950
413X002	ASPHALTIC CONCRETE (ASPHALT-RUBBER) (INCL. ASPH. CEMENT)	TON	6,815	75.00	511,125
5010011	PIPE, CORRUGATED METAL, 24"	L.FT.	354	70.00	24,780
5010017	PIPE, CORRUGATED METAL, 30"	L.FT.	652	75.00	48,900
5010025	PIPE, CORRUGATED METAL, 36"	L.FT.	272	90.00	24,480
5010030	PIPE, CORRUGATED METAL, 42"	L.FT.	416	100.00	41,600
601X001	STRUCTURAL CONCRETE (BOX CULVERTS)	CU.YD.	7,909	400.00	3,163,600
604X001	STRUCTURAL STEEL (BOX CULVERTS)	LB.	1,100,775	1.10	1,210,853
704X003	PAVEMENT MARKING (SIGNING & MARKING)	L.SUM	1	380,000.00	380,000
8050021	SEEDING	ACRE	23.00	2,500.00	57,500
807X001	LANDSCAPING ESTABLISHMENT	L.SUM	1	100,000.00	100,000
9030013	BARBED WIRE GAME FENCE	L.FT.	55,540	3.00	166,620
9050001	GUARD RAIL, W-BEAM, SINGLE FACE	L.FT.	1,000	18.00	18,000
9060011	CATTLE GUARD	EACH	6	8,000.00	48,000
9130001	RIPRAP (DUMPED)	CU.YD.	1,908	100.00	190,800
999X004	NEW BRIDGE	SQ. FT.	13,050	100.00	1,305,000
SEGMENT 8 ITEMS SUBTOTAL					13,869,138
207XX01	DUST PALLIATIVE (3%)	COST	3%		416,074
701XX01	MAINTENANCE AND PROTECTION OF TRAFFIC (8%)	COST	8%		1,109,531
810XX02	ENVIRONMENTAL IMPACT MITIGATION (4%)	COST	4%		554,766
901XX01	MOBILIZATION (10%)	COST	10%		1,386,914
924XX02	CONTRACTOR QUALITY CONTROL (2%)	COST	2%		277,383
925XX01	CONSTRUCTION SURVEYING AND LAYOUT (1.5%)	COST	2%		277,383
SUBTOTAL					17,891,187

PROJECT WIDE

	CONSTRUCTION ENGINEERING (15%)	Cost	15%		2,683,678
	CONTINGENCIES (20%)	Cost	20%		3,578,237
	CONSTRUCTION CONTINGENCY (5%)	COST	5%		894,559
416X001	ASPHALTIC CONCRETE (END PRODUCT) SMOOTHNESS INCENTIVE	LANE MILE	8.00	11,000.00	88,000
416X002	ASPHALTIC CONCRETE (END PRODUCT) MATERIALS QUALITY INCENTIVE	TON	60,090	1.50	90,135
SUBTOTAL					7,334,610

OTHER COST

Design	8%	2,018,064
SUBTOTAL		2,018,064

Summary For Segment 8 Sta 545+00 to 560+00 Alternative 0	
SEGMENT 8 ITEMS	17,891,187
PROJECT WIDE	7,334,609
OTHER COST	2,018,064
TOTAL PROJECT COST	27,243,861

SUMMARY

Segment 1	Sta 1370+00 to 1620+00	Alternative 0	24,902,188
Segment 2	Sta 104+00 to 270+00	Alternative 0	14,172,014
Segment 3	Sta 1120+00 to 1370+00	Alternative 0	21,333,676
Segment 4	Sta 972+00 to 1120+00	Alternative 0	8,558,899
Segment 5	Sta 745+00 to 1005+50	Alternative 0	20,525,818
Segment 6	Sta 560+00 to 745+00	Alternative 0	14,740,546
Segment 7	Sta 270+00 to 545+00	Alternative 0	18,414,623
Segment 8	Sta 545+00 to 560+00	Alternative 0	27,243,861
TOTAL PROJECT CONSTRUCTION COST			149,891,626

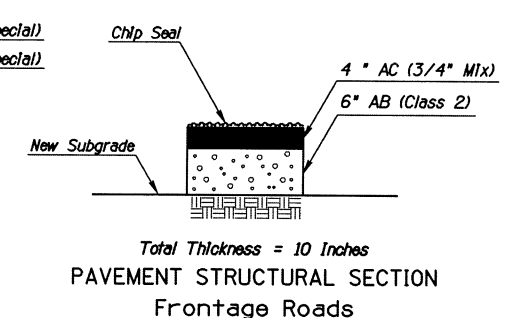
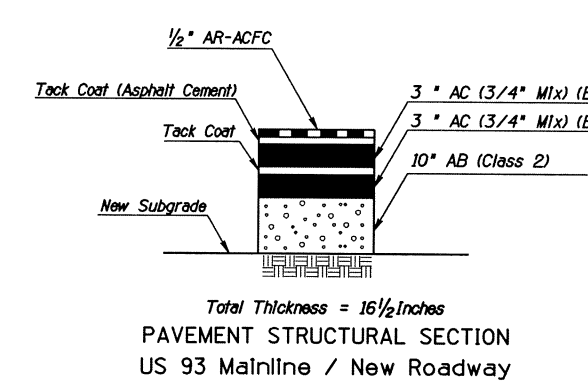
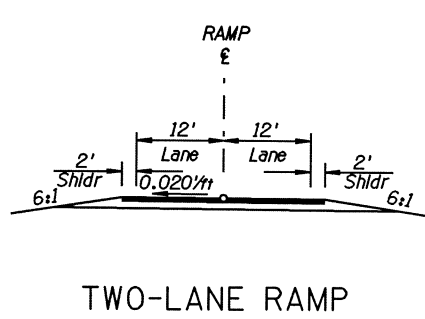
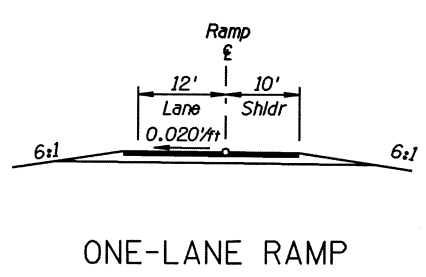
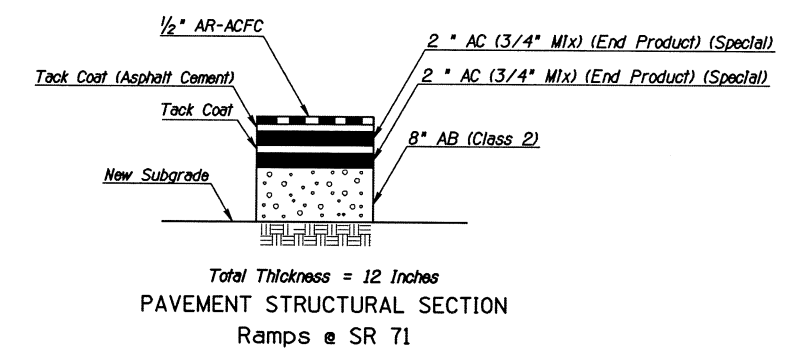
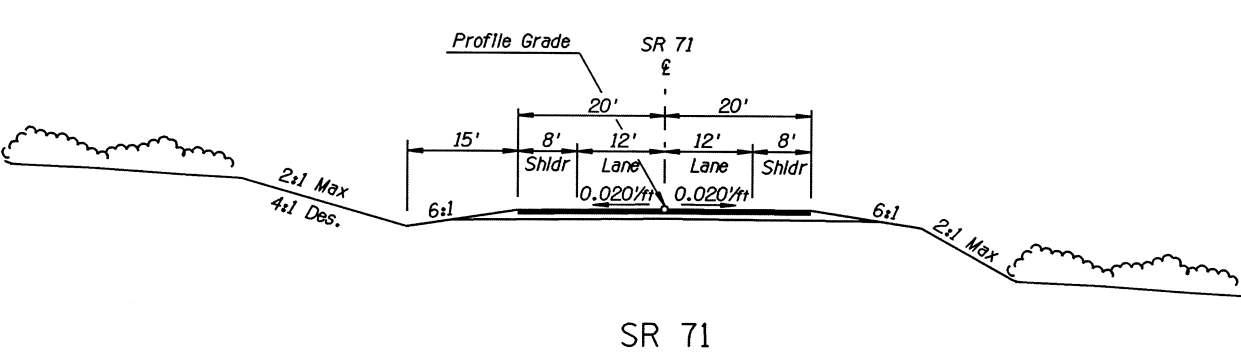
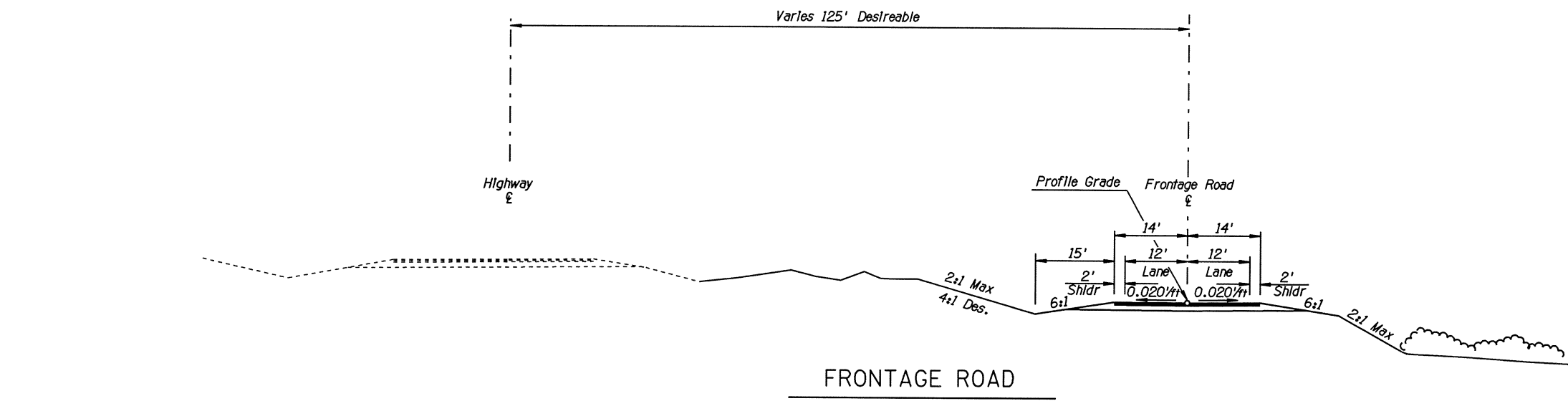
***** END OF REPORT *****

October 02, 2006

Appendix D
TYPICAL SECTIONS

Plotted By: JLSEB Date: 18-APR-2006 11:06
 File: P:\014164\700CAD\702CIVIL\702ADCN\164ctp02.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.



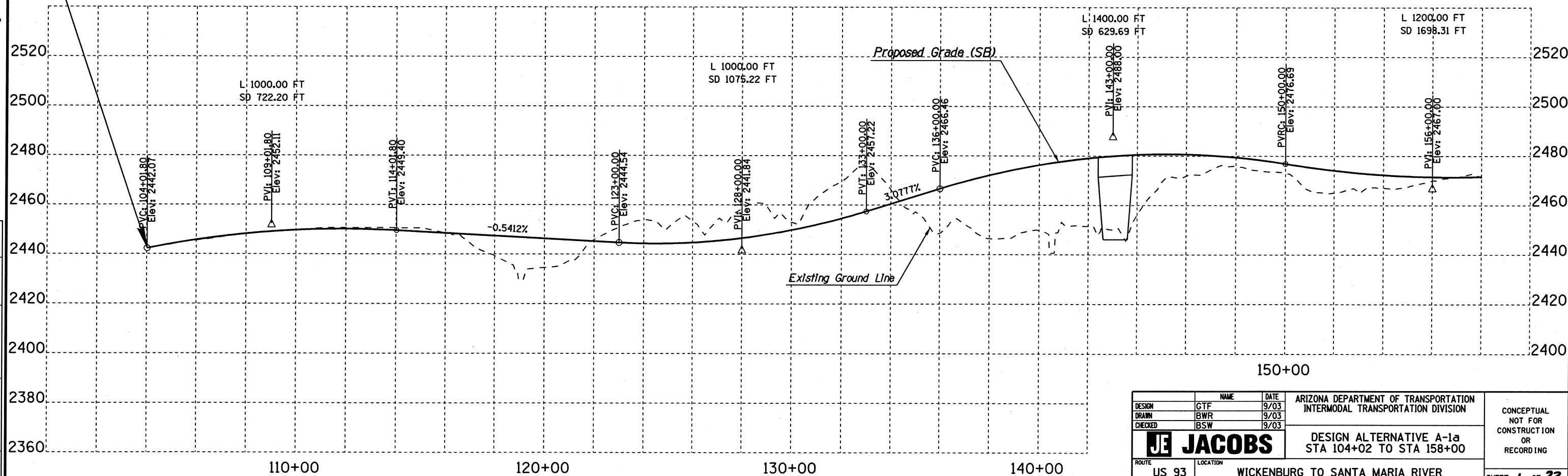
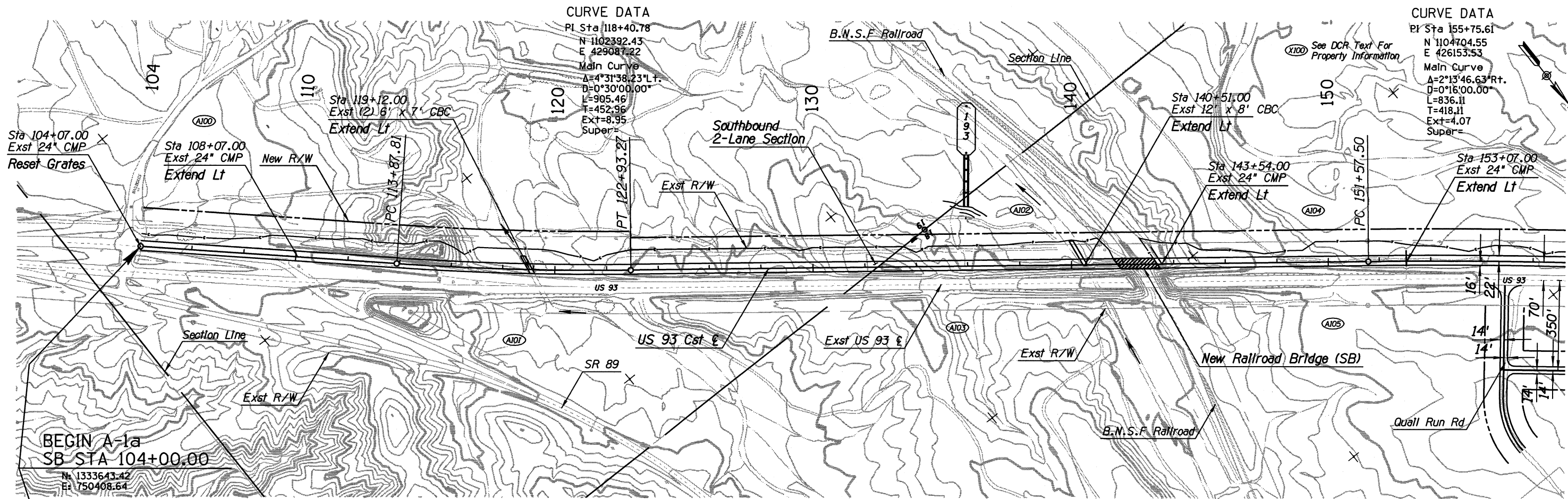
ALL CROSS ROADS WILL MATCH EXISTING FOR LANE AND SHOULDER WIDTH AND MATERIAL STRUCTURE SECTION.

CROSS ROADS

NOTES:
 EXTERIOR SLOPES PER ADOT C-02.20 STANDARDS
 RAMP SLOPES PER ROADWAY DESIGN GUIDELINES
 FIGURE 504.4B.

DESIGN	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DESIGN	GTF	9/03	INTERMODAL TRANSPORTATION DIVISION	
DRAWN	BWR	9/03		
CHECKED	BSW	9/03		
JE JACOBS			VARIOUS TYPICAL SECTIONS	
ROUTE	LOCATION			SHEET 2 OF 2
US 93	WICKENBURG TO SANTA MARIA RIVER			
TRACS NO. H 4871 01 L				OF

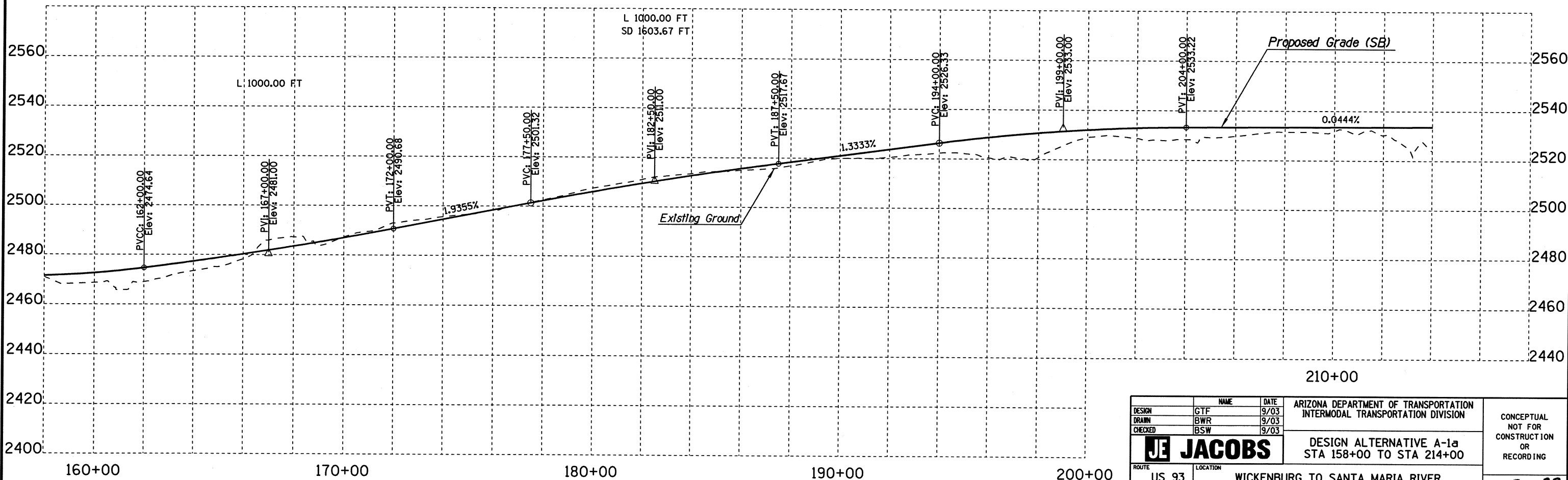
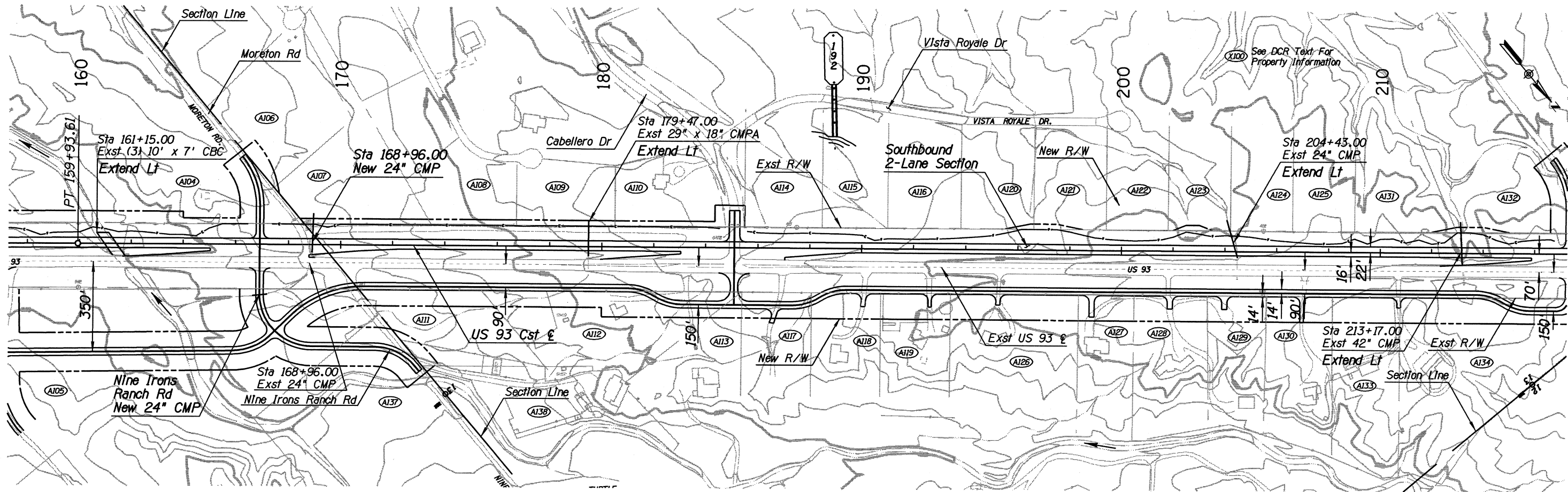
Appendix E
PLAN AND PROFILE SHEETS
- PREFERRED ALTERNATIVES -



Plotted By: *USER* Date: 17-APR-2006 14:34
 File: P:\014164\000\DD\7020\11\70903\N11-sht1.dgn

NO.	DATE	REVISIONS	LOCATION

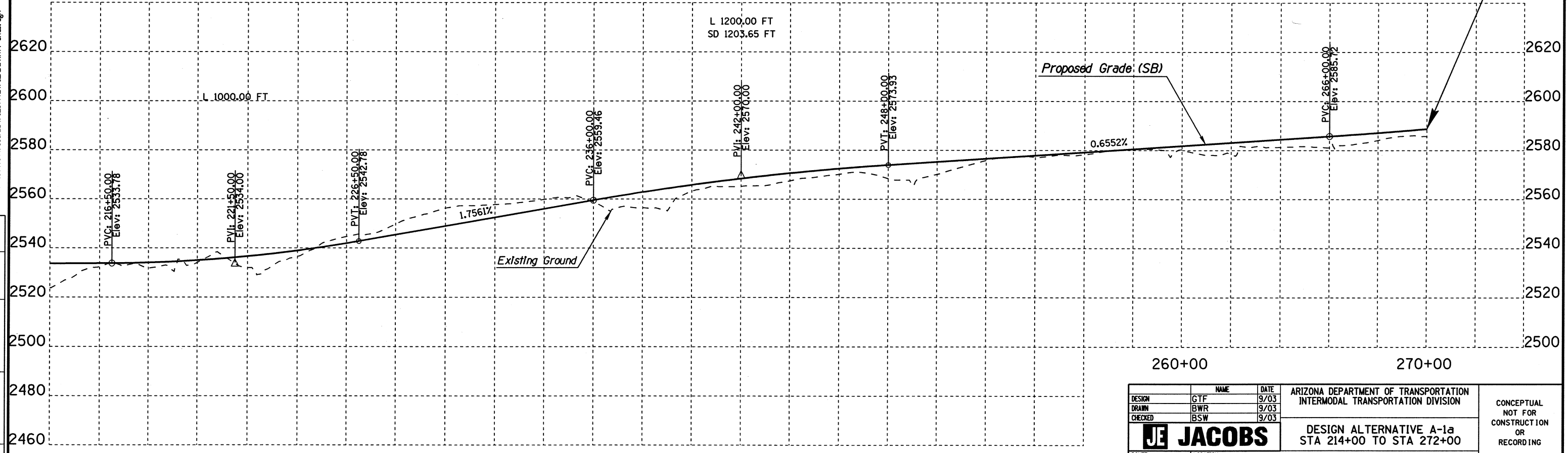
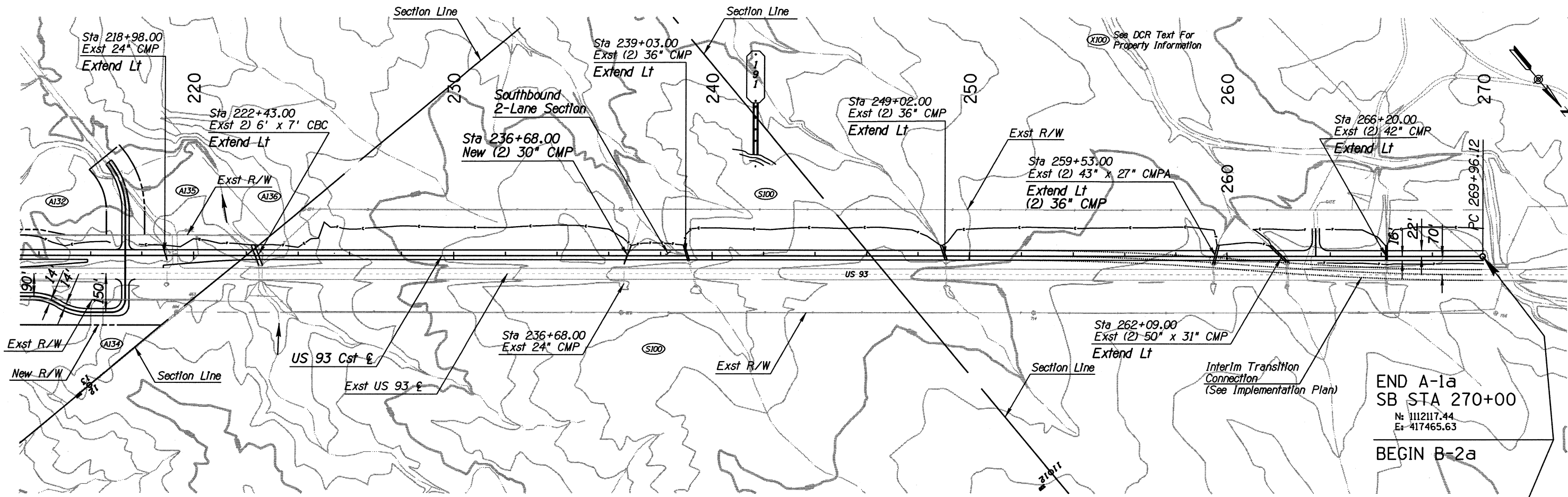
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE A-1a STA 104+02 TO STA 158+00		SHEET 1 OF 33	
ROUTE US 93		LOCATION WICKENBURG TO SANTA MARIA RIVER		TRACS NO. H 4871 01 L	



Plotted By: *USER* Date: 17-APR-2006 14:37
 File: P:\014164\7000\000\702\1\1\702\03\N11-sht2.dgn

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE A-1a STA 158+00 TO STA 214+00		SHEET 2 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L				OF	



Plotted By: USER Date: 17-APR-2006 14:39
 File: P:\01416A\7000\000\7000\11\7000\011-9113.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

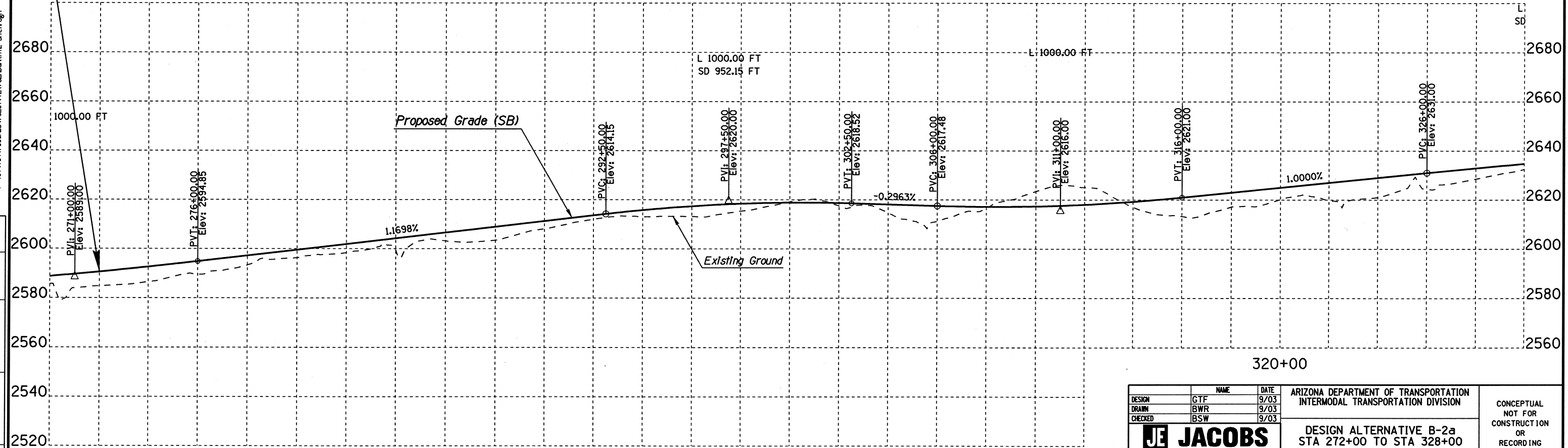
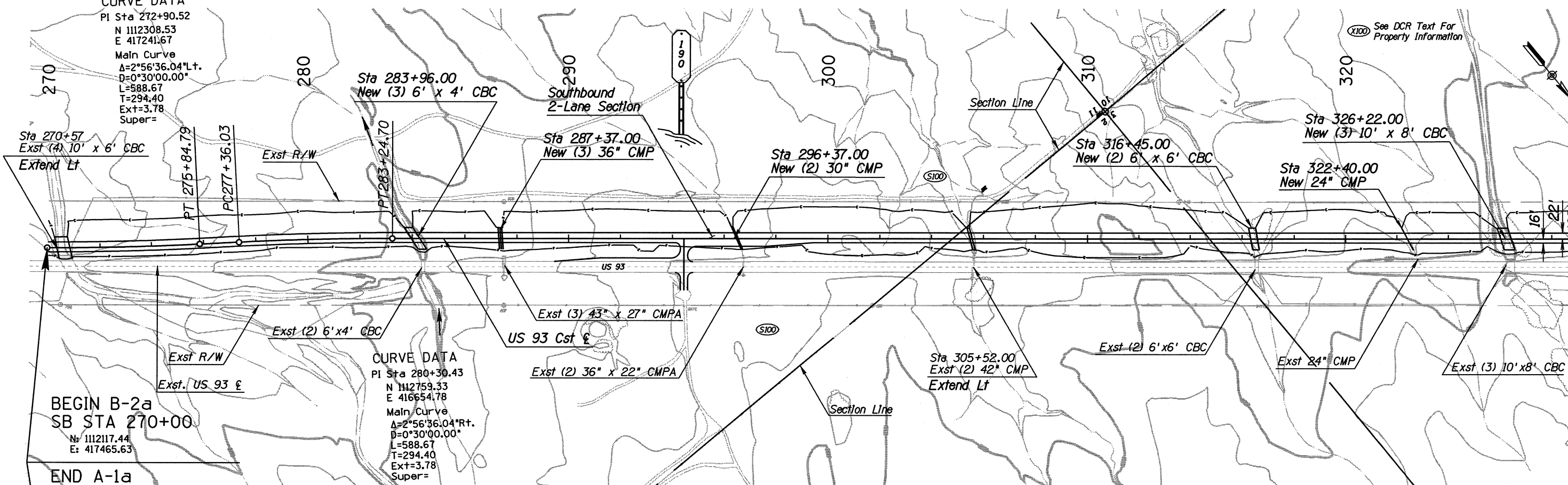
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE A-1a STA 214+00 TO STA 272+00		SHEET 3 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		TRACS NO. H 4871 01 L
					OF

CURVE DATA

PI Sta 272+90.52
 N 1112308.53
 E 417241.67
 Main Curve
 $\Delta=2^{\circ}56'36.04''$ Lt.
 $D=0^{\circ}30'00.00''$
 L=588.67
 T=294.40
 Ext=3.78
 Super=

CURVE DATA

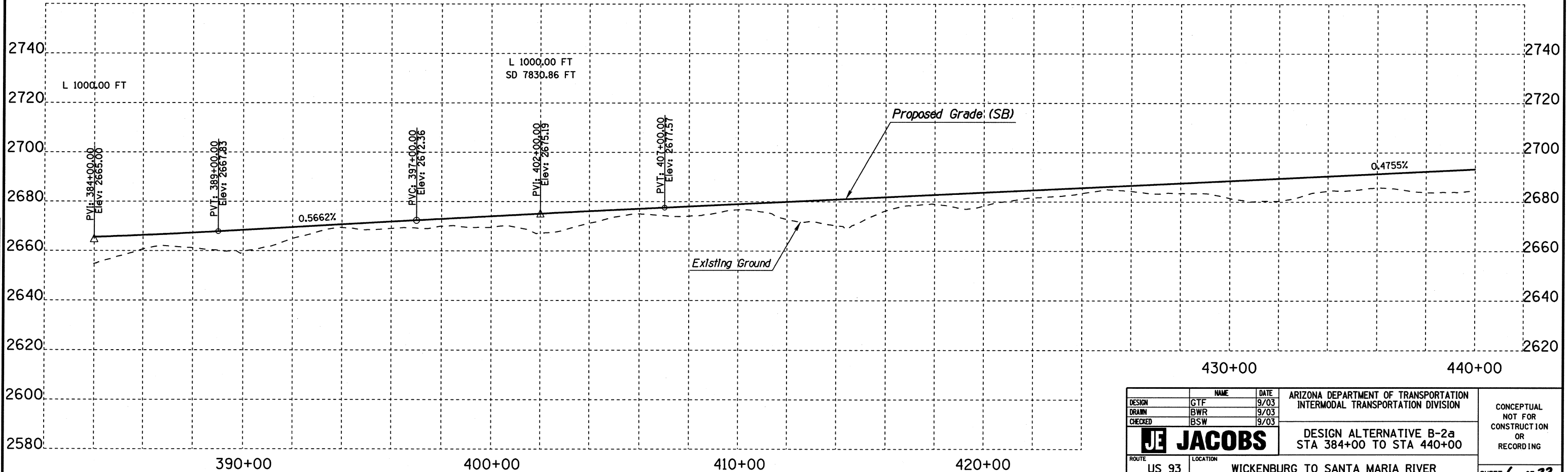
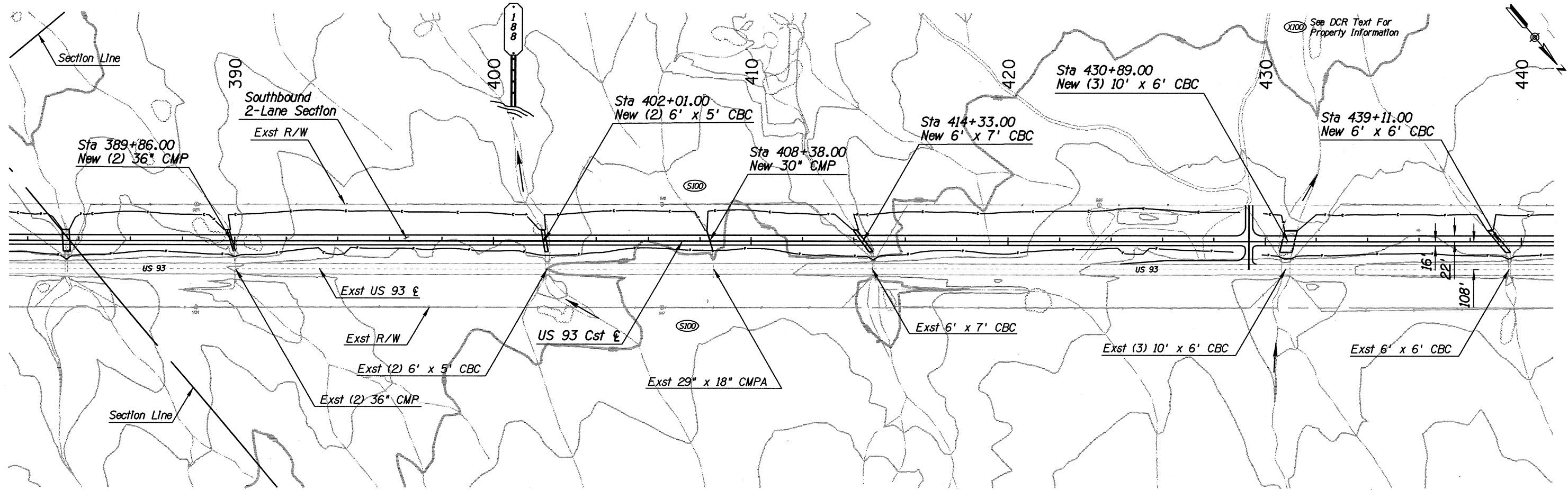
PI Sta 280+30.43
 N 1112759.33
 E 416654.78
 Main Curve
 $\Delta=2^{\circ}56'36.04''$ Rt.
 $D=0^{\circ}30'00.00''$
 L=588.67
 T=294.40
 Ext=3.78
 Super=



Plotted By: USER Date: 17-APR-2006 14:39
 File: P:\01416A\7000\001\7020\1112308\N12-sht1.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBSON		DESIGN ALTERNATIVE B-2a STA 272+00 TO STA 328+00		SHEET 4 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	TRACS NO. H 4871 01 L	
				OF	

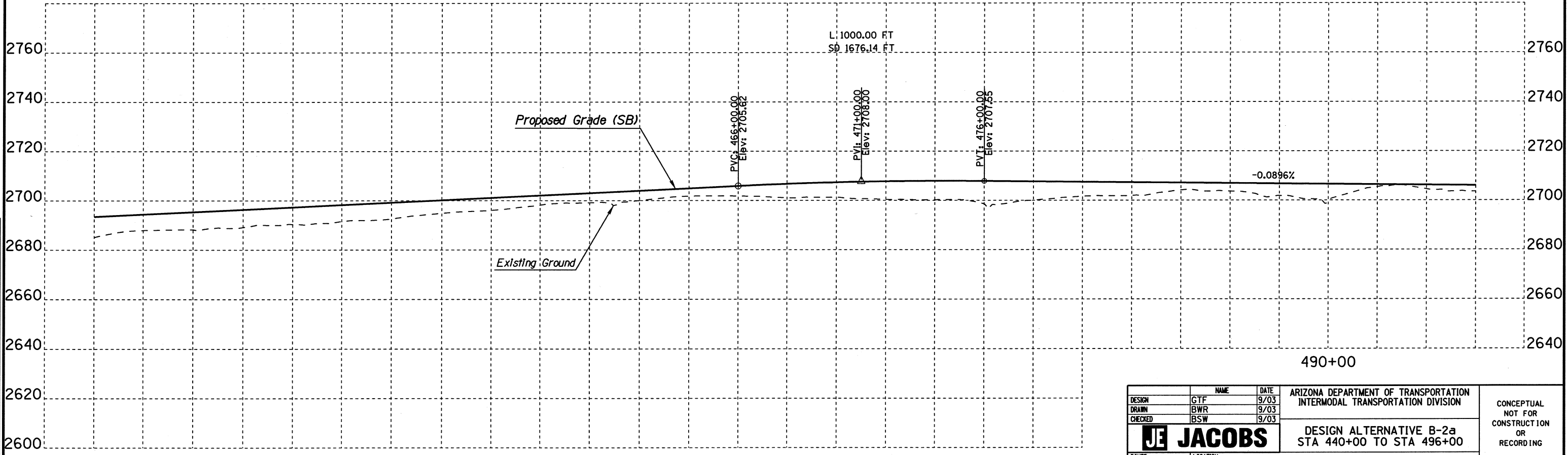
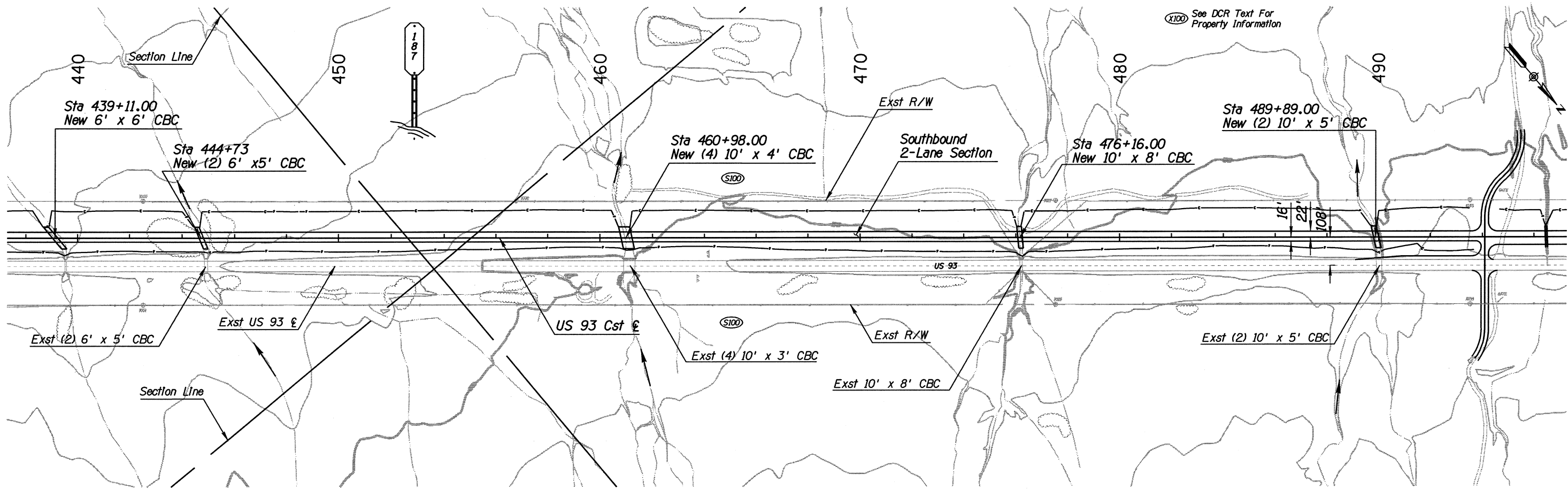


Plotted By: USER** Date: 17-APR-2006 14:40
 File: P:\016A\7000\00\702\WILLV\02\00\12-01.dgn

NO.	DATE	DESCRIPTION

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBSON		DESIGN ALTERNATIVE B-2a STA 384+00 TO STA 440+00		SHEET 6 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		TRACS NO. H 4871 01 L
					OF

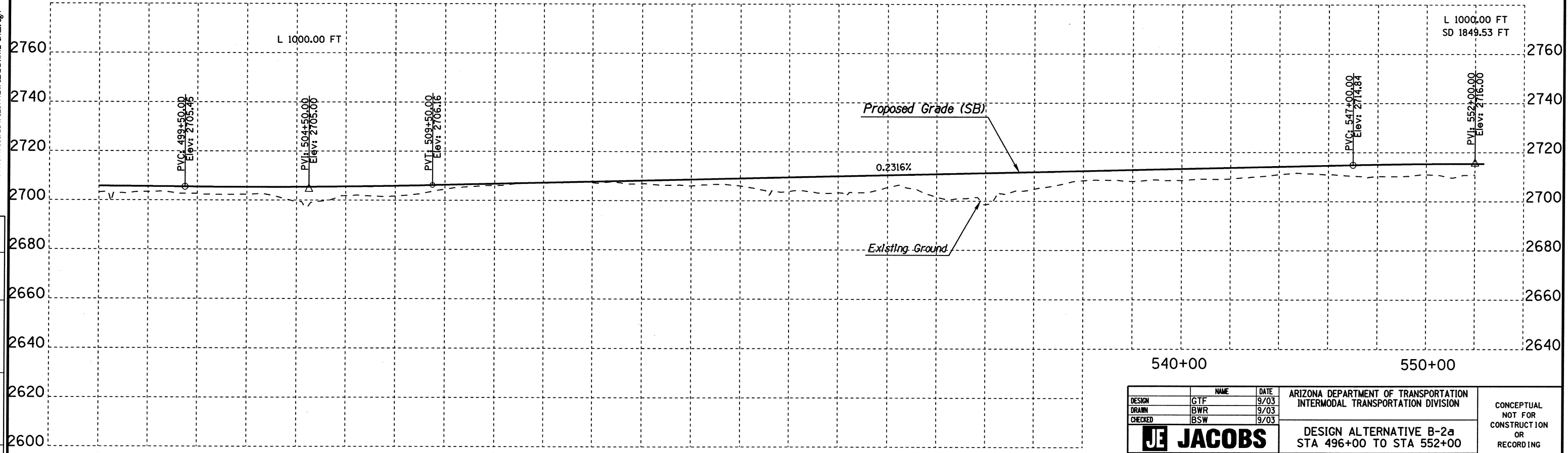
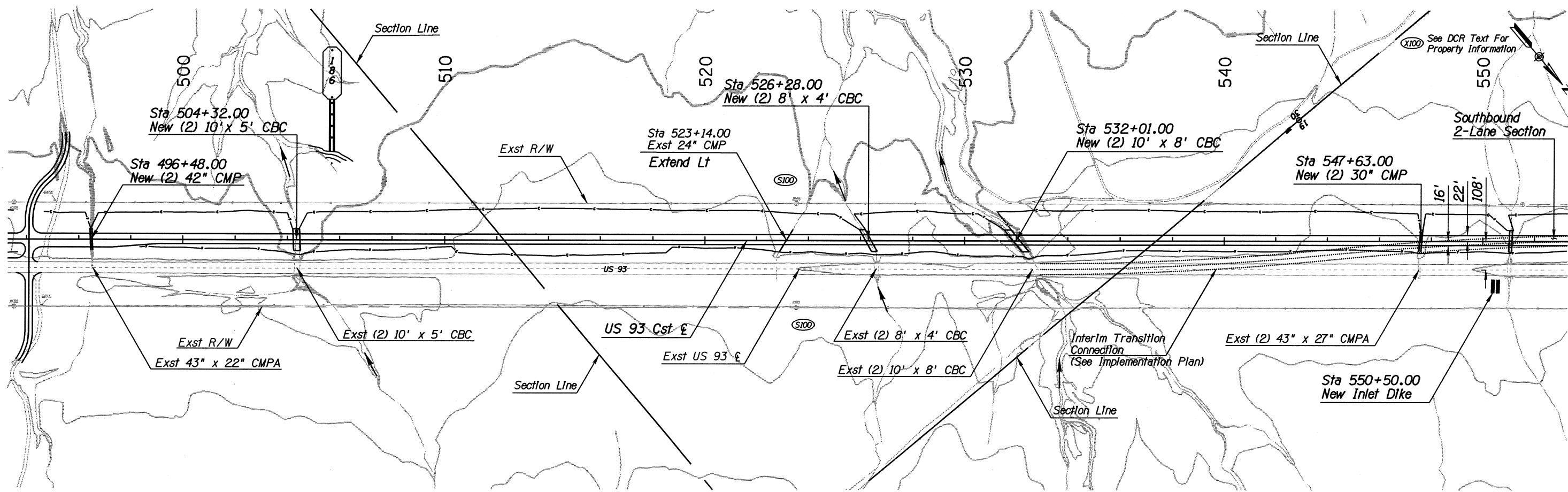
See DCR Text For Property Information



Plotted By: USER Date: 17-APR-2006 14:41
 File: P:\01416A\7000\000\7023\WILL\7020\03\112-0114.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

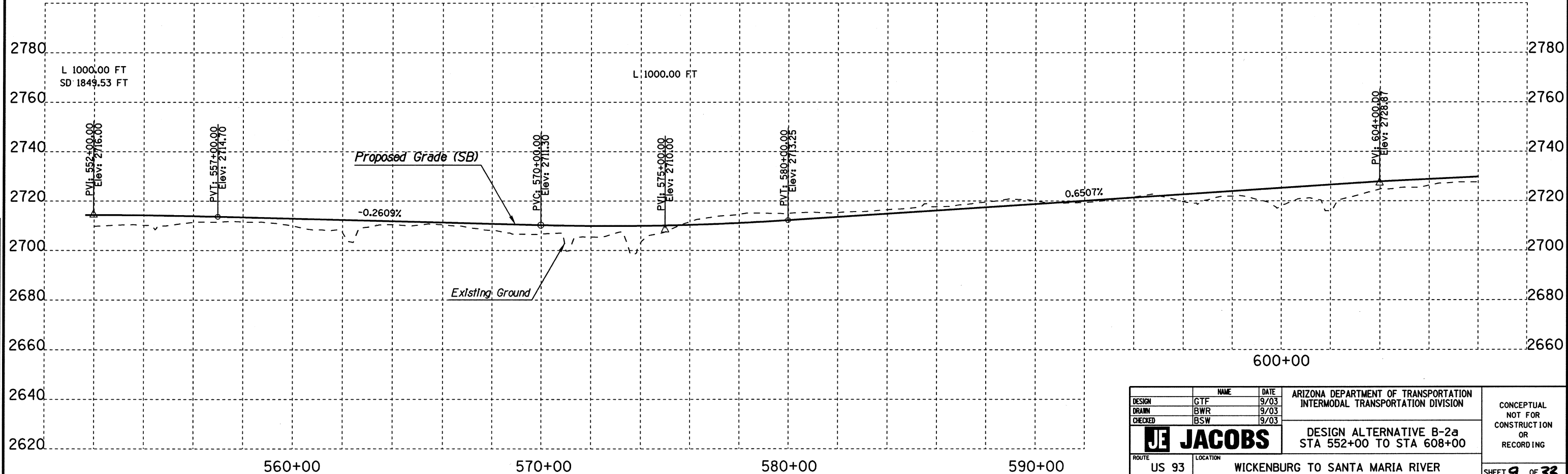
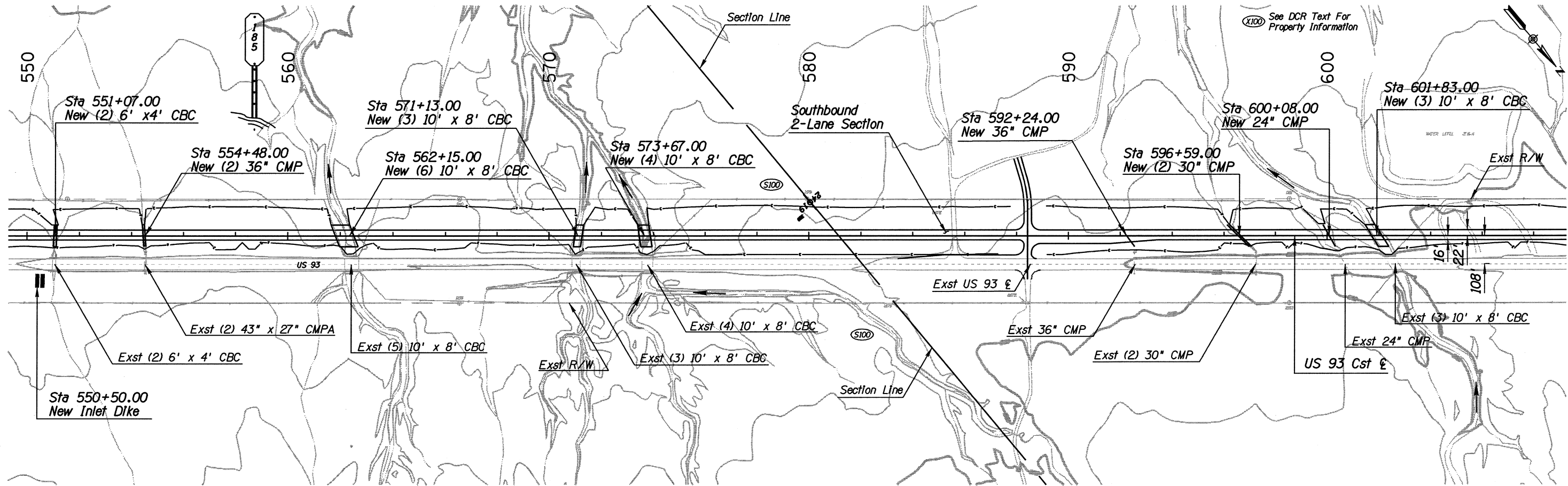
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE B-2a STA 440+00 TO STA 496+00		SHEET 7 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L			OF		



Plotted By: USER** Date: 17-APR-2006 14:41
 File: P:\01416A\7000\00\702C\11\170290\N12-sh15.dgn

REVISIONS	LOCATION	DATE

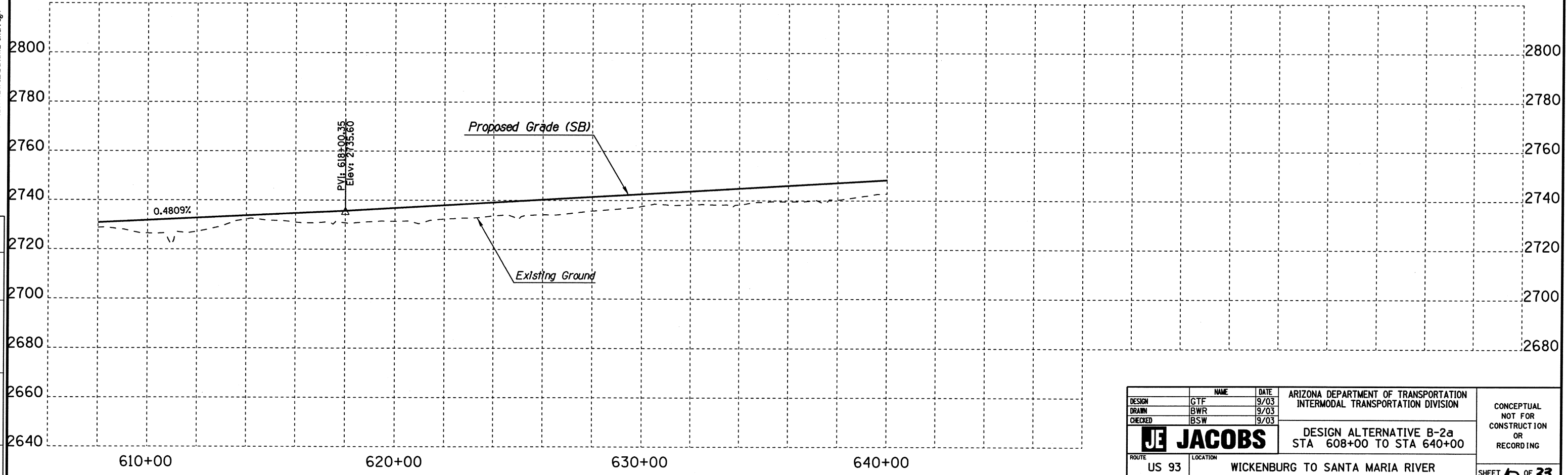
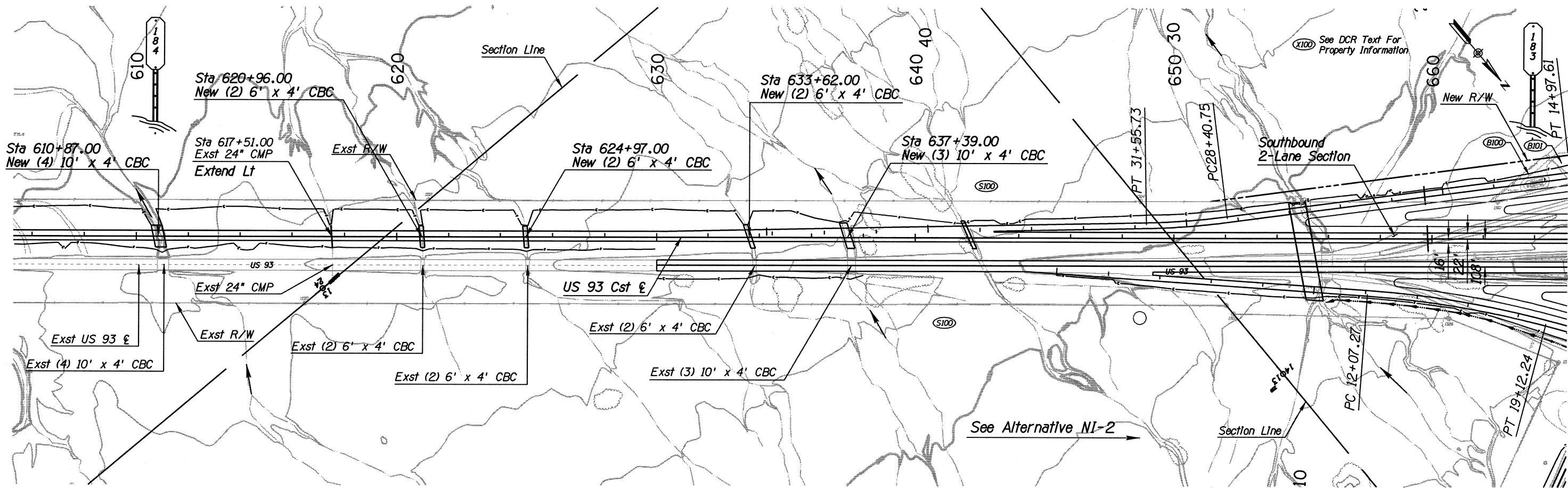
DESIGN	GTF	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	9/03		
CHECKED	BSW	9/03		
JE JACOBS			DESIGN ALTERNATIVE B-2a STA 496+00 TO STA 552+00	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	
TRACS NO. H 4871 01 L			SHEET 8 OF 33	
			OF	



Plotted By: USER** Date: 17-APR-2006 14:42
 File: P:\016A\7000\00V\02C\11\1702\00N\12-8116.dgn

NO.	DATE	DESCRIPTION

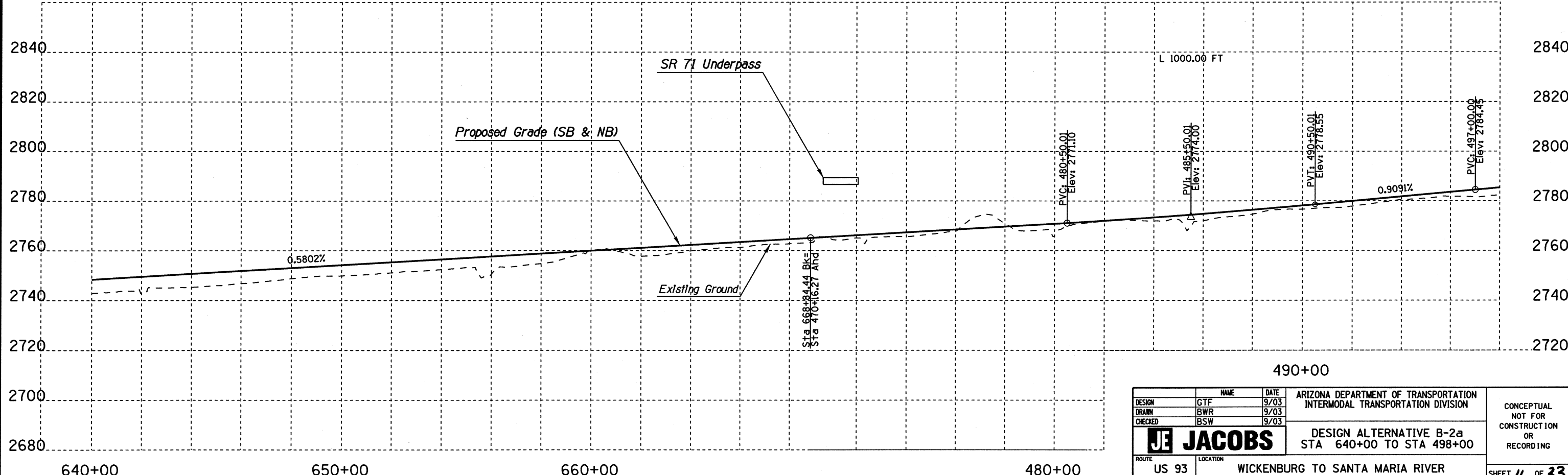
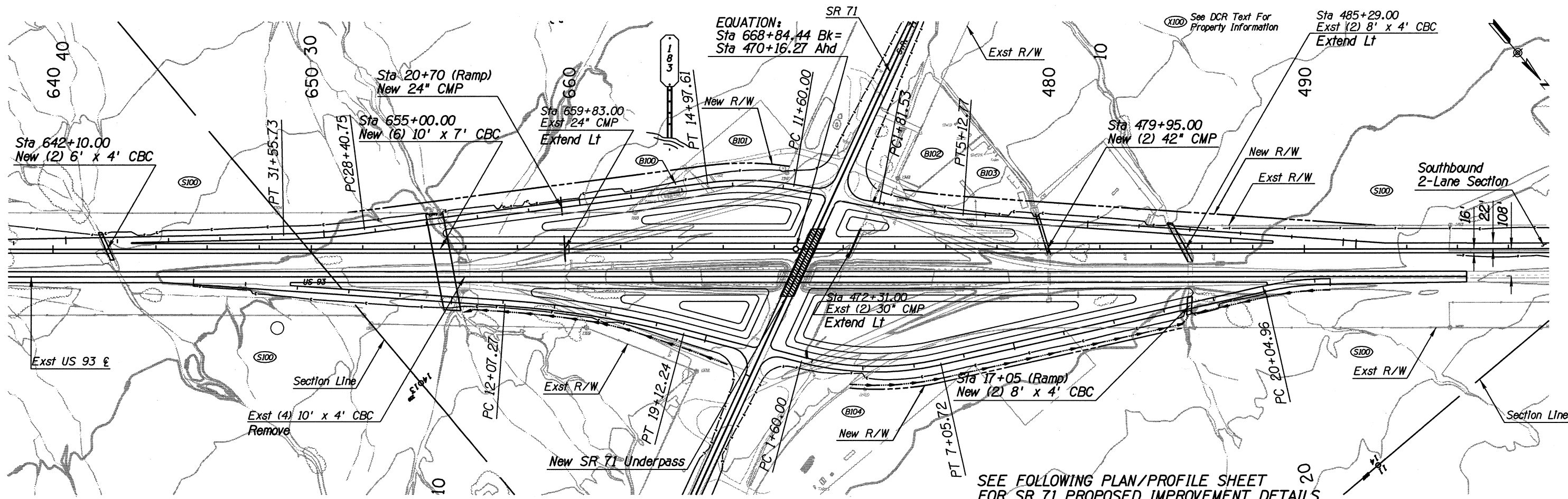
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE B-2a STA 552+00 TO STA 608+00		SHEET 9 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L				OF	



Plotted By: USER** Date: 17-APR-2006 14:42
 File: P:\01416A\7000\00\702C\11\11\7029\01\12-sh27.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

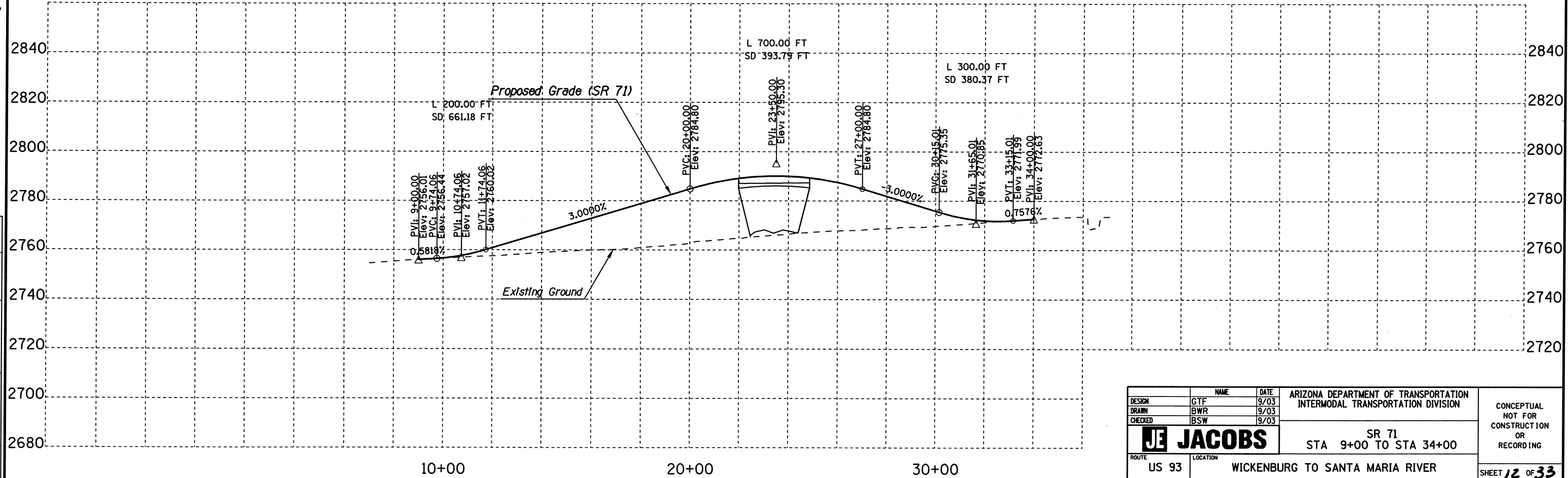
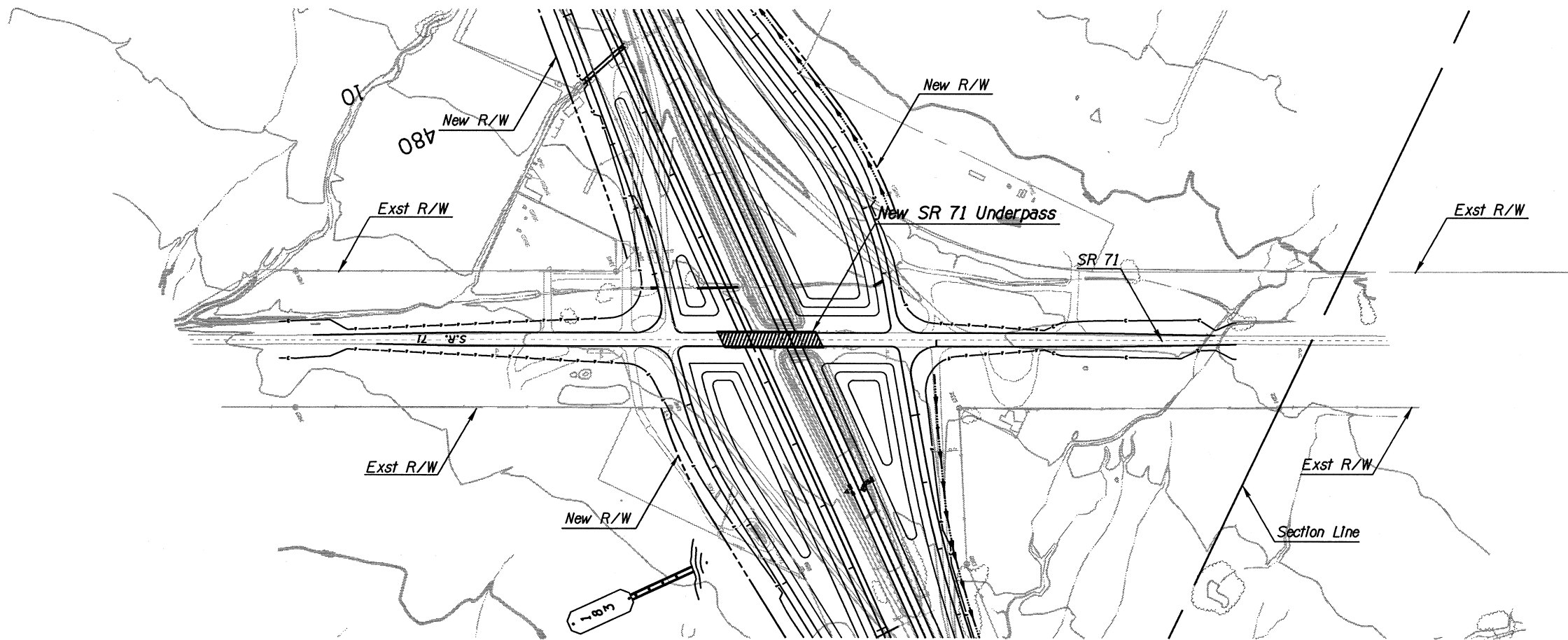
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE B-2a STA 608+00 TO STA 640+00		SHEET 10 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L			OF		



DESIGN	CTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS				DESIGN ALTERNATIVE B-2a STA 640+00 TO STA 498+00	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		SHEET 11 OF 33
TRACS NO. H 4871 01 L					OF

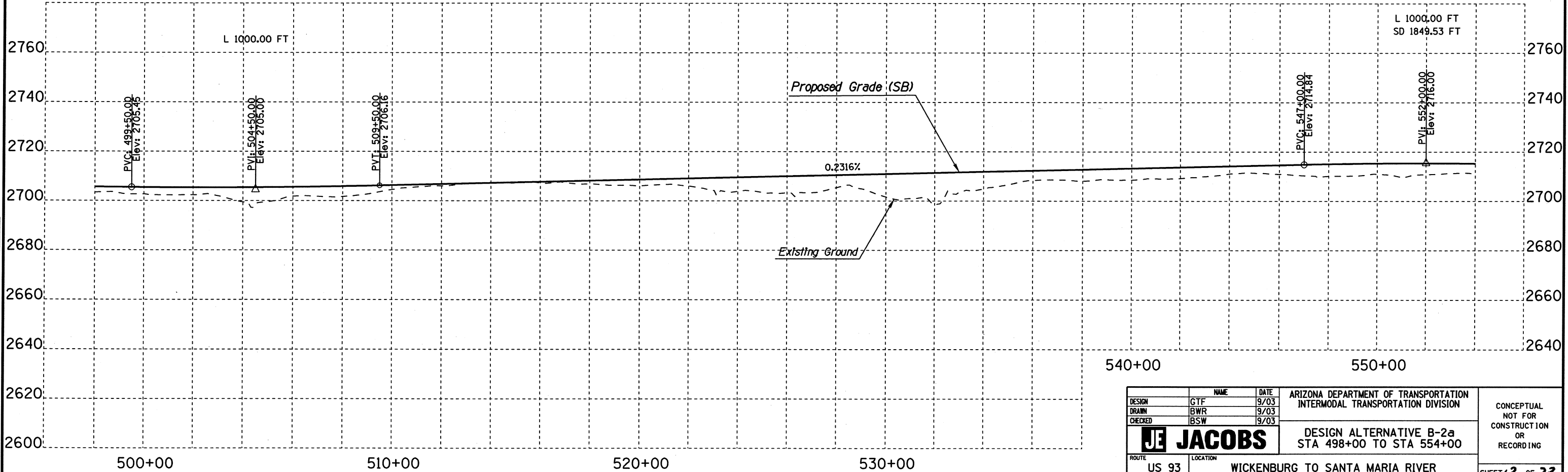
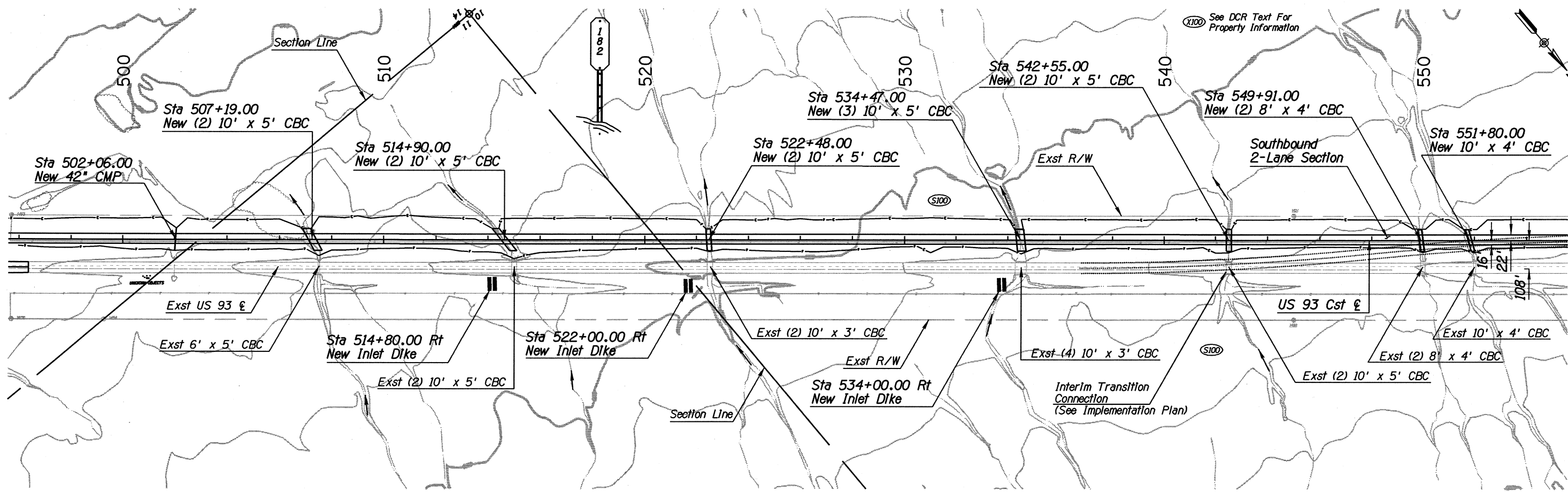
Plotted By: USER** Date: 17-APR-2006 14:47
 File: P:\01416A\7000\00\702C\11\11702903\112-9118.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.



Plotted By: USER** Date: 17-APR-2006 14:49
 File: P:\0141647000\DD\702\CVIL\70290N\sr71-sht1a.dgn

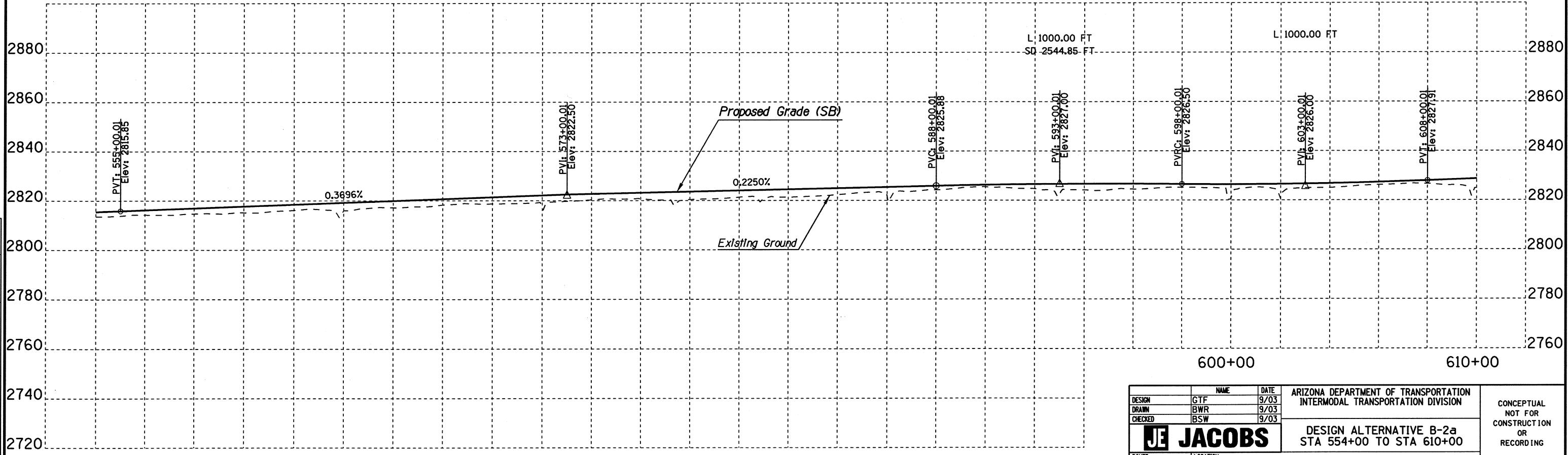
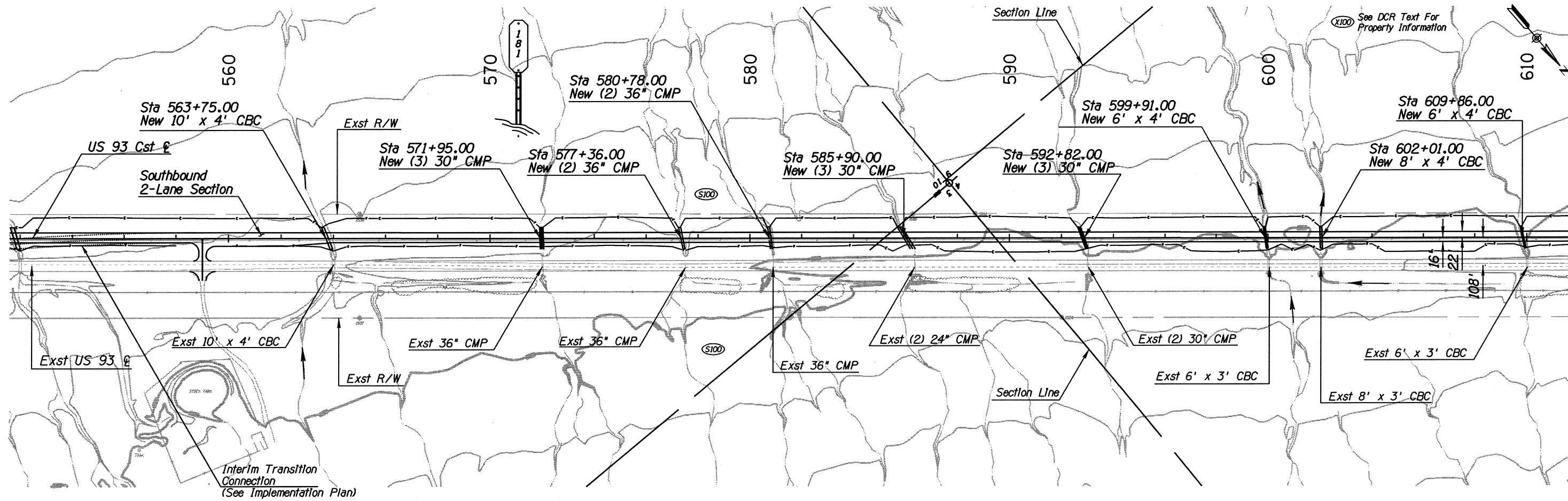
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		SR 71 STA 9+00 TO STA 34+00		SHEET 12 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	TRACS NO. H 4871 01 L	
					OF



Plotted By: USER Date: 17-APR-2006 14:48
 File: P:\01416A\7000\00\7020\11\7020\00\12-sh13.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE B-2a STA 498+00 TO STA 554+00		SHEET 13 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L			OF		

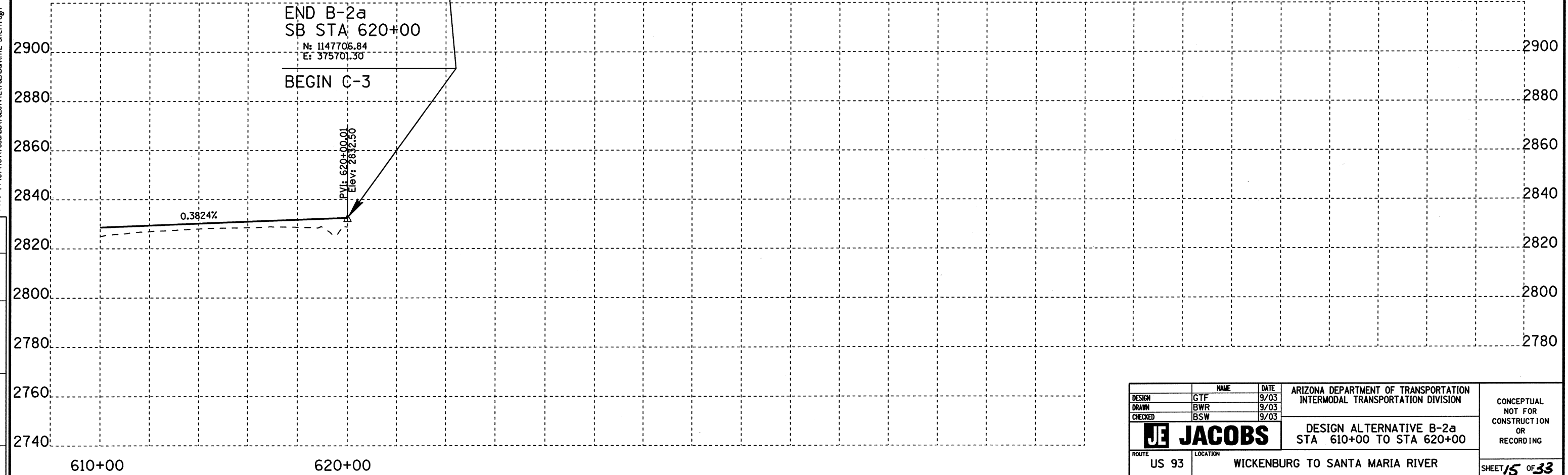
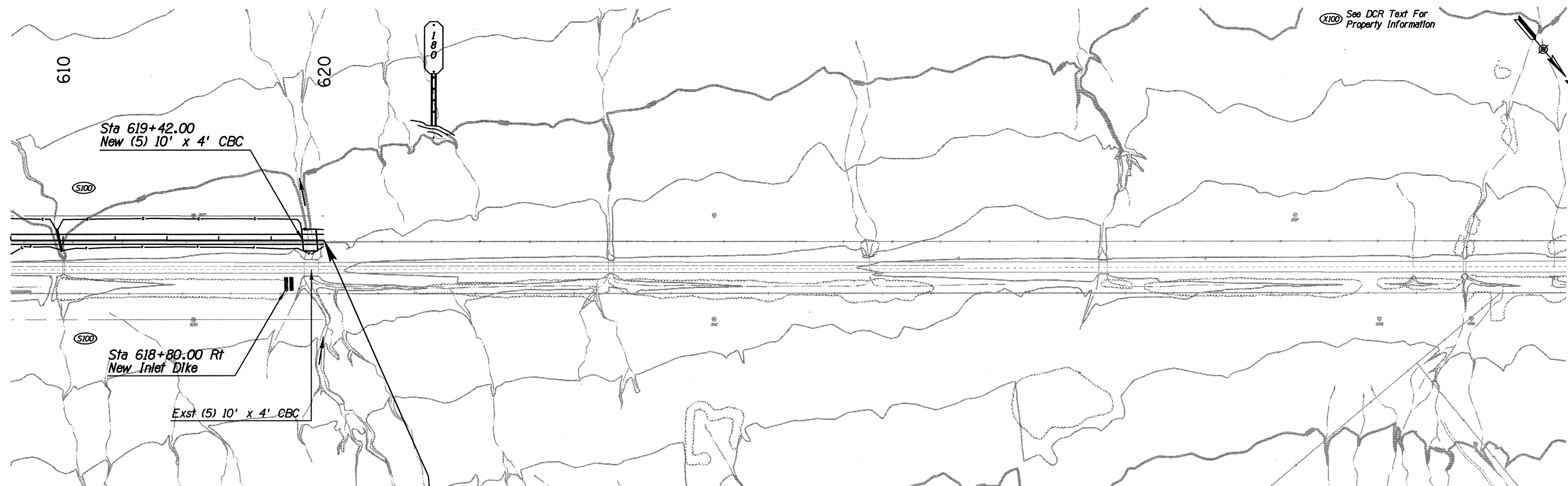


Plotted By: USER** Date: 17-APR-2006 14:48
 File: P:\01416A\7000\00\7020\1\1\7020\03\112-shr10.dgn

NO.	DATE	DESCRIPTION

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE B-2a STA 554+00 TO STA 610+00		SHEET 14 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L				OF	

See DCR Text For Property Information

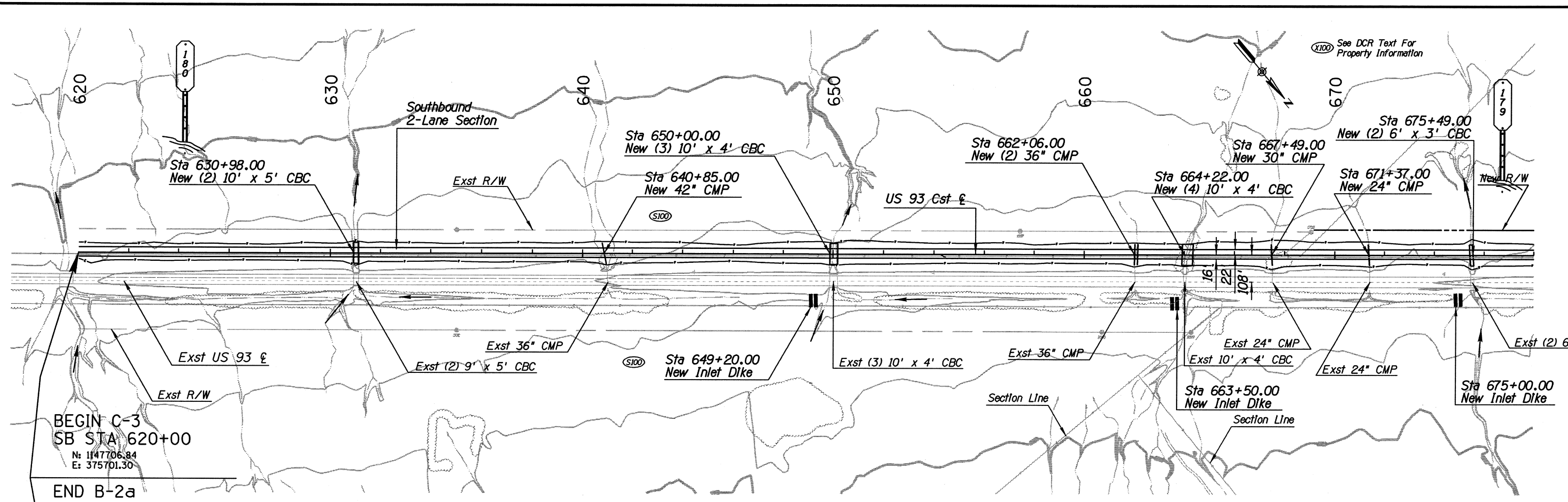


Plotted By: **USER** Date: 17-APR-2006 16:42
 File: P:\01416A\7000400\7020\1\1\7020A00\12-sht11.dgn

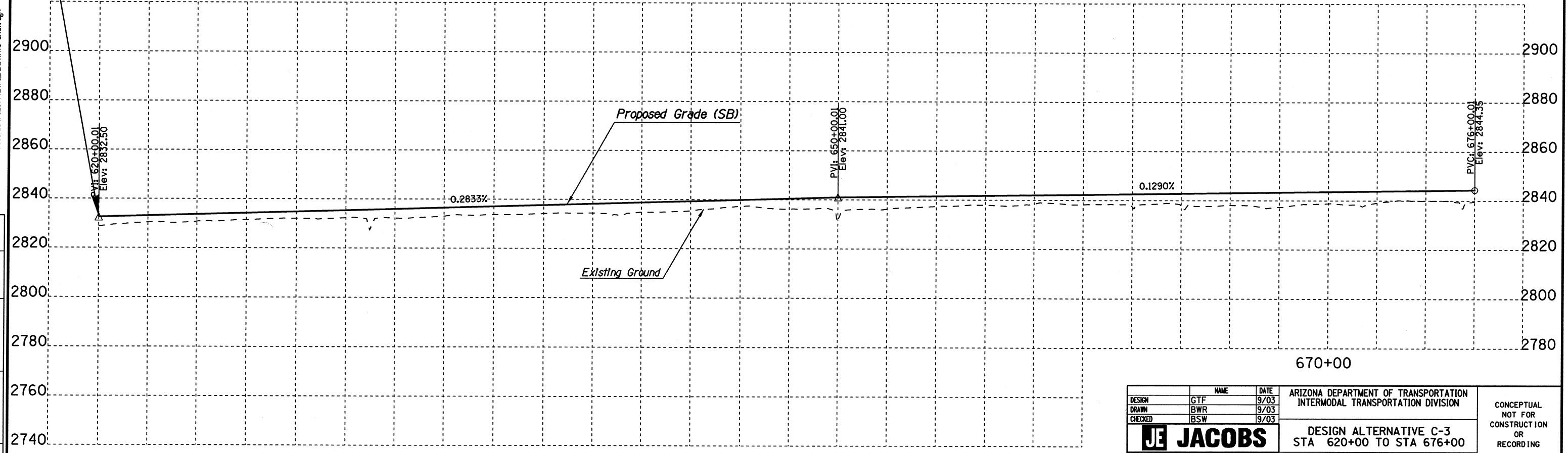
DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE B-2a STA 610+00 TO STA 620+00		SHEET 15 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		OF
TRACS NO. H 4871 01 L					

See DCR Text For Property Information



BEGIN C-3
SB STA 620+00
N: 1147706.84
E: 375701.30
END B-2a

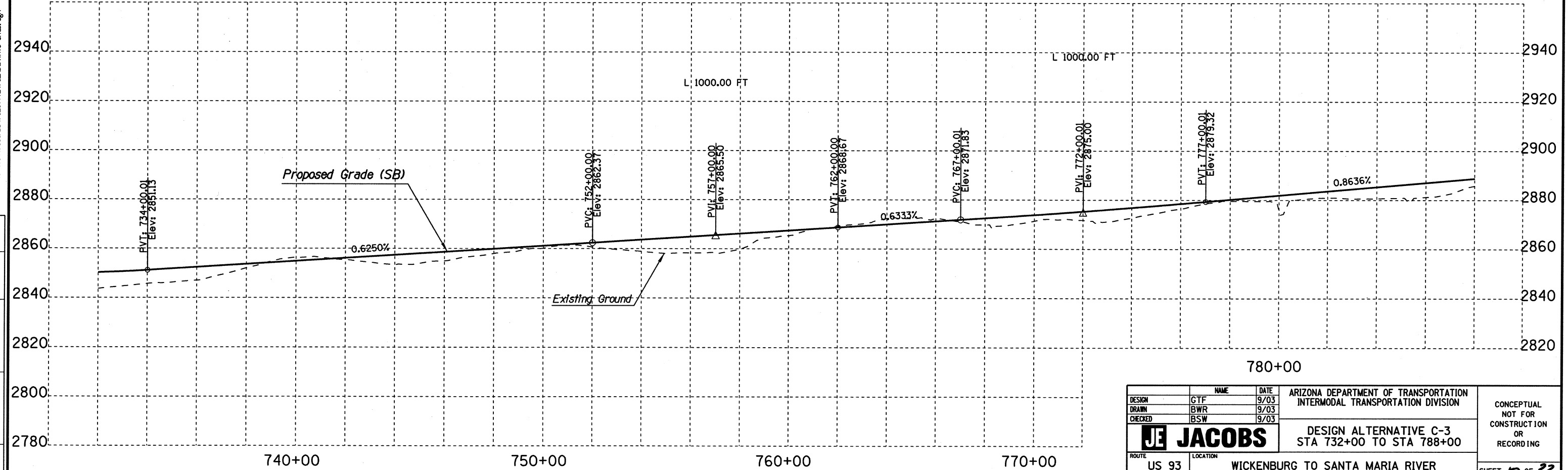
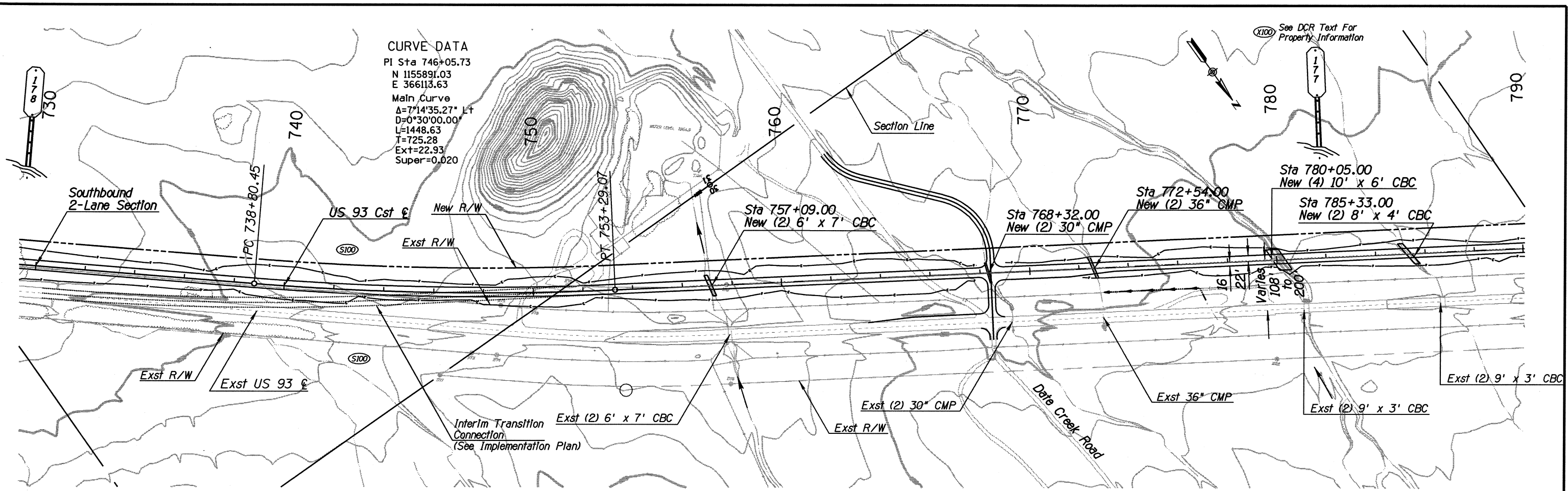


DESIGN	GTF	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	9/03		
CHECKED	BSW	9/03		
JACOBS			DESIGN ALTERNATIVE C-3 STA 620+00 TO STA 676+00	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	
TRACS NO. H 4871 01 L			SHEET 16 OF 33 OF	

Plotted By: JUEB Date: 17-APR-2006 16:43
 File: P:\01416A\7000\00\7020\11\17020\03\13-sh1.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

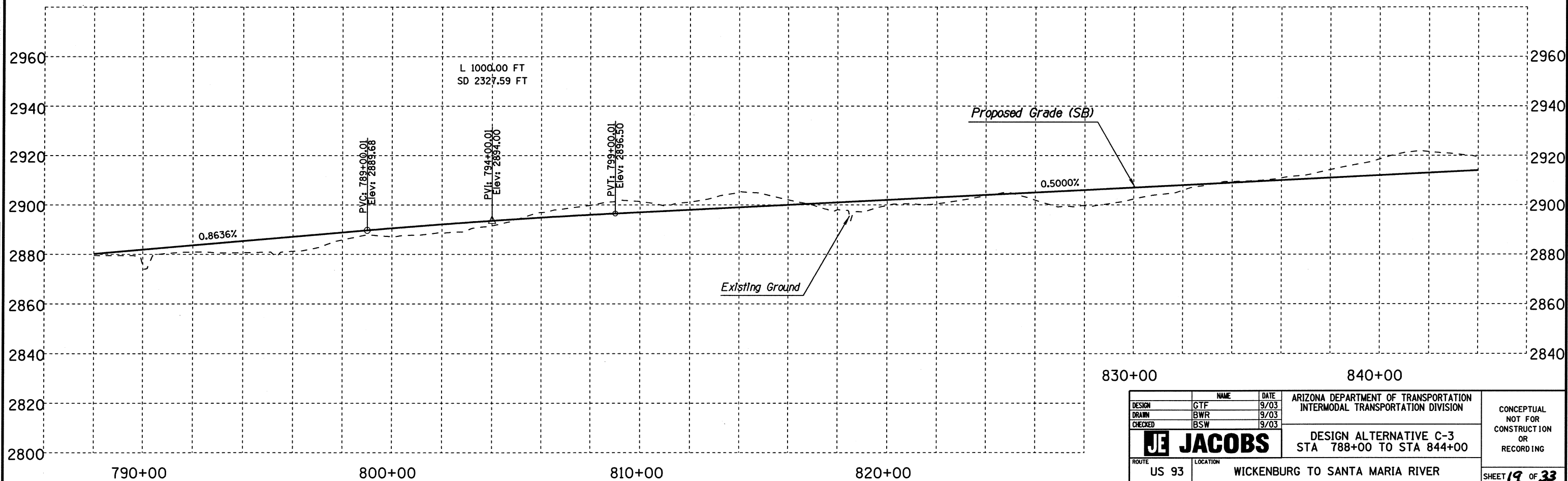
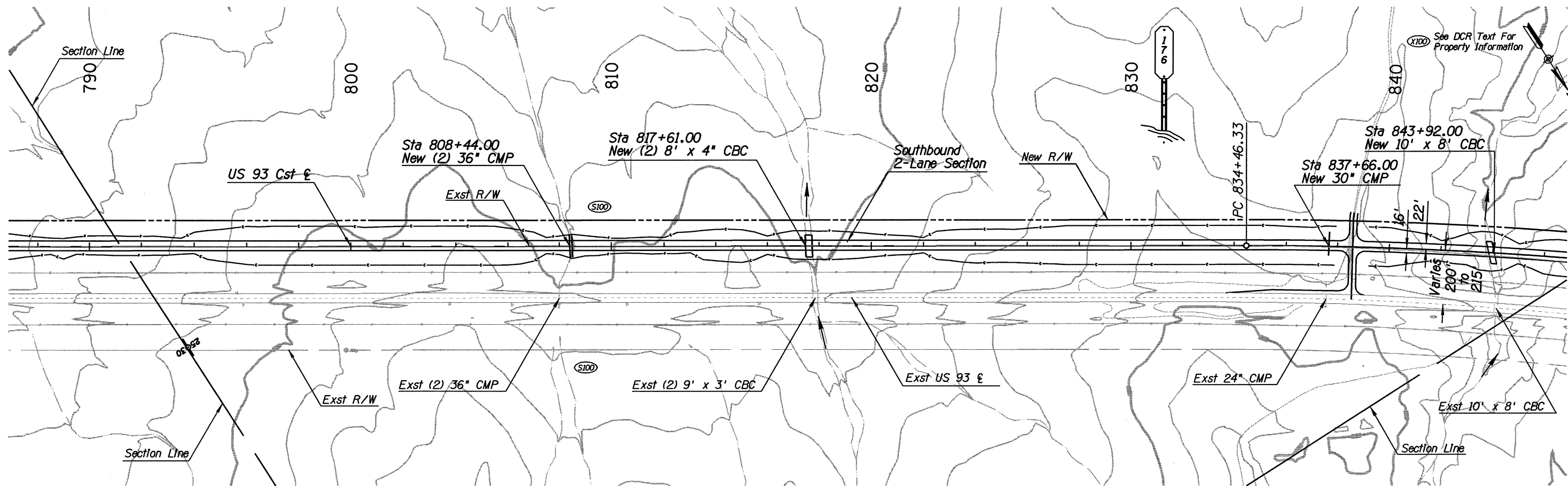
CURVE DATA
 PI Sta 746+05.73
 N 1155891.03
 E 366113.63
 Main Curve
 $\Delta = 7^{\circ}14'35.27''$ Lt
 $D = 0^{\circ}30'00.00''$
 $L = 1448.63$
 $T = 725.28$
 $Ext = 22.93$
 $Super = 0.020$



Plotted By: USER Date: 17-APR-2006 16:46
 File: P:\01416A\7000\000\7020\WILLY7020\N13-sh13.dgn

REVISIONS	DATE

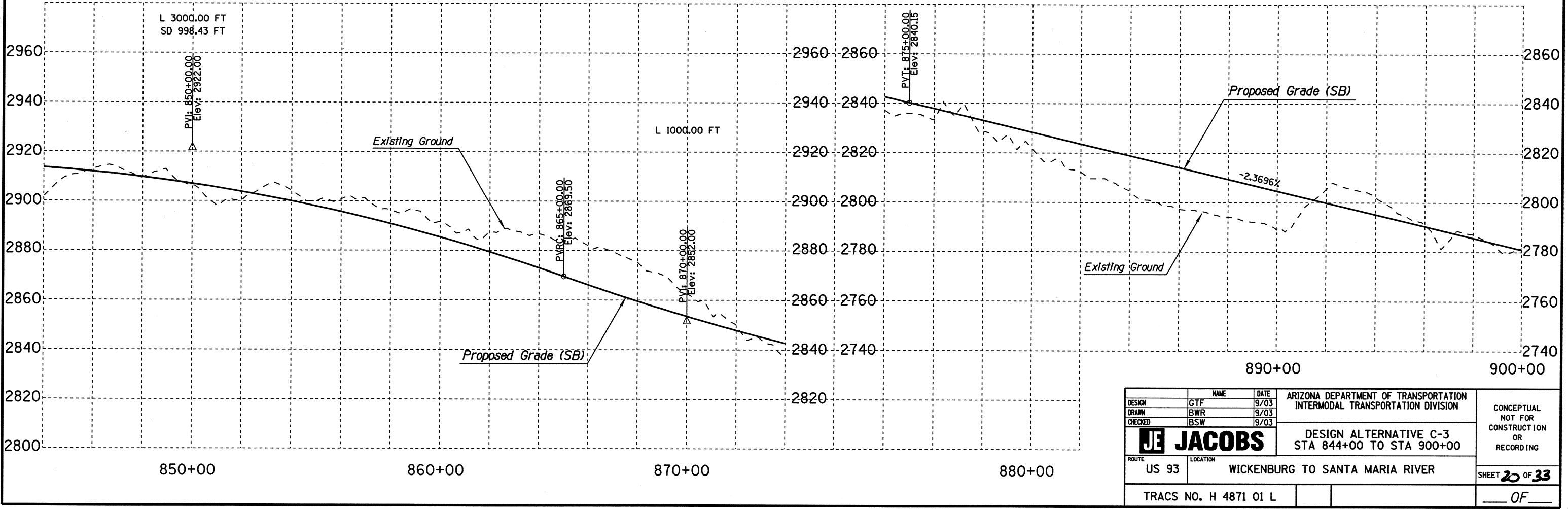
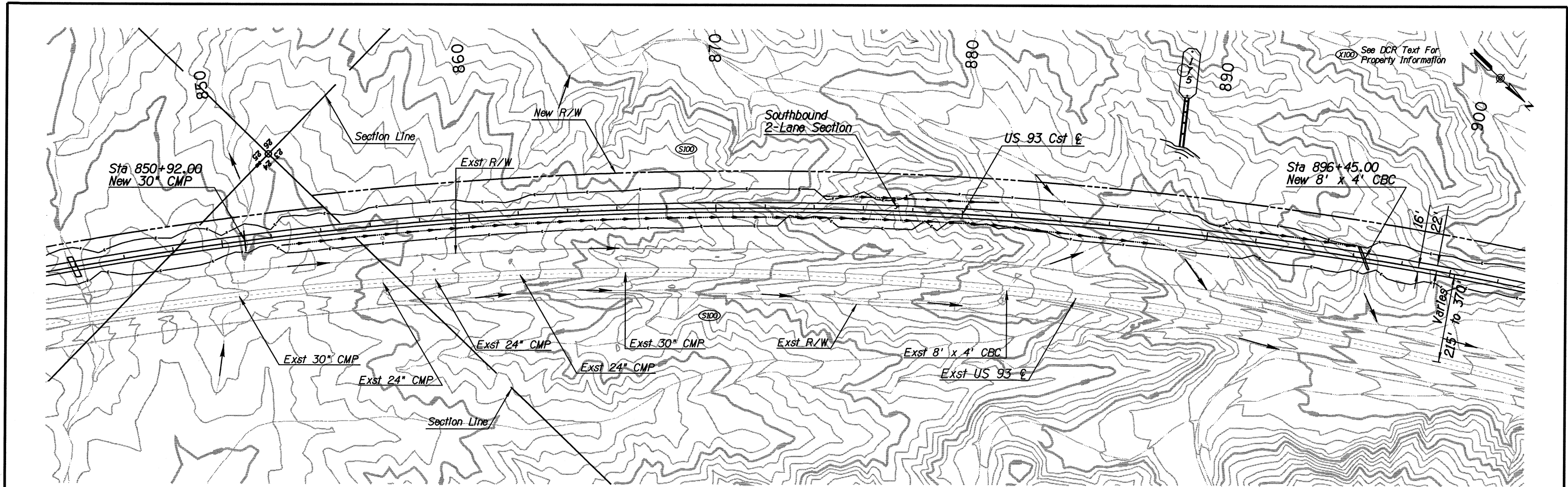
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE C-3 STA 732+00 TO STA 788+00		SHEET 13 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	OF	
TRACS NO. H 4871 01 L					



Plotted By: USER Date: 17-APR-2006 16:47
 File: P:\0141647000\0007020\11\170909\N13-sh14.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

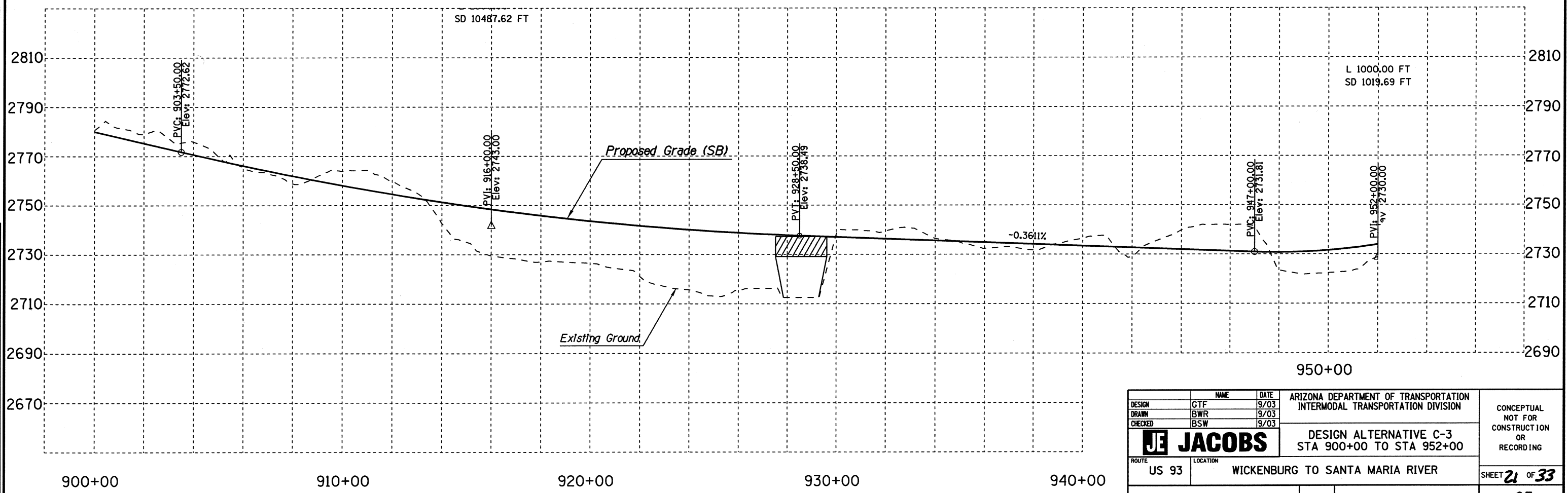
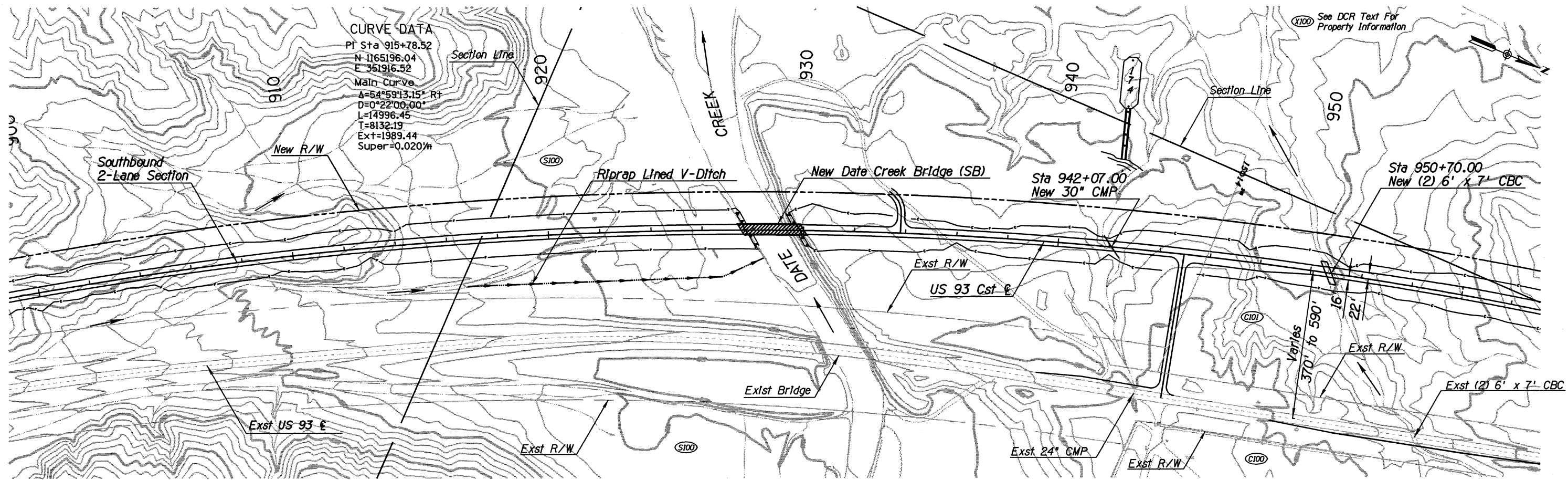
DESIGN	CTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBSON		DESIGN ALTERNATIVE C-3 STA 788+00 TO STA 844+00		SHEET 19 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		TRACS NO. H 4871 01 L
					OF



Plotted By: **USER** Date: 17-APR-2006 16:47
 File: P:\01416A\7000\00\7020\11\LV7090\N13-sh15.dgn

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

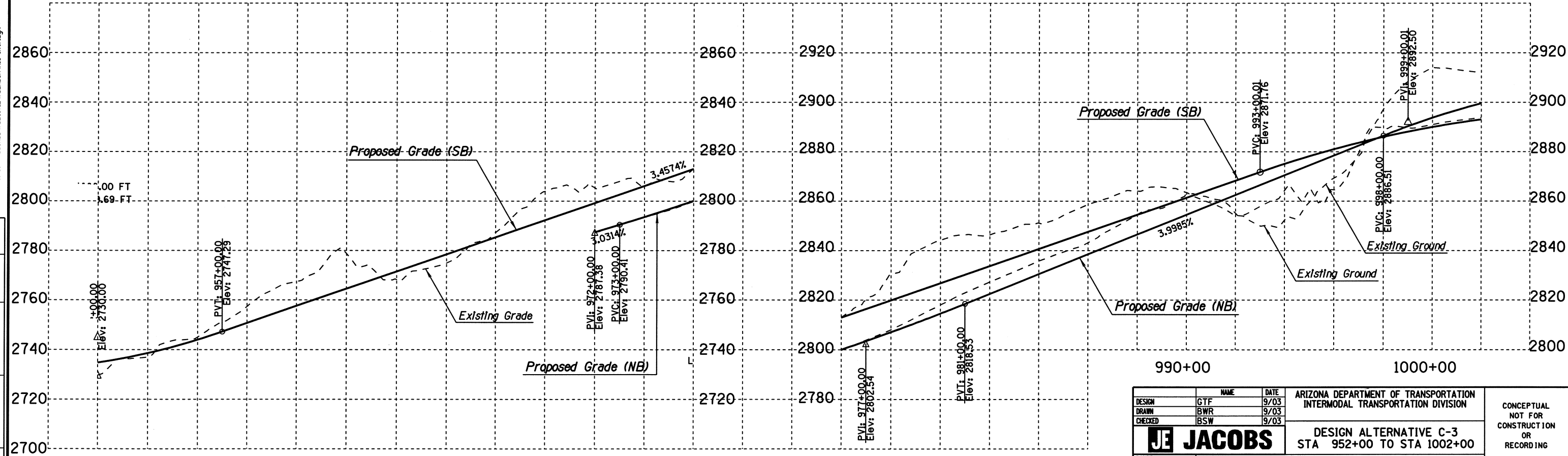
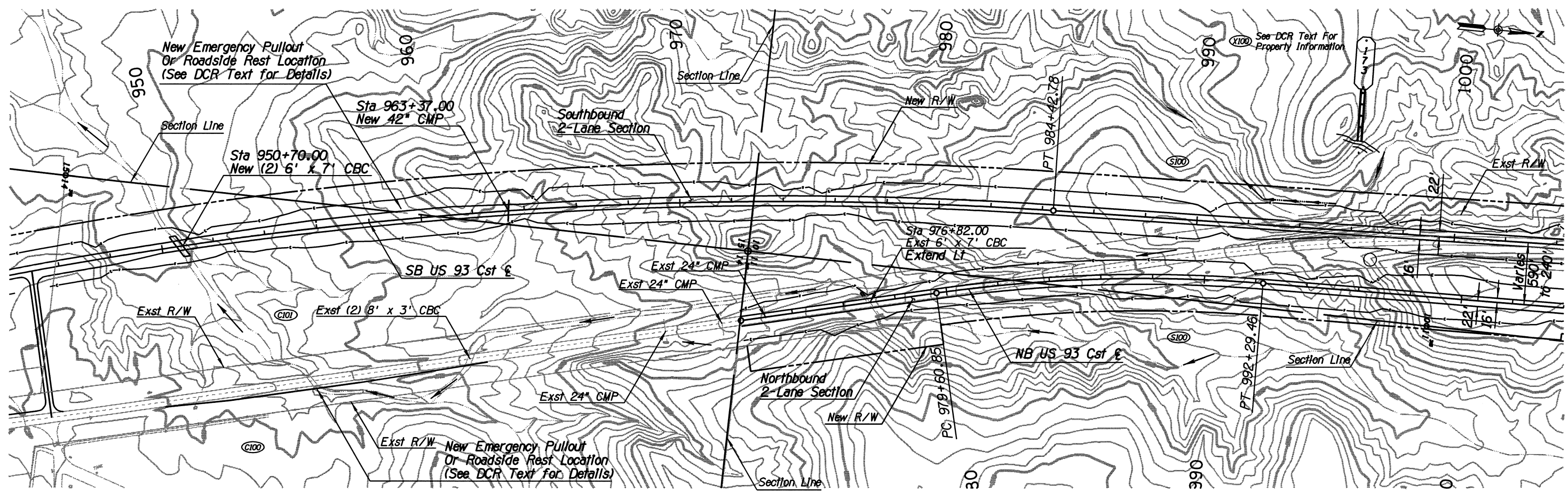
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION DESIGN ALTERNATIVE C-3 STA 844+00 TO STA 900+00	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		ROUTE		US 93	
		LOCATION		WICKENBURG TO SANTA MARIA RIVER	
TRACS NO. H 4871 01 L				SHEET 20 OF 33	
				OF	



Plotted By: USER** Date: 17-APR-2006 16:48
 File: P:\01416A\7000400\7021\WILL\702403\m13-9rt6.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

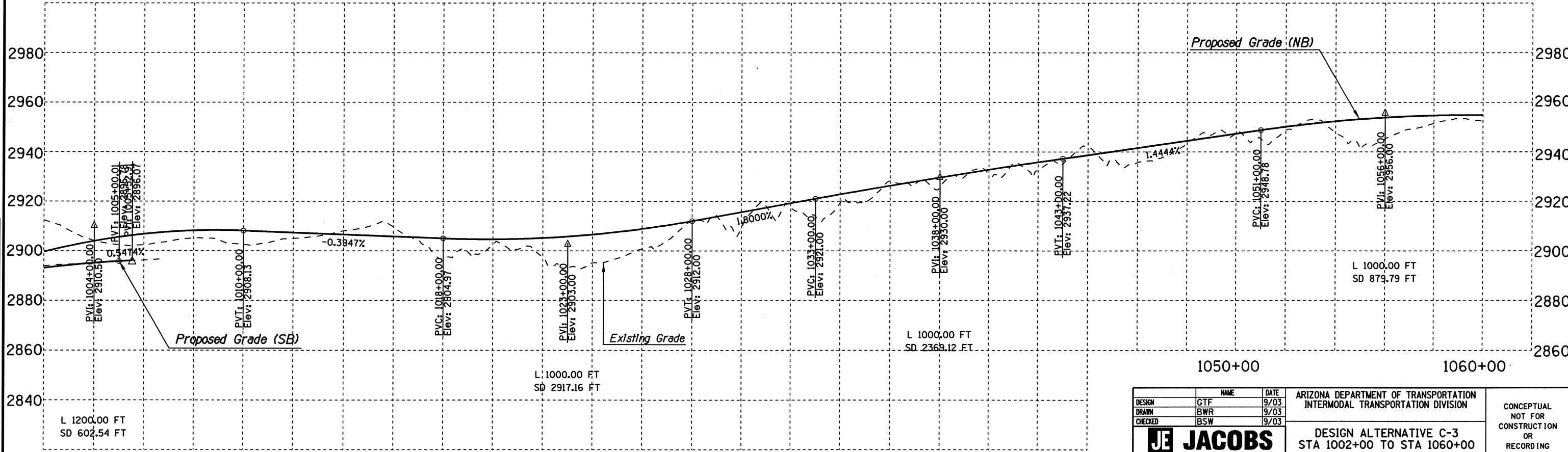
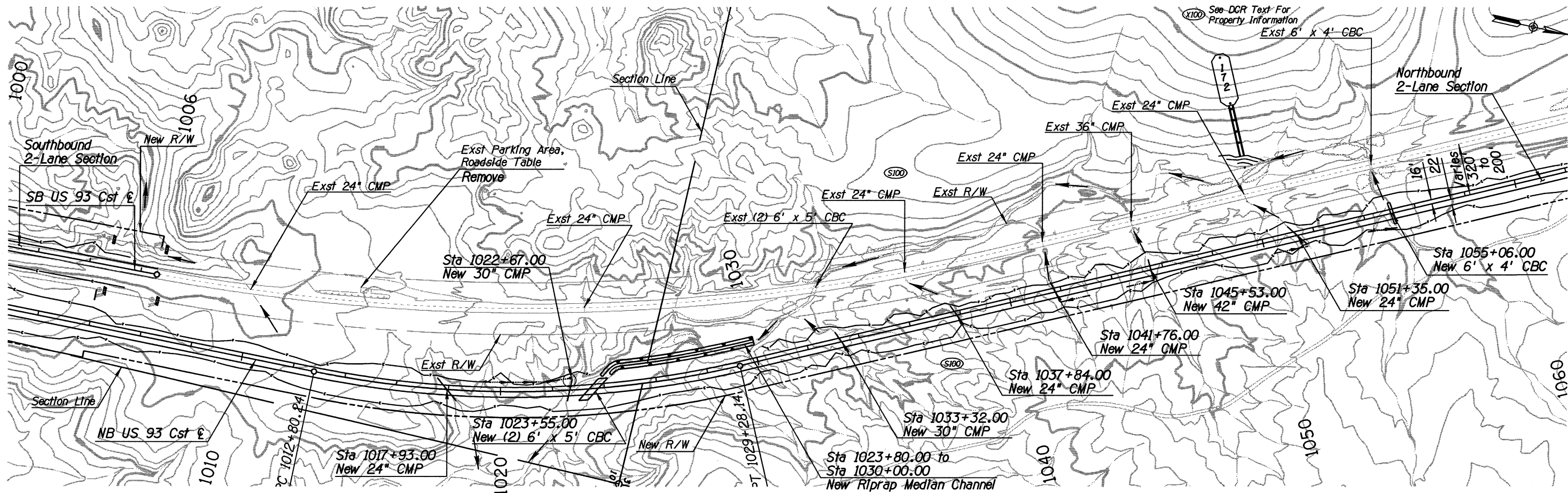
DESIGN	CTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBS		DESIGN ALTERNATIVE C-3 STA 900+00 TO STA 952+00		SHEET 21 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		OF
TRACS NO. H 4871 01 L					



Plotted By: wilbriss Date: 03-MAY-2006 12:05
 File: P:\014164\7000\001\7002\CIVIL\702\000\013-sh7.dgn

REVISIONS	LOCATION	DATE

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE C-3 STA 952+00 TO STA 1002+00		ROUTE US 93	
LOCATION		WICKENBURG TO SANTA MARIA RIVER		SHEET 22 OF 33	
TRACS NO. H 4871 01 L				OF	

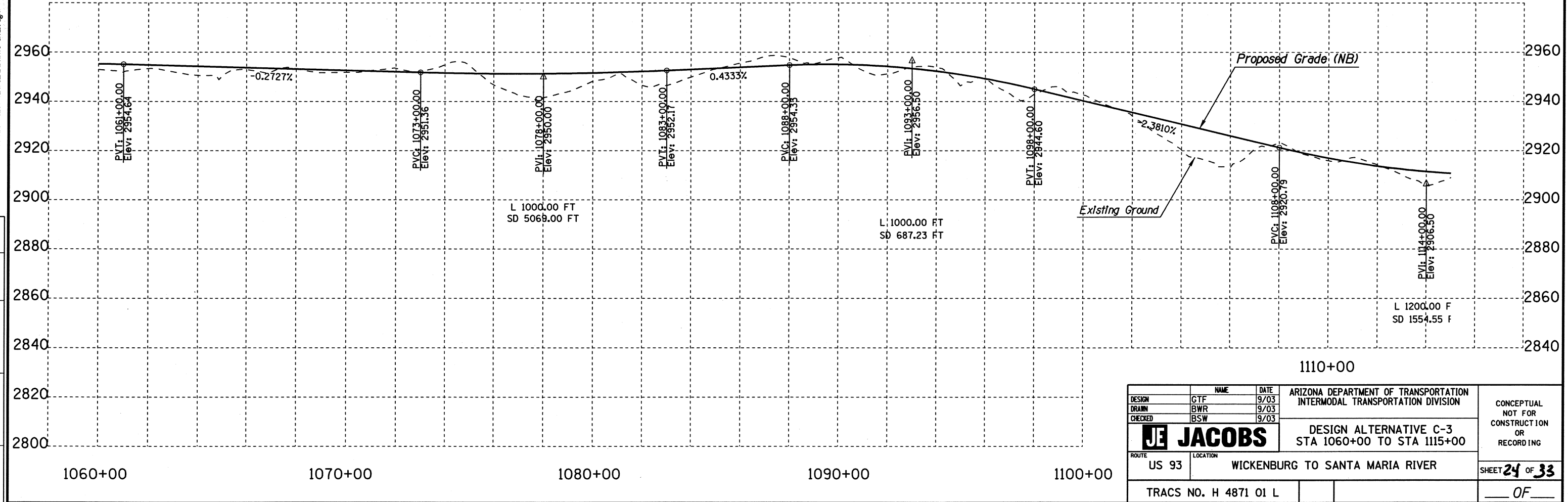
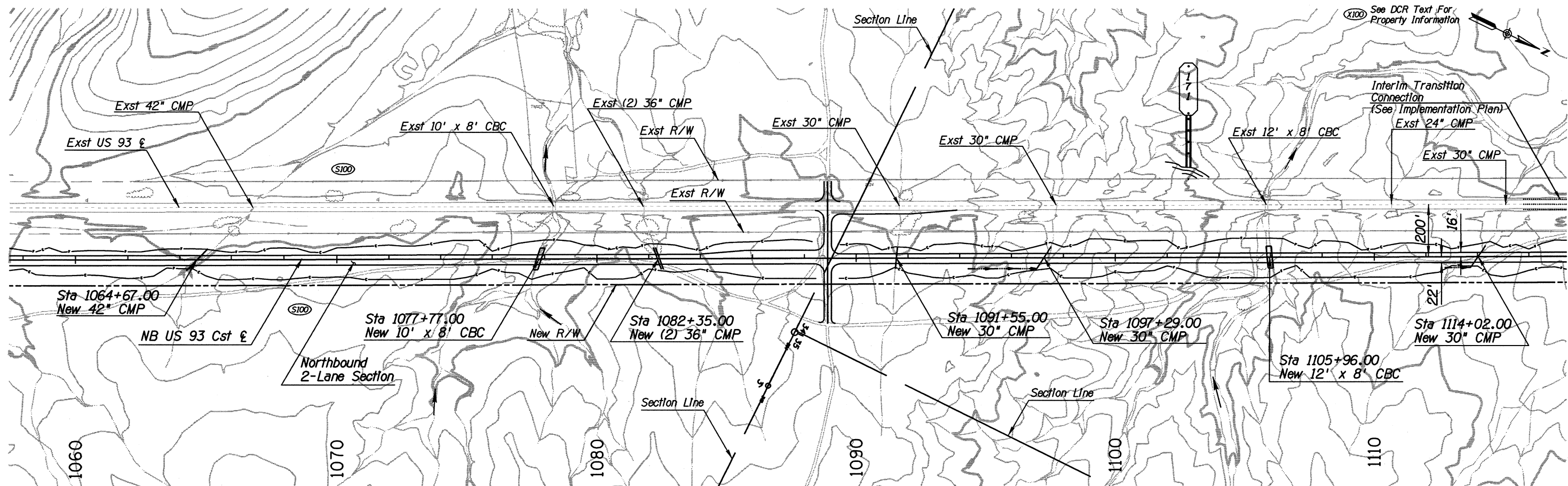


Plotted By: USER** Date: 17-APR-2006 16:49
 File: P:\01416A\7000\00\702C\11\7029\03\13-INT8.dgn

REVISIONS	LOCATION	DATE

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBSON		DESIGN ALTERNATIVE C-3 STA 1002+00 TO STA 1060+00		SHEET 23 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		TRACS NO. H 4871 01 L
					OF

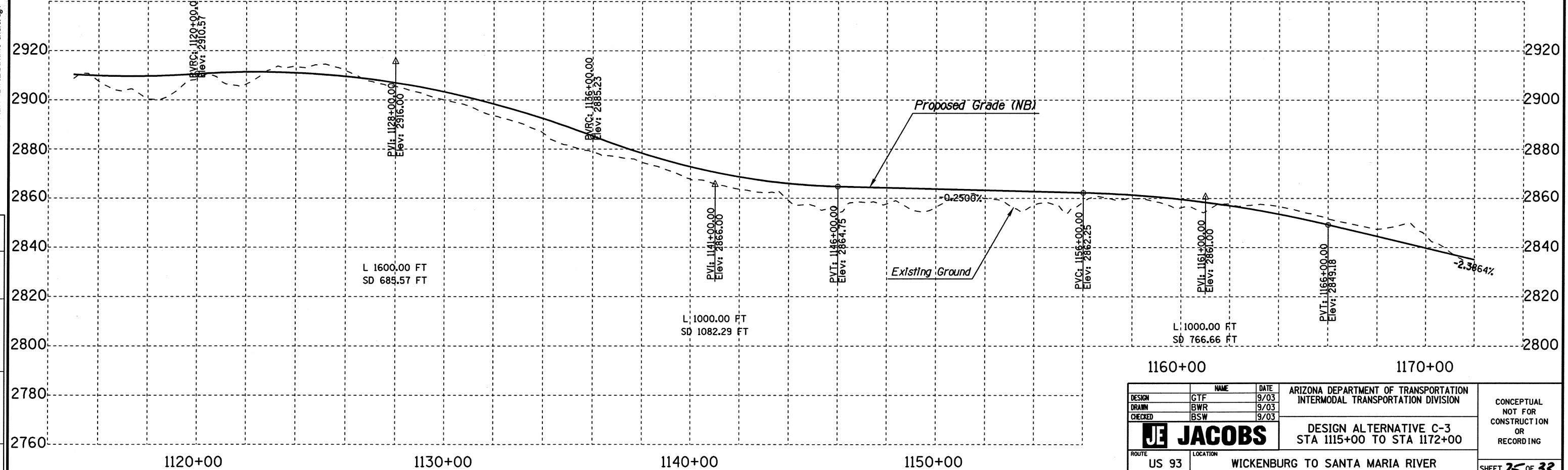
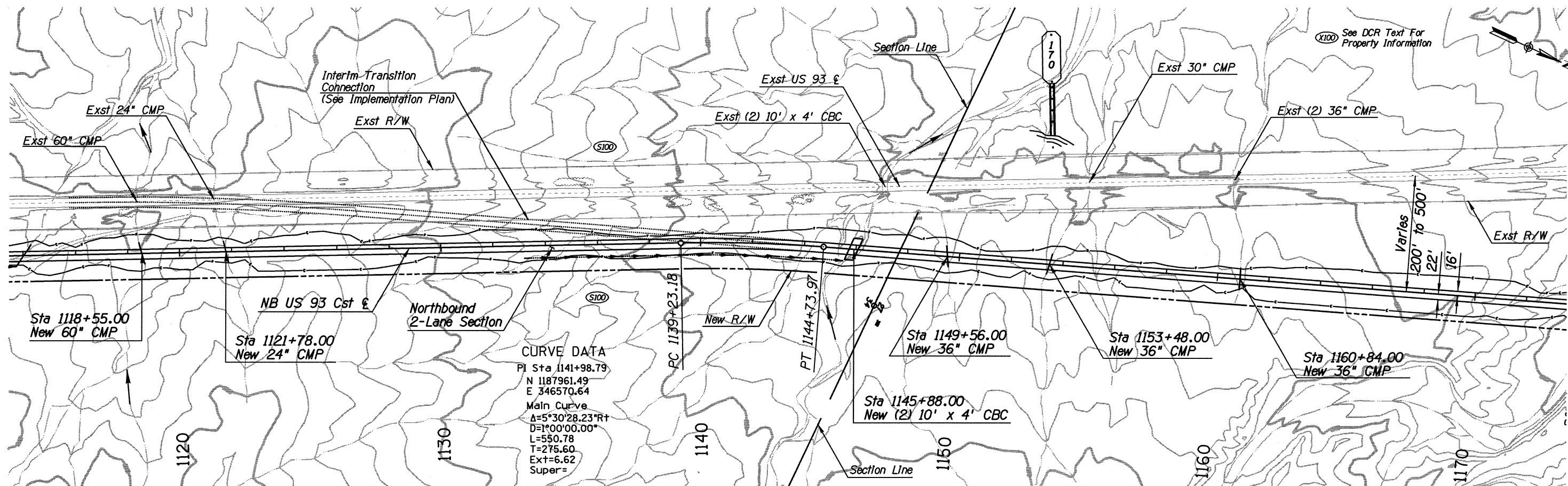
See DCR Text For Property Information



Plotted By: USER** Date: 17-APR-2006 16:49
 File: P:\01416A\7000\00\702C\WILLY\7020\N13-INT3.dgn

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

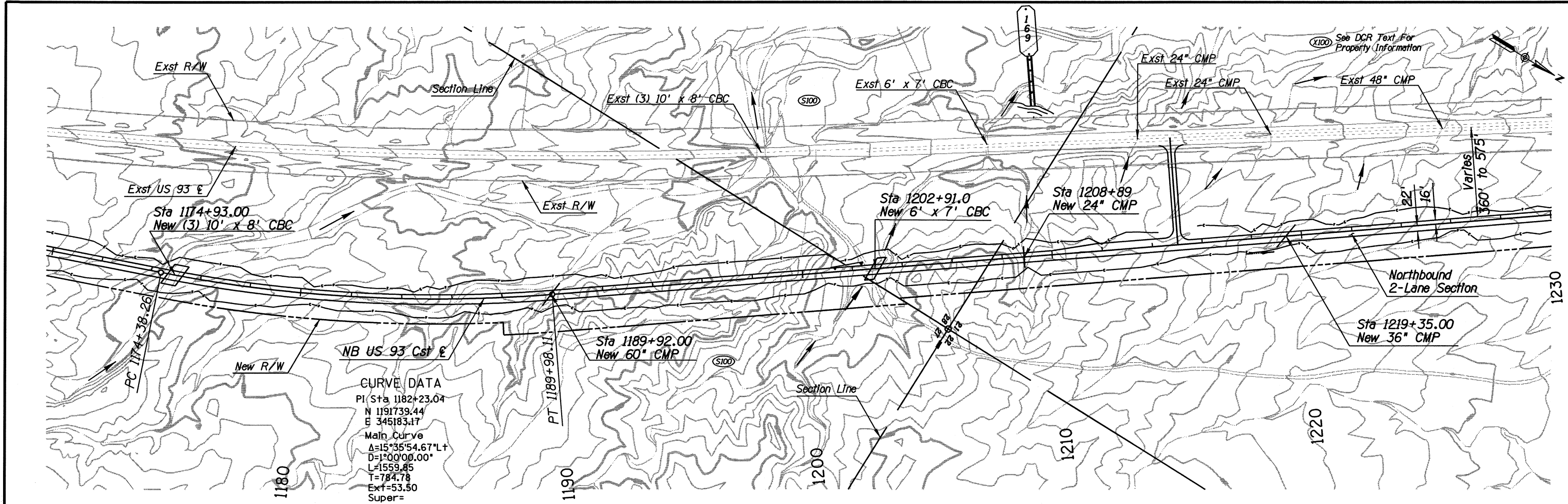
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE C-3 STA 1060+00 TO STA 1115+00		SHEET 24 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		OF
TRACS NO. H 4871 01 L					



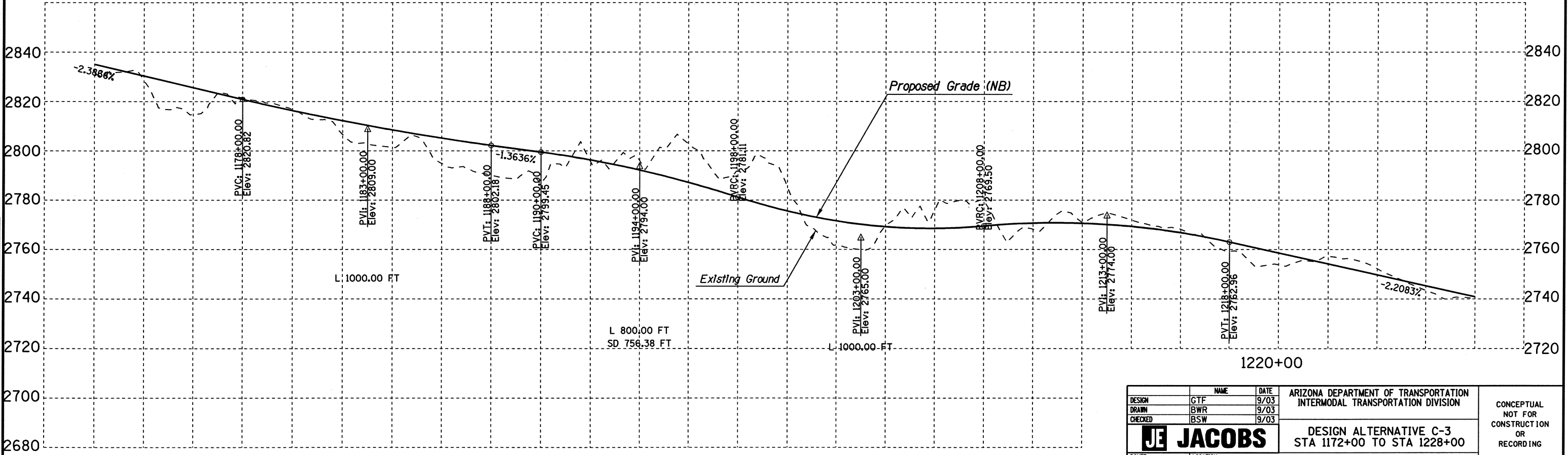
DESIGN		CTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN		BWR	DATE	9/03		
CHECKED		BSW	DATE	9/03		
JACOBSON			DESIGN ALTERNATIVE C-3 STA 1115+00 TO STA 1172+00			SHEET 25 OF 33
ROUTE	LOCATION	US 93 WICKENBURG TO SANTA MARIA RIVER				
TRACS NO. H 4871 01 L						OF

Plotted By: JUSER Date: 17-APR-2006 16:50
 File: P:\01416A\7000\DD\7020\11170903\N13-sht10.dgn

REVISIONS	LOCATION	DATE



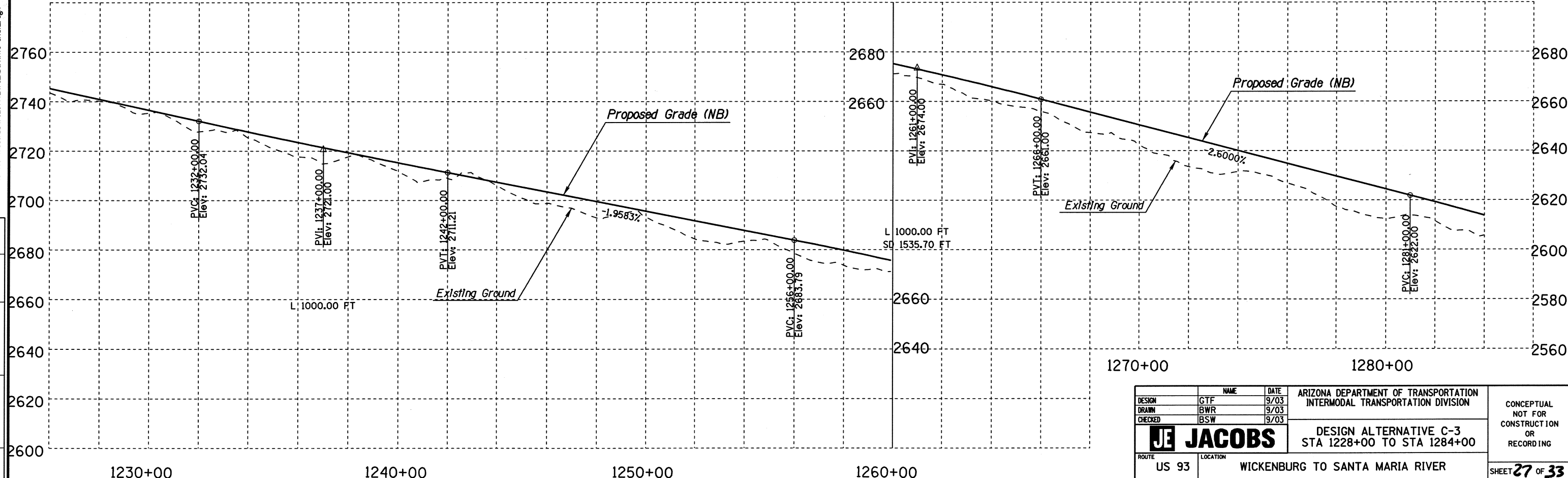
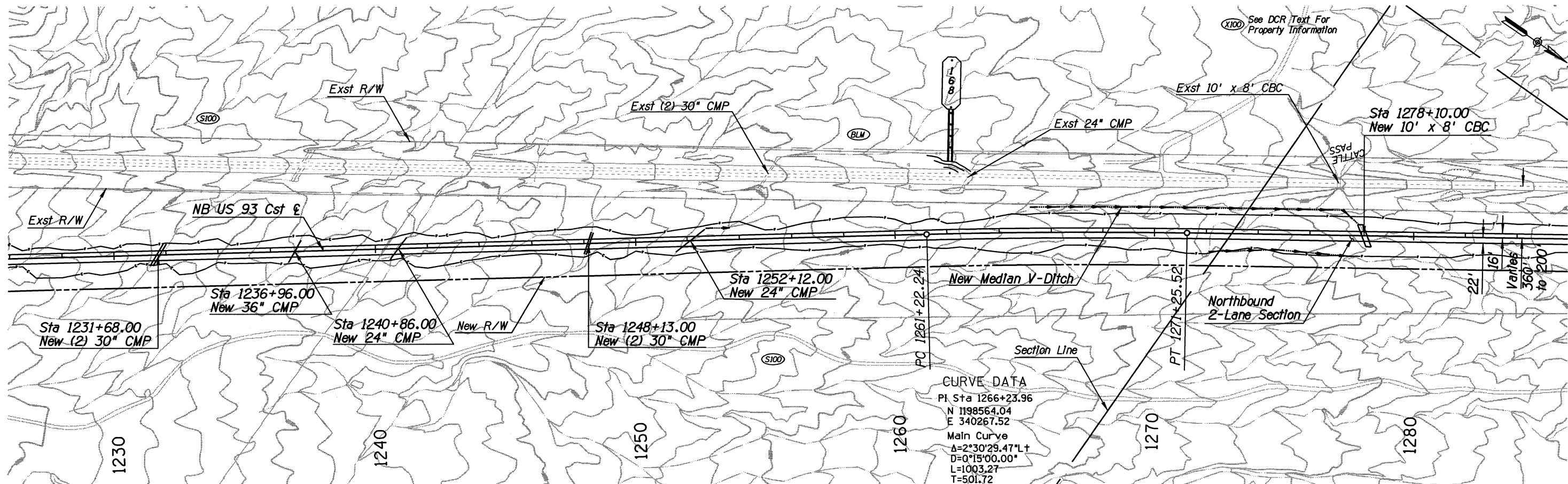
CURVE DATA
 PI Sta 1182+23.04
 N 1191739.44
 E 345183.17
 Main Curve
 $\Delta = 15^{\circ}35'54.67''$ L
 $D = 1^{\circ}00'00.00''$
 $L = 1559.45$
 $T = 784.78$
 $E_x = 53.50$
 Super =



Plotted By: USER** Date: 17-APR-2006 16:50
 File: P:\01416A\7000\00\702C\WILLY7020\GN13-ent1.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

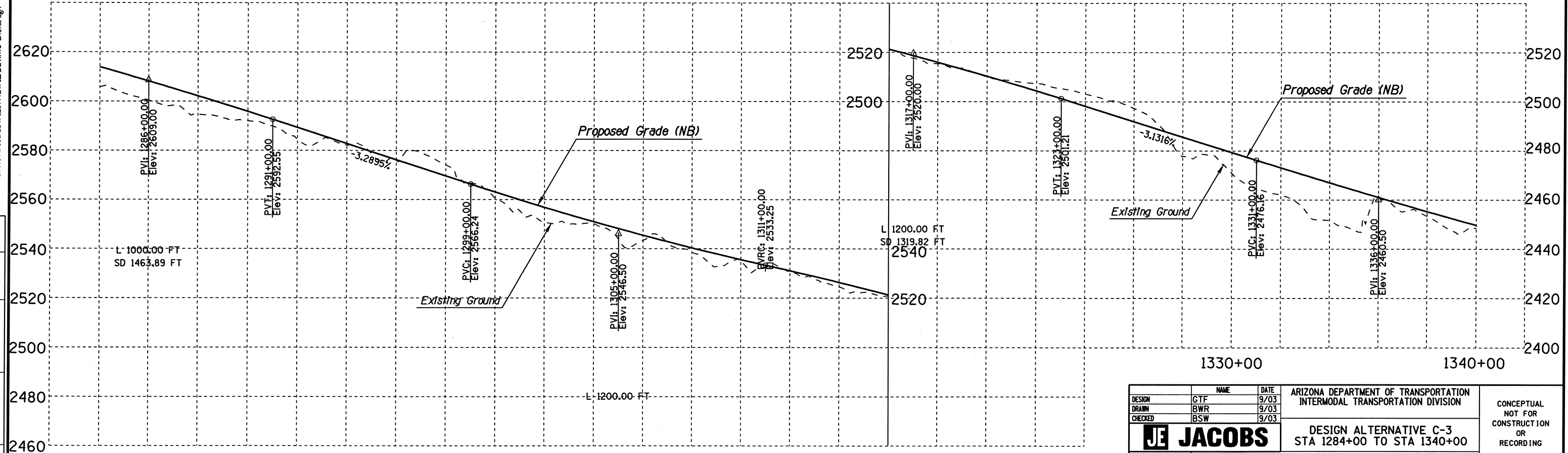
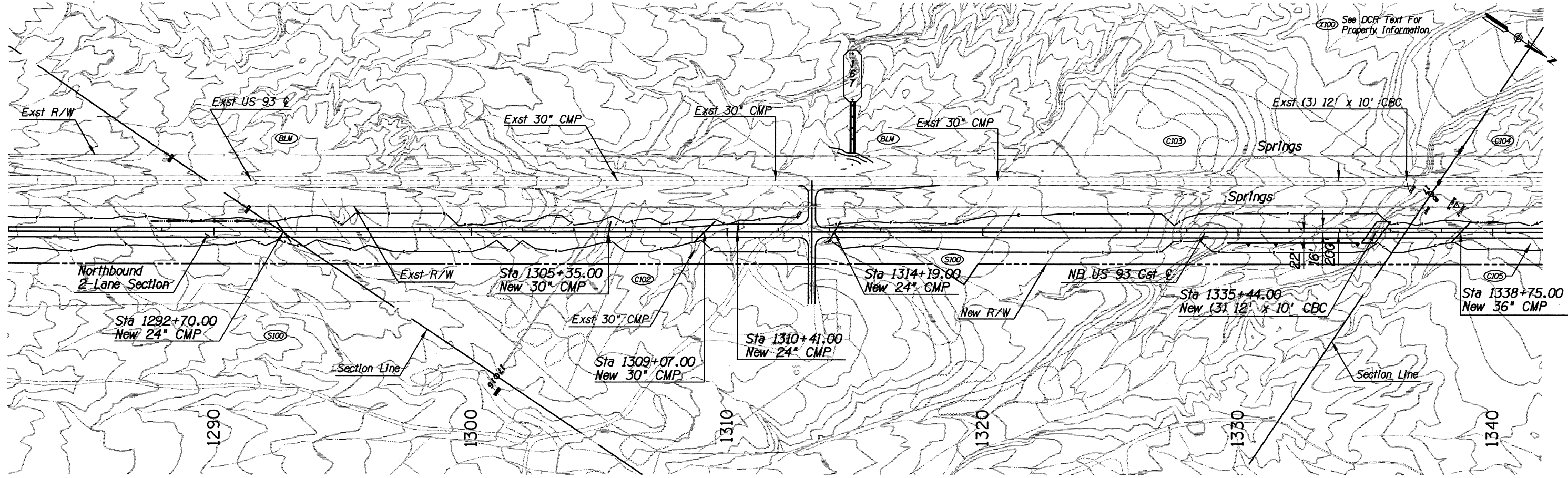
DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBSON		DESIGN ALTERNATIVE C-3 STA 1172+00 TO STA 1228+00		SHEET 26 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		TRACS NO. H 4871 01 L
					OF



Plotted By: USER** Date: 17-APR-2006 16:51
 File: P:\01416A\7000\00\702C\WILLY\7029\GN13-ent12.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

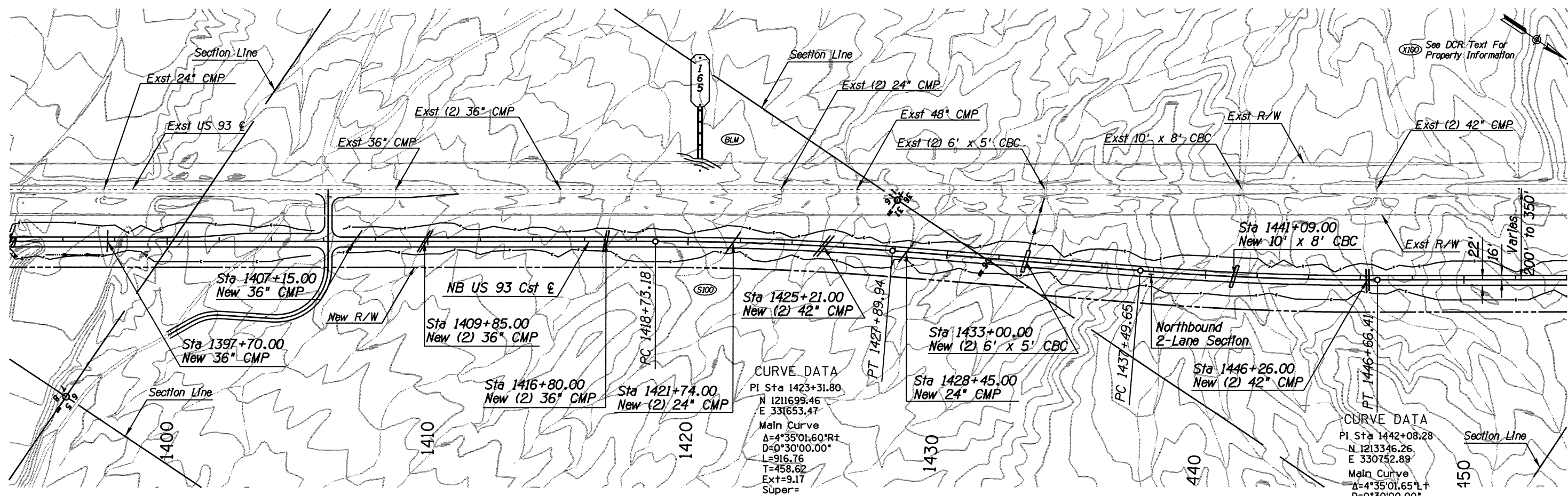
DESIGN	CTF	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR		9/03		
CHECKED	BSW		9/03		
JE JACOBS		DESIGN ALTERNATIVE C-3 STA 1228+00 TO STA 1284+00		SHEET 27 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		
TRACS NO. H 4871 01 L				OF	



Plotted By: **USER** Date: 17-APR-2006 16:51
 File: P:\01416A\7000\001\7020\11\7020\03\13-sht13.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBS		DESIGN ALTERNATIVE C-3 STA 1284+00 TO STA 1340+00		SHEET 28 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		OF
TRACS NO. H 4871 01 L					

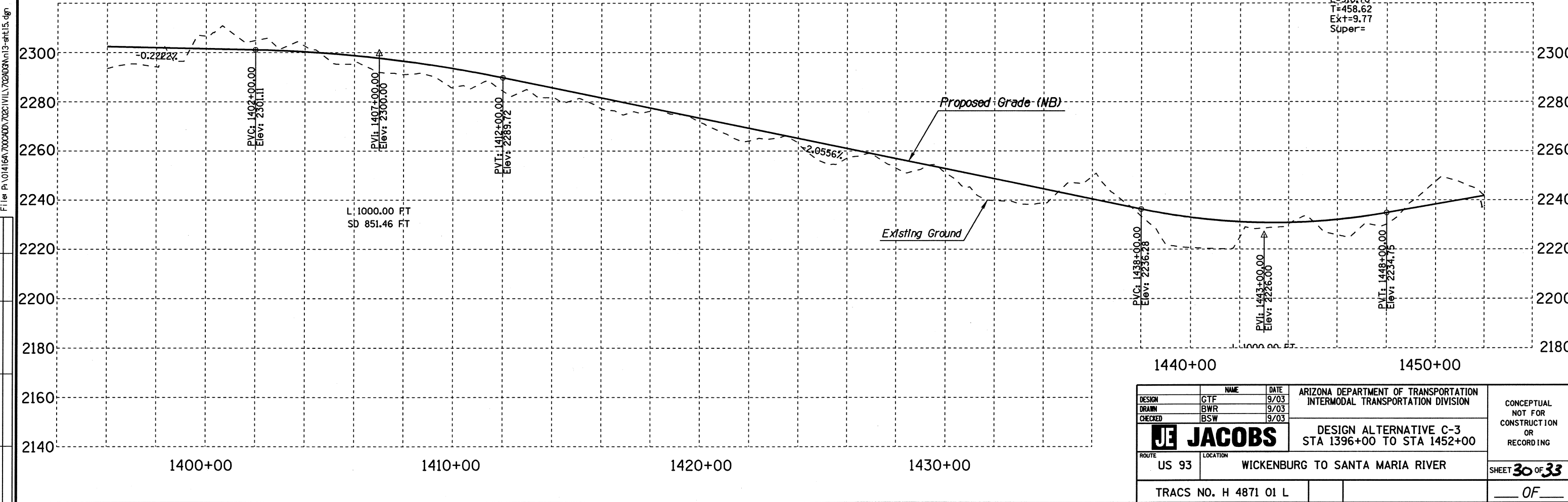


CURVE DATA
 PI Sta 1423+31.80
 N 1211699.46
 E 331653.47
 Main Curve
 $\Delta = 4^{\circ}35'01.60''R$
 $D = 0^{\circ}30'00.00''$
 $L = 916.76$
 $T = 458.62$
 $Ext = 9.17$
 Super =

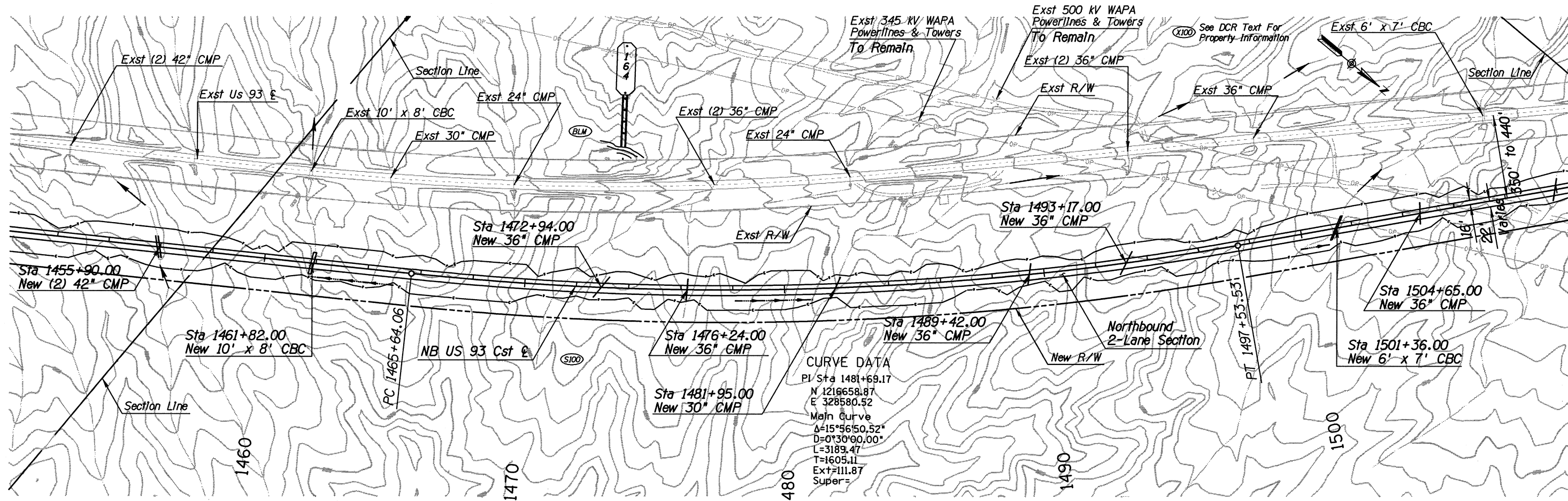
CURVE DATA
 PI Sta 1442+08.28
 N 1213346.26
 E 330752.89
 Main Curve
 $\Delta = 4^{\circ}35'01.65''L$
 $D = 0^{\circ}30'00.00''$
 $L = 916.76$
 $T = 458.62$
 $Ext = 9.77$
 Super =

Plotted By: USER** Date: 17-APR-2006 16:52
 File: P:\01416A\7000\00\702C\WILV\702A03\13-ent15.dgn

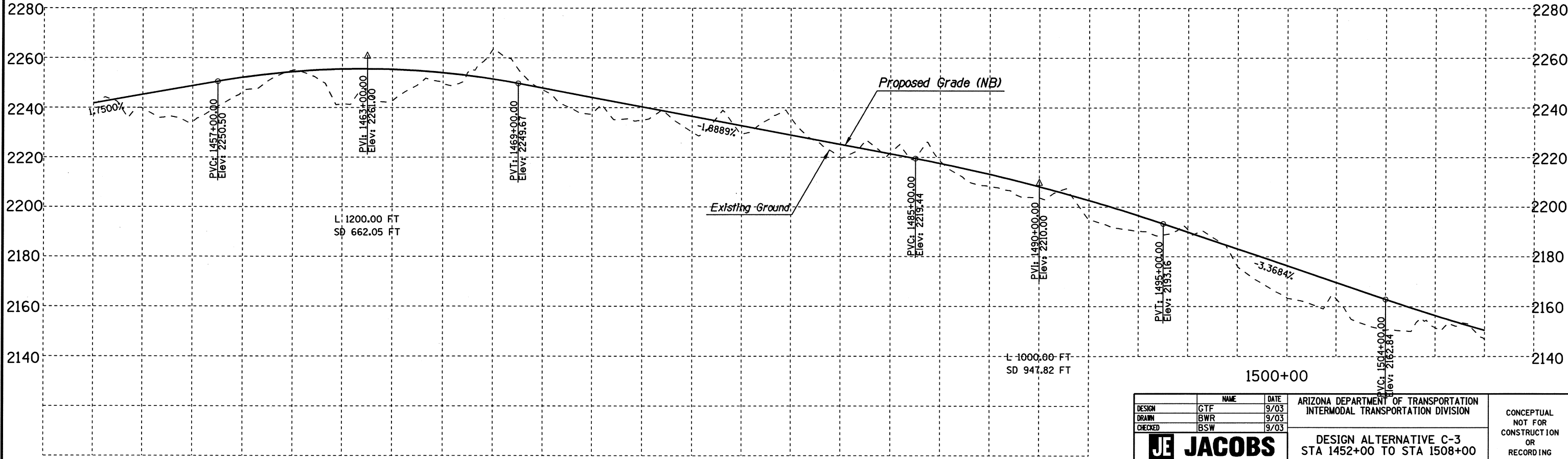
DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.



DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBS		DESIGN ALTERNATIVE C-3 STA 1396+00 TO STA 1452+00		SHEET 30 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	TRACS NO. H 4871 01 L	
					OF



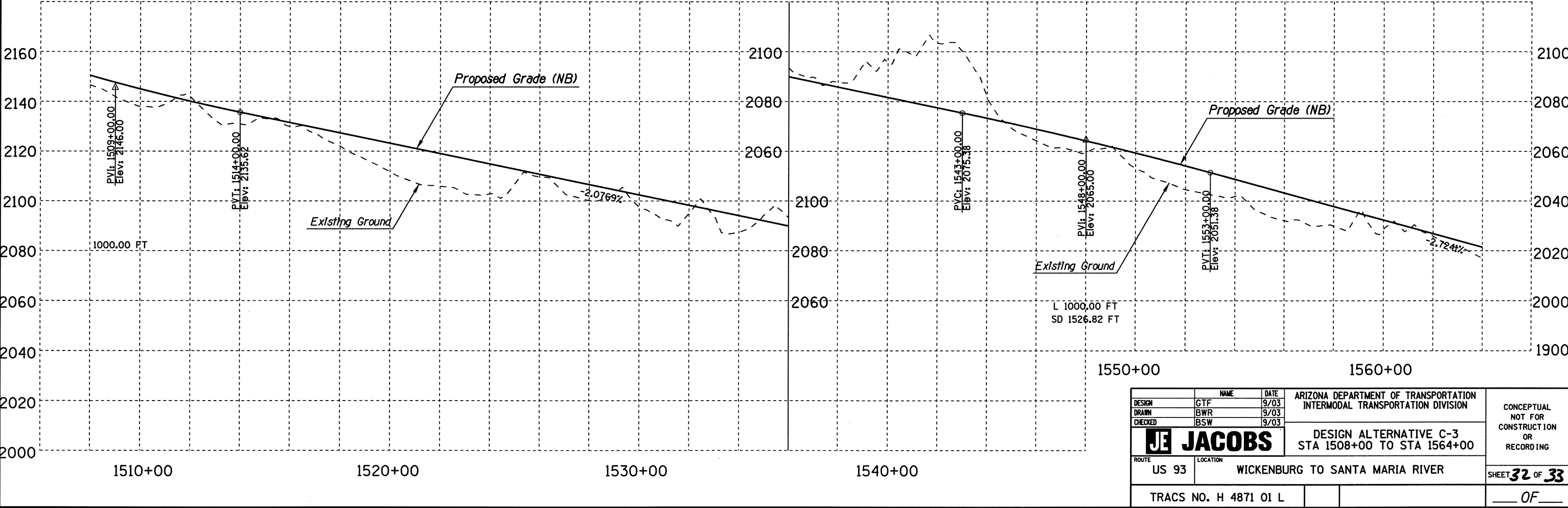
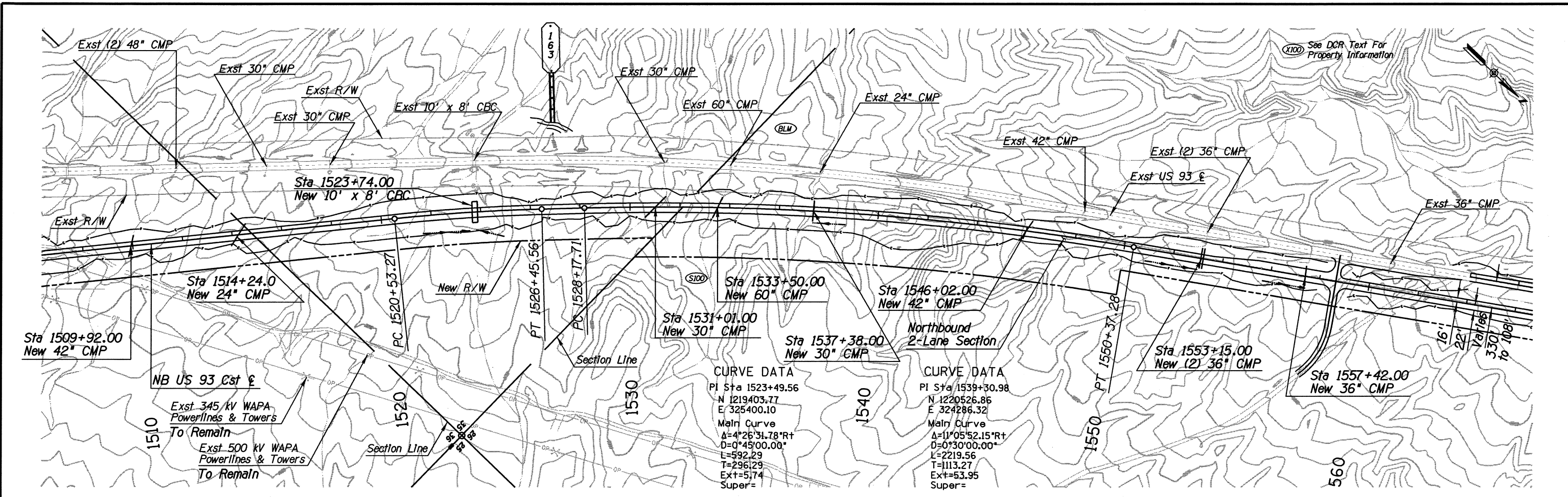
CURVE DATA
 PI Sta 1481+69.17
 N 1216658.87
 E 328580.52
 Main Curve
 $\Delta = 15^{\circ}56'50.52''$
 $D = 0^{\circ}30'00.00''$
 $L = 3189.47$
 $T = 1605.11$
 $Ext = 111.87$
 Super =



Plotted By: JUSER Date: 17-APR-2006 16:52
 File: P:\01416A\7000\00\702\1\1\1\70203\N13-sh116.dgn

NO.	DATE	DESCRIPTION

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		DESIGN ALTERNATIVE C-3 STA 1452+00 TO STA 1508+00		SHEET 31 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER	TRACS NO. H 4871 01 L	
					OF



Plotted By: USER** Date: 17-APR-2006 16:52
 File Path: P:\0141667000\0007020\WILLY7020\N13-sht17.dgn

DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

DESIGN	CTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JACOBSON		DESIGN ALTERNATIVE C-3 STA 1508+00 TO STA 1564+00		SHEET 32 OF 33	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		OF
TRACS NO. H 4871 01 L					

Appendix F
ACCESS MANAGEMENT
FULL ACCESS CONTROL CONCEPTS

APPENDIX F: ULTIMATE ACCESS MANAGEMENT CONCEPTS

Introduction

ADOT, ASLD, and FHWA met on June 15, 2005 to discuss access management plans on highway corridors where there is currently no development planned. These corridors, such as US 93 from SR 89 to the Santa Maria River, may experience growth and development as the plans for the ultimate roadway construction is being developed. It is the desire of ADOT and FHWA that a proactive approach to defining the ultimate access control be developed between the managing land agencies before the development occurs, to reduce long term costs and ensure adequate, efficient access to all properties.

ADOT Vision for the corridor:

ADOT Management described the Department's vision of the US 93 corridor from Wickenburg to Kingman as ultimately being a fully access controlled divided highway. Initially, the existing two-lane facility will be improved to a divided roadway facility that will include median cross-overs at nearly 1-mile intervals to allow left turns and access across the median. All existing access directly to the highway will be retained. As traffic volumes increase, it will eventually be necessary to change the operation of the facility to a fully access controlled highway, restricting access to grade-separated interchanges spaced at 4 or 5-mile intervals. This interchange spacing is consistent with ADOT's and FHWA's desire for rural freeways and is consistent not only in other parts of Arizona, but across the interstate system. To avoid constructing excessive access and frontage roads to consolidate access to these interchanges, ADOT and FHWA through the planning of this DCR are attempting to identify the locations of the future interchanges now, allowing all future access roadways to develop in conjunction with this plan.

The development of this corridor concept was not completed in a vacuum, but included extensive coordination efforts with the FHWA, BLM, ASLD, Arizona Game & Fish, and the various communities, counties and private property owners. The desire of all of this coordination is to preserve a corridor to operate a safe, efficient transportation facility. Key to protecting this \$250 Million dollar investment is to gain agreement with our partnering agencies on the access control concept. If there is no agreement to the access

control, development could occur without regard to the interchange locations, requiring acquisition of additional lands for frontage and access roads when these interchanges are ultimately required. This could also result in the need for more access points, increasing the cost of the facility and ultimately reducing its operating efficiency.

ADOT and FHWA are proposing this proactive approach to work with our partnering agencies to develop this guide for future access now, so the access locations meet the needs of both the existing property owners and their existing access, as well as meet the needs of future development. By publishing this plan, there should be no surprises to anyone that intends to improve or develop the lands adjacent to this corridor in the future and would allow everyone the same access to the highway. This method of early delineation is working very well on the BLM and private lands on the portions of US 93 north of Wikieup to I-40, and ADOT desires to gain the same consensus for the portions through ASLD lands as well.

ASLD Position on Access Control:

ASLD has met and worked with ADOT discussing access control on many corridors across the State. While all agree that working together to define the corridor concept is desirable for all involved, ASLD feels it is also dependant on how much planning information is available as a basis for this decision. If there is a clear vision for the planning and development of the adjacent properties, then defining the current and future access points is a reasonable effort. If, however, there is no planning information available to form this assumption, then they cannot agree to limit the development of their lands at this time.

ASLD views their responsibility to provide the maximum flexibility to the need of future developments to return the highest value of the lands they manage. Therefore, providing any restraints to their properties could have a negative impact on the value of their returns. ASLD does not envision their sales to future developers through numerous, individual land transactions but rather through large development blocks. As a result, they do not foresee the problems that occur in other portions of the State where they have numerous small parcels with individual access needs (such as portions of SR 95). As these large parcels are developed, the developer will still need to obtain permits from ADOT and work with the District to negotiate access points, however, they are not

willing to turn over access control to ADOT at this time until they have a clear picture of the development needs.

If ADOT desires to publish their proposed TI locations at this time, ASLD can provide this information to their potential clients as a guide, but they will not grant to ADOT the lands or the rights to control access at this time, therefore no advance agreement on the concept will likely be achieved.

FHWA Participation and Vision:

FHWA will be providing much of the funding for the highway improvements, and they are concerned that adequate planning from all agencies be applied early to ensure agreement on the improvement concept and provide the greatest efficiency and safety at the least cost. This agreement can protect their investment and avoid costly rework and additional land acquisitions in the future if all access is left uncontrolled. Therefore, FHWA desires that agreement be reached on all access issues now as the concept is approved and released to the public so that all lands, both private and agency managed, can be improved with an understanding of where the future access points are located.

Presentation of the Current Access Management Plan:

The concept as currently proposed provides interim median crossovers at nearly one-mile intervals to retain access to existing grazing lands, local access roads, and individual properties/ranches. In twenty or so years, when the volume of traffic becomes so great that access control is required, access will be limited to interchanges spaced 4-5 miles apart. Reviewing the current access roads serving existing ranches and clusters of private property, interchanges were proposed at seven locations.

Five of the seven locations appear easy to identify, as they align with major county roads currently serving multiple properties. These include the TIs shown as Santa Maria, Tres Alamos, Alamo Road, SR 71, and the West Wickenburg Access where the ultimate bypass connects with old US 93 and SR 87.

Some areas have either topographical or other restrictions that prohibit locating an interchange in the future. For example, placing an interchange near the Big Jim Wash would require structures not only for the highway, but for the ramps as well. Adjacent to the Date Creek crossing, drainage restrictions and terrain suggest no interchange be located between MP 173 and 175. Between MP 163 and 164 there are major power transmission lines that have height and clearance restrictions, limiting our ability to locate an interchange here.

Two of the seven interchange locations are shown as flexible locations that can be adjusted to best align with future development needs, identified as Ranchland between the Big Jim Wash and Tres Alamos TI to the north, and the Aguila TI between SR 71 and the bypass connection. For these two locations, there are no defined features or existing infrastructure that would suggest where the TI should be located. For these locations, ADOT agrees an interchange is needed, but has left the exact location to be flexible to meet the desires of ASLD.

ADOT's Plan Provides Flexibility:

ADOT agrees that some level of flexibility needs to be included in these discussions, as it is clear the development plans are not available at this time. The two interchanges proposed as Ranchland and Aguila are shown with dashed lines indicating these could be moved within a 2- or 3-mile band to best align with future development. Comments made by Greg Keller during the meeting suggest that the Ranchland TI, for example, should be moved south from its current concept location to align with the southern BLM boundary, providing full access to BLM and ASLD lands on both sides of the highway. The Aguila TI is currently shown too close to a drainage constraint and possible riparian area that would not allow full development of all four corners of the TI.

ADOT Management agreed that they could be flexible on the location of the above two TIs where development is not known, but desired agreement on the ultimate number of TIs that ADOT was willing to construct and the general concept presented. He stressed that agreement on the general layout of the plan could allow R/W to be set aside for the ultimate improvements, and that all requests for access be aligned with the final plan. Key to this plan is the separation of the ultimate interchanges of 4-5 miles. This is a rural corridor and not an urban metropolitan area. To make best use of limited funds and retain the greatest operating efficiency and safety, this corridor is being planned to match the freeway appearance of other rural areas such as I-40 through Kingman or I-10 outside of metropolitan Phoenix or Tucson.

In the far future after the access control is accomplished, if development continues to increase, additional TI locations could be proposed by developers. They would need to approach ADOT and FHWA to get agreement on the locations, and provide the funding for them similar to the TI provided by the Anthem development on I-17. With this corridor concept, ADOT desires only to construct the seven (possibly eight TI's if ASLD can provide sufficient justification for adding a location not previously identified) as proposed in the current concept.

ADOT Desires ASLD's Input to the Concept:

Once ADOT publishes this concept, development is likely to occur throughout the corridor as the improvements are completed. Therefore agreement on the conceptual layout of the concept is critical to ADOT and our agency partners. ADOT and FHWA is requesting that through the comments ASLD's staff, they review the concepts that have been prepared thus far and make suggestions for modifications as they best see fit that provides them with the necessary access to their lands. With this input, ADOT can evaluate changes or modifications to the concept to meet these future needs now, so agreement on the concept can be achieved and preserved for implementation.

ASLD was able during the meeting to provide suggestions as to how the land between the ultimate bypass of Wickenburg and the Santa Maria might be developed. His speculations included the following:

- Between the Wickenburg Bypass and SR 71: The land near the town and the bypass connection could be developed as a commercial corridor with the increase of truck traffic from the CANAMEX designation. The flat lands and access to infrastructure from Wickenburg could help facilitate this growth.
- Between SR 71 and the Joshua Forest Parkway, the land would likely be low density residential developments
- Through the Joshua Forest area, this would likely be low density residential and ranch properties.

Buy-in to a Plan is Needed:

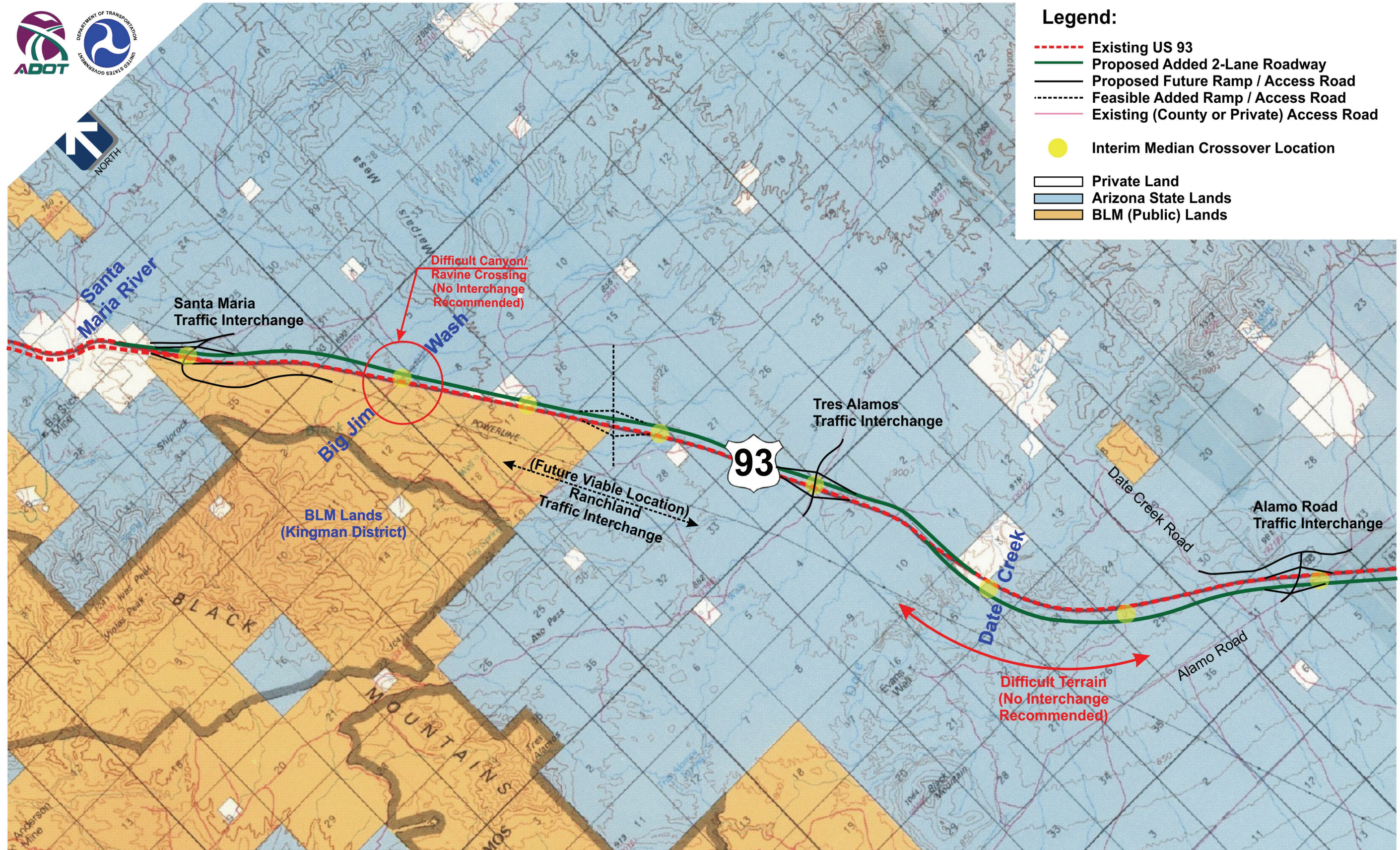
ADOT was persistent that some form of agreement or Memorandum of Understanding (MOU) be reached on the corridor concept. Without a plan, ADOT and FHWA is concerned that development could occur on any given intermediate crossover with the assumption that direct access to US 93 will always be provided. Our goal is that working together, we preserve a corridor with a fixed number of TI facilities, and define them where it is reasonable to do so, and leave the areas where some flexibility is needed until additional information becomes available, but agree to the concept in general. With this plan, developments could build their own internal roadway networks to provide access to all parcels without the costly and undesirable parallel frontage roads. The plan proposed is in conformance with federal guidelines and is designed to provide the optimum safety and performance standards. The agreement can include the flexibility the ASLD desires, but needs the input and support from ASLD to ensure it meets everyone's expectations.

ASLD could not agree to a specific concept at this time, and would not be willing to enter any MOU or agreement that would define a fixed number of interchange locations. They would agree to review the proposed concept in greater detail with their staff, and provide any comments to ADOT for consideration in the concept plans.



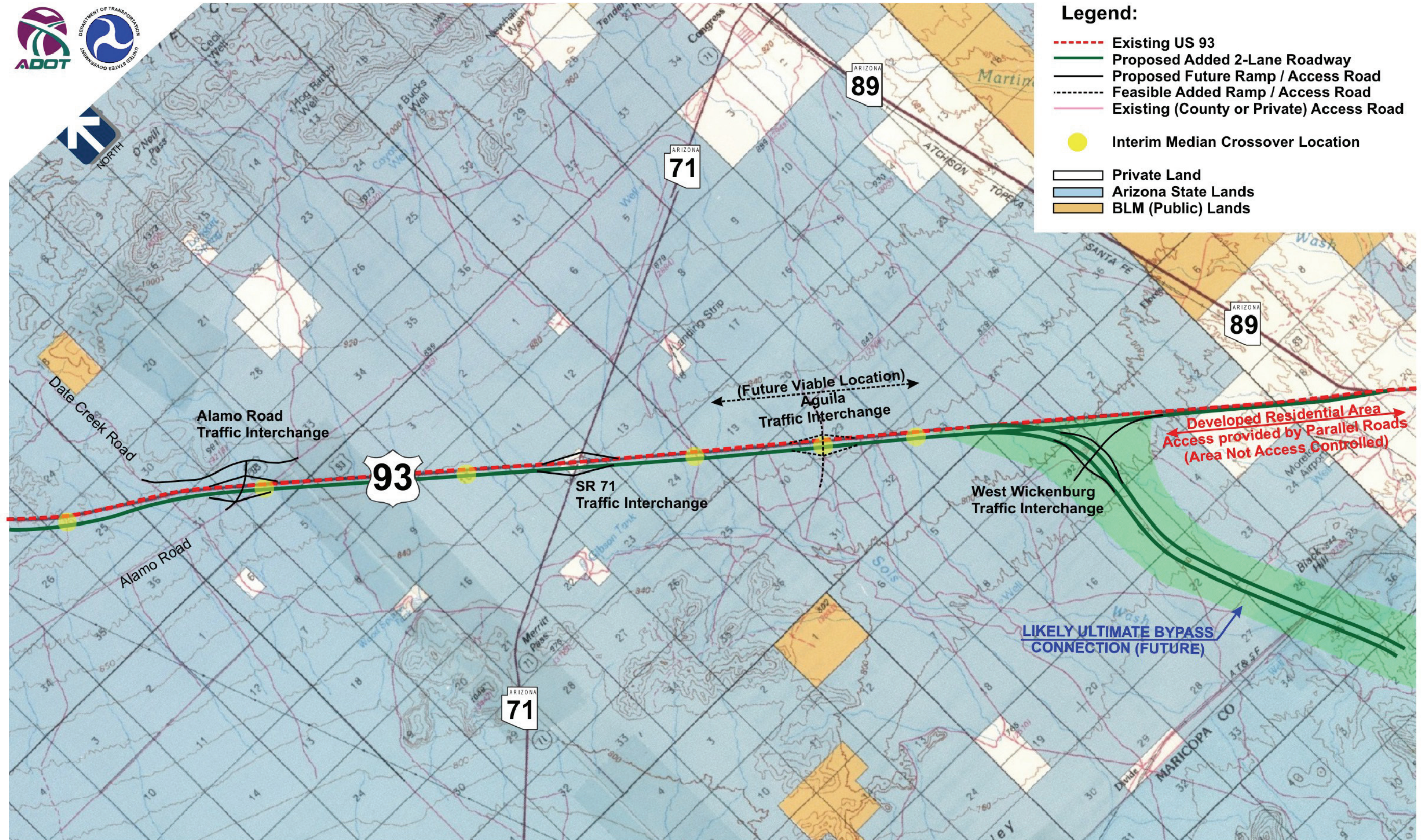
Legend:

- - - - - Existing US 93
- Proposed Added 2-Lane Roadway
- Proposed Future Ramp / Access Road
- - - - - Feasible Added Ramp / Access Road
- Existing (County or Private) Access Road
- Interim Median Crossover Location
- Private Land
- Arizona State Lands
- BLM (Public) Lands



US 93: Wickenburg to Santa Maria River - Proposed Access Management Plan

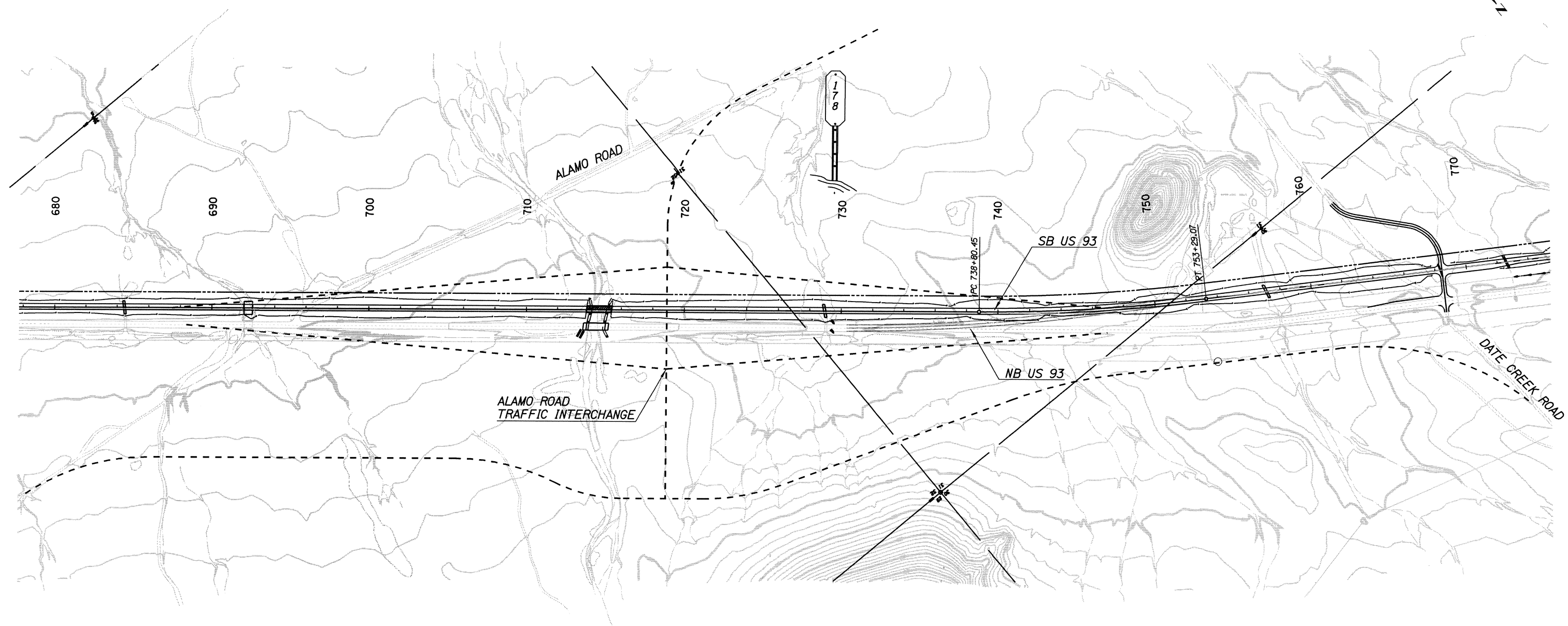
Preliminary Grade Separated Interchange Locations



US 93: Wickenburg to Santa Maria River - Proposed Access Management Plan

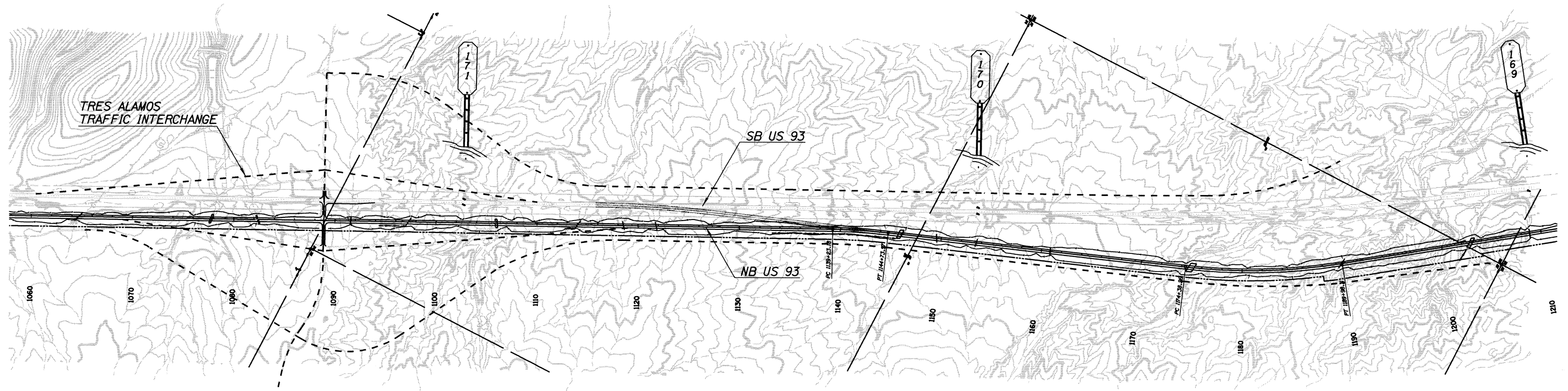
Preliminary Grade Separated Interchange Locations

Plotted By: **USER** Date: 01-MAY-2006 16:14
 File: P:\164700\ADD\702\CIVIL\702A00N\North Access-1.dgn



SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		FULL ACCESS CONTROL ACCESS ROAD CONCEPT		SHEET OF	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		SHEET OF
TRACS NO. H 4871 01 L					OF

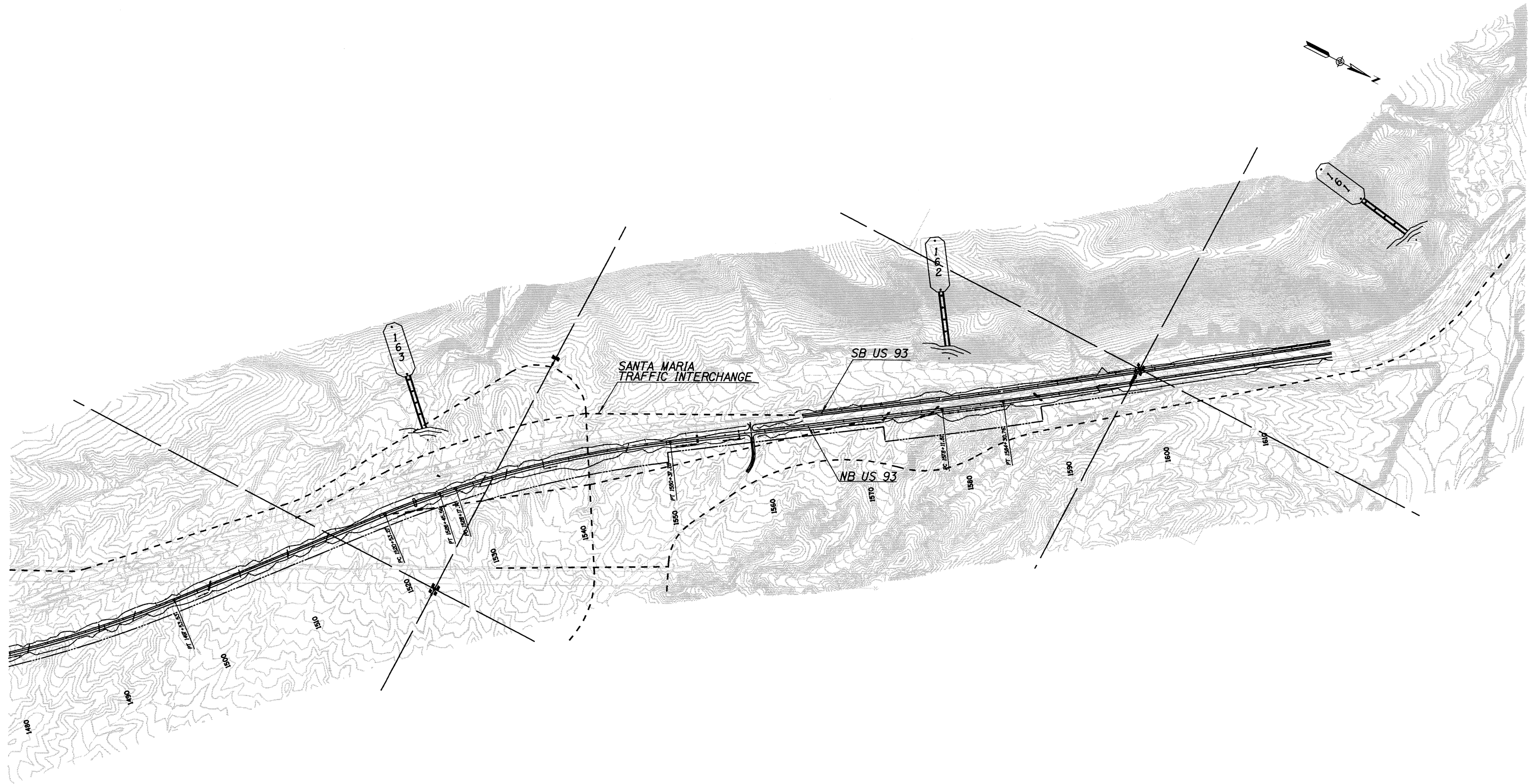


Plotted By: **USER** Date: 01-MAY-2006 10:20
 File: F:\014641700\CADD\702\CIVIL\702A00A\North Access-2.dgn

SURVEY NO.	FINISHED PLANS	REVISIONS	LOCATION	DATE

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		FULL ACCESS CONTROL ACCESS ROAD CONCEPT		SHEET OF	
ROUTE	US 93	LOCATION	WICKENBURG TO SANTA MARIA RIVER		OF
TRACS NO. H 4871 01 L				OF	

Plotted By: **USER** Date: 01-MAY-2006 10:25
 File: P:\014641700CAD07\02CIVIL\702405M\North Access-3.dgn



DATE	LOCATION	REVISIONS	FINISHED PLANS	SURVEY NO.

DESIGN	GTF	DATE	9/03	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION	CONCEPTUAL NOT FOR CONSTRUCTION OR RECORDING
DRAWN	BWR	DATE	9/03		
CHECKED	BSW	DATE	9/03		
JE JACOBS		FULL ACCESS CONTROL ACCESS ROAD CONCEPT		ROUTE US 93 LOCATION WICKENBURG TO SANTA MARIA RIVER	
TRACS NO. H 4871 01 L				SHEET	OF

Appendix G
SUMMARY - HYDROLOGY AND
REQUIRED DRAINAGE STRUCTURES

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
99	na	193.61	10	15	24	yes	24	flush pipes, reset catch basin grates
100	108+07	193.48	10	15	24	yes	24	NEW CMP SB
101	n/a	193.38	10	15	24	yes	n/a	reset catch basin grates
102A	119+12	193.31	407	486	(2) 6x7	yes	(2) 6x7	extend LT, deflection
103A	140+51	192.91	320	384	12x8	yes	12x8	extend LT
104A	143+54	192.85	187	230	24	yes	24	extend LT
105A	153+07	192.68	37	44	24	yes	24	extend LT
106A	161+15	192.52	707	834	(3) 10x7	yes	(3) 10x7	extend LT
107A	168+96	192.37	10	15	24	yes	24	NEW CMP SB
108A	179+47	192.18	10	15	29x18	yes	24	extend LT
109A	204+43	191.70	10	15	24	yes	24	extend LT, deflection
110A	213+17	191.54	10	15	42	yes	42	extend LT
111A	218+98	191.43	10	15	24	yes	24	extend LT, deflection
112A	222+43	191.36	171	208	(2) 6x7	yes	(2) 6x7	extend LT, deflection
113A	236+68	191.10	66	82	24	yes	(2) 30	NEW CMP SB
114A	239+03	191.05	see Culv 113	0	(2) 36	yes	(2) 36	extend LT
115A	249+02	190.86	73	92	(2) 36	yes	(2) 36	extend LT
116A	259+53	190.66	84	104	(2) 43x27	<<NO>>	(2) 36	extend LT w/ larger pipe
117A	262+09	190.61	see Culv 116	0	(2) 50x31	yes	(2) 50x31	extend LT, deflection
118A	266+20	190.53	69	88	(2) 42	yes	(2) 42	extend LT
119A	270+57	190.45	573	628	(4) 10x6	yes	(4) 10x6	extend LT, deflection
120A	283+96	190.19	371	456	(2) 6x4	<<NO>>	(3) 6x4	NEW CBC SB
121A	287+37	190.13	91	115	(3) 43x27	<<NO>>	(3) 36	NEW CMP SB
122A	296+37	189.96	38	47	(2) 36x22	<<NO>>	(2) 30	NEW CMP SB
123A	305+52	189.79	110	139	(2) 42	yes	(2) 42	extend LT, deflection
124A	316+45	189.58	117	143	(2) 6x6	yes	(2) 6x6	NEW CBC SB
125A	322+40	189.46	20	24	24	yes	24	NEW CMP SB
126A	326+22	189.40	206	251	(3) 10x8	yes	(3) 10x8	NEW CBC SB
127A	344+41	189.05	73	93	24	<<NO>>	(2) 30	NEW CMP SB
128A	352+51	188.90	68	86	29x18	<<NO>>	(2) 30	NEW CMP SB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
129A	358+48	188.79	13	15	24	yes	24	extend LT
130A	363+83	188.69	728	935	(2) 6x7	yes	(2) 6x7	NEW CBC SB
131A	374+55	188.48	33	41	(2) 43x27	yes	(2) 36	NEW CMP SB
132A	383+48	188.31	135	172	10x8	yes	10x8	NEW CBC SB
133A	389+86	188.19	176	224	(2) 36	yes	(2) 36	NEW CMP SB
134A	402+01	187.96	190	242	(2) 6x5	yes	(2) 6x5	NEW CBC SB
135A	408+38	187.84	15	18	29x18	<<NO>>	30	NEW CMP SB
136A	414+33	187.72	198	251	6x7	yes	6x7	NEW CBC SB
137A	430+89	187.42	292	358	(3) 10x6	yes	(3) 10x6	NEW CBC SB
138A	439+11	187.25	120	153	6x6	yes	6x6	NEW CBC SB
139A	444+73	187.15	119	146	(2) 6x5	yes	(2) 6x5	NEW CBC SB
140A	460+98	186.85	727	881	(4) 10x3	yes	(4) 10x4	NEW CBC SB
141A	476+16	186.56	210	245	10x8	yes	10x8	NEW CBC SB
142A	489+89	186.30	148	176	(2) 10x5	yes	(2) 10x5	NEW CBC SB
143A	496+48	186.21	104	128	43x27	yes	(2) 42	NEW CMP SB
144A	504+32	186.03	590	682	(2) 10x5	yes	(2) 10x5	NEW CBC SB
145A	523+14	185.68	see Culv 146	0	24	yes	24	extend LT, deflection
146A	526+28	185.61	223	276	(2) 8x4	yes	(2) 8x4	NEW CBC SB
147A	532+01	185.49	337	385	(2) 10x8	yes	(2) 10x8	NEW CBC SB
148A	547+63	185.21	38	46	(2) 43x27	<<NO>>	(2) 30	NEW CMP SB
149A	551+07	185.14	166	205	(2) 6x4	yes	(2) 6x4	NEW CBC SB & INLET DIKE
150A	554+48	185.08	48	59	(2) 43x27	yes	(2) 36	NEW CMP SB
151A	561+60	184.93	4816	5580	(5) 10x8	<<NO>>	(6) 10x8	NEW CBC SB
152A	571+13	184.77	see Culv 153	0	(3) 10x8	yes	(3) 10x8	NEW CBC SB
153A	573+67	184.71	3319	4214	(4) 10x8	yes	(4) 10x8	NEW CBC SB
154A	592+24	184.36	19	23	36	yes	36	NEW CMP SB
155A	596+59	184.28	60	73	(2) 30	yes	(2) 30	NEW CMP SB
156A	600+08	184.20	see Culv 157	0	24	yes	24	NEW CMP SB
157A	601+83	184.17	749	921	(3) 10x8	yes	(3) 10x8	NEW CBC SB
158A	610+87	184.01	237	294	(4) 10x4	yes	(4) 10x4	NEW CBC SB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
159A	617+51	183.88	12	14	24	yes	24	extend LT
160A	620+96	183.82	142	177	(2) 6x4	yes	(2) 6x4	NEW CBC SB
161A	624+97	183.74	127	158	(2) 6x4	yes	(2) 6x4	NEW CBC SB
162A	633+62	183.58	96	119	(2) 6x4	yes	(2) 6x4	NEW CBC SB
163A	637+39	183.51	82	100	(3) 10x4	yes	(3) 10x4	NEW CBC SB
164A	642+10	183.41	992	1282	(2) 6x4	yes	(2) 6x4	NEW CBC SB
165A	655+00	183.16	4036	5100	(4) 10x4	<<NO>>	(6) 10x7	NEW CONTINUOUS CBC (SB & NB)
166A	659+83	183.08	10	15	24	yes	24	extend CMP LT
166B	20+70 (ramp)	183.08	10	15	n/a	n/a	24	NEW CMP, NB OFF RAMP
167A	472+31	182.88	10	15	(2) 30	yes	(2) 30	extend CMP LT; Sta Eqtn 668+84 bk = 470+16 ahd
168A	479+95	182.72	54	66	(2) 72x44	yes	(2) 42	NEW CMP SB
169A	485+29	182.62	312	367	(2) 8x4	yes	(2) 8x4	extend LT, deflection
169B	17+05 (ramp)	182.62	312	367	n/a	n/a	(2) 8x4	NEW CBC, SB OFF RAMP
170A	502+06	182.31	60	73	36	<<NO>>	42	NEW CMP SB
171A	507+19	182.20	1020	1232	6x5	<<NO>>	(2) 10x5	NEW CBC SB
172A	514+62	182.06	50	73	(2) 10x5	yes	(2) 10x5	NEW CBC SB
173A	522+48	181.92	1060	1298	(2) 10x3	<<NO>>	(2) 10x5	NEW CBC SB & INLET DIKE
174A	534+47	181.70	1455	1772	(4) 10x3	<<NO>>	(3) 10x5	NEW CBC SB & INLET DIKE
175A	542+55	181.54	194	241	(2) 10x5	yes	(2) 10x5	NEW CBC SB
176A	549+91	181.40	161	205	(2) 8x4	yes	(2) 8x4	NEW CBC SB
177A	551+80	181.36	110	134	10x4	yes	10x4	NEW CBC SB
178A	563+75	181.13	224	270	10x4	yes	10x4	NEW CBC SB
179A	571+95	180.98	108	133	(2) 30	<<NO>>	(3) 30	NEW CMP SB
180A	577+36	180.88	69	85	36	<<NO>>	(2) 36	NEW CMP SB
181A	580+78	180.81	108	134	36	<<NO>>	(2) 36	NEW CMP SB
182A	585+90	180.71	81	99	(2) 24	<<NO>>	(3) 30	NEW CMP SB
183A	592+82	180.58	100	124	(2) 30	<<NO>>	(3) 30	NEW CMP SB
184A	599+91	180.45	128	154	6x3	<<NO>>	6x4	NEW CBC SB
185A	602+01	180.41	See Culvert 184	0	8x3	<<NO>>	8x4	NEW CBC SB
186A	609+86	180.26	217	274	6x3	<<NO>>	6x4	NEW CBC SB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
187A	619+42	180.09	251	306	(5) 10x4	yes	(5) 10x4	NEW CBC SB & INLET DIKE
188A	630+98	179.86	425	514	(2) 9x5	yes	(2) 10x5	NEW CBC SB
189A	640+85	179.68	59	72	36	<<NO>>	42	NEW CMP SB
190A	650+00	179.51	154	185	(3) 10x4	yes	(3) 10x4	NEW CBC SB & INLET DIKE
191A	662+06	179.28	See Culvert 192	0	36	<<NO>>	(2) 36	NEW CMP SB
192A	664+22	179.24	1356	2007	10x4	<<NO>>	(4) 10x4	NEW CBC SB & INLET DIKE
193A	667+49	179.17	See Culvert 192	0	24	<<NO>>	30	NEW CMP SB
194A	671+37	179.10	See Culvert 192	0	24	yes	24	NEW CMP SB
195A	675+49	179.02	209	259	(2) 6x3	yes	(2) 6x3	NEW CBC SB & INLET DIKE
196A	684+45	178.85	78	95	(2) 6x3	yes	(2) 6x3	NEW CBC SB
197A	692+30	178.71	599	713	(5) 10x5	yes	(5) 10x5	NEW CBC SB
198A	714+49	178.29	4286	4878	(5) 10x4	<<NO>>	110' x 44'	NEW CSS BRIDGES NB & SB, & INLET DIKE
199A	728+89	178.01	584	658	(2) 6x7	yes	(2) 6x7	extend CBC LT
200A	757+09	177.46	566	640	(2) 6x7	yes	(2) 6x7	NEW CBC SB
201A	768+32	177.24	41	49	(2) 30	yes	(2) 30	NEW CMP SB
202A	772+54	177.17	42	50	36	<<NO>>	(2) 36	NEW CMP SB
203	n/a	177.09	19	23	24	<<NO>>	DITCH	UNLINED MEDIAN V-DITCH TO CULV 202A
204A	780+05	177.02	2058	2357	(2) 9x3	<<NO>>	(4) 10x6	NEW CBC SB
205A	785+33	176.91	127	156	(2) 9x3	yes	(2) 8x4	NEW CBC SB
206A	808+44	176.51	133	162	(2) 36	yes	(2) 36	NEW CMP SB
207A	817+61	176.32	267	316	(2) 9x3	<<NO>>	(2) 8x4	NEW CBC SB
208A	837+66	175.95	23	27	24	<<NO>>	30	NEW CMP SB
209A	843+92	175.83	107	131	10x8	yes	10x8	NEW CBC SB
210A	850+92	175.71	16	19	30	yes	30	NEW CMP SB
211	n/a	175.60	5	6	24	yes	n/a	no culvert SB
212	n/a	175.56	3	4	24	yes	n/a	no culvert SB
213	n/a	175.50	5	5	24	yes	n/a	no culvert SB
214	n/a	175.42	11	13	30	yes	n/a	no culvert SB
215A	896+45	175.12	230	278	n/a	yes	8x4	NEW CBC SB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
DATE CREEK BRIDGE 2	927+69	174.20	28028	33172	3-span x 70'	<<NO>>	3-span	NEW BRIDGE SB
216A	942+07	173.97	29	35	24	yes	30	NEW CMP SB
217	n/a	173.85	12	15	30	yes	n/a	NO CULV SB, COMBINES DNSTM W/ CULV 218A
218A	950+70	173.76	241	291	(2) 6x7	yes	(2) 6x7	NEW CBC SB
218B	963+37	173.65	57	72	n/a	yes	42	NEW CMP SB
220	n/a	173.50	5	6	24	yes	n/a	NO CULV SB, COMBINES DNSTM W/ CULV 219
221	n/a	173.46	4	5	24	yes	n/a	NO CULV SB, COMBINES DNSTM W/ CULV 219
222	n/a	173.43	5	6	24	yes	n/a	NO CULV SB, COMBINES DNSTM W/ CULV 219
223	976+82	173.35	156	193	6x7	yes	6x7	extend LT (NB only)
224A	n/a	172.75	20	24	24	yes	n/a	no culvert NB
225A	1017+93	172.51	8	10	n/a	n/a	24	NEW CMP NB
225B	1022+67	172.51	12	15	24	yes	30	NEW CMP NB
226	n/a	172.44	See Culvert 227A		24	yes	RIPRAP CHL	10' BOTTOM WIDTH RIPRAP CHANNEL TO 227A
227A	1023+55	172.34	137	167	(2) 6x5	yes	(2) 6x5	NEW CBC NB
228A	1033+32	172.27	19	22	n/a	n/a	30	NEW CMP NB
228B	1037+84	172.27	10	13	24	<<NO>>	24	NEW CMP NB
229A	1041+76	172.17	8	9	24	yes	24	NEW CMP NB
230A	1045+53	172.10	44	62	36	<<NO>>	42	NEW CMP NB
231A	1051+35	172.02	8	10	24	yes	24	NEW CMP NB
232A	1055+06	171.91	191	234	6x4	yes	6x4	NEW CBC NB
233A	1064+67	171.68	85	97	42	yes	42	NEW CMP NB
234A	1077+77	171.46	256	313	10x8	yes	10x8	NEW CBC NB
235A	1082+35	171.40	52	67	(2) 36	yes	(2) 36	NEW CMP NB
236A	1091+55	171.21	22	26	30	yes	30	NEW CMP NB
237A	1097+29	171.10	13	17	30	yes	30	NEW CMP NB
238A	1105+96	170.94	246	302	12x8	yes	12x8	NEW CBC NB
239	n/a	170.85	8	10	24	yes	DITCH	ROADSIDE RT, NB TO CULV 240A
240A	1114+02	170.77	21	27	30	yes	30	NEW CMP NB (TAKES ~ 4 CFS FROM 239)
241	1118+55	170.70	95	112	60	yes	60	NEW CMP NB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
242	1121+78	170.65	22	28	24	yes	24	NEW CMP NB
243A	1145+88	170.16	32	39	(2) 10x4	yes	(2) 10x4	NEW CBC NB
244A	1149+56	170.07	42	50	24	yes	36	NEW CMP NB
245A	1153+48	170.01	45	54	30	<<NO>>	36	NEW CMP NB
246A	1160+84	169.90	30	37	(2) 36	yes	36	NEW CMP NB
247A	1174+93	169.21	346	424	(3) 10x8	yes	(3) 10x8	NEW CBC NB
247B	1189+92	169.21	142	173	n/a	n/a	60	NEW CMP NB
248	n/a	169.16	8	11	24	yes	DITCH	ROADSIDE RT, NB TO CULV 249A
249A	1202+91	169.03	187	236	6x7	yes	6x7	NEW CBC NB
249B	1208+89	169.03	11	14	n/a	n/a	24	NEW CMP NB
250	n/a	168.92	6	8	24	yes	DITCH	ROADSIDE RT, NB TO CULV 252A
251	n/a	168.82	9	11	24	<<NO>>	n/a	no culvert NB
252A	1219+35	168.69	58	72	48	yes	36	NEW CMP NB
253A	1231+68	168.47	51	62	(2) 30,(1) 24"	yes	(2) 30	NEW CMP NB
254A	1236+96	168.41	29	36	36	yes	36	NEW CMP NB
255A	1240+86	168.35	13	16	24	yes	24	NEW CMP NB
256	n/a	168.30	3	3	24	yes	n/a	no culvert NB
257A	1248+13	168.13	29	35	(2) 30"	<<NO>>	(2) 30	NEW CMP NB
258A	1252+12	167.99	20	25	24	yes	24	NEW CMP NB
259A	1278+10	167.72	63	78	10x8	yes	10x8	NEW CBC NB (CATTLE PASS)
260A	1292+70	167.17	18	21	n/a	n/a	24	NEW CMP NB
260B	1305+35	167.17	54	65	30	yes	30	NEW CMP NB
261A	1309+07	167.06	26	31	30	yes	30	NEW CMP NB
261B	1310+41	n/a	4	5	n/a	n/a	24	NEW CMP NB
262A	1314+19	166.89	24	29	30	yes	24	NEW CMP NB
263A	1335+44	166.61	776	943	(3) 12x10	yes	(3) 12x10	NEW CBC NB
264A	1338+75	166.45	45	55	36	<<NO>>	36	NEW CMP NB
265A	1351+90	166.23	43	53	42	yes	36	NEW CMP NB
265B	1354+65	166.23	6	7	n/a	n/a	24	NEW CMP NB
266A	1362+66	166.07	27	33	36	yes	30	NEW CMP NB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
267A	n/a	166.03	5	6	30	yes	DITCH	ROADSIDE RT, NB TO BRIDGE 3A
268	n/a	165.94	6	7	24	yes	n/a	no culvert NB
BIG JIM WASH BRIDGE 3	1391+27	165.54	4864	6361	7-span x 30'	<<NO>>	8-span	NEW BRIDGE NB
269A	1397+70	165.43	44	55	24	yes	36	NEW CMP NB
270A	1407+15	165.22	40	48	36	yes	36	NEW CMP NB
271A	1409+85	165.10	91	112	(2) 36	yes	(2) 36	NEW CMP NB
272A	1416+80	165.05	77	94	(2) 36	<<NO>>	(2) 36	NEW CMP NB
273A	1421+74	164.94	16	19	(2) 24	yes	24	NEW CMP NB
274A	1425+21	164.89	146	185	48	<<NO>>	(2) 42	NEW CMP NB
275A	1428+45	164.82	8	10	24	<<NO>>	24	NEW CMP NB
276A	1433+00	164.75	137	169	(2) 6x5	yes	(2) 6x5	NEW CBC NB
277A	1441+09	164.61	306	366	10x8	yes	10x8	NEW CBC NB (CATTLE PASS)
278A	1446+26	164.51	88	110	(2) 42	yes	(2) 42	NEW CMP NB
279	n/a	164.44	4	5	24	yes	n/a	no culvert NB
280A	1455+90	164.40	10	13	(2) 42	yes	(2) 42	NEW CMP NB
281	n/a	164.31	7	8	24	yes	n/a	no culvert NB
282A	1461+82	164.23	25	30	10x8	yes	10x8	NEW CBC NB (CATTLE PASS)
283A	n/a	164.17	9	11	30	yes	DITCH	ROADSIDE RT, NB TO CULV 280A
284	n/a	164.08	5	6	24	yes	n/a	no culvert NB
285A	1472+94	163.93	41	52	(2) 36	yes	36	NEW CMP NB
285B	1476+24	163.93	40	50	n/a	n/a	36	NEW CMP NB
286	n/a	163.83	12	15	24	yes	n/a	no culvert NB
287A	1481+95	163.63	26	32	(2) 36	yes	30	NEW CMP NB
287B	1489+42	163.63	30	37	n/a	n/a	36	NEW CMP NB
288A	1493+17	163.54	35	43	36	<<NO>>	36	NEW CMP NB
289A	1501+36	163.37	148	187	6x7	yes	6x7	NEW CBC NB (CATTLE PASS)
289B	1504+65	163.37	40	52	n/a	n/a	36	NEW CMP NB
290A	1509+92	163.29	22	26	(2) 48	yes	42	NEW CMP NB
291A	1514+24	163.21	7	9	30	yes	24	NEW CMP NB

TABLE 5
US 93 — US 89 TO SANTA MARIA RIVER
RECOMMENDED DRAINAGE STRUCTURE SUMMARY
EXISTING RUNOFF CONDITIONS

BASIN AND CULVERT NUMBER	NEW US 93 STATION (feet)	MILEPOST OF ORIGINAL CULVERT	FLOWS (See note 1)		Existing	Existing	Recommended	RECOMMENDATIONS
			Q ₅₀ (cfs)	Q ₁₀₀ (cfs)	Pipe Diameter (inches)	Hydraulics Adequate (yes/no)	Culvert Dia (inches) (#) W(ft) x Ht (ft)	
292	n/a	163.17	2	3	30	yes	n/a	no culvert NB
293A	1523+74	163.06	192	233	10x8	yes	10x8	NEW CBC NB (CATTLE PASS)
294A	1531+01	162.92	26	32	30	yes	30	NEW CMP NB
295A	1533+50	162.87	65	81	60	yes	60	NEW CMP NB
296A	1537+38	162.80	24	29	24	<<NO>>	30	NEW CMP NB
297A	1546+02	162.59	38	47	42	yes	42	NEW CMP NB
298A	1553+15	162.50	59	73	(2) 36	yes	(2) 36	NEW CMP NB
299A	1557+42	162.42	37	45	36	yes	36	NEW CMP NB
300	n/a	162.36	4	5	24	yes	n/a	no culvert NB
301A	1572+34	162.12	79	96	(2) 42	yes	(2) 42	NEW CMP NB
302A	1577+23	162.02	104	129	(2) 42	yes	(2) 42	NEW CMP NB
303	1587+82	161.85	404	486	(2) 6x7	yes	(2) 6x7	NEW CBC NB (CATTLE PASS)
304	1593+96	161.73	79	96	30	<<NO>>	30	extend RT

NOTES:

- 1) 50-Year Design Flow and 100-year Check Flow taken from Table 1.
- 2) Centerline of roadway elevation calculated from roadway as-built profiles.
- 3) The adequacy of existing culverts is based on results of analysis summarized in Table 3.
- 4) Recommended culverts pertain to new roadway segments unless stated otherwise.
- 5) Culverts 305, 306, and 307 are not expected to be modified.
- 6) This table is intended to compare the old cross-culverts and the new conveyances that will be used on the new roadway.
For a complete list of ditches channels, abutment and embankment lining, see Table 6 — Recommended Channel Itemized Summary