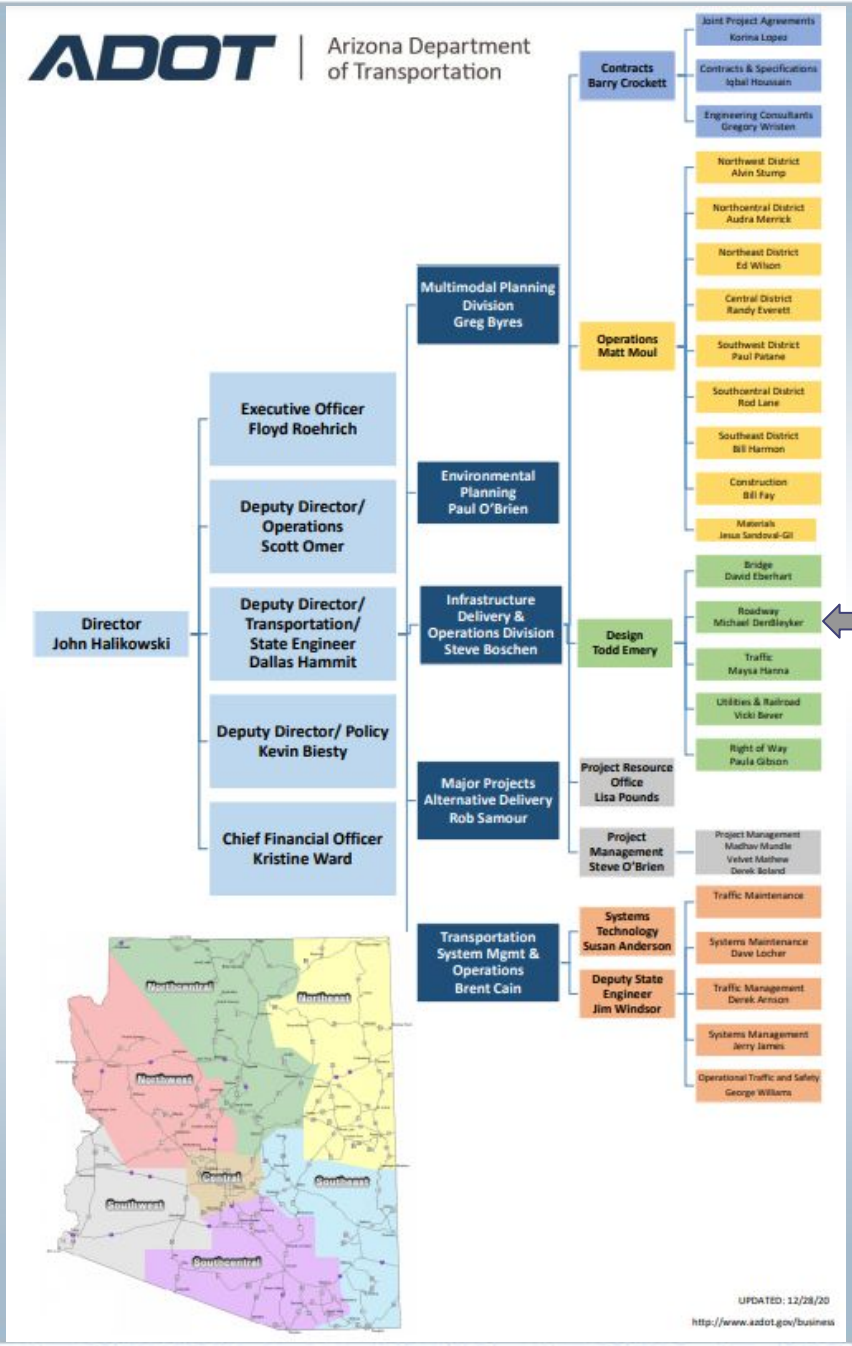
Project Delivery Process

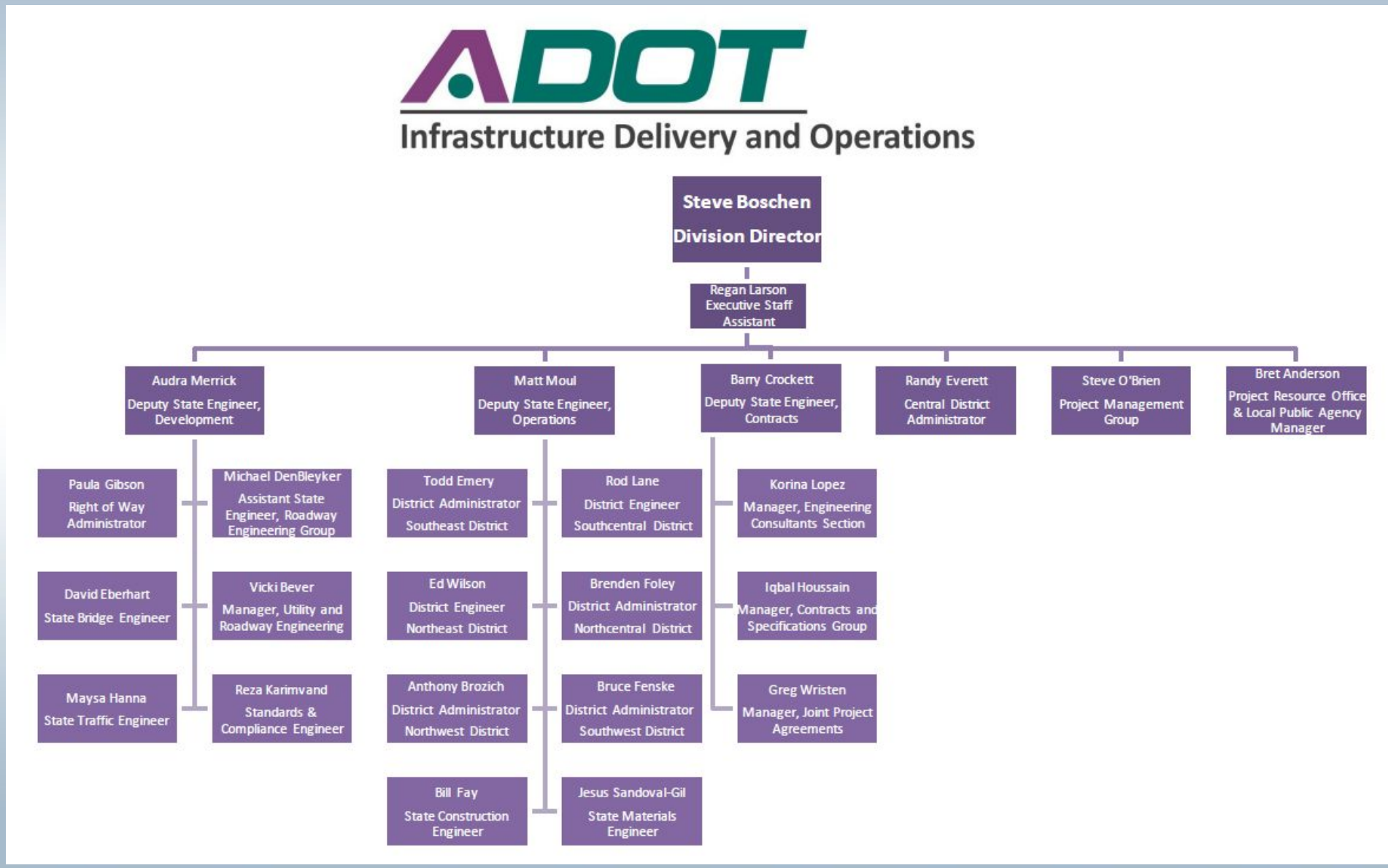
Design & Delivery Technical Groups
Infrastructure Delivery & Operations

Roadway, Bridge & Traffic
Design Groups

Where Do We Fit In?

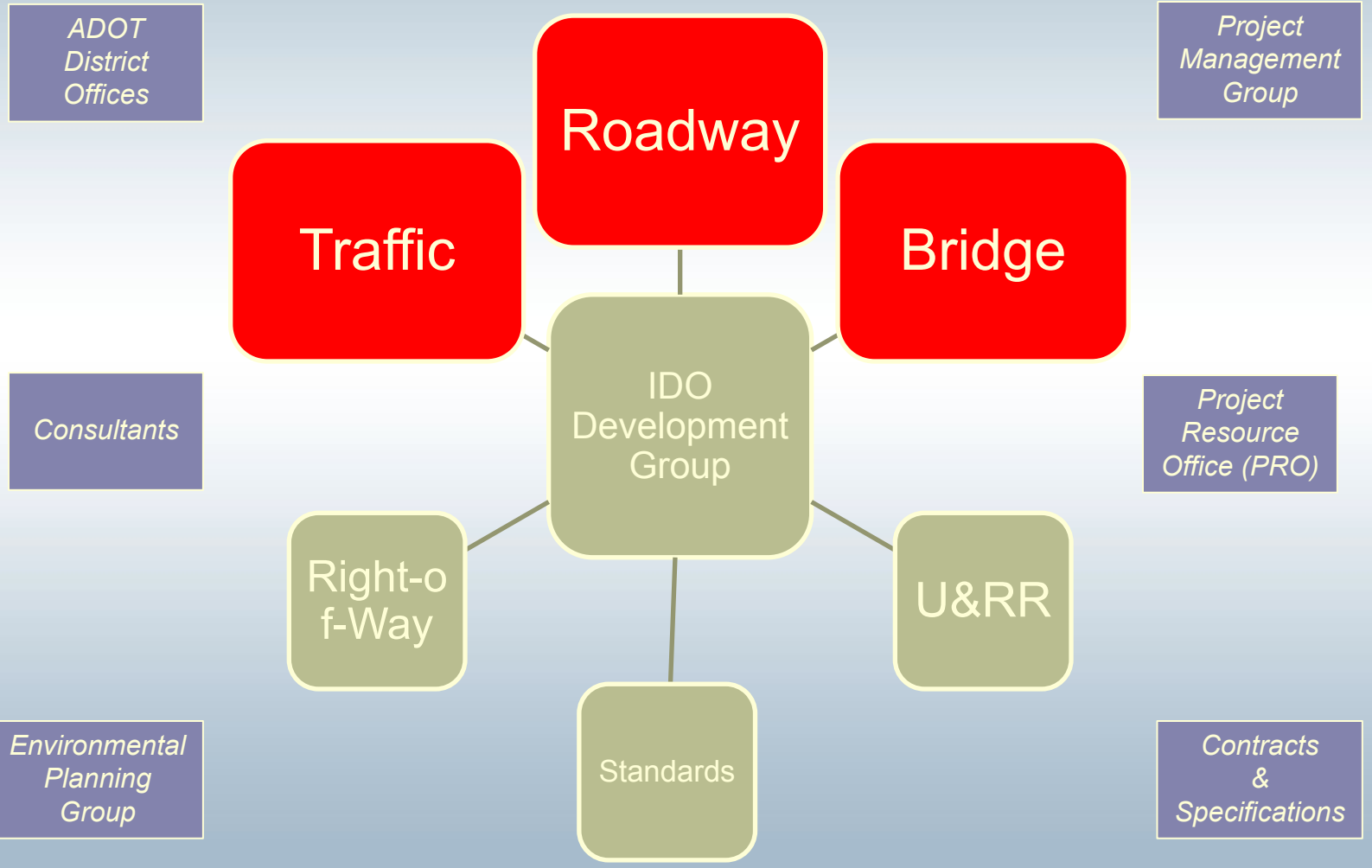


Where Do We Fit In?



Where Do We Fit In?

IDO Development

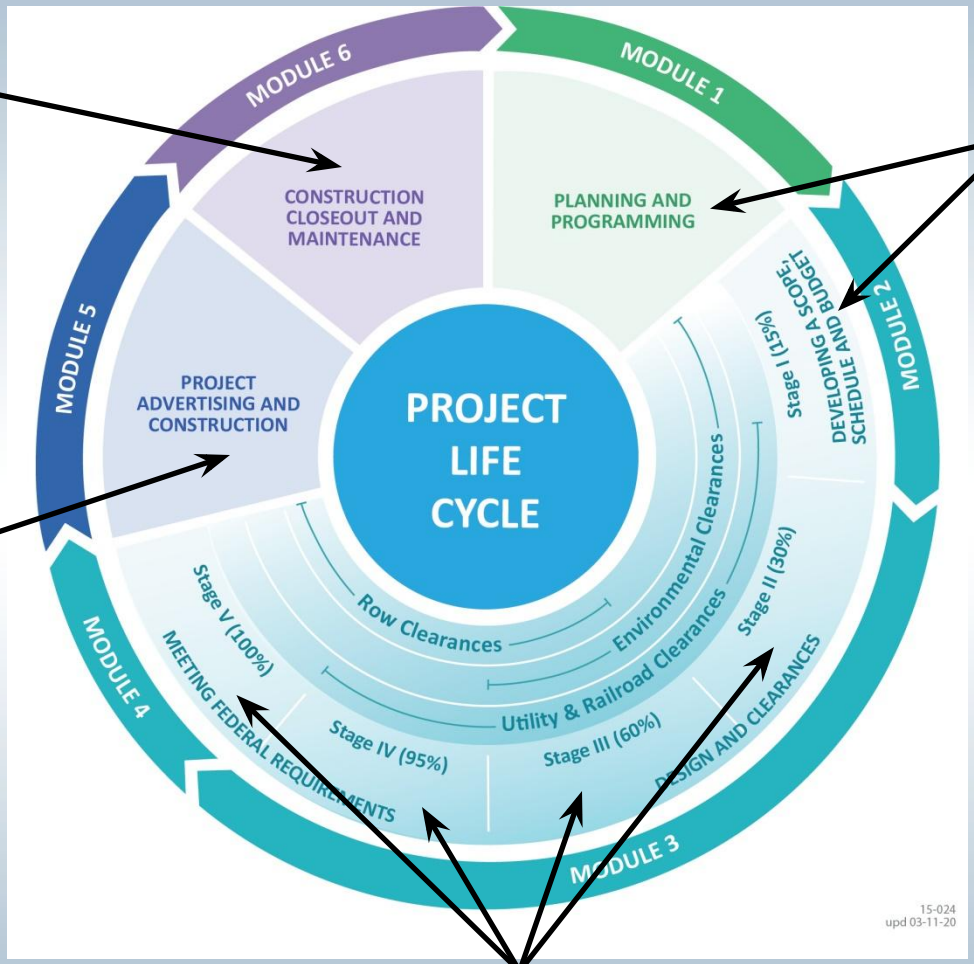


Where Do We Fit In?

Technical Teams Assist in Addressing Construction Questions and Providing Technical Guidance for Construction Related Matters

Technical Teams Provide Critical Input into Development of a Project's Scope, Schedule and Budget

Technical Teams Assist in the Preparation of Bid Documents and Address Bid RFIs



Technical Teams Coordinate to Deliver Technical Designs and Construction Documentation

Roadway Engineering Group

Infrastructure Delivery and Operations Division

Designing, Supporting & Delivering ADOT's Roadway Projects

Michael DenBleyker, P.E.
Roadway Group Manager
State Roadway Engineer

Roadway Design – What is Needed?

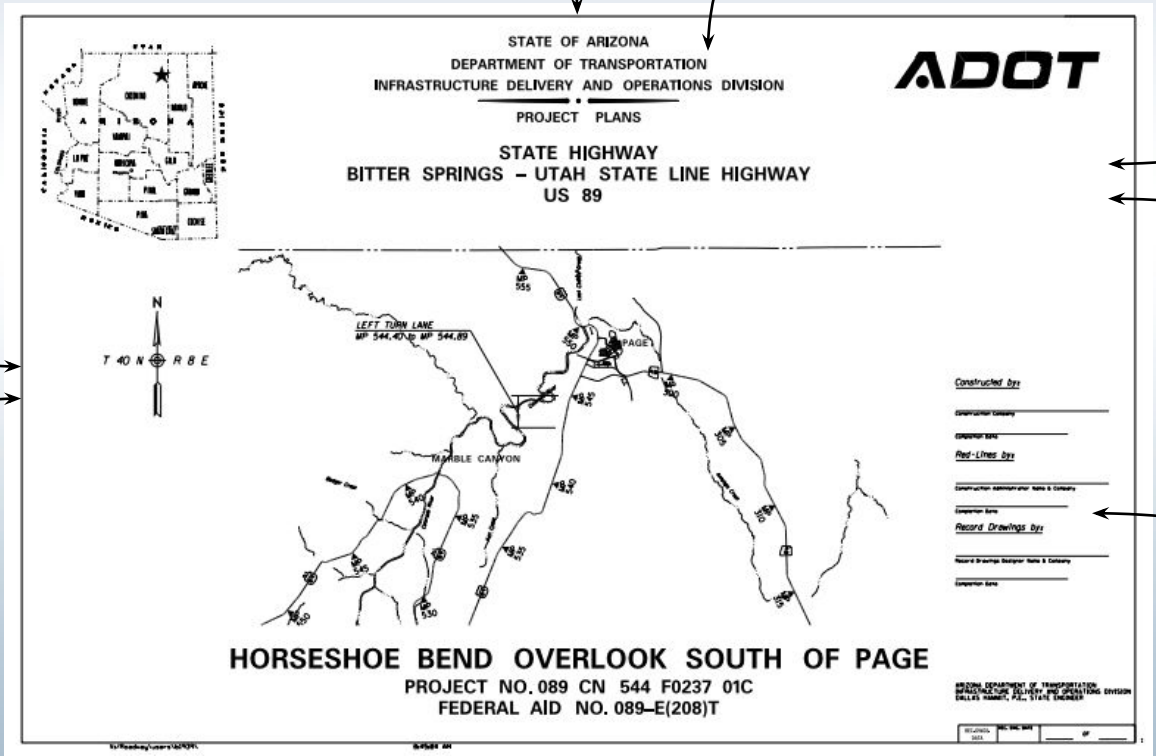
What is the Project Need & Objective?

What are the Existing Conditions?

Environmental

Utilities

Road



Are there Safety Considerations?

What Design Parameters & Standards/Criteria Exist?

What Project Risk Factors Exist?

Structures/Bridges

What is the Schedule?

What is the Budget?

Drainage

Construction

Erosion Control/Landscape

Traffic

Right-of-Way

Who We Are and What Do We Do?

Roadway Survey

Section Manager:	Virgil Coxon
Location Chief Surveyor:	Mark Luond
Construction Chief Surveyor:	Clifton Clark

Services/ Responsibilities

*Design/ Location Survey
*Construction Survey
*Survey Support

Roadway Standards

Section Manager:	Hiren Shah
Team Lead:	Chris Cooper

Services/ Respnsibilites

*Roadway Design Guidelines
*AASHTO Standards & Criteria
*MASH Standards
*Roadway Construction Details
*Design Support

Roadway Design

Section Manager:	Doug Smith
Team Leads:	Jordan Kurlin
	Hassan Eghbali
	Erica Eggen

Services/ Responsibilities

*Roadway Design Documentation
*Earthwork/ Drainage Calculations
*Construction/ Maintenance Details
*Design Management and Coordination

Roadway Pre-Design

Section Manager:	Hiren Shah
Team Lead:	Shahid Bhuiyan

Services/ Responsibilities

*Project Scoping Documentation
*Design Exceptions/ Variances
*AASHTO Controlling Criteria
*Change of Access Reports

Roadway Pavement Design

Section Manager:	Ali Zareh
Team Lead:	Ashek Rana

Services/ Responsibilities

*Pavement Testing/ Cores/ Evaluation
*Material/Pavement Design Reports

ROADWAY ENGINEERING GROUP

Manager: Michael DenBleyker
Assistant State Engineer

Roadside Development

Section Manager:	LeRoy Brady
Team Lead:	John Hucko

Services/ Responsibilities

*Aesthetic Enhancements
*Seeding & Revegetation
*Landscape & Irrigation Design
*Stormwater Quality & Erosion/ Sedimentation Control Plans

Roadway Drainage

Section Manager:	Syed Alam

Services/ Responsibilities

*Hydraulic/Hydrology Design & Standards
*Drainage Permits
*Scour/ Erosion Protection Design

Contact Information

Manager:	***Michael DenBleyker*** mdenbleyker@azdot.gov 602.712.7808
Survey:	***Virgil Coxon*** vcoxon@azdot.gov 602.712.8580
Pre-Design, Standards:	***Hiren Shah*** hshah@azdot.gov 602.712.7794
Drainage:	***Syed Alam*** salam2@azdot.gov 602.712.8701
Roadside Development:	***LeRoy Brady*** lbrady@azdot.gov 602.712.4261
Design:	***Doug Smith*** dsmith2@azdot.gov 602.712.8482
Pavement Design:	***Ali Zareh*** azareh@azdot.gov 602.712.8082

Roadway - Who We are and What We Do?

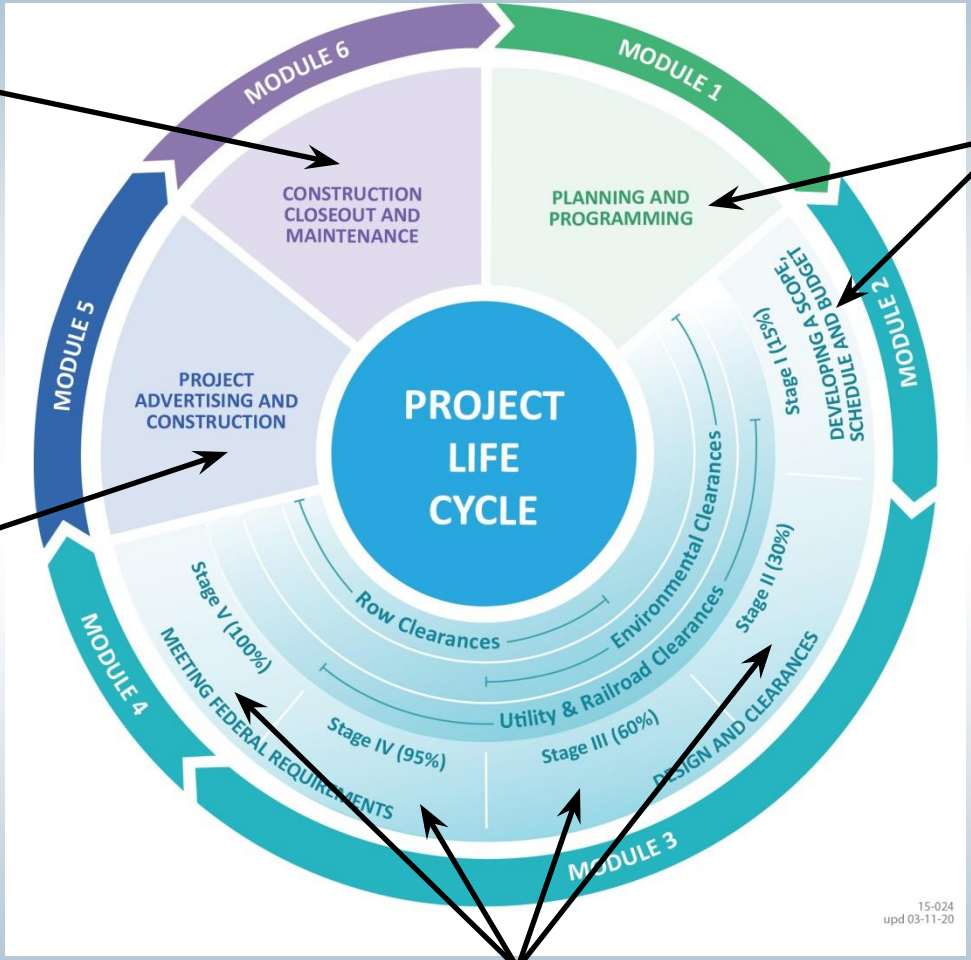
Pre-Design (Scoping)	Survey	Pavement Design	Roadway Design	Drainage	Roadside Development	Standards
Define the Scope, Schedule and Budget	*Aerial Photography and Engineering & Topographic Surveys*	*Design of New Pavement and Recommendations for Pavement Rehabilitation Treatments*	*Prepare Roadway Technical Design and Construction Documents*	*Hydrology, Hydraulics and Water Resources Expertise and Design for Projects*	*Design of Landscape Architecture, Aesthetics and Environmental Design for Projects*	*Provide Technical Guidance & Expertise in Roadway Design Criteria*
Field Research	Construction Survey	Field Reviews & Testing	Records Review	Field & Records Research	Field Reviews	Roadway Design Guidelines
Records Review	Field Survey	Records Review	Gather/Calculate Design Data	Roadway Drainage Calculations	Erosion/Sedimentation Control Plans & Specification	AASHTO Standards & Criteria
Standards Research – ADOT & AASHTO Controlling Design Criteria	CADD Processing of data	Standards Research	Develop Roadway Sections, Alignments & Profiles	Hydraulic/Hydrology Design & Modeling	Vegetation Inventory	MASH Standards
Coordination with Safety Studies	Aerial Drone Surveys & Mapping	Calculations & Pavement Design	Develop Roadway Design Plan Sheets	Modeling & Analysis of Washes, Floodplain & Floodway	Roadside and Structure Aesthetics Design	Roadway Construction Details
Documentation of Project Scope, Schedule and Budget		Report Preparation & Documentation	Evaluate Guardrail Length of Need	Bridge Hydraulics and Scour Protection Analysis & Design	Seeding & Re-vegetation Design	Design Support
Design Exceptions & Variances		Existing Conditions Analysis	Construction Details	Report Preparation & Documentation	Landscape and Irrigation Design	
Change of Access Reports			Calculations: Superelevation, Alignment, Drainage	Drainage Permits		
			Design Management & Coordination			
			Model and Calculate Earthwork Quantities			
			Prepare Cost Estimates			

Where Do We Fit In?

Roadway Design Teams Assist in Addressing Construction Questions and Providing Technical Guidance for Construction Related Matters

Roadway Design Teams Provide Critical Input into Development of a Project's Scope, Schedule and Budget

Roadway Design Teams Assist in the Preparation of Bid Documents and Address Bid RFIs



Roadway Design Teams Coordinate to Deliver Technical Designs and Construction Documentation

What Do We Use?

AASHTO

A Policy on

Geometric Design of Highways and Streets

2018
7th Edition
2nd Printing

THE GREEN BOOK

ARIZONA DEPARTMENT OF TRANSPORTATION

ROADWAY ENGINEERING GROUP

ROADWAY DESIGN GUIDELINES

JANUARY 2021

Visit the ADOT Roadway Engineering webpage for future updates

What Do We Use?

ARIZONA DEPARTMENT OF TRANSPORTATION

ADOT

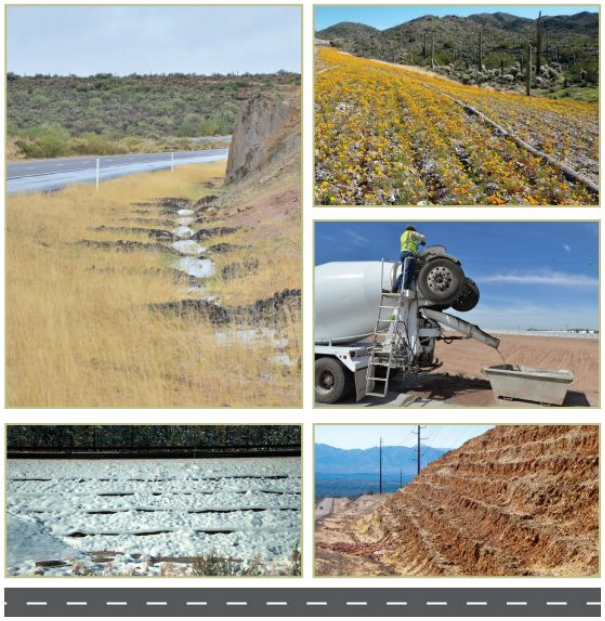
PAVEMENT DESIGN MANUAL

September 29, 2017

ROADWAY ENGINEERING GROUP
PAVEMENT DESIGN SECTION

ADOT
Arizona Department of Transportation

Erosion and Pollution Control Manual
For Highway Design and Construction



ARIZONA DEPARTMENT OF TRANSPORTATION

ADOT

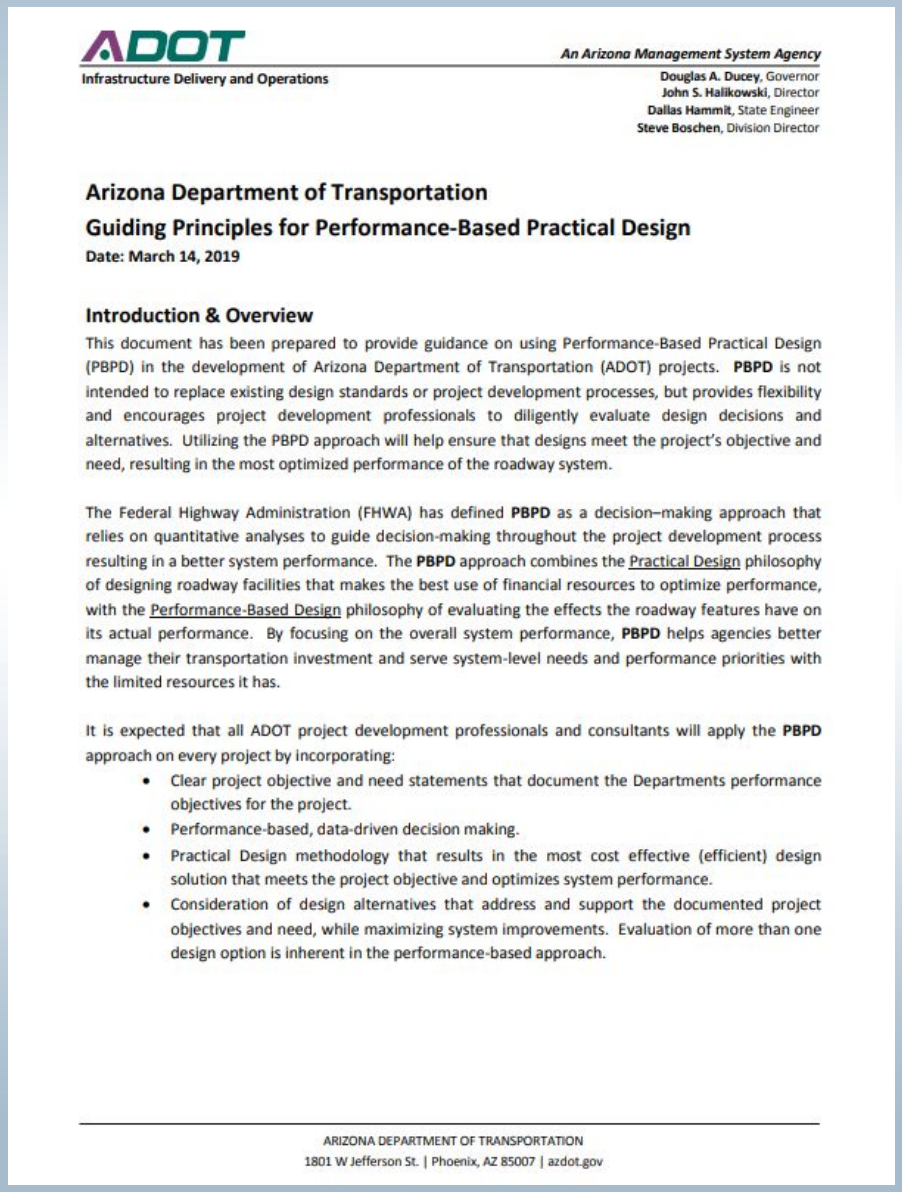
HIGHWAY DRAINAGE DESIGN MANUAL
HYDRAULICS

Final Report

January, 2007

Arizona Department of Transportation
206 South 17th Avenue
Phoenix, Arizona 85007

What Do We Use?



ADOT
Infrastructure Delivery and Operations

An Arizona Management System Agency

Douglas A. Ducey, Governor
John S. Halikowski, Director
Dallas Hammit, State Engineer
Steve Boschen, Division Director

Arizona Department of Transportation

Guiding Principles for Performance-Based Practical Design

Date: March 14, 2019

Introduction & Overview

This document has been prepared to provide guidance on using Performance-Based Practical Design (PBPD) in the development of Arizona Department of Transportation (ADOT) projects. **PBPD** is not intended to replace existing design standards or project development processes, but provides flexibility and encourages project development professionals to diligently evaluate design decisions and alternatives. Utilizing the PBPD approach will help ensure that designs meet the project's objective and need, resulting in the most optimized performance of the roadway system.

The Federal Highway Administration (FHWA) has defined **PBPD** as a decision–making approach that relies on quantitative analyses to guide decision-making throughout the project development process resulting in a better system performance. The **PBPD** approach combines the Practical Design philosophy of designing roadway facilities that makes the best use of financial resources to optimize performance, with the Performance-Based Design philosophy of evaluating the effects the roadway features have on its actual performance. By focusing on the overall system performance, **PBPD** helps agencies better manage their transportation investment and serve system-level needs and performance priorities with the limited resources it has.

It is expected that all ADOT project development professionals and consultants will apply the **PBPD** approach on every project by incorporating:

- Clear project objective and need statements that document the Departments performance objectives for the project.
- Performance-based, data-driven decision making.
- Practical Design methodology that results in the most cost effective (efficient) design solution that meets the project objective and optimizes system performance.
- Consideration of design alternatives that address and support the documented project objectives and need, while maximizing system improvements. Evaluation of more than one design option is inherent in the performance-based approach.

ARIZONA DEPARTMENT OF TRANSPORTATION
1801 W Jefferson St. | Phoenix, AZ 85007 | azdot.gov

Performance Based Practical Design (PBPD):

ADOT's Goal is to deliver projects that:

1. Maintain or improve the operational performance of the roadway system.
2. Are the most cost effective solution to meeting the Project Objective and Need.

- **PBPD** is a decision-making approach that relies on quantitative analysis to guide decision-making throughout the project development process resulting in a better system performance.
- **PBPD** combines "Practical Design" philosophy of designing roadway facilities that makes the best use of the financial resources to optimize performance, with the "Performance-Based Design" philosophy of evaluating the effects the roadway features have on its actual performance.
- **PBPD** helps agencies better manage their transportation investment and serve system-level needs and performance priorities with the limited resources it has.
- **PBPD** is not intended to replace existing design standards or project development processes. **PBPD** provides flexibility and encourages professionals to diligently evaluate design decisions and alternatives.

What We Do?

Pre-Design & Pavement Design

089 CN 544 F0237 01C
NHPP-089-E(208)T
HORSESHOE BEND OVERLOOK SOUTH OF PAGE
BITTER SPRINGS – UTAH STATE LINE HIGHWAY
US 89

AASHTO CONTROLLING DESIGN CRITERIA REPORT

MAY 26, 2020

PREPARED BY
KATHRYN HAMMOND
ROADWAY PREDESIGN SECTION
ROADWAY ENGINEERING GROUP

ADOT
Infrastructure Delivery and Operations

ADOT Project No. 089 CN 544 F0237 01C

ATTACHMENT 1 – VERTICAL CURVE INVENTORY

PROJECT NAME: HORSESHOE BEND OVERLOOK SOUTH OF PAGE
PROJECT NO: 089 CN 544 F0237 01C
ROADWAY TYPE: UNDIVIDED ROADWAY (BI-DIRECTIONAL)

VPI STATION	MILEPOST		GRADE (%)		CURVE	CURVE	STOPPING SIGHT DISTANCE (FT)		SPEED (MPH)	
(FT)	BEGIN	END	APPROACH	DEPARTURE	LENGTH (FT)	TYPE	EXISTING	REQUIRED	EXISTING	POSTED
1215+00.00	544.00	544.11	-1.4000	-2.5000	600.00	Crest	1281	675	95	65
1225+00.00	544.19	544.30	-2.5000	-1.1430	600.00	Sag	+9999	675	+100	65
1232+00.00	544.32	544.43	-1.1430	-2.2500	600.00	Crest	1275	672	95	65
1240+00.00	544.47	544.58	-2.2500	-1.2000	600.00	Sag	+9999	672	+100	65
1250+00.00	544.66	544.77	-1.2000	-2.5860	600.00	Crest	1078	676	86	65

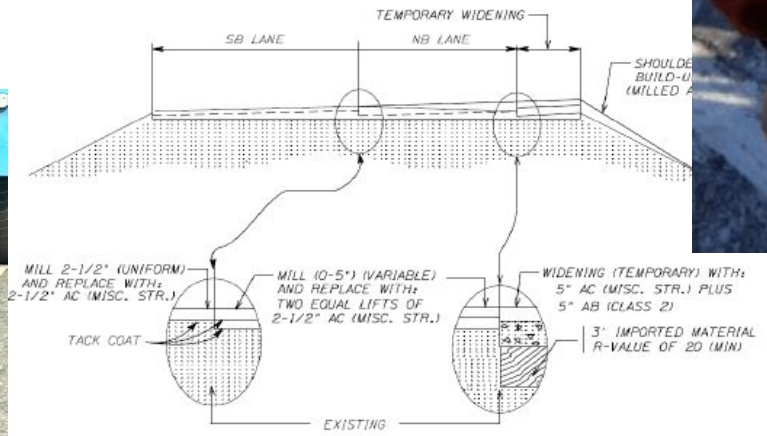
VPI STATION	MILEPOST		GRADE (%)		CURVE	CURVE	STOPPING SIGHT DISTANCE (FT)		SPEED (MPH)	
(FT)	BEGIN	END	APPROACH	DEPARTURE	LENGTH (FT)	TYPE	EXISTING	REQUIRED	NEW	DESIGN
1215+00.00	544.00	544.11	-1.4000	-2.5000	600.00	Crest	1281	592	95	60
1225+00.00	544.19	544.30	-2.5000	-1.1430	600.00	Sag	+9999	592	+100	60
1232+00.00	544.32	544.43	-1.1430	-2.2500	600.00	Crest	1275	589	95	60
1240+00.00	544.47	544.58	-2.2500	-1.2000	600.00	Sag	+9999	589	+100	60
1250+00.00	544.66	544.77	-1.2000	-2.5860	600.00	Crest	1078	593	86	60

VPI STATION	MILEPOST		GRADE (%)		CURVE	CURVE	STOPPING SIGHT DISTANCE (FT)		SPEED (MPH)	
(FT)	BEGIN	END	APPROACH	DEPARTURE	LENGTH (FT)	TYPE	EXISTING	REQUIRED	NEW	POSTED
1215+00.00	544.00	544.11	-1.4000	-2.5000	600.00	Crest	1281	514	95	55
1225+00.00	544.19	544.30	-2.5000	-1.1430	600.00	Sag	+9999	514	+100	55
1232+00.00	544.32	544.43	-1.1430	-2.2500	600.00	Crest	1275	512	95	55
1240+00.00	544.47	544.58	-2.2500	-1.2000	600.00	Sag	+9999	512	+100	55
1250+00.00	544.66	544.77	-1.2000	-2.5860	600.00	Crest	1078	515	86	55

Meaning of Symbols:
GB = Grade Break – Stopping Sight Distance and Speed not calculated
* = Existing Stopping Sight Distance less than AASHTO required value
Note:
Input grade
Project Limi

Project Scoping, Data Collection & Field Analysis/Research

TYPICAL SECTION
191 AP 323 F015001C / STBG-191-D(202)T
CARRIZO WASH



US 191
CARRIZO WASH CBC
(AT CBC APPROACHES) [1], [2]

What We Do?

Scoping & Pavement Design

Project 101L MA 001 F0203 01C
Federal ID Number – 888-A(234)T
Agua Fria Freeway
Interstate 10 (I-10) to Interstate 17 (I-17)
State Route 101 Loop (SR 101L)

FINAL SCOPING LETTER

November 1, 2019

Revised February 25, 2020

Prepared For:

ADOT

ARIZONA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION TECHNOLOGY GROUP

ARIZONA DEPARTMENT OF TRANSPORTATION * ROADWAY ENGINEERING GROUP
205 SOUTH 17TH AVENUE * PHOENIX, AZ 85007 * PHONE: 602.712.7360

May 28, 2020

MATERIALS DESIGN REPORT

Report Type: Revised Final (Rev. 1) Report # 19-12-RF1

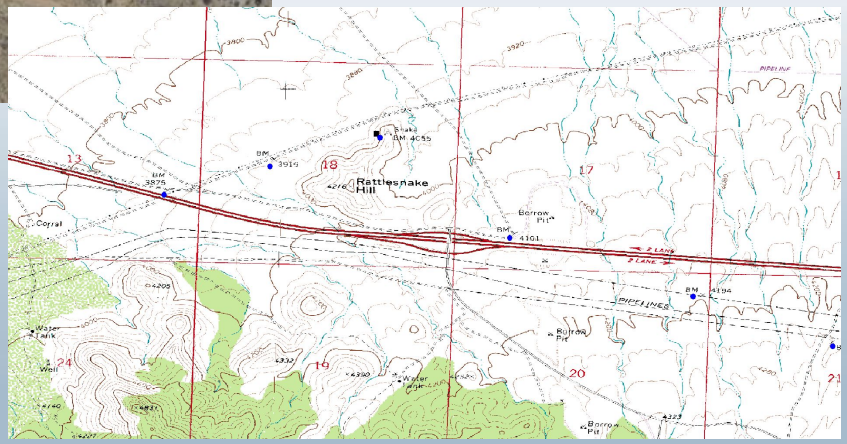
HIGHWAY NAME: ST JOHNS-SANDERS HWY (US 191)
PROJECT NAME: CARRIZO WASH
PROJECT NUMBER: 191 AP 323 F015001C / STBG-191-D(202)T
PROJECT SCOPE: DRAINAGE IMPROVEMENT
MILE POST LIMITS: MP 323.53 AND MP 324.03

Prepared by:
Pavement Design Section
Roadway Engineering Group
Arizona Department of Transportation

Design Reports & Documentation

What We Do?

Survey

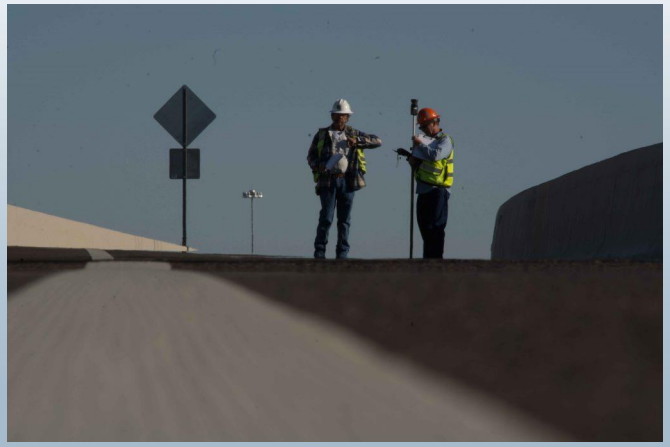


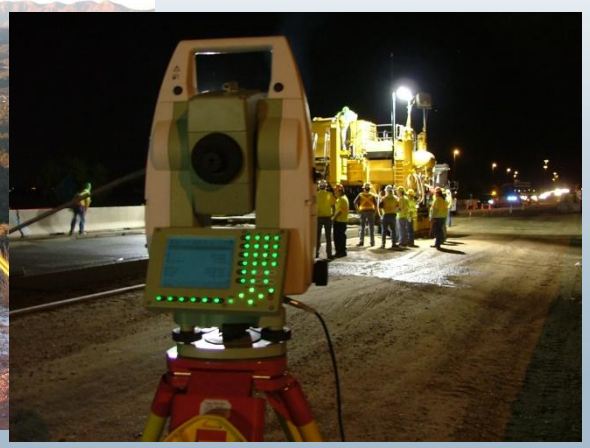
Mapping and Research

What We Do?

Survey

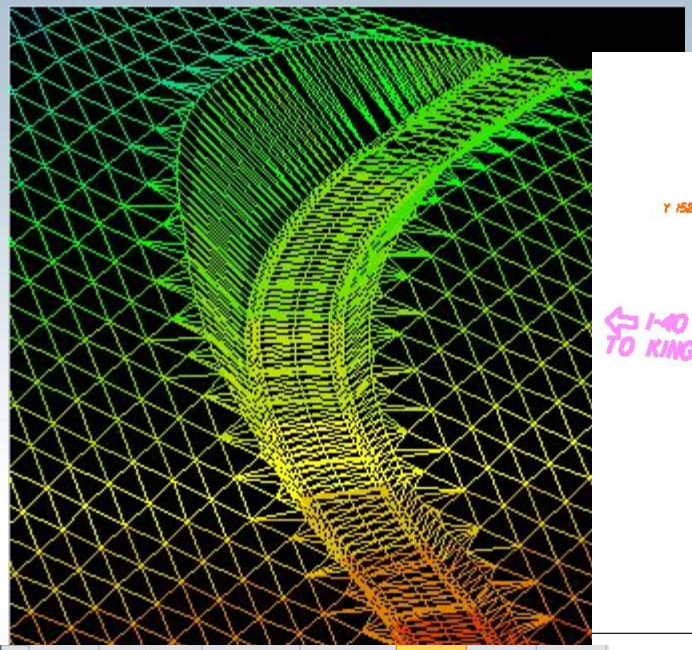
Field Data Collection

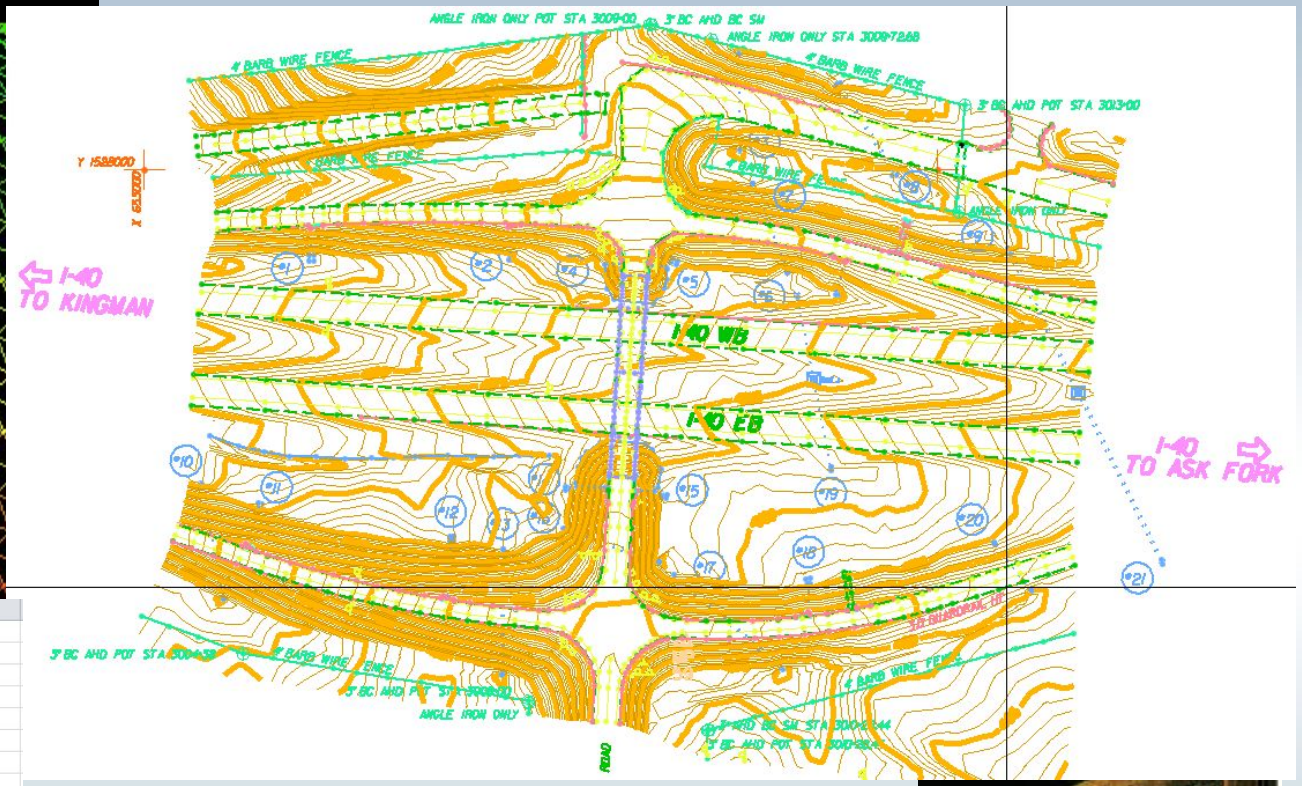




What We Do?

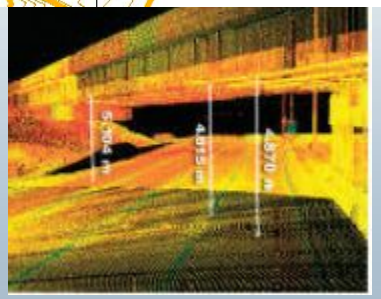
Survey





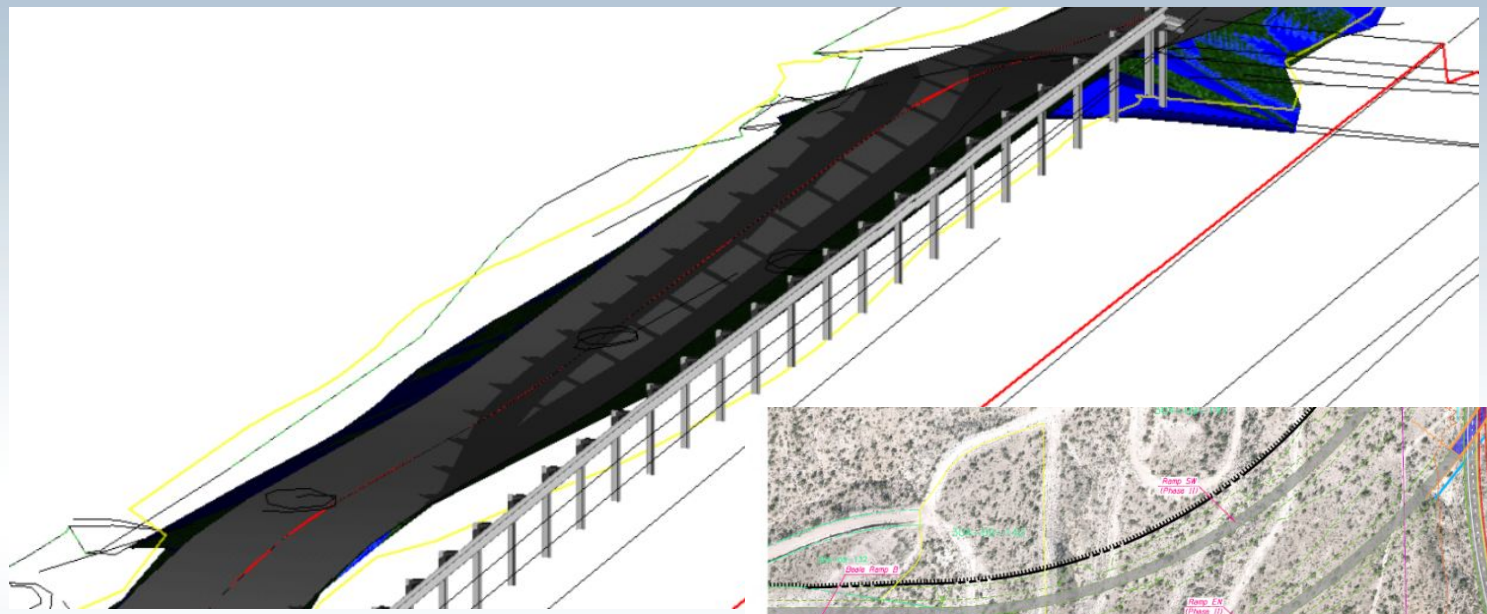
	A	B	C	D	E	F	G
1	FINAL GROUND COORDINATES WESTERN ZONE						
2	I-40 @ DW RANCH RD T.I. MP 59.71						
3	JOB LS1226, TRACS H8799O1D						
4	DTM						
5	VALUES OBTAINED BY STATIC GPS						
6	DATA COLLECTED BY McWHORTER CREW						
7	INTERNATIONAL FEET						
8	NAD83/92 HORIZONTAL & NAVD88 VERTICAL (GEOID 09AZ)						
9	GROUND ADJUSTMENT FACTOR = 1.00025						
10							
11	PT. NO.	GROUND (N)	GROUND (E)	ELEV.	DESC.		
12	1001	1527305.252	653582.303	4111.218	CLS ST		
13	1002	1527306.428	653564.973	4111.014	EP ST		
14	1003	1527306.290	653564.273	4111.275	GR ST * 2.9FT ON 6IN CURB		
15	1004	1527306.216	653564.278	4111.108	GB ST		
16	1005	1527305.650	653570.288	4111.171	DS ST * 6INCH		
17	1006	1527347.914	653584.892	4111.271	CLS		
18	1007	1527350.601	653567.816	4111.045	EP		
19	1008	1527350.563	653566.903	4111.307	GR		
20	1009	1527350.589	653566.857	4111.040	GB		
21	1010	1527350.098	653572.700	4111.155	DS		
22	1011	1527368.388	653573.414	4111.045	DS		
23	1012	1527367.877	653586.077	4111.198	CLS		
24	1013	1527384.167	653587.165	4111.128	CLS		
25	1014	1527383.104	653567.664	4110.771	DS		

- *Digital Terrain Models*
- *3D Scans*
- *Topographic Maps*

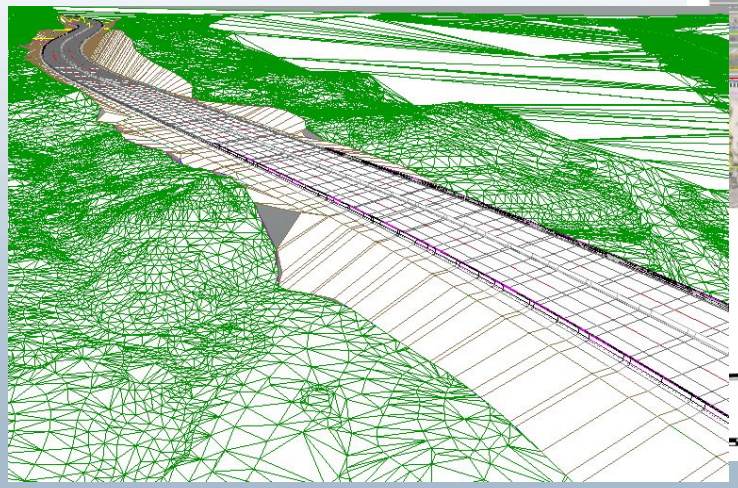


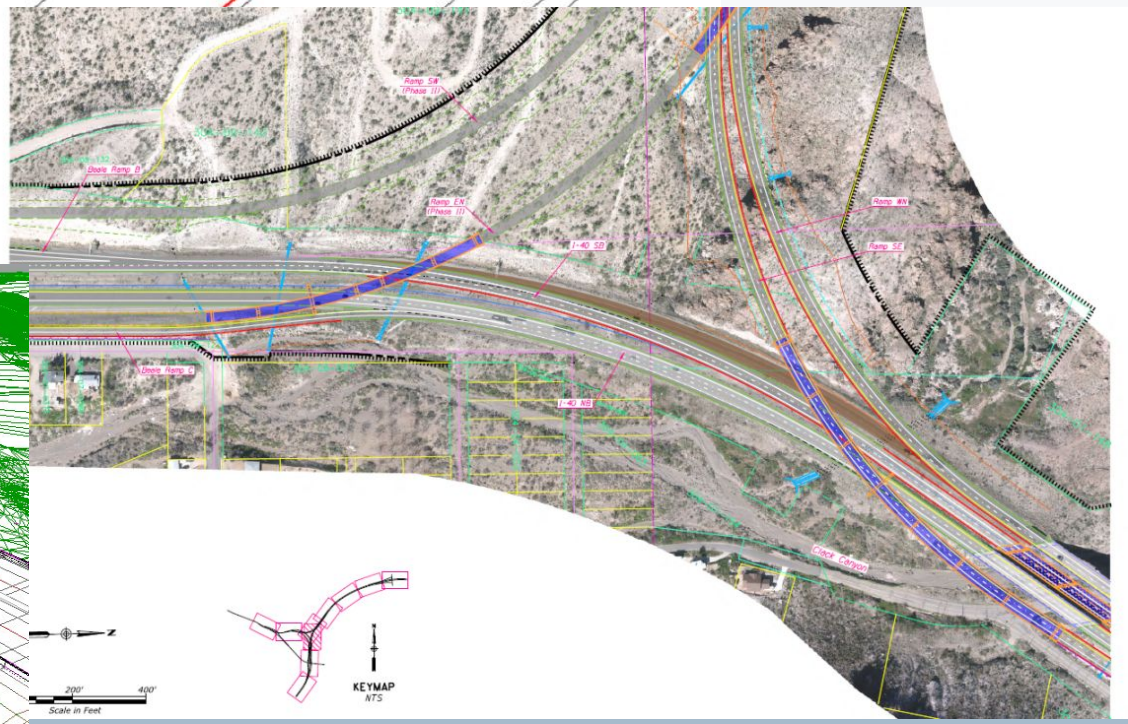
What We Do?

Roadway Design



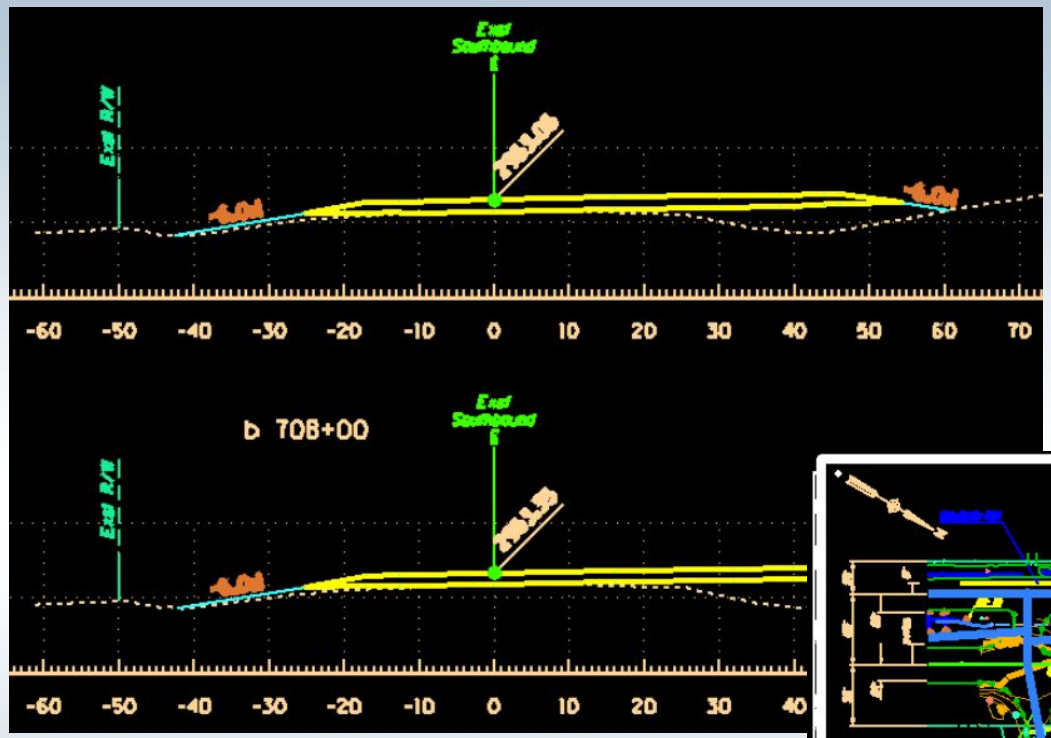
CADD Based Modeling and Geometrics

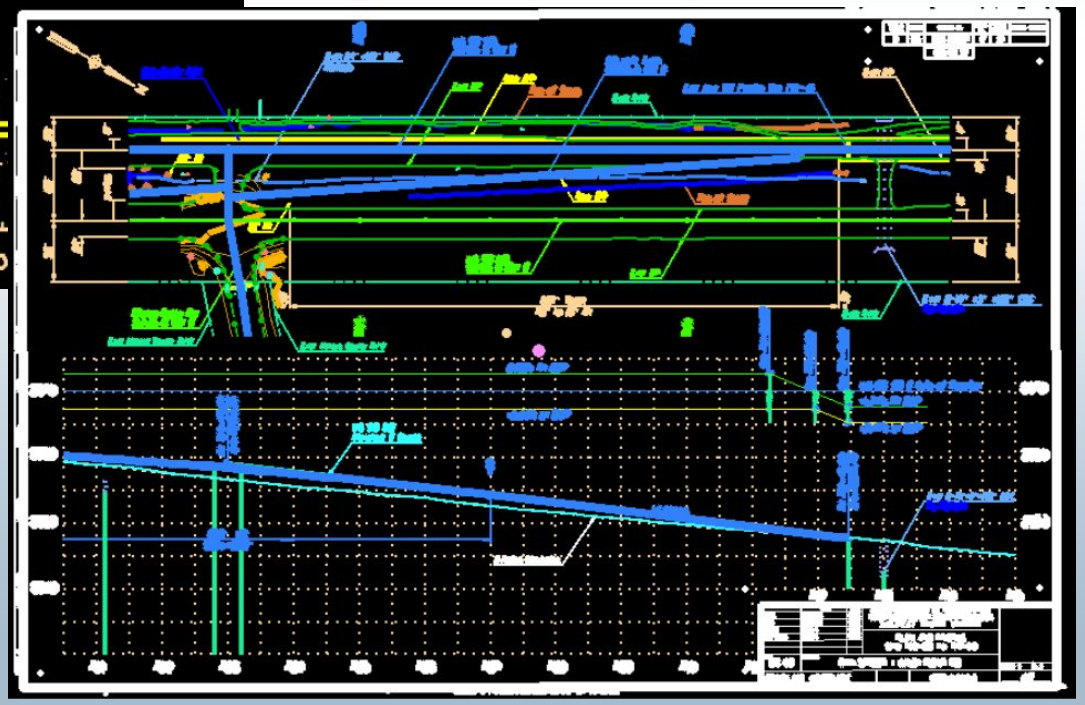




What We Do?

Roadway Design

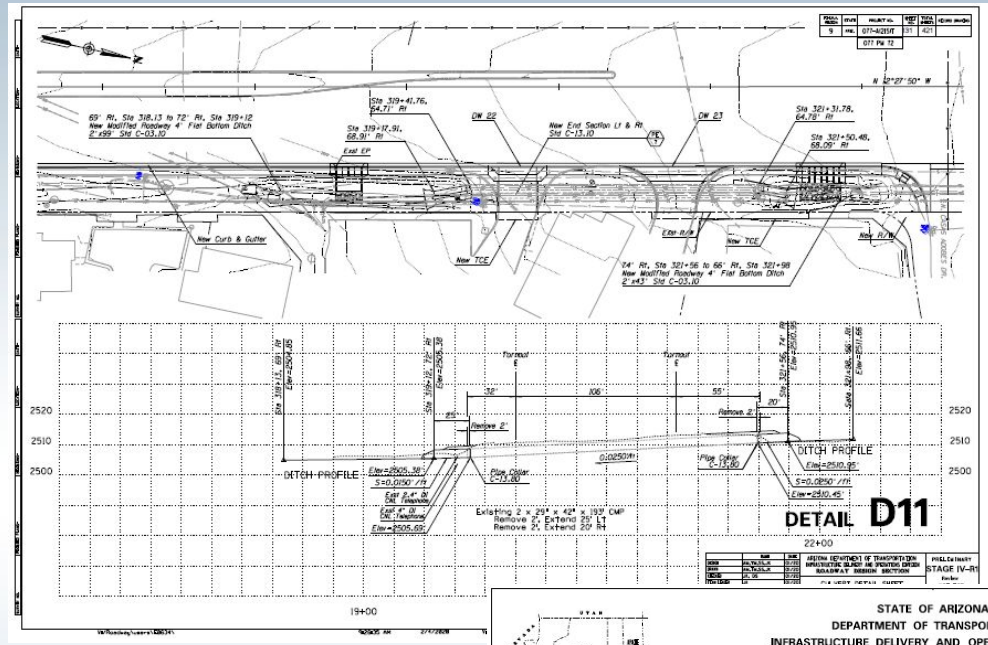


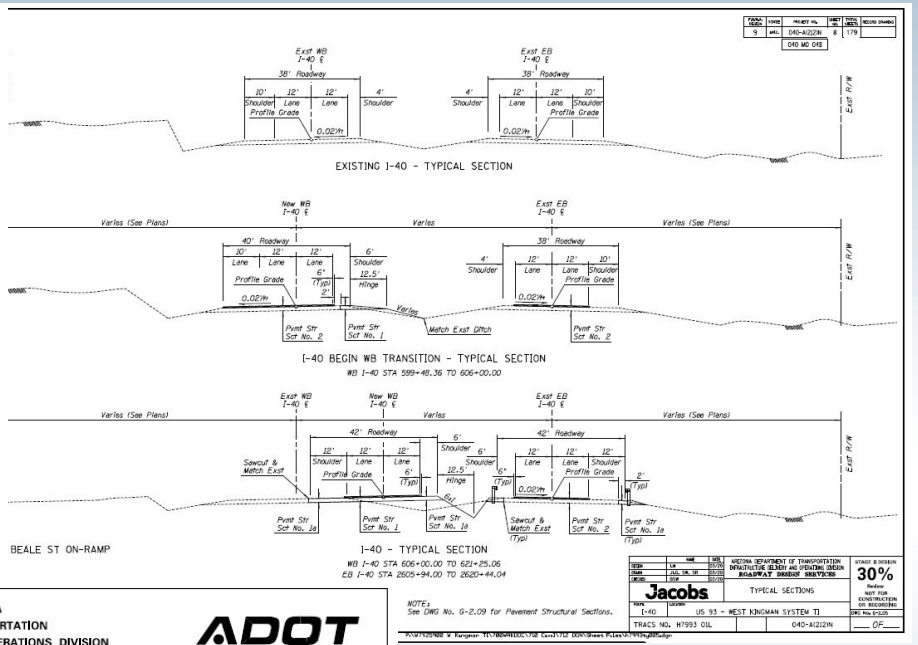


Design & Drafting

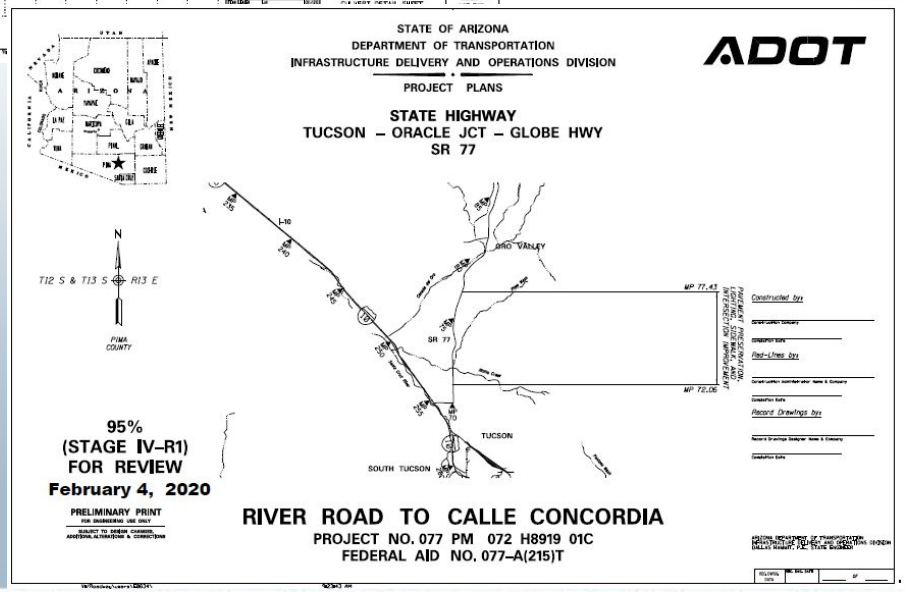
What We Do?

Roadway Design





Construction Plan Production & Delivery



What We Do?

Drainage

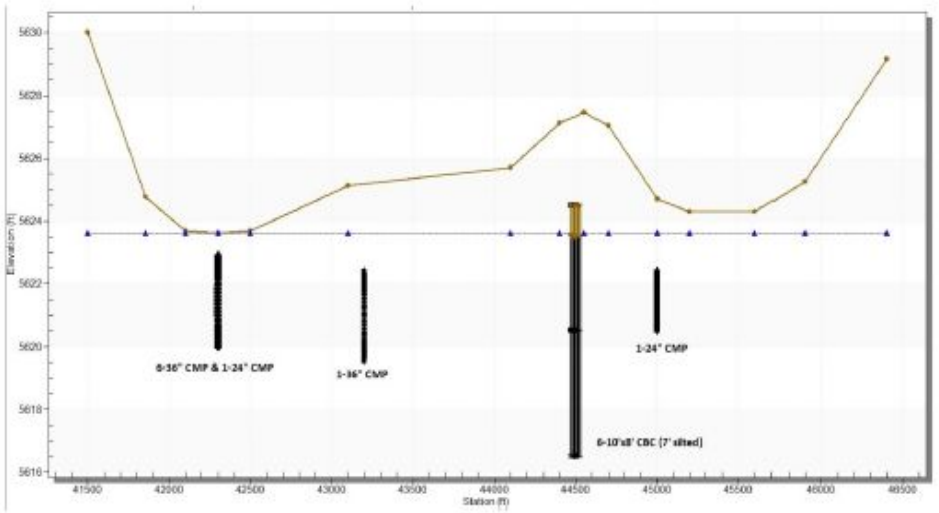
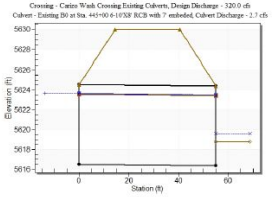


Figure 4. US 191 Roadway center line profile and existing culverts.

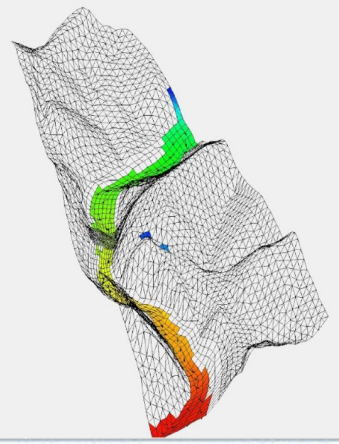
Photo 1: Siltation at Inlet of Existing 6 - 10'X8' CBC located at Carrizo Wash, MP 323.85

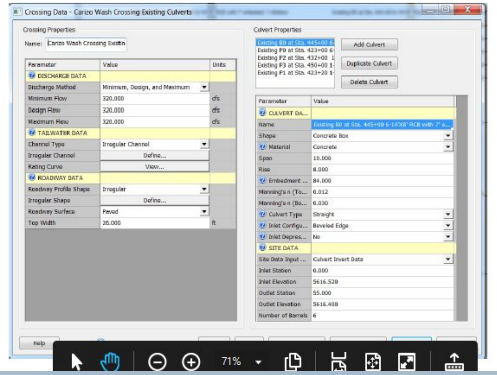
- *Data Collection*
- *Field Analysis*
- *Calculations & Modeling*



with 7'

Roadway overtopping at around Sta. 432+00 South of Existing Box Culvert.





What We Do?

Drainage

US 191 – Carrizo wash

Revised Final Drainage Report

TRACS NO. F015001D

Prepared for:
Arizona Department of Transportation

November 2019

Prepared by
Arizona Department of Transportation

Khandaker Haque, PE

Abu S Mohsenin

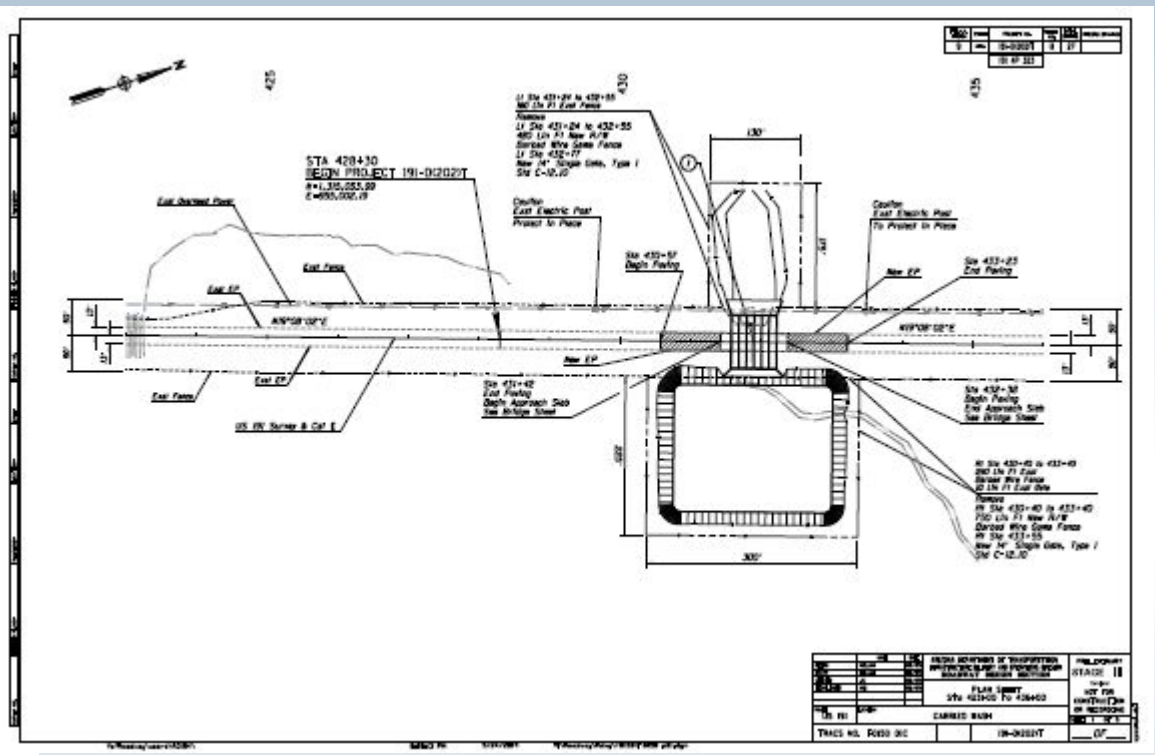
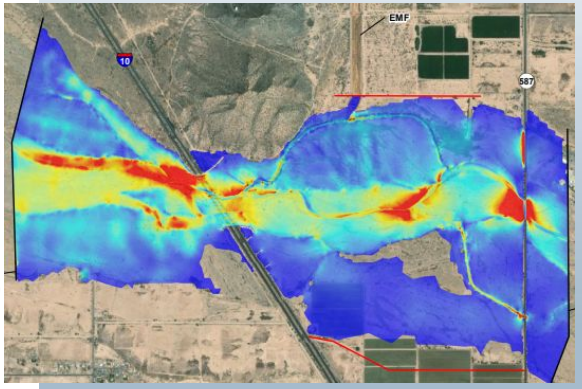


Figure 5: FEMA Flood Zone



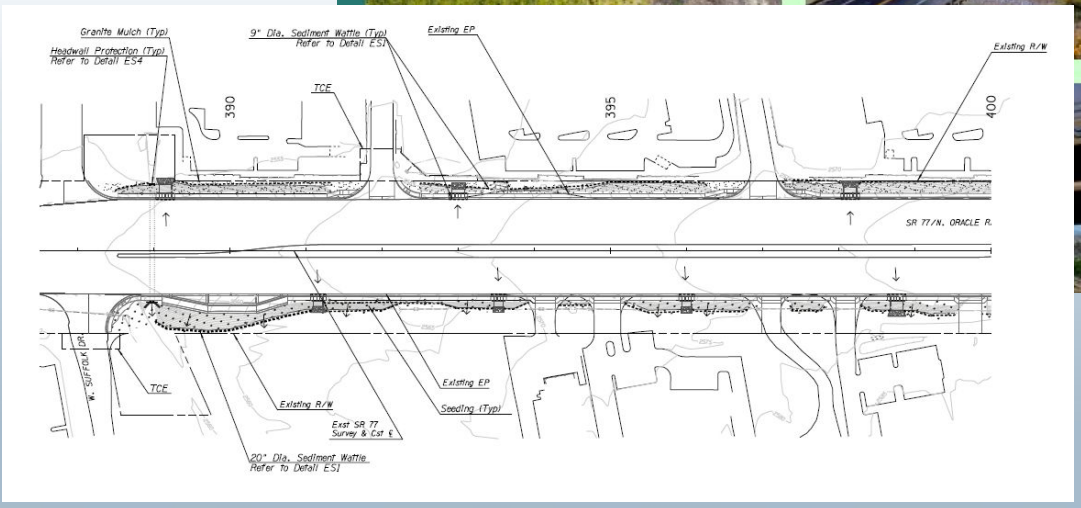
- *Design Reports & Documentation*
- *Construction Details & Plans*
- *Floodplain Modeling*

What We Do?

Roadside Development

Roadway Group

Roadside Development Section



- *Erosion Control*
- *Landscape Design*
- *Aesthetics*

Questions