

### 3.1 INTRODUCTION

This chapter of the *Roadway Design Manual* (RDM) provides guidelines for undertaking the design process and preparing the documents required to complete a Pima County roadway project. These guidelines are for use by those involved in roadway design for specific projects and in reviewing the adequacy of the documents produced. The term “designer” has been used to denote whoever undertakes roadway design for a specific project, including either Pima County in-house staff or a consultant under contract to Pima County.

As stated in Chapter 1, in the course of scoping a design project and/or carrying it out, the designer may determine that it is desirable to use methodologies and/or standards other than those presented and/or referenced in this manual. In such cases, the designer must request Pima County’s permission to use the alternative methodologies or standards. Pima County will consider all such requests and may, at its discretion, accept or reject them.

Additionally, due to the numerous stakeholders involved with the development of a Pima County roadway project, it is recommended that a Project Web Site be established for use by the Project Team to for the collation of data and information associated with the project.

#### Chapter Format

Each section begins with an explanation of the purpose of the task described, followed with a discussion of the process to complete the task, and, generally, concludes with guidance on the content of required reports or other documentation. Additionally, some sections include references to appendices that provide further guidance in the form of sample tables of content, checklists of key plan components, and other relevant material. All appendices are consolidated at the end of the chapter. The first appendix, Appendix 3-A, provides a list of references for Chapter 3.

#### Phases, Tasks, Submittals, Reviews and Approvals

The plan development process is divided into four phases. These phases (milestones) are described briefly below, and in detail in Section 3.20 of this chapter. Additionally, projects are typically reviewed and approved for advancement at key junctures of their development. These efforts include a review of various project documents, performance of a Value Engineering review(s) when applicable, completion of a Constructability Review, and following a specific

Project Management Gate process (detailed in Section 3.21) to assure agreement and approval of the project's scope, schedule and budget prior to it moving forward to its next phase.

- *Initial Design Phase*
- *Final Design Phase*
- *Initial PS&E Phase*
- *Final PS&E Phase*

Table 3-1 summarizes key design process tasks and related plan and report reviews/submittals required to complete Pima County's Roadway Design Process. The *Roadway Design Process Component Chart*, included in Chapter 1 as Appendix 1-B, provides a listing of the components to be addressed and developed within the Conceptual and Detailed Design efforts associated with the project.

The initiation, review, and approval for all project reports and plans shall conform to the following steps:

#### Step 1: Report and Plan Initiation

Development of a listing of the appropriate reports and plans for each Phase of the project, a timeline for said efforts, establishment a Quality Control Plan (refer to 3.2), and identification of an issues resolution methodology to be followed for the project.

#### Step 2: Report and Plan Development

Development of reports and plans identified for the project along with ongoing review/comment by appropriate Pima County Staff and other appropriate stakeholders during regularly scheduled working sessions (e.g. - weekly, bi-weekly, etc.). Attendees to these working meetings should include representatives from the appropriate disciplines (traffic, flood control, operations, engineering, right-of-way, cultural, transit, utility, etc.) and others whom may be impacted/involved with the project or deal with specific areas being discussed and reviewed.

#### Step 3: Report and Plan Review

Workshop reviews shall consist of the designer and other appropriate parties providing an update of the Reports and Plans associated with the particular "Phase" of the project. Comments made during the workshop review sessions should be based on the current Phase of the project's development. However, other comments about potential future issues (refined design) may be made and noted by the project team for consideration as the project is further developed. Once consensus is reached regarding the associated Reports and/or Plans, the project moves forward to its next Phase of development, which may include key milestone approvals (Step 4) or advancement to the next Phase of development. Additional details regarding Project Review and Approval Processes are found in Section 3.21

**Step 4: Report and Plan Approval.**

Location Report - Reviewed and recommended for approval by Staff and submitted for approval by the Director of the Department of Transportation (Director).

Design Concept Report (DCR) - Reviewed and recommended for approval by Staff and submitted for approval by the Director.

Environmental Assessment and Mitigation Report (EAMR) - Reviewed and recommended for approval by Department (Staff and Director). Reviewed and commented on by the Citizens Advisory Committee (CAC), with a formal submittal of comments to the Pima County Board of Supervisors. Reviewed and Approved by the Pima County Board of Supervisors. This process is further discussed in Section 3.4 and documented in Pima County's *Community Participation and Mitigation Ordinance (Code Chapter 10.56)*.

Note: The purpose of Pima County's *Community Participation and Mitigation Ordinance* is to ensure that proposed major roadway improvement projects address the overall public interest through:

- Adequate consideration of possible social, economic, environmental, and transportation effects
- Appropriate consideration of reasonable alternatives
- Interested parties are afforded an opportunity to express their views early enough in the study process to influence the course of studies as well as the action taken
- Decisions on projects are made in the overall public interest.

**Project Website**

In order to assist with access by team members for various project reviews, it is recommended that a Project Website, accessible by the Project Team be established where various project documents can be posted, maintained and updated as the project advances.

**Table 3-1 Design Process Tasks and Submittals**

<b>Task</b>	<b>Task Description</b>	<input type="checkbox"/> <b>Key Submittals</b>
3.1	Introduction to process	NA
3.2	Quality control throughout process	<input type="checkbox"/> Quality Control Plan
3.3	Utility coordination	<input type="checkbox"/> Preliminary Design Notification <input type="checkbox"/> Water, Reclaimed Water, and Sanitary Sewer Design Scoping Memorandum (as appropriate) <input type="checkbox"/> Plans for Utility Companies
3.4	Public participation starting early in the process	<input type="checkbox"/> Public Participation Plan <input type="checkbox"/> Documentation of Public Comments and County Responses
3.5	Coordination with government agencies	<input type="checkbox"/> Record of Communication (e.g., correspondence, etc.)
3.6	Integration of public art as applicable	<input type="checkbox"/> Public Art Plans
3.7	Gathering of relevant data	NA
3.8	Environmental impact screening prior to design	<input type="checkbox"/> Completed Questionnaire for Establishing Potential Areas of Impact <input type="checkbox"/> Summary Matrix <input type="checkbox"/> Results Memorandum
3.9	Study of alternative locations if needed	<input type="checkbox"/> Location Report
3.10	Surveying and mapping	<input type="checkbox"/> Summary of Coordination Meeting <input type="checkbox"/> Digital Files of the Topographic Mapping and DTM <input type="checkbox"/> Survey Report <input type="checkbox"/> Plots of Results of Culture and Utility Surveys <input type="checkbox"/> Results of Survey Drawing Showing Right-of-Way Data
3.11	Design of drainage facilities	<input type="checkbox"/> Initial Design Drainage Report <input type="checkbox"/> Final Design Drainage Report <input type="checkbox"/> Final PS&E Drainage Report
3.12	Investigation of geotechnical issues	<input type="checkbox"/> Geotechnical Report
3.13	Design of pavement related to project	<input type="checkbox"/> Pavement Design Report
3.14	Selection of bridge structure if needed	<input type="checkbox"/> Draft Bridge Structure Selection Report <input type="checkbox"/> Final Bridge Selection Report
3.15	Traffic Engineering	<input type="checkbox"/> Initial Traffic Engineering Report <input type="checkbox"/> Final Traffic Engineering Report
3.16	Design of arterial lighting	<input type="checkbox"/> Arterial Street Lighting Design Report
3.17	Study of design concept alternatives and selection of preferred concept	<input type="checkbox"/> Draft Design Concept Report <input type="checkbox"/> Final Design Concept Report
3.18	Environmental assessment needed beyond that done for screening (3.8) and development of mitigation as needed	<input type="checkbox"/> Draft Environmental Assessment & Mitigation Report <input type="checkbox"/> Final Environmental Assessment and Mitigation Report
3.19	Documentation for acquiring right-of-way	<input type="checkbox"/> Right-of-Way Plans
3.20	Preparation of construction documents	<input type="checkbox"/> Initial Design Phase <input type="checkbox"/> Final Design Phase <input type="checkbox"/> Initial PS&E Phase <input type="checkbox"/> Final PS&E Phase
3.21	Project Review and Approval Documents	<input type="checkbox"/> Value Engineering Review <input type="checkbox"/> Constructability Review <input type="checkbox"/> Exit Gate Review/Approval

Note: Appendix I-B identifies key components associated with Pima County Roadway Design Process.

## **3.2 QUALITY CONTROL**

### **Purpose**

Pima County expects designers to undertake Quality Control (QC) throughout the design process to ensure the production of well-executed plans. The QC Plan provides the basis for performing the QC review of the various documents that the designer shall submit to Pima County. The purpose of this review is to ensure that the documents are prepared in accordance with the proper standards, formats, and requirements of Pima County, that all mathematical calculations are performed correctly, and that all comments and concerns raised by the County at each phase of the document review are addressed.

### **Process**

At the beginning of the project, the designer shall prepare a QC Plan that documents the procedures to be used to ensure the accuracy and completeness of all project plans, reports, and related materials. The designer shall submit the QC Plan to Pima County for review and approval early in the project.

The QC Plan establishes the process by which the qualified individual designated by the designer fully checks plans, reports, and other documents prior to their submittal to Pima County. The individual assigned to conduct the QC review shall possess the qualifications required to perform the original work. Every project document shall be clearly marked with the name of the individual who checked the document.

Non-compliance with the QC Plan shall be sufficient cause for Pima County to reject a submittal. Pima County may perform periodic quality assurance audits.

### **QC Plan Content**

The QC Plan shall address the staff assignments, technical review procedures, checking process, and quality control monitoring approach. The Sample QC Plan presented in Appendix 3-B illustrates the items that the designer shall cover at a minimum in the QC Plan.

### **3.3 UTILITY COORDINATION AND DESIGN**

#### **Purpose**

The purpose of the Utility Coordination and Design task is to ensure the timely and accurate identification of the location of surface, underground, and overhead utilities; and if necessary, their effective and efficient relocation, such that the utilities do not impact, conflict with, or interfere with the project's construction activities.

#### **Process**

Working with Pima County's Utility Coordinator (PCUC), the designer shall complete a Preliminary Design Notification for the Utility Coordinator's signature. Pima County will distribute the notification to all the utility companies on file with the County, such that utilities that are within the project's limits are identified, and information regarding their facility location, long-range planing, and prior rights documentation is obtained. Refer to Appendix 3-C for the Preliminary Design Notification Form.

Subsequent to the Preliminary Design Notification, the designer shall schedule a coordination meeting with those entities that have active and abandoned facilities within the project limits. The purpose of the meeting will be to further review the project and discuss how the project may affect existing and future utilities in the area. During this meeting, the PCUC shall describe the requirements associated with Pima County Code, Section 1, Title 10, Chapter 10.50, Regulations for the Use of the Public Right-of-Way, which details efforts to be undertaken by utility companies that have facilities within Pima County right-of-way.

As the roadway design efforts advance, the designer shall provide the County with progress drawings for distribution to the utilities. The designer and PCUC shall schedule and hold additional utility coordination meetings as necessary to support the overall roadway design process. The PCUC and all potentially affected utilities shall be invited to these meetings to continue discussion of the identified and potential utility conflicts, focusing on approaches to resolving said conflicts, and working towards agreement on the next steps to be taken by the participants.

Utilities with facilities within the project's limits are required to provide the designer with facility horizontal survey data for incorporation into the project plans. Upon completion of "Background Culture" of the Surveys and Mapping task, Section 3.10, the designer shall distribute the results of the mapping and culture survey drawings to utility companies and request written confirmation that the depiction of their facilities, both active and abandon is complete and accurate to the best of their knowledge. A copy of the drawings shall also be sent to the PCUC for review.

The designer shall work with each utility company to identify facility locations that could impact, conflict, or otherwise interfere with the project, creating a listing of potential project/utility facility conflicts by facility type, station, and offset. Overhead facilities, (including down-guys) shall be investigated for aerial separation from improvements and possible impacts on roadway constructability. Each utility company with facilities listed will be required by a specified date to provide elevations of the facility (aerial and subsurface) at the

listed location. Subsurface facilities shall be potholed and exposed to accurately establish the facility's elevation. In the event this data is not provided to the project designer by the date specified, the design team will take appropriate steps necessary to obtain said data. Costs associated with this effort shall be tracked and provided to the PCUC for billing of the non-responsive utility in accordance with Pima County Code, Section 1, Title 10, Chapter 10.50.

The designer shall incorporate the vertical survey data into the project plans to refine the locations of project/utility facility conflicts. Based on this updated listing by facility, station, offset, and vertical location, the designer shall work with the impacted utilities to identify a proposed course of action/mitigation strategy. The proposed course of action shall be reviewed with, and approved by the PCUC prior to it becoming an approved mitigation strategy. The designer shall maintain an ongoing list of project/utility facility conflicts and related correspondence during the project.

As the roadway design efforts advance, the designer shall provide the County with progress drawings for distribution to the utilities. The designer and PCUC shall schedule and hold additional utility coordination meetings as necessary to support the overall roadway design process. The PCUC and all potentially affected utilities shall be invited to these meetings to continue discussion of the identified and potential utility conflicts, focusing on approaches to resolving said conflicts, and working towards agreement on the next steps to be taken by the participants.

Due to the variable nature of roadway design elements, the County and designer will assess the extent of project completeness, utility relocation timeframes, and project's bid advertisement date to determine when the Utility Clearance Letter request and project plans stamped *Final Plans for Public Utilities Only* will be distributed to utilities.

Upon distribution of the *Final Plans for Public Utilities Only* plans and request for a clearance letter, a meeting with each utility shall be arranged to establish a utility mitigation design schedule and milestones. The designer will be responsible for obtaining utility mitigation progress drawings from each utility at the identified milestones. The designer shall also consult with the PCUC on all plan changes subsequent to the distribution of *Final Plans for Public Utilities Only* for the purpose of identifying possible impacts to on-going utility mitigation design efforts. Should plan changes impact a utility's mitigation design, the designer shall arrange a meeting with the appropriate utility to determine what design modifications are required.

Throughout the project's design, the designer shall continue coordinating with the utility companies to monitor ongoing efforts and to resolve any other outstanding utility issues that may arise. The designer shall keep PCUC informed of any discussions conducted with and/or information provided to the utilities outside of the previously identified meetings.

The designer is directed to visit the Department's website for updates in guidelines, directives, policies, and procedures related to utility coordination and design.

## Utility Services

Utility services to each property that abut the project shall be researched for type and location (i.e. gas, water, electric, cable, phone, septic, and sewer). The designer shall develop a list of addresses of all properties abutting the project's right-of-way for distribution to utilities requesting information on whether service to the property is being provided.

Based on the information received, culture survey data, and field inspection of each property, a spreadsheet listing each property's address or tax code (if appropriate) (row) and utility servicing the area (column) shall be developed. The spreadsheet should clearly indicate which utilities are servicing the property. The location of each property service within road right-of-way shall be identified on the project plans and reviewed for impacts with the roadway improvements.

## Tucson Water Design – Scoping Memorandum

The designer may be requested by the County to prepare utility design drawings for the alteration of Tucson Water facilities. When this is the situation, the designer shall prepare a scoping memorandum that describes apparent potable, reclaimed water conflicts, and includes a scope that details the work required to design necessary modifications of those facilities. The designer shall provide the scoping memorandum to Pima County at the time the Final Design Phase is initiated.

Upon approval of the scoping memorandum by Pima County and Tucson Water, the designer shall submit a fee proposal to Pima County for the authorized design work. Following authorization of the additional services, the designer shall prepare water modification plans in accordance with the standards dictated by Tucson Water. These plans once completed and approved by Tucson Water, will be distributed to the other utilities as needed.

## Utility Design – Memorandum of Agreement

Utility work (design and/or construction) other than for Tucson Water to be performed by the County at the request of a utility company, shall be memorialized in a Memorandum of Agreement (MOA) signed by the County and utility. The purpose of the MOA is to have a written understanding of the agreement between the County and utility. No work shall commence until the MOA has been executed. Refer to Appendix 3-V, Sample Utility Memorandum of Agreement.

The MOA shall include the following sections and language:

1. GENERAL

*{Insert language that provides the necessary background information addressing the reason for the MOA; agreement participants; county project name, location, and number; and other pertinent information.}*

2. PURPOSE

*{Insert language describing the intent and purpose of the parties to the agreement.}*

3. DESCRIPTION OF WORK

*{Insert description of work including design and/or construction standards and specifications, if applicable.}*

4. ROLES AND RESPONSIBILITIES

Pima County Department of Transportation

*{Insert language that describes the departments role and responsibilities including, but not limited to, specific work activities, processes to follow, deliverables, permitting requirements, deadlines, assistance to be provided, inspections, commitments, acceptance of work, etc.}*

*{Insert Name of Utility}*

*{Insert language that describes the departments role and responsibilities including, but not limited to, specific work activities, processes to follow, deliverables, permitting requirements, deadlines, assistance to be provided, inspections, commitments, acceptance of work, etc.}*

5. COMPENSATION AND BILLING

*{Insert a detailed breakdown of all costs to be paid by each party. Cost should include, either on a percentage of total cost basis or actual invoice amount, administration, inspection, mobilization, profit, overhead, traffic control and other similar type charges, if applicable. Method of payment, payment due date, and consequences for nonpayment or past due payment should be included. An estimate of costs may be used if exact costs are not known at the time of execution of the agreement. Billings will be based on actual costs incurred. }*

6. MODIFICATION AND TERMINATION

This Agreement may be modified or terminated at any time only by the mutual written consent of *{insert name of utility}* and Pima County Department of Transportation.

7. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement hereto and supersedes any prior understanding or written or oral communication between *{insert name of utility}* and Pima County Department of Transportation respecting the subject matter hereof.

8. EFFECTIVE DATE, TERM, AND SIGNATURE

This Agreement shall be effective on the date on which both parties sign hereto, whichever date is later, and end *{insert date}*, or until the Agreement is terminated pursuant to the terms contained herein, whichever event occurs first.

Authorized signatures and dates

_____	_____
<i>{Insert name and title of authorized person for Party 1}</i>	Date
_____	_____
<i>{Insert name and title of authorized person for Party 2}</i>	Date

**Prior Right Claim**

A claim of a prior right shall be brought to the attention of the Pima County Utility Coordinator for processing. The utility alleging a claim of prior right shall submit the following information:

- Property or easement documentation
- Acquisition date of the property or easement
- Documentation identifying when the effected facility physically occupied the property or easement.

The Pima County Utility Coordinator shall submit the information to the Pima County Engineering Information Management Mapping and Records Section for validation of the claim.

## 3.4 PUBLIC PARTICIPATION

### Purpose

The purpose of Public Participation is to inform citizens about projects and solicit their input during project development. In recent years, members of the public have made it clear that they want roadways that are functionally compatible with their neighborhoods, constructed in a manner that is sensitive to the surrounding environment, and aesthetically pleasing. The public participation process provides the opportunity for understanding what is important to the public at an early stage and for seeking ways to respond to citizen issues as an integral part of the design process.

Key goals of Pima County's public participation process are to:

- Educate the public about the project's purpose and need
- Solicit the public's comments on the roadway project
- Review public comments and adjust the roadway design to address public concerns to the greatest extent possible and within the constraints of safety and cost

### Process

The Public Participation process shall be in accordance with the latest version of Pima County's *Community Participation and Mitigation Ordinance* (see Chapter 1, [Appendix 1-A](#)). Key elements of the Public Participation process are summarized below.

Pima County will establish and select the members of the required Community Advisory Committee (CAC). Pima County will arrange for a regular meeting place, and will develop and mail all meeting notices. Meetings shall be held as often as necessary for the committee to provide input to the development of all reports and plans identified in this chapter. Typically, the CAC meetings are used to introduce the public participation process and project basics to the Committee members, provide preliminary design information, obtain input relative to the project's design, and follow-up on the comments/suggestions made by the CAC, ultimately working towards a final project design concept based on these interactions.

Public open house meetings shall also be held, as necessary, for Pima County to disseminate information and for the public to provide input. Pima County will arrange the site for all public open house meetings, develop the mailing list, develop open house meeting notices and mail all notices. Pima County will develop and distribute all questionnaires and public opinion surveys used at the public open house meetings.

### Tasks and Documentation

The designer shall assist Pima County with the following public participation as appropriate:

- Develop a Public Participation Plan in coordination with the Pima County Project Manager and Pima County Community Relations office. The plan shall begin with the requirements of the Pima County *Community Participation and Mitigation Ordinance* and then be

expanded as appropriate to reflect the scale of the project, probable controversy, and level of potential impacts on the physical, social, and economic environment. Checklists of tasks required to implement the plan activities, events, and/or mailings and those responsible for each task shall be developed along with the plan. Items for consideration in developing a Public Involvement Plan are presented in Appendix 4-Da.

- Provide sufficient representation at all CAC meetings, public open house meetings, and public hearings
- Provide necessary background information, reports, plans and displays for all CAC meetings and open houses
- Provide meeting summaries for all CAC meetings
- Develop questionnaires and public opinion surveys
- Summarize the results of all questionnaires and public opinion surveys
- Assist the County in the documentation of responses to public comments

Summarize the implementation of the Public Involvement Plan (see [Appendix 3-B](#)). Include the summary to date in the project documents that discuss public involvement, including the DCR (Section 3.17) and the EAMR (Section 3.18). Include complete documentation of the public involvement effort in the appendix to the EAMR including the Public Participation Plan; copies of all mailings, surveys, questionnaires, advertisements, meeting and event announcements, handouts, and displays; copies of all mailing lists; copies of all meeting and event sign-in sheets; copies of all written comments and all written responses; photographs of meetings and events, if available; and any other relevant material.

Pima County shall also establish and maintain a project web site where project materials and information will be uploaded for access and review by the public.

### **Exemptions**

While all projects must follow the use of design guidelines and standards, including potential environmental and cultural resource evaluations to ensure compliance with State or Federal Regulations, the Department may use its discretion in determining the appropriate level of documentation and/or public involvement required to facilitate the decision making efforts for minor projects. “Minor projects” which are exempt from the Community Participation Ordinance, but shall require approval by the Director of the process to be utilized include the following:

- Overlay or maintenance of an existing roadway
- Addition of paved shoulder, bike lanes, or multi-use lanes to an existing roadway
- Pavement widening of an existing roadway which does not increase the number of through traffic lanes
- Changes or improvements to the right-of-way area outside the shoulder of an existing roadway
- Drainage improvements
- Safety improvements identified as contained in Traffic Engineering’s Safety Management System (SMS)

## **3.5 FEDERAL, STATE, AND LOCAL COORDINATION**

### **Purpose**

The purpose of federal, state, and local coordination is to make sure that all other governmental agencies and jurisdictions (hereafter referred to as agencies) that have an interest in the project area are informed of the project and provided an opportunity to comment on the project and, as appropriate, participate in the project development process.

### **Process**

Agencies with a potential interest in the project shall be identified by the Pima County Project Manager and the designer and confirmed with other members of the Design Team at an early project Coordination Meeting. Agencies with an interest would normally be those agencies with property adjacent to the project site or with regulatory responsibilities within the project area. Examples of such entities might be the Tohono O’Odham, Pascua Yaqui, U.S. Department of the Interior - Bureau of Land Management, U. S. Forest Service, U.S. Fish and Wildlife Service, Arizona Game and Fish Department, Arizona State Land Department, U.S. Army Corps of Engineers (ACOE), Town of Marana, Town of Oro Valley, Town of Sahuarita, City of South Tucson, City of Tucson, and others.

Once potentially interested agencies are identified, Pima County, or the designer if so instructed by Pima County, shall contact those agencies by letter or phone to determine their level of interest in the project. This agency coordination should be undertaken to satisfy any agency coordination that may be needed in conjunction with undertaking the Environmental Screening (Section 3.8) and the EAMR (Section 3.18).

If there are particular agencies with whom intergovernmental agreements (IGAs) or mitigation measures must be established, the Pima County Project Manager will be responsible for setting up meetings, conference calls, or whatever form of communication is most appropriate for addressing and resolving any issues directly relevant to the design of the project.

If the design of a project changes substantially after consultation with an agency is completed, the agency shall be informed of the change and provided another opportunity to comment.

### **Documentation**

Coordination with other agencies shall be documented in a Record of Communications that includes letters, e-mails, faxes, and summaries of phone calls, and meetings.

## 3.6 PUBLIC ART

### Purpose

The purpose of the Public Art Program is to comply with Pima County's Public Art Program Policy as found in Board of Supervisor's Policy C 3.3, which requires that 1% of the planning, design, and construction cost of each roadway project be used for public art. Works of art may include the integration of artistic elements into bridges, noise walls, railings, benches and sidewalk surface treatments, as well as stand-alone sculptures placed within public right-of-way. A copy of the Board's Policy is found in [Appendix 3-E](#).

### Process

The Public Art Program for a project shall be in accordance with the Pima County Board of Supervisors Policy on Public Art. The program is implemented pursuant to Administrative Procedure 3-16. The process includes project scoping, artist solicitation and selection, project design and construction.

Pima County contracts with the Tucson-Pima Arts Council (TPAC) to coordinate artist solicitation and selection, and to assist during project design and construction. The Arts Council is responsible for development of the Call to Artists; assembling the artist selection panel (a professional artist, two representatives of the affected neighborhood with one being appointed by the Board member within whose district the public art project will be located, two artists appointed by the Public Art Coordinator based on input from the Public Art and Community Design Committee, one designee from the department funding the project – typically the project manager, and one project professional – e.g. design principal, landscape architect, project contractor); and completing a final inspection of the artwork, certifying to Pima County that the artwork is complete.

The selection process is an open and competitive process, with the panel reviewing all applicants and selecting an artist based upon their qualifications. After the artist is selected by the panel, the selection shall be approved by County Administration. The artist will then contract with Pima County (DOT) and become a member of the project design team. When the project design is initiated, the project team (including the artist) shall schedule a Community Advisory Committee (CAC) meeting to discuss the public art for the project and solicit community input. As the artwork is developed, additional CAC involvement may be required. Designs for the artwork are to be included in the project design plans, specifications and construction documents. Additionally, the project artist and PCDOT shall be responsible for assuring the artwork is designed and constructed within the scope, schedule and budget established for this component of the project.

Due to the time that is necessary to complete the efforts associated with an artist's selection, approval, and contracting (typically 4 – 6 months); it is imperative that the artist selection activities are scheduled and occur sufficiently early enough within the project to assure the Public Art component is appropriately addressed and included as part of the project. The Department has designated a specific position (Public Art Coordinator) within the Transportation Planning Division whom shall be contacted to provide guidance and assistance with these efforts.

## **3.7 DATA GATHERING**

### **Purpose**

The purpose of Data Gathering is to obtain all available pertinent information required to complete the project. This information shall be used throughout the design process to develop reports and plans.

### **Process**

The designer shall collect and assemble the required data from Pima County and other sources.

### **Information to be Acquired**

The designer shall acquire, at a minimum, the following project area information as is relevant and available:

- Record of Survey Maps, Subdivision Plats (including original subdivision plat information if a replat of subdivision), and Development Plans
- Assessor maps
- Zoning maps
- Aerial photography and topography with support data
- Improvement plans
- Hydrology/hydraulic reports
- Geotechnical reports
- Property ownership from assessor's records
- Right-of-way ownership records (deeds, easements, leases, patents)
- Existing and proposed development plans
- Proposed rezoning cases
- Ordinances and statutes
- Homeowner associations
- Permitting requirements
- Planning reports/studies
- Traffic studies/reports
- City limit maps (annexation maps)
- Applicable design standards
- Floodplain map (by Federal Emergency Management Agency [FEMA])
- Road maps
- As-built plans

- Blue Stake information
- Utility plans and easements

## 3.8 ENVIRONMENTAL SCREENING

### Purpose

The Environmental Screening provides an initial indication of potential environmental impacts to the surrounding physical, social, and economic environment that may result from construction and operation of the project. The screening results should inform the design process, allowing early and careful consideration of possible design modifications and/or alternatives that would help avoid or minimize adverse impacts. The screening is also the first step in the preparation of the EAMR, which is discussed in detail in Section 3.18.

### Process and Documentation

The Environmental Screening process includes the following three documents:

- Questionnaire for Establishing Potential Areas of Impact (Questionnaire)
- Summary Impact Matrix (Matrix)
- Results Memorandum (Memorandum)

Sample forms for the Questionnaire and Matrix, as well as a suggested outline for the Memorandum, are included as Appendices 3-Fa, 3-Fb, and 3-Fc, respectively. Together these documents provide the tools for the systematic identification of potential areas of concern in the surrounding natural, physical, and social environment; of project elements and construction and operational activities; and of the potential impact of the project elements and activities on the potential areas of concern.

The Environmental Screening process shall take place early within the Initial Design Phase and prior to development of the initial draft DCR submittal (see Chapter 1, Appendix 1-B).

#### Step 1: Environmental Coordination Meeting

The designer shall arrange an Environmental Coordination Meeting with the full Design Team, including any environmental specialists working on the team, and the Pima County Project Manager. The focus of the meeting shall be to raise any questions about the project that would assist in completing the Questionnaire, and, most importantly, to go through the Matrix to identify the project elements and construction and operational activities that are applicable to the project and could potentially cause impacts to the surrounding natural, physical, and social environment. A copy of the Matrix shall be revised to reflect the outcome of the discussion.

A field visit to observe and photograph the site is strongly recommended prior to the Environmental Coordination Meeting. (Some photographs may be appropriate for use in the Results Memorandum and later in the DCR and EAMR.)

### Step 2: Completing the Questionnaire (Appendix 3-Fa)

The purpose of the Questionnaire is to systematically identify areas of the physical, natural, and social environment that might be affected by the project. The Design Team member charged with overseeing the environmental impact assessment for the project shall be responsible for making sure that the Questionnaire is completed. However, questions related to specific technical disciplines shall be answered by or in collaboration with a member of the Design Team trained in the discipline. Information sources shall be cited in the space allotted on the Questionnaire form, (e.g., maps, species lists, conversations, documents, field visits, written communication).

### Step 3: Completing the Matrix (Appendix 3-Fb)

The chief purpose of the Matrix is to provide a “snapshot” of potential adverse environmental impacts so that they may be addressed in the design, or if that is not feasible, analyzed further and mitigated to the extent possible. The Design Team member charged with overseeing the environmental impact evaluation for the project shall be responsible for making sure that the Matrix is completed.

The level of research and/or assessment undertaken in preparation for filling out the Matrix will vary from project to project. It is assumed, however, that most roadway projects that would be subject to the *Roadway Design Manual* would have either in-house or contracted environmental specialists on the Design Team. These specialists may want to proceed with literature reviews at the screening stage. This reconnaissance work should provide information useful to identifying potential project issues and concerns.

### Step 4: Preparing the Memorandum (Appendix 3-Fc)

The team member charged with overseeing the environmental impact assessment for the project shall be responsible for preparing the Memorandum, which should include the following:

- Summary of the screening process
- Discussion of environmental issues revealed through completion of the Questionnaire and Matrix
- Suggestions/recommendations on how environmental issues might be addressed through the design process
- Identification of technical issues that may need analysis above and beyond those included in the original scope of work for the project’s environmental assessment

The Memorandum shall serve as the basis for the text on environmental considerations included in the DCR (see Section 3.17). Additionally, the completed Questionnaire, Matrix(cies) (see Step 6 below), and Memorandum shall be included in the DCR Appendices.

Step 5: Team Review of Screening Results

The results of the screening process shall be reviewed and discussed with the full Design Team to ensure that members representing different disciplines are aware of the potential environmental concerns as early as possible in the project, so that these concerns can be actively taken into account during the development of the design concept.

Step 6: Project Modifications/Alternatives

If project modifications are made to address potential environmental issues or for some other reason, or project alternatives are considered, additional Matrices may be prepared to show how the “snapshot” evaluations of the modified project and/or alternatives differ from the original “snapshot” evaluation.

## 3.9 LOCATION STUDY

### **Purpose**

A Location Study is undertaken for a new roadway project or for a major improvement project for which there are several possible alternative roadway alignments that are worthy of examination. The purpose of the Location Study is to develop reasonable corridor alignments and compare them based on costs, impacts to the area, and construction requirements.

### **Process**

The designer shall conduct the study of possible locations using data gathered and environmental issues identified during the Data Gathering and Environmental Screening Tasks (see Sections 3.7 and 3.8). The designer shall document the results of the study and the recommended roadway alignment in a Location Report.

### **Report Content**

Items that shall be addressed in the Location Report include:

#### Introduction

Summarize the reasons that a Location Report was determined necessary.

#### Mapping

See Section 3.10, Mapping, for Location Study.

#### Identification of Alternative Locations

Briefly describe both the horizontal and vertical geometry for each location.

#### Comparative Impact Assessment and Analysis

Determine potential impacts of the project on the existing conditions and the conceptual construction cost of each roadway location. Present a qualitative and quantitative (when possible) comparison of the impacts and construction costs of the alternative roadway locations. Summarize the results of the comparison of alternative roadway locations. (The forms provided for the Environmental Screening [see Section 3.8 and Appendices 3-Fa, 3-Fb, and 3-fc] may be helpful in evaluating the location alternatives.)

#### Conclusions and Recommendations

Identify the recommended roadway location. Summarize the potential impacts of the recommended location on the environment, neighborhoods, and alternative modes. Identify which of these impacts should be further analyzed in conjunction with preparation of the EAMR (see Section 3.18).

Report Exhibits

- An aerial photo showing the alternative locations with significant features such as major streets and washes, as well as features evaluated in the alternative comparison such as residential areas, businesses, historic sites, and habitat.
- A matrix comparing impacts of the alternative roadway locations studied. An example is provided in Appendix 3-G.

## 3.10 SURVEYS AND MAPPING

### Purpose

The purpose of Surveys and Mapping is to provide the field data needed to perform the planning, design, and right-of-way tasks for the project. This typically includes record research, control surveys, right-of-way surveys, photogrammetric mapping, and engineering surveys.

### Coordination Meeting

The designer shall arrange to have a Survey Coordination Meeting with the Pima County Project Manager and a representative of the Pima County Survey Section to determine project-specific survey approaches and details. This meeting shall be held during contract negotiation to further define the scope of work. Items to be resolved include the following:

- Basis of horizontal and vertical control – use of Arizona Coordinate System, 1983 (ACS 83), and North American Vertical Datum, 1988 (NAVD88), and availability of acceptable control points
- Availability of as-built plans, right-of-way plans, and other research materials
- Basis of stationing
- Contour interval and scale of topographic mapping if required
- Scale and extent of Location Study mapping if required
- Timing of survey tasks, including arrangement by Pima County for utility Blue Staking for design
- Format and information to be included in survey report
- Format of other survey-related deliverables to be provided by the designer, including the line type and weight, symbols, and layering scheme for digital submittals

The designer shall prepare a written summary of the meeting documenting any instructions given and choices made. This summary and any clarification shall be completed in a manner compatible with the contract negotiation.

### Research

The designer shall:

- Obtain as-built plans, right-of-way plans, and deeds of acquisition from the Pima County Engineering Information Management Section
- Obtain copies of encroachment licenses from Pima County Real Property and review licensed improvements within the road right-of-way, creating a listing of impacted improvements
- Check other sources of information, including recorded plats and recorded surveys

- Make inquiries with the Pima County Development Services Department for proposed development that is adjacent to the project. These developments may impact the project and require coordination with Pima County.
- Make inquiries at municipal offices, utility company offices, and other agencies for documentation that may impact the project
- Obtain applicable Public Land Survey System plats and notes from the Bureau of Land Management office
- Seek information from local surveyors known to have worked in the area as appropriate

### **Datum and Basis of Bearing**

Horizontal control shall be referenced to the ACS 83 utilizing the latest published adjustments of the North American Datum, 1983 control network. (international foot, as specified in the Arizona Revised Statute (ARS) §33-132).

The basis of bearing shall be established on a well-defined line, between two existing found monuments, within the project limits and shall be referenced to ACS 83 grid north.

The vertical datum shall be NAVD88 utilizing the most recently published orthometric heights.

### **Stationing**

Stationing shall be south to north and west to east for roadway improvements, and in the upstream direction for drainage improvements. The initial station shall be set large enough to preclude the possibility of negative stations should the project limits be expanded. Stationing shall be established in the Survey Coordination Meeting.

Pima County will not accept horizontal survey equations on design plans unless prior written approval has been obtained. Vertical survey equations will not be accepted under any circumstances.

### **Horizontal Control Network**

A horizontal control network shall be established encompassing the project. Pima County will provide the existing control points on which the project horizontal control network is to be based at the Survey Coordination Meeting.

Horizontal control points shall be recovered or established at each end of the project, at major intersections, and at the ends of intersecting streets where the proposed work extends more than one-quarter mile.

Section corners, quarter corners, sixteenth corners, and other monuments that define existing alignments and rights-of-way and/or lie within the project limits shall be incorporated into the horizontal control network. Obliterated aliquot corners shall be identified and re-monumented as specified in the Arizona Revised Statutes (ARS) §33-103. Corners deemed lost shall be re-established and monumented as specified in the ARS §33-103.

The horizontal control network shall meet a 2 cm local accuracy standard (minimally constrained least squares adjustment) and 4 cm network accuracy standard (fully constrained least squares adjustment) with a 95% level of confidence.

The ACS 83 coordinates and the surface coordinates of each horizontal control network point shall be determined. A single mean combined grid-to-surface factor shall be computed and used to transform the horizontal control network to the surface. Surface values shall be used for all other survey and design work.

Horizontal centerline (not including property centerline, etc.) control points shall be referenced with swing ties to at least two durable points, which are to be tagged or marked "Ref." Reference points shall be located at the edge of right-of-way or in other locations where they are unlikely to be disturbed during construction. At least two reference points shall be provided to each section corner, quarter corner, and centerline monument.

### **Vertical Control and Benchmarks**

Vertical control shall be tied to at least two known benchmarks provided by Pima County at the Survey Coordination Meeting identified previously. Benchmark level lines shall, at a minimum, originate on one existing benchmark agreeing within the limits of these specifications and terminate on one existing benchmark agreeing within the limits of these specifications. The originating and the terminal benchmarks must be recognized as Third Order or better by the NGS or Pima County DOT Survey Section. The following equations will be used to compute the maximum elevation closure.

Third Order – maximum elevation closure (in feet) =  $0.05 * \sqrt{M}$  , where M equals the distance between checks (in miles)

All supplemental vertical control surveys necessary for establishing vertical positions or vertical control points, shall be performed by method of differential levels initiated and terminated on a benchmark, double run, or looped, and a turn may be made on the point. Vertical Control points shall be established, at a minimum interval of 500 feet, on alternating sides of the project centerline control and shall be located at the edge of the right-of-way, or in other locations where they are unlikely to be disturbed during construction.

Missed closure for benchmark leveling shall be prorated throughout the marks, in proportion to the distance between them. Missed closure for supplemental vertical control leveling shall be uniformly distributed through the turns in the run or loop.

The survey notes for the bench circuit, including benchmarks set for the project, shall be included in the survey report.

### **Topographic Mapping and Surveys**

Terrestrial and/or photogrammetric topographic surveys shall be performed to determine contours, spot elevations, ridges, drainage patterns, and other elevation-related information needed for project studies and design. For Field Surveys (i.e. topographic & photogrammetric

surveys) existing NGS control points will be used to establish Third Order Control on projects as defined in Part 4 of the latest edition of *Standards for Architecture, Engineering, Construction and Field Management of the Federal Geographic Data committee Standards manual (i.e. FGDC-STD-007.4-2002)*.

Topographic information normally obtained for a project includes (1) digital files of the terrestrial and/or photogrammetric contour mapping in the drawing file format to be used for design, (2) a hardcopy plot of the topographic mapping, and (3) a digital terrain model (DTM) in a format that can be used with roadway design software such as InRoads.

Topographic mapping, photogrammetrically derived, shall conform to the accuracy standards approved by the American Society for Photogrammetry and Remote Sensing Professional Practicing Division, March 1990, Class 1. The term “error” is used here to signify the discrepancy between the locations of a particular point as shown in the mapping and as determined by a field survey. The accuracy of the mapping is indicated by the root mean square (rms) of the error existing at a finite number of well-defined points. The rms is computed as

$$\text{rms} = (D^2 / n)^{1/2}$$

where

$$D^2 = (d_1^2 + d_2^2 + \dots + d_i^2 \dots + d_n^2)$$

N = number of points  
 $d_i$  = error at a particular point

This is typically applied separately in the x and y components of horizontal location. It is also used as a measure of vertical error, though a different standard applies. The unit of rms is measured in distance (feet in most cases). RMS error analysis applies to x, y, and z equally. Horizontal points must be well defined in the mapping in order to be located in the field. Vertical checks are random and computed against the DTM surface. Units must match the project datum definition.

The horizontal standard of accuracy of rms is one hundredth of the map scale. For 1" = 40' mapping, for example, the separately calculated  $\text{rms}_x$  and  $\text{rms}_y$  should both be less than 0.4'.

The vertical standard of accuracy of rms for contours is 1/3 the contour interval and for spot elevations, 1/6 the contour interval.

*Note: The topographic mapping and DTM within the right-of-way shall be sufficiently accurate (within 0.1') to allow for the determination of pay quantities associated with the project earthwork (e.g. – roadway excavation, drainage excavation, embankment demand, and borrow).*

## Cross Sections

Cross sections of the existing corridor shall be provided. These may be determined by manual field surveys or created from the DTM with special software such as InRoads. Cross sections shall be taken at 50-foot intervals along roadways and minor drainage ways, and at 100-foot intervals along major drainage ways. Cross sections shall also be taken at grade breaks, drainage crossings, and other significant terrain features. All cross section points must meet the topographic mapping accuracy requirements stated above.

Additional cross sections, data collection of both horizontal and vertical information, shall be made at any and all designated “tie-in/match existing” locations identified within the project limits (including but not limited to begin/end of project, side streets and driveways) to verify the existing conditions. These additional cross sections shall be field surveyed by conventional survey methods utilizing trig leveling for vertical data. GPS RTK data or computer generated vertical datum derived from aerial topographic DTM will not be acceptable for vertical data on these additional cross sections.

### **Utility Coordination**

Pima County will provide utility coordination and arrange for Blue Stake for design prior to the culture survey. Note: Right-of-way and/or construction limits may need to be marked prior to Blue Staking.

### **Culture Surveys**

The purpose of culture surveys is to locate existing improvements and other features within the project limits that are potentially relevant to the studies and design of the project. Culture items typically located, include but are not be limited to:

- Existing paving, sidewalks, and curbs
- Utilities and appurtenances, including underground facilities located by Blue Stake and the utility owner
- Structures
- Mailboxes, walls, and fences\*
- Driveways
- Signage (e.g. – subdivision or business)\*
- Significant landscaping\*
- Major vegetation
- Washes/drainage ways
- Geotechnical features visible on the surface, such as boring locations and landfill limits that have been marked on the ground by others

\* Note: When signage or other improvements/facilities are found within the public right-of-way, additional investigation shall occur (e.g. - review with Pima County Real Property) to determine if the facility is licensed to be within the public right-of-way.

### **Background Culture**

The results of the mapping and other culture surveys shall be compiled in a form suitable for depicting existing conditions in the plan views for roadway, drainage, right-of-way, and other plans as needed. Background culture shall be a separate design file with differing types of features on separate layers that can be turned on or off, depending on the type of plan. The background culture also serves to document existing conditions along the length of the project,

including natural topography and features, and existing improvements with utilities. Section lines, centerlines, existing right-of-way lines, and property lines are shown for reference but are not dimensioned. The culture information would typically be derived from the photogrammetry, supplemented with field surveys as necessary.

The background culture shall include the following items:

- Pertinent natural features such as washes and mature vegetation
- Existing improvements shown in the photogrammetry or located by field surveys. This would include pavement, curbs, sidewalks, culverts, buildings, and similar enhancements
- Existing traffic control facilities such as signs, signals, and striping
- Utility surface features such as poles, pedestals, vaults, manholes, and transformers, including the locations of any Blue Staking. Use utility base maps, as-built plans, and field and photogrammetric survey information to show the location of underground utilities as reasonably as possible.
- Underground utilities which have the potential to impact the design of the project's features shall be horizontally located by the Utility Company in accordance with terms and conditions of Pima County Code, Section 1, Title 10, Chapter 10.50
- Topographic information consisting of contours at one-foot intervals and spot elevations determined either photogrammetrically or by field measurement
- Existing centerlines correctly plotted and labeled; section, quarter section, and sixteenth section lines within the project limits shown; existing right-of-way lines and approximate location of property lines defining the frontage of parcels adjacent to the project plotted
- Centerlines and right-of-way lines of intersecting streets along with street names shown

Unless requested separately by Pima County, this information shall be initially submitted in the form of culture background for the DCR plan. All information, including contours and spot elevations, shall be included with that submittal. Non-critical background information such as contours and spot elevations, after conversation with the Project Manager, may be eliminated from subsequent submittals if necessary to reduce clutter.

### **Mapping for Location Study**

If a Location Study (Section 3.9) is to be conducted, preliminary mapping of the study area at a larger (less detailed) scale than used for design may be appropriate. Pima Association of Governments (PAG) orthophotos and digital terrain modeling may be sufficient for this purpose and shall be considered. Scale, contour interval, and extent of any mapping to be obtained for a Location Study shall be discussed during contract negotiation and approved by Pima County. Once an alignment is selected, more detailed mapping is required.

### **Right-of-Way Surveys**

Right-of-way surveys are essentially boundary surveys of the project right-of-way and adjacent properties. Right-of-way surveys shall be extended to the limits necessary to recover the data needed to support the right-of-way documentation requirements of the project. Section corners,

quarter corners, sixteenth corners, centerline markers, property corners, and other monumentation defining existing right-of-way shall be incorporated in the horizontal control network as described above. If record monuments, other than section corners, quarter corners, and sixteenth corners, are not found during the field survey search, they shall be noted as "not found" on the Record of Survey drawing described below.

Survey work done in support of documenting existing rights-of-way, and/or in support of acquiring new rights-of-way shall conform to the procedures and standards set forth in the current version of *Minimum Standards for Arizona Land Boundary Surveys* as adopted by the State Board of Technical Registration.

### **Title Reports**

Status-of-Title reports with a 30-year chain of title are required at the start for all parcels from which all types of easements are to be acquired. Updates to the title reports shall be required at approximately the time of the Initial PS&E Phase submittal (see Chapter 1, [Appendix 1-B](#)), and again at the time of actual acquisition. The responsibility of obtaining title reports shall be determined during the contract negotiation.

### **Orthophotos**

Pima County may request that digital orthophotos be provided to assist with the design and right-of-way acquisition process. The need for this task will be identified during contract negotiation. Scale, accuracy, resolution, and extent of coverage shall be determined at that time. Orthophotos will be registered to the project control. The orthophotos are primarily for use in the right-of-way acquisition process. See Section 3.19, Right-of-way Acquisition Support, for more discussion on scale, extent of coverage, and resolution.

### **Protection of Vegetation**

No vegetation shall be disturbed, harmed, or damaged during survey work without the prior written approval of the property owner. Pima County will approach the property owners for this permission when needed.

### **Protection of Archaeological and Historical Sites**

No artifacts from any historic or prehistoric ruin or archaeological site located within the project limits and corridor shall be disturbed, excavated, or collected. The discovery of any archaeological or historical site or object during the course of survey, excavation, or construction shall be reported to Pima County. All reasonable steps shall be taken to secure the preservation of those sites or objects.

### **Survey Report**

All survey work shall be documented in such a manner that copies or original notes can be provided to Pima County. This shall be done in the format of a Survey Report, which documents research, control work, calculations, and other related items of importance.

Document control network points and their references in the survey report. Provide a sketch of the control network. Include a point description list describing what was set and found. Provide both legal and physical descriptions of the points. Provide the ACS 83 and surface coordinates of the network points. Certify the accuracy of the control network.

The Survey Report shall be submitted no later than the Final Design Phase of the process (see Chapter 1, Appendix 1-B), and may be requested to be submitted as part of the Initial Design Phase efforts. Suggested note keeping techniques are available in the Survey Section of the Field Engineering Division of Pima County. If the fieldwork is done using electronic data collection hardware and software, computer printouts and plots of the raw and adjusted data may be provided in lieu of field books. The exact format for submitting this data shall be determined at the Survey Coordination Meeting. Pima County may request that measurements, calculations, and drawings be submitted in electronic form on magnetic media or CD-ROM as well.

### **Results of Survey Drawing**

A "Results of Survey" drawing shall be submitted in conjunction with the Survey Report. This drawing or series of drawings is intended to document both existing survey conditions and the project control, and shall include the following:

- Existing survey control information such as section lines, existing centerline, existing section corners, quarter corners, sixteenth corners and other applicable monuments. Include coordinates of key points. Show basis of bearing and relation to the ACS 83. Provide the grid to surface factor and surface coordinates for a central point.
- Project horizontal and vertical control, including project coordinates and elevations as applicable. Include at least two existing benchmarks to which the project vertical control is referenced.
- Existing right-of-way definition, including existing right-of-way lines, street names, and recording information and year for instruments establishing the existing rights-of-way. Show description and locations of found monuments along the project centerline and intersecting streets.
- Adjacent property definition, including existing right-of-way lines, property lines, and pertinent easements. Provide description and locations of found property pins. Show name of owner, tax identification number, and parcel recording information for adjacent parcels.

The Results of Survey drawing must be sealed by a registered Arizona Professional Land Surveyor and be suitable for recording as a Record of Survey.

### **Summary of Survey and Mapping Deliverables**

Table 3-2 provides a summary of survey and mapping deliverables and the schedule for submittal to Pima County.

**Table 3-2  
Survey and Mapping Deliverables and Schedule**

<b>Deliverable</b>	<b>Submittal Schedule</b>
<input type="checkbox"/> Summary of Coordination Meeting	Within one week of meeting date
<input type="checkbox"/> Digital files of the topographic mapping and DTM	When obtained
<input type="checkbox"/> Plots of culture and utility survey results, including Blue Staking, if possible, and existing center, section, and right-of-way lines accurately plotted and labeled, but not dimensioned	With Initial Design Phase submittal
<input type="checkbox"/> Survey Report, including Results of Survey drawings	With Final Design Phase submittal
<input type="checkbox"/> Results of Survey drawing showing right-of-way data	With Preliminary Right-of-Way Plan submittal

## 3.11 DRAINAGE REPORT

### Purpose

The purpose of the Drainage Report is to document the proposed drainage design and the considerations and calculations on which the design is based. The report shall present a description of the existing drainage conditions and any impacts the proposed improvement may have. The drainage analysis and design should generally be accomplished in accordance with the guidelines, procedures, and references discussed in Section 2.10. Deviation from Section 2.10, if necessary, shall be discussed first with Pima County.

### Process and Documentation

The drainage report at various stages of completion is included with the Initial Design Phase, Final Design Phase, and Final PS&E Phase Reviews/Submittals (see Chapter 1, Appendix 1-B, and Section 3.20). The following text describes the various elements of the drainage report expected with each.

#### Initial Design Phase Review/Submittal

At the time of the Initial Design Phase Review/Submittal, the preliminary drainage concept that has been developed should be described and documented. In particular, the following report sections and material to be included are as follows:

#### 1.0 Introduction

- 1.1 *Project Description:* Provide an overview of the project, including a description of the proposed roadway improvements, project limits, and vicinity and location maps.
- 1.2 *Major Drainage Features:* Identify major washes, channels, storm drains, or other significant existing drainage features in the project vicinity and generally how they will be treated.
- 1.3 *Proposed Improvements:* Provide a narrative overview of the drainage system that is proposed to deal with the drainage issues facing the project.
- 1.4 *Design Criteria:* State the design criteria to be used for the various components of the drainage design, such as return frequency, allowable spread of flow, placement of catch basins upstream of intersections, and so forth. These criteria are generally those stated in Chapter 2 of this manual, but shall be spelled out specifically for the project under design. Any criteria not covered in Chapter 2 but needed for the project shall be stated here as well.

#### 2.0 Existing Conditions

- 2.1 *Overview:* Provide an overview of the drainage patterns and features that currently exist along the project limits. Describe generally the topography of the area, existing and projected land use, vegetative and soil characteristics, and other factors affecting drainage impacting or being impacted by the project.
- 2.2 *Existing Conditions Hydrology:* Determine peak discharges and other hydrologic information needed to establish existing conditions. Provide a drainage map showing

points of concentration for which information is needed, tributary areas and flow paths of offsite drainages, and existing drainage features affecting the project such as culverts, washes, and channels. Breakouts upstream that materially affect the location or amount of flow reaching the project should be accounted for.

State the hydrologic methodology used. Provide in tabular form the results of the hydrologic analysis. Include key information such as precipitation, subbasin area, runoff coefficients, times of concentration, rainfall intensity, and peak discharges for return frequencies needed. Discuss any results of particular interest or importance. Provide calculation sheets for each point of concentration, along with electronic modeling files as an appendix.

- 2.3 *Existing Conditions Hydraulics:* Determine the depth and velocity of flows crossing or adjacent to the project. Account for the capacity of existing culverts, flow overtopping the roadway, and flow breaking out along the roadway into adjacent drainage basins.

Identify the methodologies used for the existing conditions hydraulics determination. Discuss and summarize in tabular form roughness coefficients, expansion and contraction factors, culvert geometrics, and other parameters used in the calculations.

Summarize the results of the hydraulics analysis, identifying areas of flooding, flow breakout, and other key results. Present in tabular form depth and velocity of flow at key points. Provide a drainage map showing the 100-year floodplain limits and a plan and profile of floodplains if appropriate. Provide electronic modeling files as an appendix.

- 2.4 *Summary of Existing Conditions:* Provide a short narrative summary of key results and observations arising from the existing conditions analysis that should be considered during the project design.

### 3.0 Proposed Cross Drainage Improvements

- 3.1 *Offsite Drainage Approach:* Discuss the approaches proposed for dealing with the various offsite drainages impacting the project. Such approaches might include new or modified culvert installations; downstream channelization; drop inlets; and taking offsite drainage into the storm drain system. Include diagrams as report figures or appendices as needed to illustrate the discussion.

- 3.2 *Proposed Conditions Hydrology:* Provide any additional hydrologic calculations needed to reflect drainage basins altered or newly created by the proposed design. Such basins may include portions of the new roadway being drained by the same storm drain mains and laterals used for offsite drainage. Provide a “Proposed Conditions” drainage map, unless noted otherwise. Summarize these results in tabular form, comparing pre- and post-construction conditions where appropriate. Discuss in the narrative any results or changes from existing conditions of note. Provide electronic modeling files as an appendix.

- 3.3 *Proposed Conditions Hydraulics:* Provide hydraulic calculations used to determine the sizing and other aspects of culverts, inlet and outlet treatments, channelization, erosion protections, and other elements of the offsite drainage. Include diagrams and sketches depicting the proposed drainage system as report figures or appendices. Provide a storm drain delineation map demonstrating consistency with the drainage basins that provides the basis for the design. The delineation map will include, but not be limited to the design-year flood plain limits and the design-year discharge values. Summarize in tabular

form key results, including comparison of proposed and existing water surface elevations where appropriate. Explain in the narrative any results or issues of particular concern. Include supporting calculations and electronic modeling files as an appendix.

- 3.3x *Preliminary Storm Drain (Initial Design Phase submittal only):* Discuss in general the storm drain system being proposed to provide pavement drainage for this project. Note any segment of storm drain main that will also be used for offsite drainage and any special requirements that will result, such as over-sizing for a larger design storm. Provide sketches or diagrams showing the preliminary location and size of storm drain mains, including the potential for use of prefabricated structures.

At this stage, storm drain sizing may be approximated by assuming normal flow of the conduit flowing full with appropriate allowance for minor losses. Alternatively, standard hydraulic grade calculations may be used. Summarize the results of the sizing calculations with appropriate narrative discussion and tables. Provide the preliminary sizing calculations and electronic modeling files as an appendix.

*Note: This subsection for preliminary storm drain design is provided with the Initial Design Phase submittal only. Storm drain design in subsequent submittals is addressed separately (see Section 5.0 below).*

- 3.4 *Sedimentation:* Note any special consideration of sedimentation needed in the design of culverts or channels. Do not place culvert inlets below the invert elevation of the approaching drainage way without accounting for the capacity and sedimentation implications. Maintain suitable velocity of approaching flow and flow through the barrel to carry incoming sediment, accounting for downstream backwater effects if present.
- 3.5 *Channelization:* In cases where it is necessary to channelize upstream or downstream of the culvert, follow the procedures outlined in Pima County *Drainage and Channel Design Standards for Local Drainage*, 1984.
- 3.6 *Outlet Protection:* Determine if the discharge velocity warrants outlet protection downstream culvert, storm drain, and channel discharge points. Procedures for addressing culvert outlets are provided in Pima County *Drainage and Channel Design Standards for Local Drainage*, 1984 and the U.S., Department of Transportation - Federal Highway Administration, *Hydraulic Design of Energy Dissipators for Culverts and Channels - HEC-14*, 1983.
- 3.7 *Right-of-Way Requirements:* Identify any special acquisitions of right-of-way or drainage easements required to accommodate the proposed drainage improvements.
- 3.8 *Mitigation Measures:* Discuss the environmental impact of the proposed improvements. Identify proposed measures for mitigating loss of vegetation and other impacts associated with channelization and other drainage improvements.
- 3.9 *Permitting Requirements:* Identify whether an ACOE 404 permit or other permits and/or approvals are required.

#### Final Design Phase Review/Submittal

A draft final drainage report is to be included with the Final Design Phase Review/Submittal. Comments from the initial review/submittal shall be addressed and additional information supplied, as appropriate, to reflect design revisions. Revisions shall be submitted for review and

approval by both Pima County and RFCDD prior to being included in the final drainage report and project plans. Provide calculations and electronic modeling files as an appendix.

Additionally, the sections discussed below shall be included.

#### 4.0 Storm Drain Inlet Design

4.1 *Inlet Configuration:* Discuss generally the types and locations of catch basin inlets being proposed for the pavement drainage system and for capturing offsite drainage where applicable. Provide a diagram showing proposed inlet locations and types as a report figure or an appendix. Note that catch basins shall be used in-lieu of manholes for access to the storm drain system and for cleaning purposes when possible.

4.2 *Inlet Design:* Determine inlet location and sizing utilizing the methods outlined in HEC-22 or other approved software or references. Provide a tabulated summary of results as a report figure, including spread data. Summarize the inlet design data on a form such as the one found in Appendix 3-T. Place the detailed inlet design calculations and the electronic modeling files as an appendix.

#### 5.0 Storm Drain Design

5.1 *Storm Drain Configuration:* Revise the preliminary storm drain design as needed to serve the proposed catch basin layout, avoid major utilities, minimize the installation of storm drains under pavement, minimize manholes within pavement, and meet other constraints that have emerged in the project design. Update report diagrams as needed.

5.2 *Hydraulic Grade Line Calculation:* Update the storm drain hydrology and preliminary pipe sizing developed in Section 3.3x to reflect any changes in design that have occurred since the initial submittal. Calculate the hydraulic grade line through the proposed storm drain system. Revise the pipe sizing, junction structures and other system components if necessary to meet project design criteria. Provide the hydraulic grade line calculations as an appendix, and provide a plot or table summarizing results as a report figure. Provide diagrams of the proposed storm drain configuration, a storm drain plan and profile plan, appropriate design-year hydraulics grade line, discharge values and sketches of unusual junction structures and other special components.

#### 6.0 Bridge Analysis

This section is included if a bridge over drainage is included in the project design, or, alternatively, a separate report may be provided. Pima County shall be consulted during the project scoping to determine the form for the documentation of the bridge analysis.

The Initial Design Phase drainage report should include sufficient hydrologic and hydraulic information for the Draft Bridge Structure Selection Report to be prepared. Subsequent submittals should reflect finalized bridge geometrics, channel improvements, and other relevant design features.

6.1 *Overview:* Describe the nature of the drainage to be crossed by the bridge. Note the character of the surrounding area (e.g., is it natural, developed, are existing structures threatened by flooding or erosion, and other pertinent information). Note any special environmental conditions that may apply, such as the presence of riparian habitat, wildlife crossing patterns, or the need to span the entire floodplain.

- 6.2 *Design Criteria:* State the hydrologic, hydraulic, and scour criteria being applied to the design of this structure. Typically, bridges in Pima County are designed for a 100-year storm. In special cases, such as environmentally sensitive areas or roadways with low traffic volumes, other standards may apply. Pima County shall be consulted to develop the design criteria to be used for special cases.
- 6.3 *Hydraulic Modeling:* Use HEC-2, HEC-RAS, or equivalent flow-profile analysis methodology to evaluate existing conditions and to develop bridge and improved channel geometrics that meet the design criteria.
- 6.4 *Scour Analysis:* Perform appropriate scour analyses to determine the depth of bridge abutments and piers using the *Guidelines for Establishing Scour and Freeboard for Bridges in Pima County*. If soil cement or other bank protection exists along the channel to be spanned by the bridge, evaluate its long-term viability. If it appears that the bank protection is questionable, not sound or could be breached, the abutments shall be designed as piers, or appropriate remedial action shall be taken to upgrade the bank protection.

#### Final PS&E Phase Review/Submittal

Final revisions to the Drainage Report shall address Pima County's Final Design Phase Submittal comments as well as revisions to the final project design. Final PS&E Phase plan documents shall not be submitted until the Drainage Report is accepted by Pima County and RFCD.

#### Suggested Drainage Report Table of Contents and Study References

Table 3-3, which follows, summarizes the content for the drainage report submittals. Appendix 3-A presents a list of Chapter 3 references including those relevant to conducting and documenting drainage studies.

**Table 3-3  
Suggested Drainage Report Table of Contents**

Section		Initial Design Phase Submittal	Final Design Phase Submittal	Final PS&E Submittal
1.0	Introduction			
	1.1 Project Description	X	X	X
	1.2 Major Drainage Features	X	X	X
	1.3 Proposed Improvements	X	X	X
	1.4 Design Criteria	X	X	X
2.0	Existing Conditions			
	2.1 Overview	X	X	X
	2.2 Existing Conditions Hydrology	X	X	X
	2.3 Existing Conditions Hydraulics	X	X	X
	2.4 Summary of Existing Conditions	X	X	X
3.0	Proposed Cross Drainage Improvements			
	3.1 Offsite Drainage Approach	X	X	X
	3.2 Proposed Conditions Hydrology	X	X	X
	3.3 Proposed Conditions Hydraulics	X	X	X
	3.3 x Preliminary Storm Drain (Initial Design Phase)	X	–	–
	3.4 Sedimentation	X	X	X
	3.5 Channelization	X	X	X
	3.6 Outlet Protection	X	X	X
	3.7 Right-of-Way Requirements	X	X	X
	3.8 Mitigation Measures	X	X	X
	3.9 Permitting Requirements	X	X	X
4.0	Storm Drain Inlet Design			
	4.1 Inlet Configuration	–	X	X
	4.2 Inlet Design	–	X	X
5.0	Storm Drain Design			
	5.1 Storm Drain Configuration	–	X	X
	5.2 Hydraulic Grade Line Calculation	–	X	X
6.0	Bridge Analysis			
	6.1 Overview	X	X	X
	6.2 Design Criteria	X	X	X
	6.3 Hydraulic Modeling	X	X	X
	6.4 Scour Analysis	X	X	X

## 3.12 GEOTECHNICAL INVESTIGATION (062016)

### Purpose

The purpose of the geotechnical investigation is to determine the pavement structure, trench backfill requirements, foundation designs, and other geotechnical information needed for design of the various elements of the roadway project.

### Process

The designer shall undertake the investigations described below as appropriate for the particular project. The designer shall arrange a geotechnical investigation coordination meeting with the County to discuss proposed test boring locations and potential geotechnical issues related to the project. Prior to beginning any investigation, testing or sampling, the designer shall develop plans outlining proposed test boring and sampling locations, and shall request Blue Stake to locate utilities.

Upon completion of the geotechnical investigations, a report will be submitted to Pima County for review. The Materials Section will be responsible for evaluating the appropriateness of the existing soils for various uses on the project. This information will be provided to the designer for inclusion in the final Geotechnical Report and preparation of the project's Special Provisions.

### Roadway Soil Investigation

The roadway soil investigation for pavement design shall be performed in accordance with the requirements in the current edition of the Arizona Department of Transportation (ADOT) *Materials Preliminary Engineering and Design Manual* (MPEDM) and the following additional provisions. Field exploration shall be performed only after the initial roadway profile grade and alignment has been established.

- The minimum number of borings and test samples shall be in conformance with the MPEDM. Each boring shall extend a minimum of 5 feet below the final finished grade of the pavement and borings shall be located at significant features of the design such as drainage crossings, walls, etc. Sampling frequency shall be based on the specific needs of the project and the engineer shall ensure that all soil types encountered are adequately sampled and tested.
  
- Split-spoon and ring samples shall be obtained by performance of standard penetration tests (SPTs) at intervals of 2.5 feet and 5 feet below the anticipated finished grade of pavement. If a split-spoon sample is collected at 2.5 feet then ring sample shall be collected at 5 feet. This sampling pattern shall be alternated in adjacent pavement borings along the corridor. For example, if one boring has a split-spoon sample at 2.5 feet and ring sample at 5 feet then the next boring shall have ring sample at 2.5 feet and split-spoon sample at 5 feet. The ring samples shall be obtained in set of 6 rings at a minimum.

- In situ dry density and moisture content shall be determined from a suitable ring within the set of six (6) rings. If the in situ dry density is less than 100 pcf or is described as “loose”, a one-dimensional collapse test shall be performed on another suitable ring sample from the same set of six (6) rings in accordance with ASTM D5333. This test is to determine the need for subgrade modifications to mitigate the detrimental effects of soil collapse on pavement structure.
- For samples with  $PI > 15$  and percent fines (passing #200)  $> 20\%$  swell tests shall be performed on in situ as well as remolded compacted soils in accordance ASTM D4546 Part B to determine swell potential. The surcharge (seating pressure) during the swell test shall be 125 psf. Swell tests on in situ samples shall be performed using undisturbed ring samples. The swell tests on remolded compacted soils shall be performed by remolding the soils to 95% of maximum dry density and at 3% below optimum moisture content. The maximum dry density and optimum moisture content shall be determined in accordance with ASTM D698 (Standard Proctor).
- Sampling existing pavements is required to produce an accurate representation of existing pavement structure. The location of test holes in existing pavements shall be varied to yield samples in the paved shoulder (if present), inside and outside lanes and from lanes in both directions. This is especially important in providing design recommendations for rehabilitation or widening projects where the existing pavement may be incorporated into the new structural pavement section.

### **Trench Backfill Investigation**

The trench backfill soil investigation shall be conducted at the plan development stage when the storm drain system and cross drainage structures are fairly well defined. Sampling locations and test bores shall be taken at enough locations to be considered representative of the materials in the area. The sampling depth shall be to the pipe or cross drainage structure invert elevation, plus the thickness of the structure, plus 6 inches. Test boring locations shall be marked and numbered consecutively on 11”x17” project plan sheets and included in the appendix of the Geotechnical Report.

### **Channel Soil Investigation**

For channel improvements, the wash bottom and banks shall be sampled a minimum of every 500 feet. At least one test boring shall be taken at each proposed grade-control structure location. These borings shall extend a minimum of 25 feet below the existing flow line unless an impenetrable substratum is encountered. For bank protection design, tests shall be conducted a minimum of every 500 feet along both sides of the proposed bank protection alignment. Testing alternate sides of the channel is permissible if the results demonstrate uniformity between the sides.

The investigation may need to provide structural information necessary to design rigid lining, soil cement mix design if in situ material is to be used, and depth of scour. Borings to determine

toe down stability analysis shall extend a minimum of 5 feet below the proposed bottoms of the toe downs.

### Bridge Soil Investigation

The bridge soil investigation shall be performed in conjunction with the Bridge Structure Selection Report (see Section 3.14). Adequate exploration, testing, and analysis shall be performed to determine the bridge foundation and abutment designs.

If the bridge is a river crossing, sufficient geotechnical information for determining depth of scour must also be obtained. A minimum of one test boring at each proposed bridge pier and abutment location is required. These test borings shall extend a minimum depth of 70 feet unless an impenetrable substratum is encountered. Test borings must also extend at least 20 feet below the ultimate bottom of each pier and abutment.

### Protection of Vegetation

Vegetation may not be disturbed or damaged during the geotechnical investigation without the prior written approval of the property owner. Pima County will approach the property owner for such permission subsequent to the designer demonstrating the need for vegetative disturbance.

### Protection of Archaeological and Historical Sites

A geotechnical-boring plan showing any existing roadways and proposed boring locations shall be provided to the Pima County Project Manager in advance of fieldwork. The Project Manager will forward the plan to the Pima County Office of Cultural Resource and Historic Preservation (OCRHP), which will determine if the proposed field work is located in an area of known artifacts. If sufficient concern exists, the OCRHP will provide an archaeologist to observe the boring as it is being conducted.

Note: The discovery of archaeological or historical sites or objects shall be immediately reported to Pima County, and all reasonable steps taken to secure its preservation. Artifacts from historic or prehistoric ruins or archaeological sites may not be disturbed, excavated, or collected.

### Restoration of Test Sites

Test sites must be restored to their prior condition unless written permission to leave the site disturbed has been obtained from the affected property owner. Pima County will contact the affected property owner for this permission upon demonstration of the need by the designer.

## **Report Content**

The designer shall document the procedures, findings, and resulting design recommendations in a Geotechnical Report. Normally, this report should contain the following:

### Introduction

Describe the location and limits of the project, and the proposed improvements with emphasis on those elements requiring geotechnical consideration.

### Site Exploration

Discuss the number and location of borings, boring procedures, and laboratory testing methodology and procedures.

### Subsurface Conditions

Describe the types of materials, the depth of impermeable substratum (if encountered) and the general subsurface conditions. Summarize the results of the analyses needed for the particular project. These may include the following:

#### *Pavement Design:*

- Sieve Analysis
- Plasticity Index (PI)
- R-values
- pH and Resistivity
- Resilient Modulus
- In situ dry density
- In situ moisture content
- Collapse potential
- Swell potential

#### *Trench Backfill:*

- Gradation
- Liquid Limit
- Plastic Limit
- Plasticity Index (PI)
- pH and Resistivity
- Soluble salts (chlorides and sulfates)

#### *Retaining Wall, Spread Footing, Drilled Shafts and Other Structures:*

- Unit weight of soil
- Allowable bearing pressure
- Active and passive friction coefficients
- Active and passive lateral pressure
- Shear Strength (C)
- Settlement
- Internal friction angle ( $\emptyset$ )
- Swell potential

- pH and Resistivity
- Soluble salts (chlorides and sulfates)
- Other specific information such as spring constants of soil-structure interaction analysis

The designer shall consult with the pavement design engineer and/or structural engineer to confirm the specific information needed for the project.

#### Conclusions and Recommendations

Recommendations, which shall also include the information needed for the particular project, typically address the following:

- Maximum cut and fill slopes
- Erosion potential and slope stability
- Special treatment of subgrade
- Treatment of embankment materials
- Collapse and differential settlement
- Swell potential
- Compaction
- Use of on-site borrow material
- Bridge foundation design parameters for drilled shafts, spread footings, and abutment walls
- Retaining wall design parameters
- Need to replace in situ material with engineered backfill
- Possible slope stabilization techniques
- Other geotechnical information needed for the particular project

### 3.13 PAVEMENT DESIGN (062016)

#### Methodology

Generally, ADOT methodology is used for pavement structure design in Pima County. This process is outlined in the latest edition of ADOT's *Materials Preliminary Engineering and Design Manual*. For simplicity, that document is referred to in this section as "the reference." An overview of the process for flexible pavement design is provided here along with parameters appropriate for Pima County. The reference shall be consulted for guidance in the design of rigid pavement structures.

Flexible pavement structure design follows four general steps.

#### Step One

Determine the geotechnical properties of the in-place or borrow material that will make up the subgrade on which the pavement structure is to be placed. The geotechnical characteristic that reflects the strength of subgrade is the Resilient Modulus ( $M_R$ ), which is derived from the mean R-Value ( $R_{MEAN}$ ) which in turn is based on R-Value tests ( $R_T$ ) and Pima County correlated R-Values ( $R_C$ ) estimated from measurements of plasticity index (PI) and percent of soil by weight passing a #200 sieve (minus 200).

- All soil and subgrade sampling and testing shall be in accordance with Chapter 1 of the reference and Chapter 3.12 of this manual.
- The  $R_{Mean}$  shall be calculated using a combination of tested R-values and Pima County correlated R-values as adapted from the reference. The Pima County correlated R-value ( $R_{PC}$ ) shall be calculated using the soil PI and minus 200 percentage as follows:
  1. Calculate the base correlated R-value ( $R_{CB}$ ) from Table 202.02-3 in the reference or by using the following equation:  

$$\log R_{CB} \text{ (value at 300 psi)} = 2.0 - 0.006 \text{ (minus 200)} - 0.017 \text{ (PI)}$$
  2. Calculate the Pima County correlated R-value ( $R_{PC}$ ) as follows:  

$$R_{PC} = x R_{CB}^y$$
 Where  $x = 0.3$  and  $y = 1.2$
  3. The  $R_{Mean}$  is the design R-value. Since the correlated R-value has been adjusted above, the design R-value is also the construction control R-value.

Where a site specific correlation may provide cost saving opportunities, the designer shall consult with Pima County to determine the sufficient number of actual R-value laboratory tests (typically anticipated to be 10-20 per geologic formation) in order to develop project-specific correlated R-values ( $R_C$ ) using the power function as noted above with site-specific  $x$  and  $y$  values. When this option is used, a site specific subgrade acceptance chart must also be created.

For small development projects, a measured R-value option is acceptable in lieu of using correlations. In such cases, the design R-value is the lowest measured project R-value and the subgrade acceptance threshold is based on the mean PI and the mean minus 200 percentage.

Step Two

Estimate the traffic loading to which the pavement will be subjected during its design life. This is expressed as the number of equivalent 18-kip single axle loads (ESAL) in the design lane and is based on the current and projected design year average daily traffic (ADT) and the current mix of vehicle classifications.

- For determining ESAL, use the process described in Appendix A of the reference.
- The percentage of total traffic assumed in the design lane for various roadway widths is:

Two-lane roadway	50%
Four-lane roadway	45%
Six-lane roadway	40%

Step Three

Combine the geotechnical and traffic information into a quantifiable measure reflecting the strength of the pavement structure needed. That measure is the Structural Number (SN) from which the thickness of various paving courses can be determined.

- The Level of Reliability and Combined Standard Error (So) values appropriate for various roadway classifications in Pima County are as follows:

<i>Functional Level of Classification</i>	<i>Level of Reliability</i>	<i>So</i>
Arterials	95%	0.35
Collectors	90%	0.35
Local Streets	80%	0.35

- The values for change in Present Serviceability Index ( $\Delta PSI$ ), initial serviceability index (Po) and terminal serviceability index (Pt) are as follows:

<i>Functional Classification</i>	<i>Po</i>	<i>Pt</i>	<i><math>\Delta PSI</math></i>
Arterials	4.2	2.8	1.4
Collectors	4.1	2.6	1.5
Local Streets	4.0	2.4	1.6

Step Four

Using the criteria below, determine a pavement structure that provides the necessary SN. Typically, several possible structures are developed for a SN with the final selection being based

on cost and constructability. For Pima County CIP projects, provide alternate pavement sections for a minimum of four R-values, or as directed by the project manager, based on the minimum and maximum R-values. The intent is to quantify the cost differences between removing poor soils and providing a thicker pavement section.

- The structural coefficients to be used for various pavement structure courses are as follows:

Asphalt Rubber Asphaltic Concrete (ARAC)	0.44
Asphaltic Concrete (AC)	0.44
Cement or Bituminous Treated Base	0.28
Cement or Bituminous Subgrade	0.23
Aggregate Base (AB)	0.12

- The value for AB shall be adjusted by a drainage coefficient of 0.92 for projects in the Tucson area. Table 202.02-7 (p. 102 of the reference) shall be consulted for projects in other areas.

- The minimum thickness of paving courses for various roadway classifications and pavement types is as follows:

<u>Arterial (Greater than 10,000 ADT)</u>		<u>Major Collector (2,500 to 10,000 ADT)</u>	
Top Lift (AC)	2.5"	Single Lift AC	3.0"
Bottom Lift (AC)	2.5"	AB	6.0"
AB	4.0"	Minimum SN	1.98
Minimum SN	2.64		
<u>Collector (1,000 to 2,500 ADT)</u>		<u>Local Street (Less than 1,000 ADT)</u>	
Single Lift AC	3.0"	Single Lift AC	2.5"
AB	4.0"	AB	4.0"
Minimum SN	1.75	Minimum SN	1.49

- Driveways shall be 2.5 inches AC on a minimum of 4 inches AB, subject to local conditions.
- Cement or bituminous treatment of the subgrade can be considered in lieu of removing and replacing poor native soil. The minimum thickness of these courses is 6 inches. Lime stabilization and the use of geotechnical membranes may also be considered in lieu of removing and replacing poor native soil.
- The ratio of AB to AC generally shall be between 1:1 and 1.75:1.
- If minimum thickness of the AC and AB courses together does not provide the necessary SN, increasing the thickness of AC is preferable to specifying deeper sections of AB.

### Pavement Design Report

The data, procedures, and design recommendations shall be documented in a pavement design report in conformance with Appendix C of the reference and the following:

### Introduction

Describe the location and limits of the project, and the proposed improvements with emphasis on the pavement design aspects.

### Geotechnical Data

Summarize the general geotechnical characteristics of the soils on which the roadway will be constructed. Provide in tabular form all the geotechnical data and test results used in designing the pavement structure. Identify the limits of unsuitable subgrade material, including those soils susceptible to collapse or swelling.

### Traffic Data

State the traffic data used in developing the pavement structure such as current and design year traffic volumes, percentage of vehicle types, percentage of total traffic in the design lane, reliability factors, and ESAL calculations.

### Pavement Structure Design & Subgrade Acceptance

- Discuss the results of the pavement structure design. Provide in tabular or other appropriate form the calculations used to determine the structural number (SN) for the various portions of the project.
- Provide pavement section design(s) based on the required structural number(s) (SN). Present the data used and the calculations made in a manner that is straight forward and easily repeated for verification.

The subgrade acceptance chart, Appendix 3-W, is based on the Pima County correlated R-values. If a project specific correlated R-value power function other than the Pima County Correlated R-value power function is used, a separate subgrade acceptance chart must be prepared.

### Recommendations

Identify the recommended structural sections, including sub-base and subgrade treatment. Include cost, construction considerations, limits of various pavement sections and other factors taken into account in developing the recommendations.

## 3.14 BRIDGE STRUCTURE SELECTION STUDY/REPORT

### Purpose

The purpose of the Bridge Structure Selection Study effort is to evaluate various materials and approaches to determine the most suitable for the particular bridge structure, which result in the development and documentation of findings in a Bridge Structure Selection Report.

### Process

The Draft Bridge Selection Report is included with the Initial Design Phase Submittals. The Final Bridge Selection Report is provided with the Final Design Phase Submittals. The final report shall reflect any comments on the draft report provided by Pima County, as well as any design modifications.

### Report Content

The content and procedures of the Bridge Structure Selection Report shall conform to the current version of the ADOT *Bridge Design Guidelines*. An outline for use in the preparation of the report and guidance on the content are presented below. Deviations from this process or changes in assumed values (e.g. – modifications of concrete strength values or allowing of continuity of pre-stressed girder design), shall be reviewed and approved by Pima County DOT prior to initiating said changes/modifications.

#### Executive Summary

Prepare a two-page (maximum) executive summary that presents the key features of the report.

#### Introduction

Describe the location and site conditions of the structure and the roadway. Mention any previous or existing structures at or near the site. State the purpose of the bridge, and note if it will serve a flood control function.

#### Geometrics

Discuss the following items providing diagrams and figures as appropriate:

- Roadway alignment, profile, cross section, typical bridge cross section, longitudinal bridge section
- Identify an open or closed bridge median and provide appropriate justification
- Location with respect to right-of-way
- Provisions for structure access and maintenance
- Provisions for future widening or lengthening – provide justification if not providing for future widening

- Skew angle of substructure units
- Headroom clearances, walkways (pedestrian/equestrian/bicycle), barriers, handrail placement, parapet design, lighting (natural & artificial) requirements, and public art/aesthetics
- Wildlife crossing provisions, when appropriate

#### Drainage Summary

Provide key hydraulic information affecting the bridge. Cite the source of the information (i.e., the project Drainage Report).

- *Hydrology*: Cite the return frequency and discharge amount for which the bridge is being designed, and state the information source. Provide discharges for other return frequencies for which hydraulic analyses have been done.
- *Hydraulics*: Describe the results of the hydraulic analyses on which the bridge design is based. Include design flow and hydraulic properties of the bridge such as channel cross section, bridge length, number and type of piers, and abutment type. Tabulate water surface elevations under existing and proposed conditions. Provide plotted profiles of the water surface elevation for existing and proposed conditions, channel invert, top-of-bank, and the transverse section of the proposed bridge superstructure. State the recommended freeboard (based on review with PCDOT & PCRFCO), minimum soffit elevation, and recommended foundation depth. For hydraulic analysis purposes, assume two feet on each side of the pier to account for debris.
- *Scour*: Summarize the results of the scour used to determine scour depth, including long-term degradation. Identify the source of information used in determining long-term degradation.
- *Channel Improvements*: Discuss any channel improvements to be made in conjunction with the bridge construction, including channel alignment, cross section and bank protection design. Provide the results of the scour analysis for existing or proposed bank protection upstream and downstream of the bridge and describe any modifications or improvements being proposed.
- *Surface Drainage*: Address roadway surface drainage on bridge deck and approaches.

#### Geotechnical Summary (Final Report Only)

Provide results of the geotechnical report applicable to the bridge design, such as recommended bearing pressures, allowable bearing pressures, soil friction coefficients, active and passive lateral pressure, etc. with the Final Bridge Structure Selection Report. Special information may be requested by the designer such as spring constants and modulus of subgrade reaction for soil-structure interaction analysis

#### Bridge Substructure (Final Report Only)

Describe the process on which the pier, abutment, and foundation types have been based.

- *Piers:* Describe the pier types considered and the economic, hydraulic, and other considerations leading to the selected type.
- *Abutments:* Describe the considerations made in developing the proposed abutment design, including compatibility with the proposed superstructure, the use of expansion type versus integral, wing-wall skew, and proposed abutment protection.
- *Foundations:* Describe the issues leading to the proposed foundation design, including cost, soil characteristics, and ground water effects. Generally, pile, drilled shaft, and spread footings are given consideration. Summarize the capacities needed and the dimensions and/or depths of the recommended footings.

### Bridge Superstructure

Describe the considerations leading to the recommended superstructure type including the following alternatives:

- Cast-in-place Portland cement concrete slabs or girders
- Precast Portland cement concrete girders
- Steel girders

Discuss the corresponding decks, pedestrian rails/barriers, traffic barriers and foundation, pier, and abutment type.

### Utilities

Discuss existing utilities and indicate any utility relocation requirements associated with the proposed alternative designs. Discuss any additional accommodation or prohibition for utilities on structure. Identify need for future lighting.

### Architectural Treatments

Discuss and illustrate possible architectural designs and treatments for exposed concrete surfaces to improve the aesthetics of the various alternatives. Recommendations by a registered architect are required for urban structures and structures located in highly scenic areas or protected areas (e.g., national, state or local parks, nature preserves).

### Construction Procedure

Discuss any proposed phased construction or provisions for future expansion. Discuss issues associated with maintenance of traffic, detours, potential need for road closures (Note: Requires Department and BOS Authorization) and estimated construction times for the proposed alternatives.

### Cost Comparison

Compare and discuss the costs of the alternatives considered. Express the costs as dollars per square foot.

### Summary

Summarize the report findings and recommendations.

### Appendices

Provide the following appendices:

- Preliminary design calculations
- Cost estimates for alternatives considered
- Plan and elevation sketches for various alternatives

## 3.15 TRAFFIC ENGINEERING STUDY

### Purpose

The purpose of the Traffic Engineering Study is to document existing traffic conditions, evaluate the impacts of future traffic volumes, and present design recommendations. The recommendations shall address such issues as the number of through traffic lanes, the need for auxiliary lanes, the need for signalization improvements, the need for raised medians, the location of median openings, and alternative mode improvements (sidewalks, multiuse paths/trails, bicycle lanes/paths, equestrian trails, and transit facilities). The recommendations shall guide the design of the proposed roadway and intersections, as well as the specific design of the traffic engineering features.

### Process

The study process and findings shall be documented in the Traffic Engineering Report. The Traffic Engineering Report shall be submitted, reviewed, and approved prior to the completion of the Design Concept Report. The report should also be shared with the public as part of the overall project outreach process. (See Chapter 1, Appendix 1-B and Section 3.20 for information on the County development process phases.)

### Report Content

The following paragraphs detail the activities and information to prepare the Traffic Engineering Report.

#### Executive Summary

Prepare a two-page (maximum) executive summary that presents the key features of the report. This executive summary can also be used as an informational hand out at project open houses.

#### Introduction

Provide a project description, a location map, a vicinity map, and an aerial photo (1" = 400') of the project.

#### Existing Conditions

Provide an inventory of existing features and conditions for all roadways, intersecting roadways, and intersections to be improved. The traffic data collection schedule shall be coordinated with and approved by the County. This inventory shall include the following:

- Geometrics and roadway cross section.
- Auxiliary (turning) lanes.
- Turning movement traffic counts for critical intersections (a.m. and p.m. peak hours). Critical intersections shall be determined during the project scoping process. New data shall be collected if the existing data is more than one year old.
- Hourly approach traffic volume counts for one full 24-hour period at critical intersections. New data shall be collected if the existing data is more than one year old.
- Directional ADT and hourly volumes on major arterials at the approximate midpoint between existing signalized intersections.
- Directional ADT on all side streets except for minor cul-de-sacs.
- Capacity and level of service analyses for existing conditions along the segments and at critical intersections (a.m. and p.m. peak hours).
- Accident data (Pima County supplied data) and accident/crash rates based on the most recent edition of the County *Accident/Crash Statistics Report*.
- Traffic control devices.
- Posted speed limits.
- K (proportion of the ADT occurring in the peak hour) and D (proportion of the peak hour traffic in the peak direction) factors.
- Peak hour factor by movement at critical intersections.
- Heavy vehicle percentage based on a manual classification study (8:00 a.m. to 11:00 a.m.).
- Alternative transportation modes (bus routes; pedestrian, bicycle and equestrian usage; transit, bicycle, pedestrian and equestrian facilities).
- Intersection and roadway lighting.
- Intelligent transportation systems (based on County data).
- Traffic signal warrant analyses at critical intersections defined in the project scoping process. Traffic signal warrant analyses shall be conducted in accordance with the latest County policy associated with the application of the latest FHWA, *Manual on Uniform Traffic Control Devices* warrants.

### Future Conditions

Determine the a.m. and p.m. peak hour volumes for all roadways, intersecting roadways, and intersections to be improved. These shall be determined for the opening year and the design year (typically 20 years into the future). The volumes shall be based on the existing traffic volumes obtained in the previous section, on traffic projections prepared by PAG or by the designer guided by County staff, a review of the zoning, and existing and future development proposed in the area. Private driveways with significant traffic volumes shall be evaluated in a similar manner. Perform traffic signal warrant analyses for the project-opening year at those intersections identified in the scope of work.

### Proposed Improvements

Document the required traffic-related improvements, including alternative transportation modes, for all roadways, intersecting roadways, and intersections to be improved. The improvements shall be those needed to maintain level of service D or better for the a.m. and p.m. peak hours in the design year. Determine the number of traffic lanes required using the most recent version of the Transportation Research Board *Highway Capacity Manual* (HCM) or a software package that reflects the HCM and is approved for use by Pima County. Include the output generated by this software in the appendix of the Traffic Engineering Report.

Present the proposed improvements for all roadways, intersecting roadways, and intersections to be improved. The proposed improvements shall be for the project opening year and the design year. It is recognized that not all of the required improvements for the design year may be provided as a part of the project under consideration (e.g., grade separations). All initial improvements shall be compatible with the design year improvements. Identify the following for all proposed improvements:

- Posted speed limits
- Alternative transportation modes (bus routes; pedestrian, bicycle and equestrian usage; transit, bicycle, pedestrian and equestrian facilities)
- Design parameters (design speeds, sight distances, shoulders, access, clear zones)
- Raised median justification if applicable
- Median opening locations (preliminary locations provided in the Initial Traffic Engineering Report are subject to change prior to submittal of the approved Final Traffic Engineering Report.)
- Roadway cross section
- Need for auxiliary (turning) lanes and frontage roads
- Storage lengths per Pima County approved methods for the design year or other year specified by Pima County
- Traffic control devices for critical intersections
- Peak hour volumes (a.m. and p.m.) for critical intersections
- K (proportion of the ADT occurring in the peak hour) and D (proportion of the peak hour traffic in the peak direction) factors for arterial segments
- Peak hour factors (a.m. and p.m. peak hours) for critical intersections
- Heavy vehicle percentages for arterial segments and critical intersections
- Need for intersection and arterial roadway street lighting
- Impact on adjacent neighborhoods (both during and after reconstruction) and the potential need for traffic calming measures within the subdivisions and arterial access issues

- Intelligent transportation systems (including, but not limited to, fiber optics communications and conduit, pan-tilt-zoom cameras, traffic and speed counting stations, video detection, traffic signal coordination, emergency vehicle pre-empt systems, and dynamic message signs)

### Conclusions and Recommendations

The final section of the report shall summarize:

- Conclusions of the report
- Recommended improvements for the project-opening year
- Recommended improvements for the design year

## **3.16 ARTERIAL STREET LIGHTING DESIGN**

### **Purpose**

The purpose of the Arterial Street Lighting Design Report is to present and document all calculations that define the levels of illumination, lighting layout and configuration of poles, luminaries, power source(s) and the electrical operation of arterial street lighting system(s). If a unique street lighting system is required for the project, the report shall discuss the justification for the unique system and parameters used to define, design, operate and maintain said system. Note: An Arterial Street Lighting Report shall not be required for projects that do not include such systems.

### **Report Content**

For further detail on the contents of the Arterial Street Lighting Report, the designer shall refer to the most current version of the Pima County *Street Lighting and ITS Conduit Design Manual* for specific design direction. The link is as follows:

<http://dot.pima.gov/trafeng/DesignManual/SLManual2011.pdf>

### **3.17 DESIGN CONCEPT REPORT**

#### **Purpose**

The DCR documents the processes undertaken in developing a design concept for a roadway project, including the issues identified, design criteria employed, optional approaches considered, public input, and the recommended concept for design. The report will be approved by the Pima County Director of Transportation and a signature block for that purpose shall be provided on the title page.

An important function of the DCR is to document the tradeoffs made between the various, sometimes disparate, elements in developing a viable overall project design. For example, designing the roadway geometry to balance earthwork may increase the time and cost to relocate utilities beyond that of importing or exporting material. Raising the profile of the roadway across a drainage feature may increase the need for sound walls and visual mitigation, but could reduce cost and environmental impact of downstream channelization. A successful design considers the project as a whole, finding an appropriate balance between conflicting design issues. The DCR brings together the results of the various studies and reports, and documents the process by which the recommended concept was developed.

It should be noted that while there will be the potential to analyze several alternatives in an attempt to obtain the “optimal” design concept for the roadway, it is important to maintain an equilibrium between the amount of effort focused on investigating these alternatives, versus the potential improvement that would occur from their inclusion/addition into the recommended roadway design concept. Components such as roadway lane configuration and drainage, while impacting the overall roadway design concept, have limited flexibility due to traffic volumes and the drainage within the area being impacted

The draft DCR and associated plans may be processed thru a Value Engineering (VE) Review for the purposes of identifying opportunities to enhance the project. Determination of which projects that will have a VE Review and the appropriate time for this review within the overall project development schedule, will be determined on a individual project basis. Typically, projects that are over \$10 million or have several significant and/or complicating components will be reviewed. Note: VE reviews usually occur during an early phase of the project.

The DCR is provided to Pima County staff for review and comment and may be distributed to other interested agencies to provide them with information about the proposed project. Ultimately, the report serves as the guide for the project design phase.

#### **Pima County Ordinances**

All applicable Pima County ordinances must be met. Any conflicts found between operative ordinances and this manual shall be brought to the attention of Pima County as soon as possible for resolution.

## **Environmentally Sensitive Roadways**

If the project has been designated as an Environmentally Sensitive Roadway (ESR), it is subject to additional requirements and procedures. See, the Pima County *Environmentally Sensitive Roadway Guidelines*, which are included in this manual as Chapter 4.

## **Report Format**

The DCR is prepared first as a draft for review by Pima County staff. The Design Team then revises the draft report based on Pima County's comments and resubmits it for review as a final report. The DCR is typically reviewed and recommended for approval by Staff and submitted for approval to the Director. Note: The DCR should be as brief as possible while containing enough information to clearly explain the basis for the selection of the key project elements and their proposed implementation.

## **Report Content**

A typical table of contents for the DCR is included as [Appendix 3-I](#). The remainder of this section discusses the various items that shall be included in the DCR

### Executive Summary

Provide a brief description of the project location and scope, design year, estimated cost, funding source, project purpose and need, alternatives considered, comparative findings, and recommended alternative. Include a Location Map as described previously under "Format." This Executive Summary shall be of limited length and shall be comprehensible to non-technical readers.

### Project Overview

Introduce the project by noting the Pima County assigned project number, name, location, project budget, funding sources, and construction fiscal year. Briefly discuss previous work and actions leading up to the DCR, including reference to the Location Report if one was required for the project. Describe the project location and limits and provide a Location Map as discussed previously under "Report Format." Discuss the project need and objectives.

### Project Description

Describe the scope of the project and note key features and approaches being proposed, including the following (as applicable):

- Type of project (e.g., widening, overlay)
- Project termini and length (in miles)
- Design and posted speeds
- Nominal right-of-way width

- Roadway section including number and type of travel lanes, medians, bikeways, sidewalks, and Americans with Disabilities Act (ADA) features
- Drainage improvements, including pavement and cross drainage
- Utility, railroad, or irrigation impacts and relocation
- Access control, if any
- Proposed striping, marking, and signing
- Signalization and lighting
- Landscape
- Public art
- Intersection improvements
- Safety upgrades such as culvert extensions and guardrail
- Other key features or approaches that define the construction process or project as it will be ultimately completed

#### Project Area Characteristics (Existing Conditions)

Address the existing conditions of the project site, including as applicable:

- Surrounding topography and terrain
- Existing roadway, including horizontal and vertical alignment, width of pavement, type and width of existing lanes, surface type, and posted speed limit
- Roadway geometric deficiencies
- Other existing roadway features, such as curb and gutter, bikeways, sidewalks, and ADA features
- Width of existing rights-of-way
- Drainage characteristics likely to affect the project, such as watersheds and drainages
- Drainage structures such as culverts, storm drains, and bridges
- Known drainage problems and recurring drainage complaints
- Signalization and lighting
- Existing utilities
- Existing vegetation and landscaping
- Biological resources
- Archaeological and historic resources
- Visual resources
- Existing land use
- Future land use

- Current zoning
- Proposed developments and other significant traffic generators
- Potentially affected community facilities such as schools, hospitals, parks, and recreational and historic facilities
- Public lands within or adjacent to the project area, either under the jurisdiction of Pima County or of any other public agency (e.g., City of Tucson)
- Tribal lands
- Applicable known intergovernmental agreements that are in place or under discussion

#### Traffic and Accident Data

Provide current and projected design year ADT volumes. Summarize results of the traffic operational analysis. Provide traffic turning movements at interchanges and intersections. Address parking and pedestrian and bicycle movements where applicable. Present historical accident data and locations, indicating the beginning and end dates of the accident sample. Reference the Traffic Engineering Report (see Section 3.15).

#### Design Standards and Criteria

List the design standards and criteria used in developing the project as discussed below. For projects that have been or may be designated Environmentally Sensitive Roadways, see also design standards and criteria provided in the Pima County *Environmentally Sensitive Roadway Guidelines*, which are included in this manual as Chapter 4. Consult Pima County's website, for a regularly updated bibliography of standard references used for roadway design.

- *Geometric Standards:* Note the reference(s) for the geometric design of the project. In most cases the reference will be this manual. Other possible sources include the latest version of AASHTO's *Policy on Geometric Design of Highways and Street* and AASHTO's *Roadside Design Guide*.
- *Design Standards:* State the design standards used for the project. In most cases the standards will also be from this manual and the most current joint Pima County/City of Tucson *Standard Details for Public Improvements*.
- *Slope Standards:* Note the cut and fill slopes to be used. If they differ from those presented in this manual, state the reason and reference the geotechnical report where the technical aspects are addressed.
- *Pavement Structure:* Describe the methodology used to develop the pavement structure design. (See Section 3.13.)
- *Design Speed:* State the design speed used for the project design.
- *Drainage Design:* State the design return frequency for cross-drainage and pavement drainage systems. Indicate if cross-drainage is to be taken into the pavement drainage system and, if so, any design implications.
- *Access Control:* Note any portions of the project that will be access controlled. Typically, access would be controlled in the vicinity of intersections.

- *Cross Section Elements:* State the number, type, and width of travel lanes, turning lanes, medians, shoulders, and special use lanes, if any. Generally, these elements shall conform to the guidelines presented in this manual. Provide a diagram of the typical section.
- *Roadway Geometrics:* Describe key alignment characteristics such as minimum radius and maximum profile gradient.
- *Right-of-Way Width:* State the proposed right-of-way width.

### Major Design Features

Discuss each of the major design features listed below as it applies to the proposed project. Identify any situations or locations where design exceptions are needed and the reasons why.

- *Horizontal and Vertical Alignment:* Include a general description of the geometry with emphasis on major considerations that influenced the recommended alignment and profile. Provide Initial Design Plans consisting of typical section and plan/profile sheets as an appendix to document proposed geometrics.
- *Right-of-Way:* Provide estimated quantity (in acres) of right-of-way to be acquired. Identify private or public entities that control the property needed. Identify any special right-of-way impacts (e.g., relocations, effect on the operation of businesses, and other environmental issues associated with acquisitions, including habitat impacts). Provide Right-of-Way Requirements Plans as an appendix showing existing right-of-way, existing parcels with owner's names and addresses, and anticipated acquisition of right-of-way, drainage easements, slope easements, and temporary construction easements to the extent known at the time. Include in the drawings existing driveway locations and access for vacant land. Note if no new right-of-way is required for the project.
- *Drainage:* Describe the general direction and slope of the drainage. State the storm return frequency to be used in the hydrologic and hydraulic calculations. Reference the drainage report, and summarize overall drainage features and any drainage changes that would be created as a result of the project. Indicate the type, size, and condition of existing structures and identify the type, size, and location of proposed drainage structures; including options for precast vs. cast-in-place structures. Describe any proposed alterations to existing drainage ways and structures, along with any additional features (e.g. - drop inlets, walls, bank protection, etc.) which may be required. Note whether the project encroaches on regulated floodplains and if a LOMR or CLOMR is required in the case of Federal Emergency Management Act (FEMA) floodplains. Describe the proposed surface (pavement, surrounding terrain, channel, etc.) drainage approach and whether a storm drain system or open ditch drainage is recommended. Note any special permits that may be required at the federal, state, or County levels, (e.g. 404 permit).
- *Earthwork Considerations:* Note if waste or borrow is anticipated, or if the earthwork is to be balanced. Note if unusually large cuts or fills are anticipated and options for dealing with them.
- *Structures:* Describe any new major types of structures or structure upgrades that are proposed (e.g. - bridges or widened bridges). Describe any minor types of structures that are being upgraded or added (e.g. – retaining walls). Note the type, size, and location for structures.

- *Roadway Cross Section & Pavement Design:* Describe and illustrate the typical roadway cross section, including side-slopes and identification of clear zone. Additionally, identify the pavement structure being proposed, along with any alternatives that were considered and the rationale for the selected choice. Reference the Pavement Design Report (see Section 3.13).
- *Traffic:* Describe whether the project will be access controlled or whether access to adjacent properties will be permitted subject to applicable agency standards. Include the Access Management Plan in the Traffic Report (see Section 3.15). Discuss traffic channelization, number of lanes, configuration, special turning lanes, shoulders, bicycle, pedestrian and auxiliary facilities (e.g. – bus pull-outs, mass transit ride share lots, etc.). Identify the location and design features of major intersections (including specific lane configurations). Describe signalization and lighting facilities to be provided with the project, including conduits for future signal, lighting, and Intelligent Transportation System (ITS) installations. Note: Should a unique street lighting system be required for the project, discuss the justification for the unique system and parameters used to define, design, operate and maintain said system.
- *Utilities:* Describe utilities and railroads located in the vicinity of the project. Discuss impacts of the project on these facilities and how the impacts will be addressed (including approximate quantities of utility relocation/reconstruction work). Identify utilities that are proposing to upgrade or add to their existing infrastructure. Also note utilities and railroads known to have, or represented having prior rights. Discuss the possibility of a joint trench and of installing overhead power lines underground. Identify any utility relocations subject to construction time restrictions.
- *Construction Issues:* Describe key components to be considered as part of the construction sequencing and traffic control plan for the project. Address such issues as whether the traffic flow should be maintained during construction, or if closures and detours might be required and where the detours will be located. Discuss how access can be maintained to adjacent residences and businesses. Identify any construction timing constraints imposed by environmental or utility relocation considerations.
- *Design Exceptions:* Note any exceptions from the design criteria established for the project and why such exceptions are necessary.

### Social, Economic, and Environmental Considerations

Summarize the results of the environmental screening process (see Section 3.8). Include the environmental impact screening matrix in the DCR as an exhibit or appendix. Provide a written overview of the screening results with particular attention to impacts requiring treatments or mitigation. Briefly address each of the following areas:

- *Air Quality:* State the potential impact of the project on air quality.
- *Biological Resources:* Identify any threatened, endangered, proposed, and/or candidate species likely to be impacted by the project, and any mitigation measures under consideration. Identify protected native plants likely to be impacted and mitigation measures under consideration. Identify invasive species likely to be encountered and measures that will be employed to reduce the likelihood of further propagation.

- *Community Resource Impact:* Identify potential impacts on schools, parks, churches, recreational facilities, and other community facilities.
- *Hazardous Materials:* Summarize the results of the Preliminary Initial Survey Assessment (PISA), including any special measures that may be required to address identified hazardous materials issues.
- *Historic/Cultural Resources:* Summarize the results of the Cultural Resource survey, including any protected resources identified and any special mitigation measures under consideration. This effort shall be coordinated with the Pima County OCRHP in accordance with Board of Supervisor's Policy C 3.17 - *Protection of Cultural Resources*
- *Neighborhood Impact:* Summarize potential impacts the completed project will have on nearby neighborhoods, such as the continuity of circulation and access, and intrusion of traffic. Identify impacts that construction activities may have on nearby neighborhoods and any special measures under consideration.
- *Noise:* Identify noise impacts from the project, any sensitive noise receptors in the area, and mitigation measures recommended in conformance with the Pima County Department of Transportation - Traffic Noise and Mitigation Guidance for Major Road Projects, Procedure 03-5.
- *Visual/Aesthetic Resources:* Discuss important views and other aesthetic resources affected by the project and any special measures under consideration.

### Public Involvement

Summarize the public participation plan developed for this project and implementation to date (e.g., meetings and open houses, mailings, informational materials, notices). Include as an appendix documentation of comments that have been received from the public and responses provided. Identify any outstanding issues and how they are being addressed. Provide the proposed schedule for implementing any remaining public involvement steps (see Section 3.4).

### Agency Coordination

Describe agency coordination undertaken for environmental review, intergovernmental agreements, etc. Summarize how the coordination was conducted (e.g., written correspondence, phone calls, meetings), issues raised regarding the project, agreed upon resolution, and any ongoing consultation (see Section 3.5).

### Alternatives

Each project will have several possible alternatives that should be considered in developing the design which may have not been documented elsewhere in the design process. Examples of alternative studies that should be documented in the DCR include:

- Typical section considerations such as the use of a four-lane divided versus a five-lane section
- Use of retaining walls versus slope easements in areas of large cuts or fills

- Shifting the alignment to minimize impacts to adjacent property or the environment
- Use of special non-standard lanes

Examples of alternative studies that would be documented elsewhere include:

- Choice of culvert sizing and pipe materials (precast vs. cast-in-place), which would be documented in the Drainage Report (see Section 3.11)
- Choice of pavement structure, which would be documented in the Pavement Design Report (see Section 3.13)

If a Value Engineering Review was performed, briefly recap the process and results, and reference the Value Engineering Report (see Section 3.21)

If a Location Study was performed, briefly recap the process and results, and reference the Location Report (see Section 3.9).

Following is a suggested procedure for documenting the evaluation of alternatives:

- First, identify the needs/deficiencies of the existing roadway features and elements.
- Second, identify any constraints that will impact the various solution alternatives which need to be considered in the overall decision making/evaluation process.
- Third, summarize the alternatives that were initially considered infeasible and discounted without detailed analysis. State the basis for rejection.
- Fourth, discuss the detailed analysis of the concepts retained for further study. Compare the costs and other impacts of each alternative, including the following as appropriate:
  - Effectiveness in meeting the project purpose and need
  - Potential effect on future land use
  - Impact on the environment
  - Impact on neighborhoods
  - Impact on traffic operations
  - Traffic control
  - Drainage
  - Utilities
  - Constructibility
  - Cost
  - Design exceptions

The use of comparative matrices such as the sample provided in [Appendix 3-G](#) is encouraged.

Cost Estimate

Provide an initial cost estimate of the project as proposed. Identify the recommended alternatives on which the estimate is based. Provide as an appendix the quantities and item or unit costs used to arrive at the project cost estimate. Include the cost of design, right-of-way acquisition, and utility relocation to be borne by Pima County, mobilization, construction, and construction administration. An example of items that should be included in the cost estimate along with some potential percentage ranges are provided as Appendix 3-J. An appropriate level of contingency funding should be included based on the level, and detail of information available for the project. Projects which do not have significant unknowns should have a smaller contingency percentage and associated amount than those with more significant unknown/unresolved issues. As the project moves forward and more becomes known and/or defined, the percentage and amount being held as a contingency should be reduced. PCDOT’s practice, as reflected in the table below is to maintain a 10% contingency for unforeseen construction issues at the Final PS&E Phase of project development.

Examples of project contingencies associated with project development are as follows:

**Table 3-4 Project Contingencies**

<b>Phase</b>	<b>Percent Contingency</b>
Initial Design	35% - 40%
Final Design	25%
Initial PS&E	10 - 15%
Final PS&E	10%

Budget Considerations

Identify if the budgeted amount is sufficient to construct the project as currently planned. In the event that it is not, identify viable options for reducing construction costs such as shortening the project, eliminating medians, and making other project modifications. If there is still insufficient funding available, identify potential project phasing that could be used to address the most critical needs first.

Delivery Method

Historically, project delivery has been completed thru the Design-Bid-Build process. However, it is appropriate to assess and identify if the project should be delivered in this manner, or if there are circumstances/issues associated with the project that could be improved upon/enhanced using an alternative delivery method (e.g. – Construction Manager at Risk, Job Order Contract, Design/Build). This review and assessment should include an evaluation of the specific circumstances, issues, risks, benefits, and opportunities associated with the project; the recommended delivery method, and how conducive said delivery method is towards meeting the needs of the project.

### Conclusions and Recommendations

Identify the recommended set of alternatives/project characteristics and explain the reasons for their selection. Discuss the interaction of various design elements and the trade-offs that constitute the recommended course of action, along with recapping the overall benefits of the project.

### 3.18 ENVIRONMENTAL ASSESSMENT AND MITIGATION REPORT

In order to be consistent in the development of the two primary project documents, the DCR and EAMR shall be developed jointly, or concurrently such that the elements and features that are contained within these documents are described and addressed consistently

#### **Purpose**

The purpose of the EAMR is to document the results of the assessment undertaken to identify unavoidable adverse impacts of the recommended alternative on the physical, social, and economic environment located within the vicinity of the project, and to recommend measures to mitigate those adverse effects. Mitigation measures are separate from features of the proposed action that avoid or substantially reduce the environmental consequences of the proposed action. Mitigation includes measures that:

- Compensate for impacts by replacing or providing substitute resources or environments
- Rectify impacts by repairing, rehabilitating, or restoring the affected environment
- Minimize impacts by limiting the degree or magnitude of the action and its implementation
- Avoid certain impacts altogether by not taking a certain action or by not incorporating selected elements of a proposed action

The environmental screening process conducted early in the project planning (see Section 3.8) and summarized in the DCR shall serve as the starting point for this final assessment. The results of any assessment conducted in conjunction with the environmental impact screening, as well as additional assessments undertaken, shall be documented in the EAMR to provide a comprehensive environmental report for review by the Pima County Board of Supervisors and the public.

The EAMR is provided initially to Pima County staff for review and comment and then revised as appropriate and submitted to the Pima County Board of Supervisors for review and approval following a public hearing. The EAMR is also made available to the CAC for its comments (see Section 3.4) and is available to the general public for review at the Pima County Department of Transportation prior to the public hearing.

#### **Environmentally Sensitive Roadways**

An EAMR that follows the general process described in this section must also be prepared for projects that are designated as Environmentally Sensitive Roadways as defined in the Pima County *Environmentally Sensitive Roadway Guidelines*, which is included in this manual as Chapter 4. Environmentally sensitive roadway projects are also subject to the assessment process and mitigation tools for biological resources, cultural resources, and visual and aesthetic resources as described in the aforementioned guidelines.

## Scoping Confirmation

In conjunction with the development of the scope for development of the DCR, the Pima County Project Manager and appropriate Design Team members shall meet to confirm the scope of work required for the EAMR. This meeting shall consist of reviewing the evaluation completed in conjunction with the screening process undertaken prior to the DCR (see Section 3.8), reviewing the preferred alternative and project limits as identified in the DCR, and identifying any assessments needed above and beyond that undertaken for the environmental impact screening.

## Funding Options

These EAMR guidelines have been developed with the knowledge that projects sometimes acquire federal funding during their planning. The approach and methodologies described below should provide the majority of information needed to complete the necessary federal-level environmental documentation, should it become necessary.

## Report Format

The EAMR is prepared first as a draft for review by Pima County staff, along with any technical assessment reports prepared. The Draft EAMR is then revised based on comments received and resubmitted as a Final EAMR for review and approval by Staff and submitted for approval to the Director. Upon approval by the Director, the EAMR is forwarded for review and approval by the Pima County Board of Supervisors (Appendix 3-O provides additional background relative to requirements/scheduling of EAMR for Public Hearing/Board Action). The EAMR shall briefly discuss any technical evaluations and surveys that were conducted in conjunction with the early environmental impact screening, as well as additional technical work undertaken for the EAMR. The discussion shall include a brief description of methodologies used and the results. Any technical documentation referred to in the EAMR shall include the title, author, and date. Technical environmental documentation prepared in conjunction with the project and referred to in preparing the EAMR shall be posted on the project's web site.

The EAMR is the major and final document approved by the Pima County Board of Supervisors for a project. It is important to understand that the report must serve as a “stand alone” document, which can be read and understood independent of other documents prepared for the project.

*Note: It is acceptable to summarize or repeat relevant information from other project documents, with those documents being referenced within the document and posted on the project web site should the reader wish to investigate a specific area further. It is not acceptable to simply refer the reader to another document to obtain information necessary to understanding the EAMR.*

## Report Content

A typical EAMR Table of Contents is included as [Appendix 3-K](#). The remainder of this section provides additional detail on what shall be covered in the major sections of the EAMR.

## Executive Summary

Prepare an Executive Summary that provides a project overview, including project name, number, location, limits and Location Map, estimated cost, funding sources, and construction year; an explanation of the project purpose and need; a brief description of the project; a summary of the unavoidable adverse impacts identified, the recommended measures for mitigating the impacts, any agency coordination and consultation conducted, and parties responsible for the implementation of the mitigation; and finally a summary of the public involvement activities conducted for the projects, the comments received from the public, and Pima County's responses. Appendix 3-L provides an outline for the Executive Summary, while Appendix 3-M offers a sample table for summarizing impacts, recommended mitigation, agency coordination and consultation, and responsible parties, and Appendix 3-Db presents a sample table for summarizing public participation activities.

The Executive Summary shall be of limited length and shall be comprehensible to non-technical readers. The summary shall be prepared as a document that can be both bound into the EAMR and distributed and understood independent of the full EAMR.

## Abbreviations

Provide an alphabetized listing of the abbreviations used in the document.

## Background

Begin the report with the following information:

- Pima County assigned project name and number
- Project location and limits (including construction easements)
- Estimated cost, funding sources, and construction fiscal year
- Listing of the steps completed in the design process to date (see Table 3.1 and Chapter 1, Appendix 1-B)

*Exhibit:* Provide a copy of the Location Map specified for the DCR (see Appendix 3-H).

## Project Purpose and Need

Develop a purpose and need statement that describes the overall objective of the project – that is, why the agency is undertaking the project, and what objectives are to be achieved by the project. The statement shall explain why the proposed action, with its inherent costs and potential adverse environmental impacts, is being pursued.

The distinction between the “purpose” and the “need” might be described as follows:

- *Purpose* is the specific objective(s) of the project (e.g., to widen the road)
- *Need* is the problem(s) that is (are) being addressed or the opportunity(ies) being pursued (e.g., to address congestion problems)

### Project Setting

Provide an overview description of the environment in which the project will be located. Include both physical and socioeconomic aspects of the setting, such as the configuration of the existing roadway (if the project is an upgrade or improvement project), general characteristics of the vegetation, the level and type of development, etc. Include any unusual or important elements or features of the existing setting.

Base the description on information completed in the Questionnaire for Establishing Areas of Impact (see Section 3.8 and Appendix 3-Fa) and on the “Project Area Characteristics” prepared for the DCR (see Section 3.17).

*Exhibits:* Include an aerial photo with project limits and prominent physical features identified (e.g., major streets, washes, and recreational areas). Provide captioned photographs to illustrate key features.

### Proposed Project

Drawing on the Environmental Screening Summary Impact Matrix (see Section 3.8 and Appendix 3-Fb) and the project description presented in the DCR (see Section 3.17), describe the proposed project. Include the following items:

- Key features of the facility’s design and operation (e.g., number of lanes, bicycle, pedestrian, and transit facilities, traffic signals, ADA facilities, medians, drainage facilities, proposed speed limit, etc.)
- Construction activity (e.g., utility involvement, etc.)
- Features incorporated into the proposed action’s design to avoid or reduce adverse environmental impacts

### Environmental Screening

Describe how the environmental screening process (see Section 3.8) was used in the development of the design to respond to potential impacts and reduce the need for mitigation measures by avoiding or minimizing potential impacts. Identify the adverse impacts that could not be avoided, and note additional technical analyses that were done above and beyond that done for the environmental screening to identify impacts.

### Environmental Assessment and Mitigation

Appendix 3-N presents the Natural/Physical and Neighborhood/Social environmental categories that shall be considered when undertaking a roadway project design. The table also includes guidance on evaluating potential project impacts for each category. The EAMR shall address each environmental category separately, providing information on each of the topics listed below. If the project will not affect an environmental category, note the category and provide a one or two sentence explanation as to why the category is not applicable.

- *Existing Conditions:* Describe the existing conditions related to the environmental category of interest in the vicinity of the project area. (*Note: The area of concern for different categories varies.*)
- *Potential Impacts:* Identify findings of the assessment for the environmental category, clearly calling out the potential impacts that were unable to be avoided or minimized in the development of the design concept.
- *Mitigation Measures:* Describe the recommended measures to mitigate the potential impacts, and any effects that the measures may have on other environmental categories.
- *Permits:* Identify any permits associated with the environmental category that are likely to be needed, and briefly describe any mitigation measures that are likely to be needed to obtain permit approval.

### Agency Coordination

Identify any coordination and consultation conducted with the following:

*Local Jurisdictions and Tribal Nations:* Document any coordination undertaken with other local jurisdictions and/or with tribal nations that is relevant to the environmental issues addressed in this EAMR. Reference correspondence, meetings, Intergovernmental Agreements, etc. Include any coordination letters sent and responses received in the EAMR appendices.

*State and Federal Agencies:* Describe any coordination and/or consultation with state and federal agencies that occurred during the evolution of the project and that was associated with addressing environmental issues. Provide dates and topics of correspondence, meetings, phone calls, and other relevant communication. Include any coordination/consultation letters sent and responses received in the EAMR appendices.

### Public Participation

Describe the public participation process undertaken in accordance with the Pima County *Community Participation and Mitigation Ordinance* (see Appendix 1-A) and the Public Participation Plan prepared for the project (see Section 3.4). Discuss the formation of the CAC and its make-up. Summarize the public activities undertaken, as well as the comments received from the public and the County's responses to those comments.

Characterize the key issues raised by the CAC and/or the general public, how the issues were addressed, and whether the CAC has any remaining key issues of concern. Discuss comments raised by members of the general public through written correspondence, public open houses, phone calls, the Pima County Website, or other means. Describe how the comments were taken into consideration in the project planning and the means of response to the public.

Describe the CAC's ongoing role in the project. Describe whether any other public meetings or activities regarding this project are planned for the general public in the future.

Include in the EAMR appendices, the names and affiliations of the CAC members and copies of materials handed out at the CAC meetings, materials mailed or distributed to the public, the

public open house sign-in sheets, CAC and public open house meeting announcements and notifications, and written comments received from members of the public.

### Conclusions and Recommendations

Provide a table summarizing the results of the EAMR, including the following: (a) potential adverse impacts; (b) measures recommended to mitigate the possible impacts; and (c) the party(ies) responsible for implementing the mitigation measures. A sample summary table is presented in Appendix 3-L. (*Note: This table is to be included in the EAMR Executive Summary also.*) If a potential adverse impact cannot be mitigated, explain why. Provide the estimated total cost of the recommended mitigation measures.

### References

Provide a listing of the information necessary for the reader to locate and retrieve any of the sources that were cited in the document. Each source cited shall appear in the reference listing and should also be cited within the document itself.

### Tables

Provide a listing of the Tables contained within the document.

### Figures

Provide a listing of the Figures contained within the document.

### Project Documents

Provide a listing of Project Documents used to in the development of the EAMR and website linkage information.

### **Special Provisions**

Upon approval of the EAMR and specified mitigation measures, the measures must be incorporated into the Special Provisions for the project.

## **3.19 RIGHT-OF-WAY**

### **Introduction**

This section describes the preparation of right-of-way documents associated with roadway improvements, including those required for acquisition and disposal of real property. Right-of-way documents include right-of-way plans, legal descriptions, title reports, individual parcel maps, and orthophotos. Field staking of acquisitions may be required as well. This section also details the function of each type of right-of-way document and outlines the content expected with each.

For the purposes of this section, “a parcel” is considered to be a tract of land that has unity of title, unity of use, and physical contiguity. The term “affected parcels” refers to those parcels for which right-of-way or easements will be acquired, or which will be economically impacted by the roadway project in some other way.

Real property, rights-of-way, and easements acquired as part of the project shall be designated as “new” if recordation of the instrument by which they were established occurs prior to finalization and acceptance of the project plans by the County. If not, a designation of “proposed” shall be used.

Ownership of real property and property rights (i.e. land, right-of-way, easements) necessary for construction of a roadway project shall be acquired and recorded with the Pima County Recorder prior to submitting the construction documents to the Pima County Procurement Department unless directed otherwise by the County.

### **Standard of Accuracy**

Fieldwork shall be performed in accordance with the procedures and accuracy standards described in Section 3.10, Surveys and Mapping. Boundaries of proposed acquisitions must close mathematically.

### **Right-of-Way Plan Functions**

Right-of-way plans serve several functions.

- Define existing right-of-way, including relevant drainage and utility easements. Other types of easements, such as private ingress/egress easements, are shown if they affect the design and operation of the improvements.
- Show proposed and new fee right-of-way and easement acquisition with sufficient dimensions and ties to existing monumentation to define them for the purpose of preparing legal descriptions and locating them in the field.
- Provide supplemental information such as areas of acquisition needed for appraisal and other acquisition activities.

### **Right-of-Way Plan Format and Content**

The following paragraphs provide guidance that shall be followed in preparing project right-of-way plans.

### General

Right-of-way plans shall stand alone in terms of defining existing, new, and proposed right-of-way with respect to existing monumentation and to the construction control line. Sufficient ties, dimensions, stationing, and other information necessary to accomplish this shall be provided.

### Right-of-Way Plan Sheets

Plan sheets shall adhere to the following format and content guidelines:

- Prepare right-of-way plans as 22” x 34” sheets and normally at a scale of 1” = 40'. It may be necessary to provide details at larger or smaller scales to show large parcels in their entirety or if an unusual amount of detail is necessary.
- Orient north to the top or right of the sheet.
- Show major street intersections in their entirety on a single sheet, even if this results in the incomplete use of the sheet.
- Label all streets.
- Show and label the right-of-way and construction control line and stationing.
- Provide a table of curve data for each sheet, listing the delta, radius, and arc length for each curve shown on that sheet for which dimensions are required. Curves shall be designated with consecutive numbers enclosed in ellipses placed as near as possible to the pertinent curve. Arrows and leaders may be employed if necessary for clarity. Data for curves that extend from one sheet to another shall be shown in the tables on each sheet.
- Show and label major topographic features such as rivers, washes, and railroads.
- Show and label jurisdictional limits such as city limits, Indian reservations, national forest boundaries, State land, and similar jurisdictional limits.
- Show recorded subdivisions adjacent to the project including the subdivision name, book and page, block and lot numbers, along with year of recording in parenthesis. Original lot and block lines that are no longer current property lines shall be shown as dashed and without dimensions.
- For adjacent lots that are subdivided, show the subdivision lot number, assessors parcel number, name of owner, and address of parcel. For adjacent parcels that are not subdivided, provide the same information except replace lot number with the word “UNSUBDIVIDED.”

### Monumentation and Control

- Show the monumentation from which existing and proposed rights-of-way are established. Provide legal and physical descriptions for each monument.
- Show and label section, quarter section, and sixteenth section lines (aliquot lines) applicable to the existing or proposed rights-of-way. Show the existing right-of-way control line if

other than an aliquot line.

### Existing Rights-of-Way and Easements

- Show existing rights-of-way and easements, referencing the instruments by which they were established, along with the date of establishment (e.g., map and plat, County road map, and recorded deed/easement). Include the recorded book and page of each document, along with year of recordation in parenthesis. Show these references on the project side of the right-of-way lines. It should be clear how the existing right-of-way originated at any location on the plan. Utility blanket easements shall be clearly identified.
- Show any vacated rights-of-way and easements. Reference the instruments by which they were vacated, and show these in parentheses. Show vacated rights-of-way with dashed lines and without dimensions or ties. In many cases, rights-of-way abandoned or vacated for roadway purposes continue to serve as public utility easements.
- In cases where rights-of-way originally created by a subdivision plat have been widened by a subsequently recorded document, show the original line as dashed. Clearly show the amount of widening.

### Access Control

- Show any existing and proposed access control lines.

### New and Proposed Right-of-Way and Easements

- Show new and proposed rights-of-way, and permanent and temporary easements. Label these and show the dimensional information needed to prepare legal descriptions. For New rights-of-way, reference the instrument by which it was acquired along with the date of establishment. Show these references in parentheses on the project side of the right-of-way lines. It should be clear how the existing right-of-way originated at any location on the plan.
- Shade or crosshatch new and proposed right-of-way and easements to be distinctive. Provide any necessary labeling or notes.
- New and proposed rights-of-way shall be brought to the attention of PCDOT – Engineering Information Management (EIM) Mapping and Records to determine if a new roadway or modification of an existing roadway establishment is required. PCDOT – EIM Mapping and Records Section will coordinate said establishment and/or modification.

### Affected Parcels

- Show affected parcels in their entirety with record or calculated dimensions. Use broken lines, details, or insets at different scales if necessary to show very large or very small parcels.
- Assign each affected parcel an identifier consisting of the sheet number on which the parcel first appears and a consecutive letter unique to the particular sheet. Enclose this identifier in a hexagon to make it visually distinctive.
- Show record distance, bearing, and curve data of property line of affected parcels. Provide

radial or tangent bearings if necessary to fully define curves that are not tangential to adjoining curves or line segments. The portion to be acquired shall be tied to permanent control and sufficiently dimensioned that this portion can be unambiguously described and the area of take calculated.

- As appropriate, show physical features that may impact the acquisition of affected parcels such as:
  - Permanent improvements and structures within 50 feet of the proposed right-of-way line. Label the type of improvement, such as house, barn, garage, and shed.
  - Points of ingress and egress such as driveways, access easements, and private roads.
  - Fences, sidewalks, patio walls, major landscaping, signs, utility service lines and meters, and other structures.
  - Evidence of unwritten or unrecorded easements, such as visible utilities that may indicate unrecorded utility easements.
- Indicate the disposition of any improvements located within proposed acquisitions (demolition or relocation).
- For each affected parcel provide a table or tables containing the parcel identifier, the Pima County Tax ID number, docket and page of the parcel deed, the parcel owner, gross area of the parcel per assessor records, the type of acquisition, the size of the area to be acquired, and the net area of the remainder. Include areas for permanent and temporary construction easements (TCE). Areas shall be rounded to the nearest square foot or the nearest one thousandth of an acre.
- Provide a table of coordinates of found monuments, new right-of-way points, and other key points. Use the project specific surface coordinate system established per Section 3.10. Note the basis of bearing and project grid to surface factor established per Section 3.10.

### **Legal Descriptions**

Legal descriptions shall be prepared for each right-of-way and easement acquisition required for the project. Preparation of legal descriptions will require the data outlined in Sections 3.7 and 3.10. Additional data gathering may be necessary such as updates of the data gathered earlier, status of title and/or chain of title reports for adjoining parcels, and copies of documents referenced in the other documents.

The legal description is the primary component of the conveyance package and must unambiguously define the area being acquired. If a legal description includes by reference other recorded instruments, those instruments shall be submitted to Pima County with the legal description. Include on the legal description, as a foot note, the project name, number and parcel identification letter shown on the right-of-way plans, The acquisition area (square feet or acres) shall not be included in the legal description. Each legal description shall be sealed by an Arizona Registered Land Surveyor and shall state the type of acquisition such as “Fee Road Right-of-Way”, "Drainage Easement”, “Temporary Construction Easement”, or “Slope Easement”.

## **Individual Parcel Maps**

An individual parcel map shall accompany each legal description. This map is a diagram of the legal description and shall include a reference location map, the existing parcel, and the acquisition area clearly shown and labeled. The parcel map is attached to and recorded with the legal description and shall have no text less than 11 points in size for legibility. When an entire parcel is acquired, and only a portion of the property taken is for road right-of-way, said portion shall be labeled as “Road Right-of-Way”, with the remaining portion(s) of the property labeled according to the type of acquisition.

Individual parcel maps shall be prepared on 8 1/2” x 11” paper at a scale sufficient to depict pertinent information. Each parcel map shall include the consulting firm's name, type of acquisition, assessor number, date written and dates of any revisions, property owner's name, parcel address, and sufficient dimensional information to illustrate the derivation of the legal description.

For areas less than 1,000 square feet, provide the area to the nearest square foot; for areas between 1,000 square feet and 1/4 acre inclusive, give area to the nearest 1/10,000 of an acre; and for areas greater than 1/4 acre give the area to the nearest 1/1,000 of an acre.

## **Orthophotography**

Provide orthophotographs of the project site. These photos shall be at the same scale as the right-of-way plan and at a resolution of 0.25 feet per pixel. Aerial coverage shall extend at least 200 feet each side of the proposed centerline for the full length of project. Each photo shall be on a 22” x 34” mylar with the date of the photo placed in the lower right-hand corner of each sheet. Show the following on these photos:

- Existing rights-of-way and easements
- New and proposed rights-of-way and easements
- New curb lines and sidewalks
- New curb cuts and driveway openings
- New median cuts and turn bays
- New travel lanes (vehicular and multi-purpose)

The orthophotos are submitted with the right-of-way plans, but not considered a part of the record documents.

## **Field Staking**

Field staking of new and proposed right-of-way acquisition may be necessary in special cases. If so, that work shall:

- Mark existing, new and proposed right-of-way lines with a sufficient number of nails with flagging to clearly define existing right-of-way and proposed acquisitions on the ground. Provide nails at key points such as angle points, intersections of existing property lines with

the proposed right-of-way, corners of easements, and so forth. Provide lath labeling key points.

- Coordinate parcel staking with Pima County Real Property Services. Notify Real Property Services as parcels are completed to allow them to photograph the results.
- Tie all staking to the project construction control line via station and offset. Provide stations and offsets on lath labeling key points, as well as type of right-of-way identified (e.g., existing, new TCE, drainage easement, slope easement).
- At completion of approved right-of-way plans, provide field staking services to permanently monument the new and existing right-of-way line. Place 1/2-inch pins or other suitable markers at angle points, beginning of curves, and end of curves on existing and new right-of-way line. Place monuments at the intersection of right-of-way with public land survey lines.
- Do not disturb, excavate, or collect artifacts from any historic or prehistoric ruin or archaeological site located within the project limits and corridor. The discovery of any archaeological or historical site or object during the course of survey, excavation, or construction shall be reported to the Pima County Department of Transportation, which will notify the Pima County CRHPO. All reasonable steps shall be taken to secure any archaeological or historical resources.
- Do not disturb, harm, or damage any vegetation during survey work without the prior written approval of the property owner. Pima County staff shall approach the property owner(s) for this permission once the need has been demonstrated by the designer.

### **Finalized Plans**

Once construction is completed, the right-of-way plans shall be updated to reflect any changes in the actual acquisitions. An as-built record of survey of the finalized right-of-way shall be performed to be recorded with the Pima County Recorder and filed with the Pima County Engineering Information Management (EIM) Mapping and Records Section.

### **Right-of-Way Notebook**

Complete and legible copies of all documents used in the development of the right-of-way plans (e.g. - deeds, easements, road maps, subdivision plats, utility easements, and other recorded instruments) shall be assembled into a Right-of-Way Notebook and submitted with the right-of-way plans. The notebook shall be organized and cross-referenced with the right-of-way plans, such that property, rights-of-way, and easement information may be readily located. The Right-of-Way Notebook shall also include a right-of-way document summary in the form of a spreadsheet containing the following information:

- Document Number
- Source (e.g. TEP, SW Gas, Name of Subdivision, etc.)
- Type of Document (e.g. - Deed, Utility Easement, Patent, Lease, Subdivision Plan, etc.)
- Township, Range, Section; Recording Docket and Page (with year)
- Plan Sheet Station reference(s) and Page Number
- Any associated notes relevant to the document.

## **Checklists**

Checklists to aid the preparation of right-of-way plans, parcel maps, and legal descriptions are provided in Appendix 3-P.

## 3.20 CONSTRUCTION DOCUMENTS

### Purpose

The package of construction documents includes final construction plans, specifications, bid schedule, and a cost estimate in Pima County's bid sheet format. The construction documents need to be clear and unambiguous about the work to be done, the standards to be met, elements of work, method of measurement, and basis of payment. The construction documents shall reflect current Pima County design practices and standards except as previously agreed upon with Pima County. The documents shall also reflect any special recommendations or requirements stated in the DCR, EAMR, Traffic Report, and other applicable planning documents.

### Construction Plans

Unless otherwise approved by Pima County, the following guidelines shall be followed in the preparation of construction plans:

- Prepare drawings at 22" x 34"
- Orient project with north arrow pointing upward or to the right on the plan sheets
- Provide match lines for plans and details that due to size or scale must be broken between sheets or different locations on a single sheet
- Provide details, text, and other drawing components at a sufficient size and clarity to be legible when reduced to half size or microfilmed
- Clearly mark drawings submitted for review and comment with the words "Preliminary, Not for Construction" along with the phase of completion
- Show vertical control of roadways by a single profile and superelevation for direction of travel
- Use the following scales for various plan types (*Note: Other scales may be acceptable in unusual conditions, but Pima County shall be consulted prior to using any scales other than those indicated here.*)

Roadway Plans:	1" = 40' horizontal, 1" = 4' vertical
Storm Drain Mains and Laterals:	1" = 40' horizontal, 1" = 4' vertical
Sewer and Water Modification:	1" = 40' horizontal, 1" = 4' vertical
Minor Channel Improvements:	1" = 40' horizontal, 1" = 4' vertical
Major Channel Improvements:	1" = 100' horizontal, 1" = 5' vertical
Traffic Signal Plans:	1" = 20'
Lighting and ITS Plans:	1" = 40'
Signing Plans:	1" = 40'
Pavement Marking Plans:	1" = 40'
Landscape Plans:	1" = 20'

Roadway Cross Sections:	1" = 40' horizontal, 1" = 4' vertical
Minor Channel Cross Sections:	1" = 40' horizontal, 1" = 4' vertical
Major Channel Cross Sections:	1" = 100' horizontal, 1" = 5' vertical

## **Plan Phases**

The various phases of plan preparation are as follows:

### Initial Design Phase

The Initial Design phase plans, included with the DCR, shall consist of basic typical sections and initial horizontal and vertical geometry.

### Final Design Phase

The Final Design Phase plans, define in detail the roadway and cross drainage geometry consistent with the requirements put forth in the DCR, EAMR, Traffic Report, and other predesign documents. A conceptual design of the pavement drainage system is provided to determine approximate size of mains, discharge locations, and potential utility conflicts. Preliminary pavement marking is provided to ensure traffic operational and capacity requirements are being met. Preliminary plans for bridges and retaining and noise walls are also provided. Preliminary landscape approaches are also presented at this time. The checklist presented in Appendix 3-Q indicates the plan sheets and level of detail for Final Design Phase plans.

Plotted cross sections shall be provided at a minimum of 50-foot intervals and at other key locations such as significant breaks in terrain, driveways, and intersections with side streets. Conflicts with existing water and sewer facilities are identified and the scope of water and sewer modifications determined. A preliminary quantities report and updated cost estimate is provided at this phase. Costs estimates for components that have not been fully identified should include an appropriate level of contingency funding.

### Initial PS&E Phase

The Initial PS&E Phase includes appropriate plan revisions in response to Final Design Phase comments, as well as further development of the design. The pavement drainage system is finalized, including profiles of storm drain laterals, and the need for water and sewer modification is identified. Preliminary landscape, signalization and lighting, and staking plans are included. Detailed plans for bridges and other structures are also provided at this phase. Roadside barriers and their associated warrants/supporting documentation are submitted. Plans for any water and sewer modifications are prepared. The checklist presented in Appendix 3-R indicates the plan sheets and level of detail for Initial PS&E Phase plans.

Additionally, the quantity report and cost estimate are updated, and an initial draft of special provisions is provided. Plotted cross sections as necessary to reflect design changes and to show existing and proposed drainage and underground utility features are presented.

The Plans, Special Provisions and Estimate (PS&E) package should all work together, with notes and references on the plans and specifications relative to the scope of work and how an item of work is measured and paid. Quantities and items of work on the plans and in the Special Provisions should be listed by their pay item number whenever possible.

### Final PS&E Phase

The Final PS&E Phase completes the review/updating of the detailed construction plans, incorporating revisions in accordance with comments received from the Initial PS&E Phase submittals and any other reviews made in completing the Final PS&E. Note that this includes incorporating and updating the stormwater pollution prevention plans, cost estimate, and special provisions as necessary. Appendix 3-S provides a checklist for the Final PS&E Phase.

### **Special Provisions**

An initial draft of Special Provisions shall be included with the Initial PS&E Phase documents, with the final included with the Final PS&E Phase document submittals. Special Provisions are necessary when work is required that is not sufficiently addressed in the drawings or standard specifications, and to describe the methods of measurement and basis of payment for special bid items. The Special Provisions shall also include mitigation measures identified in the EAMR and approved by the Board of Supervisors (see Section 3.18). Appendix 3-U provides additional guidelines on information to be included within the Project's Special Provisions.

### **Bid Item, Cost Estimate, and Quantities Report**

A bid item list is to be provided with the Initial PS&E Phase plan submittal and shall consist of bid items identified in the department's *Master Bid Item Listing* available on the department's website or new items provided by the department at the request of the designer. Bid item number series are related to the specific numbered sections of the Standard Specifications.

In order to avoid creating new item numbers for special items of work, which may only apply on one type of project, there are several specialty-type item numbers available for use. For example, there are general items of work, such as *Temporary Traffic Signal (Intersection A, B...)*, which are utilized to avoid creating a new item number for a specific intersection, or *Box Culvert No.1,2...* to identify a specific culvert structure size and location. Several items will also have a (*Special*) category in order to allow for non-standard items of work. There are also several Miscellaneous Work 1, 2... items which can be used to describe an unusual item of work and how it is to be measured and paid.

Cost estimates are to be provided as part of the Final Design Phase submission, as well as subsequent submittals, and are to include quantities in the form of a report that provides take-off calculations. These estimates are to follow Pima County's standard format. Any items not covered in the Pima County Master Bid Item List must be forwarded to Pima County for assignment of a bid item number. Quantities for special bid items must be consistent with the special provisions. The following order of submittals shall be adhered to:

- Preparation and submittal of a quantity take-off calculation report covering the major pay items with the Final Design Phase and Initial PS&E Phase submittals

- Preparation and submittal of a quantity take-off calculation report, including all pay items, with the Final PS&E Phase submittal
- Revision of the report as necessary

Note: Preparation of a quantity take-off calculation report provides an excellent QC tool for coordinating the project plans with the specifications and estimate, and for ensuring that major items of work are properly addressed in a logical and consistent manner.

### Quantities Report

The format of the Quantities Report shall be as follows:

- Three-hole punched and bound with a hard cover identifying the project by name, project number, level of submittal, and date.
- Immediately following the cover will be the quantity take-off summary, sorted sequentially by pay item number. Each pay item will include the correct verbal description of the quantity, the unit of measurement, the quantity, and the cost.
- Immediately following the quantity take-off summary will be the quantity calculations for each pay item.
- Quantity calculations will be documented on a suitable computation form that identifies the project, the level of submittal, date, the person performing the calculation, the Checker, and the Backchecker.
- No more than one pay item will be documented on a single computation sheet.
- The computation sheets will be in numerical order and in the same sequence as the quantity take-off summary.
- Quantities for each pay item will be identified by station offset and plan sheet if appropriate. Paving and earthwork calculations and lump-sum item calculations will provide sufficient information regarding location and method to facilitate review by the County reviewer.
- Computer generated quantities will include sufficient documentation to adequately review the output.
- The Quantities Report will be sealed, signed, and dated by the responsible engineer in accordance with State Technical Board of Registration Regulations.

### **Construction Document Submittal to Procurement**

A Work Requisition, executed by the Project Manager, shall be submitted to the Procurement Department, Design and Construction Division in order to begin the contracting process.

When preparing a set of contract documents for submittal to Procurement, the following information should be included in the *Invitation to Bid* package, as required in Subsection 102-1, Advertisement for Bids:

- Project number and name
- Location and length of project

- General scope or description of work, principal items, and approximate quantities
- Specified contract time (working days, calendar days or fixed date(s)) for completion of contract work
- Statement of requirements, if there are any special contractor requirements

Procurement will address the following items:

- Date, time and place of the public opening of the bids
- Date, time and place of the prebid meeting
- Type and amount of the Bid Bond
- The DBE goals (and number of On-The-Job Trainees for federally funded projects)
- Manner in which project plans and specifications may be obtained and the cost of same
- Number of days after bid opening within which the contract will be awarded, if awarded
- Number of days that the successful bidder has to return the signed contract, bonds and certificates of insurance

Note: For the last two items, suggested times are 60 days for award of contract and 15 calendar days for the return of signed contract, bonds and insurance after the date of the notice of award letter. For Improvement District Projects, please consult A.R.S. for requirements.

#### Procurement Submittal

- Final Sealed Plan mylars, with the Cover Sheet signed by the Director and the applicable Division Managers;
- All applicable specifications and special provisions, both hard copy and electronic;
- For special provisions which are greater than 20 pages, Procurement prefers to receive them on a CD in Microsoft Word and pdf adobe file format, with hard copy for Procurement's file. The CD will be copied and included with the Specification Bid book.
- For special provisions less than 20 pages, where the Project Manager desires that they be merged and included as part of the Procurement Bid package, the Project Manager should submit the electronic version as an email attachment. The Project Manager should submit a hard copy with the Work Requisition;
- Engineer's Estimate Excel Spreadsheet (electronic and hard copy);
- Bid Schedule documents as both a Word file and Excel file, and hard copy;
- The Disadvantaged Business Enterprise (DBE) goals provided by the Minority and Women-Owned Business Enterprises (MWBE)/Construction & Design Program Coordinator in the Procurement Department. On Federal Aid projects, this information must be obtained from ADOT's Civil Rights Division. (See the Pima County Certification Acceptance Manual.)
- If non-County funds are used, cite any Special Contract provisions or requirements such as FHWA Form 1273, and/or Minimum Wage (Davis-Bacon) if required by the funding source.
- List of the Arizona Registrar of Contractors License(s) that the Contractor is required to possess in order to perform the Scope of Work

## **As-Built Plans**

The construction plans shall be updated to reflect any changes made during construction. The responsibility for updating, maintaining, and submittal of the “as-built” plans shall be determined during the initial project scoping.

## **Post Design Services**

Members of the Design Team will be called upon to provide services beyond the submittal of the Final PS&E and throughout the construction phase of the project. These services can be divided into two phases: pre-bid services and post design services.

### Phase I: Pre-Bid Services

Pre-Bid Services are generally part of the design contract negotiations. These services may include, but are not limited to:

- Attending pre-bid meetings
- Assisting in the preparation of addendums
- Addressing questions on the plans and specifications
- Bid evaluations

### Phase II: Post-Design Services

Post-Design Services will be added by contract modification or new contract. These services may include, but are not limited to:

- Attending the pre-construction meeting and partnering meetings if any
- Attending weekly construction meetings at the project site
- Making site observations of the work under construction
- Evaluating and/or recommending changes in the construction documents
- Responding to Requests for Information (RFI)
- Responding to Field Change Orders (FCO)
- Providing design details and revised drawings as needed to support construction
- Reviewing shop drawings, erection procedure plans, form work details, and proposals for substitutions or "approved alternates"
- Evaluating contractor submitted value engineering proposals
- Preparing the “as-built” documents

## **3.21 PROJECT REVIEW AND APPROVAL PROCESSES**

### **Purpose**

During the development of each project, there are several review efforts that are undertaken to assure consistency and appropriateness of project development, document preparation, design, and delivery. Additionally, specific efforts shall be followed during the review and approval of each phase of the project as it is developed, prior to embarking on the next phase of the project. These reviews, along with the appropriate approval requirements are further detailed below.

### **Report and Plan Review\***

Pima County uses an ongoing/continuous focused review and approval process to advance projects. This process is described below, with specific reviews to be applied to each project being defined during the initial project scoping efforts.

#### *Report and Plan Initiation*

The designer shall work with Pima County Staff to determine the appropriate reports and plans to be developed for each Phase of the project, a timeline for said efforts, establishment a Quality Control Plan (refer to 3.2) for the overall effort, and identify an issues resolution methodology to be followed.

#### *Report and Plan Development*

The designer shall begin the process to develop reports and plans identified for the project. Pima County's Project Manager and other appropriate Pima County personnel will hold regularly scheduled working committee meetings (e.g. - weekly, bi-weekly, etc.) with the Design Team and other appropriate stakeholders to review, comment and provide input/feedback into the reports and plans being developed for the project. Attendees to these working meetings should include representatives from the appropriate disciplines (traffic, flood control, operations, engineering, field engineering, right-of-way, cultural, transit, utility, etc.) and others who may be impacted/involved with the project or deal with specific areas being discussed and reviewed.

Comments, suggestions, recommendations, and other outcomes arrived at during these working meetings shall be documented in written format by the designer to provide documentation relative to the projects development and decisions. Once all of the reports and/or plans have been developed to a point where it is appropriate to move the project to its next milestone (as identified by project Phase), a specific Report and Plan Review meeting (Step 3) shall be scheduled.

#### *Report and Plan Review*

Once reports and plans that have been developed/reviewed and are ready for advancement by the appropriate working committee, they shall be assembled into a project "Phase" submittal that will be the basis of review/advancement during a Workshop Review. Note: The assembled submittal shall (a) reflect use of the study/analysis/evaluation processes described in this manual, (b) conform to the plan checklist or the Sample Table of Contents, whichever is applicable as

presented in this manual, and (c) be clearly marked with the name of the individual(s) who performed the review and checking in accordance with the approved Quality Control Plan.

The purpose of each workshop review is to engage and allow the designer and other appropriate parties involved with the project (working committee members, stakeholders, and others impacted by the project) the opportunity to review and discuss the overall project and provide an update of the Reports and Plans associated with the particular “Phase” of the project. The workshop review shall include, as applicable, discussion of major project design components, public involvement issues/concerns, real property, drainage, costs, risks, and any other associated project items that would be appropriate to review/discuss and obtain feedback relative to the phase of project development. Comments made during the workshop review session should be based on the current phase of the project’s development. However, other comments about potential future issues (refined design) may be made and noted by the project team for consideration as the project is further developed.

Comments, suggestions, recommendations, and other outcomes arrived at during these workshop review sessions shall also be memorialized by the designer to provide documentation relative to the projects development and decisions. During the workshop review session, it shall be determined if the suggestions can/should be incorporated into the associated Reports and/or Plans and allow the project to move forward to the next phase of development/approval, or if there will need to be a follow-up workshop review session to review and finalize the proposed changes.

Once a decision is reached regarding the associated Reports and/or Plans, it is appropriate to move the project forward to its next phase of development, which may include key milestone approvals (Board, Director, Exit Gate) or advancement to the next Phase of development.

#### *Report and Plan Approval*

Based on the type of Report and/or Plan and the Phase of the project, the documents shall be forwarded as appropriate for approval by the Director and Board of Supervisors.

\* Note that during these review processes, keys to success include being organized with project information being disseminated in a timely fashion; providing participants with an understanding/expectation of their involvement; appropriate and timely follow-up efforts with participants to assure all comments/issues are brought forward; establishment and adherence to deadlines; and being open and honest relative to comments made and/or received, as the outcome from these efforts is to obtain a better end-product for the project.

#### **Value Engineering Review**

A Value Engineering (VE) Review is a systematic method to improve the "value" of a project by optimizing the mix of performance (function) and costs of a project. The intent of this practice is to review the overall project and identify alternative(s) which will meet the project’s functional goals at a comparable or reduced cost, further enhance the projects functionality, or validate that the projects design has been optimized. PCDOT will identify projects that will require Value Engineering, with those being in excess of \$5M being candidates for this additional review. This review should occur concurrently with the development of the DCR.

## **Constructability Review**

A Constructability Review is a methodology used to review project plans and specifications when the design of the project is reaching its final phase. The intent of this review is to check the project's plans and specifications to assure they are coordinated, identify and clarify any ambiguous or undefined information, and perform an overall review the project's documents to assure they represent a project that can be bid, built, and administered effectively. The ultimate goal of the review is have a well-defined set of contract documents, a plan for construction, with provisions in the specifications to properly manage the construction process and to allow the contractor to bid necessary resources and develop appropriate costs to properly prosecute the work. The Pima County Department of Transportation will identify projects that will require a separate Constructability Review, with those being in excess of \$5M or having significant complexity, being candidates for this additional review. This review should occur subsequent to the delivery of Initial PS&E Phase plans and prior to the finalization of the Final PS&E Phase plans and will be based on the detail and complexity of the project being reviewed. Note: There may be constructability issues/concerns which could impact environmental and other permitting requirements. These should be identified and addressed early in the project.

## **Project Management Exit Gate Process**

Pima County has developed a Project Management Process that has various steps and control points associated with the development and advancement of a project. These steps are intended to assure that all stakeholder departments participate in the project development process at a time when their input is needed, and that project criteria are addressed prior to the project moving forward. There are seven specific gates in the process. These are listed as follows:

- Gate 1     Project Charter
- Gate 2     Preliminary Design Report Review
- Gate 3-1   Preliminary Construction Plan Phase (Initial PS&E)
- Gate 3-2   Final Construction Plan Phase (Final PS&)
- Gate 4     Construction Acceptance
- Gate 5     Startup Acceptance
- Gate 6     Closeout – Complete Project

The efforts associated with each exit gate is further documented in the *Pima County Project Management Manual and Exit Gate Process Manual*, found at <http://www.pima.gov/cip/pmprocess/documents/PMmanual.pdf#TOC>

## APPENDIX 3-A

### Chapter 3 References

*Note: These documents are revised periodically; therefore users should double check that they have the specific version of the document specified in this chapter, or, if the reference is undated, that they have the most recent version.*

- American Association of State Highway Transportation Officials. 1999. *Guide for the Development of Bicycle Facilities*.
- . 2002. *Roadside Design Guide*.
- Arizona Department of Transportation. *Bridge Design and Detailing Manual*.
- . *Materials Preliminary Engineering and Design Manual*.
- Arizona State Board of Technical Registration. *Minimum Standards for Arizona Land Boundary Surveys*
- Federal Emergency Management Act Maps as applicable
- Pima County. *Community Participation and Mitigation Ordinance*.
- . *Floodplain and Erosion Hazard Management Ordinance*.
- . 2009. *Project Management Manual and Exit Gate Process*
- Pima County/City of Tucson. *Standard Details for Arizona Land Boundary Surveys*
- . *Standard Specifications for Public Improvements, Pima County and City of Tucson*
- Pima County Department of Transportation. *Traffic Noise Analysis and Mitigation Guidance for Major Road Projects*
- . 2012. *Guidelines for Establishing Scour and Freeboard for Bridges in Pima County*
- Pima County Regional Flood Control District. 1984. *Drainage and Channel Design Standards for Local Drainage*
- U.S. Department of Transportation. Federal Highway Administration. 2000. *Manual on Uniform Traffic Control Devices*.

#### **Additional References for Drainage Studies:**

- Pima County. 1979. *Hydrology Manual for Engineering Design and Flood Plain Management*.
- U.S. Army Corps of Engineers. 1990. *Flood Hydrograph Package User's Manual*. HEC-1.
- . 1990 (rev.). *Water Surface Profiles User's Manual*. HEC-2.
- . 2001. *River Analysis System User's Manual, Hydraulic Reference Manual, and Applications Guide*. HEC-RAS.
- U.S. Department of Transportation. Federal Highway Administration. 1983. *Hydraulic Design of Energy Dissipators for Culverts and Channels*. HEC-14
- . 1985. *Hydraulic Design of Highway Culverts*. HDS-5
- . 1995. *Evaluating Scour at Bridges*. HEC 18. 3<sup>rd</sup> ed.
- . 2001. *Urban Drainage Design Manual*. HEC-22.

**APPENDIX 3-B**  
**Quality Control Plan**  
*(Sample)*

**Introduction**

Quality is achieved through our commitment to provide quality products. Individuals responsible for implementing the Quality Control (QC) Plan must be technically qualified and perform their duties carefully; there must be adequate planning, coordination, supervision, and direction; the quality and accuracy of the work must be verified by individuals not directly responsible for the work; and a member of management should provide further auditing and surveillance as appropriate.

The goal of this QC Plan is to provide the basis for performing a quality review of the various documents that will be submitted to Pima County. This purpose of the QC review is to ensure that the documents have been prepared in accordance with the proper standards, formats, and requirements of Pima County, that all mathematical calculations have been performed correctly, and that all comments and concerns of previous County reviews have been addressed.

**Personnel Assignments**

Following is a listing of the Firm's team members along with their responsibilities for the project and the QC Plan. *[Insert team members' names and responsibilities.]*

**Technical Review**

Technical review begins at the conceptual level. Firm managers, the County Project Manager, and individuals associated with particular design and review tasks, discuss the practicality of the design concept, general design approaches, and alternatives that might be considered.

The Technical Review Procedures for the project documents include the following general steps: (1) firm managers, the County Project Manager, and engineers thoroughly review the documents; (2) plans are reviewed on a sheet-by-sheet basis; (3) alternatives for items such as culverts, traffic barriers, and side-street and access treatments are discussed, and (4) a consensus is reached and documented.

At a minimum, the review will:

- Determine the adequacy of the design to achieve the desired goals
- Evaluate the general selection and sizing of materials and equipment
- Establish that all viable alternatives have been considered
- Confirm that legal and physical restraints were considered
- Assess whether design theory, concepts, and project layout are logical

- Confirm the applicability of computer programs used
- Determine that the technical specifications are sufficiently comprehensive
- Verify the constructibility of the selected design

### **Checking Procedures**

All documents and supporting data will be reviewed and checked in their final format before being submitted to Pima County. These documents and supporting data include all reports, written project programs, design analyses, drawings, calculations, project or procedure manuals, specifications or special provisions, cost estimates, quantity calculations, and schedules.

All documents will be clearly identified with job numbers, project name, date of preparation, and responsible party (i.e., Originator). All documents will be neat and legible. Any deviations from recognized codes and procedures will be defined in detail.

Checking procedures are detailed below.

### Checking Plans

The roles and responsibilities in checking the project plans are described below for the Originator, the Checker, and the Backchecker.

*Originator:* The Originator, that is the party responsible for developing the plan, will:

- Verify that all information required on the Pima County checklists is present
- Verify that acceptable drafting standards have been incorporated

*Checker:* The Checker, someone other than the Originator, will:

- Examine the checkprint prepared by the Originator for:
  - Requirements of the project
  - Technical accuracy
  - Drafting standards and accuracy
  - Suitability and adequacy for the required function
  - Compatibility with other associated project documents
- Review the marks on the checkprint
- Redline any incorrect information with the required corrections
- Sign and date the checkprint and return to the Originator or Backchecker

*Backchecker:* The Backchecker, who may be the Originator – but not the Checker, will:

- Review the Checker's marks on the checkprint

- Indicate if he/she agrees that the original document should be changed
- Check with the Checker if he/she does not agree with the changes. If the Checker and Backchecker both agree that the change should not be made, this will be indicated on the checkprint
- Update the original document to include the agreed upon changes
- Sign and date the checkprint and forward the document to the Reviewer

*Rechecker:* The Rechecker, who is usually the Checker, will:

- Review the revised original against the checkprint from the Backchecker to ensure that all changes have been made
- If all the changes have not been made, the Rechecker will return the document to the Backchecker for further changes

*Reviewer:* The Reviewer, someone other than the Checker or Backchecker, will:

- Review the checked document for compatibility with the project requirements, technical adequacy, and constructibility
- Review the checkprints for compliance with the established QC Procedures
- Resolve all review notations and comments with the Originator
- If necessary, have the document originals updated and checked as necessary to include the Reviewer's comments
- Document originals to see that all of the agreed-to-changes have been made accurately
- Sign and date the check prints

### Reviewing Calculations and Reports

Calculation reviews will include verifying the reasoning and assumptions, formulas, solutions, and completeness of information provided to ensure that the calculations are referenced to the plans and text, and that sketches are provided where necessary.

The review/quality control process for calculations and reports will follow a procedure similar to the one outlined above for plans.

### **Quality Control Monitoring**

The Project Manager will ensure that the QC checking procedures are followed. Documents shall be professional quality and meet the job requirements and applicable standards.

The Project Engineers are responsible for maintaining the quality of the technical items produced under their direction. Should technical problems arise, the Project Engineer will define the problem and propose alternative solutions. If the recommended solution conflicts with another

engineer's solution, the affected parties will meet with the Project Manager, and the Project Principal if necessary, to come to a solution acceptable to all parties.

The Firm will review all sub-consultant work for compliance with the QC Plan, specifically for the Technical Review and Checking. The designer will also review all work prepared by sub-consultants for compliance with the requirements of the most current edition of the Pima County RDM, and for consistency with all other related reports and plans. All reports submitted will contain a cover letter signed by the individual responsible for the preparation of the report and by the individual responsible for the Technical Review and Checking. The designer will attach a signed letter to all sub-consultant plans and reports that indicates that the designer has reviewed the plan or report.

All submittals to Pima County will include evidence of the QC review process, including verification that each checkprint was accomplished.

### **Preparation of a Quantity Take-Off Calculation Report**

The Firm will prepare a Quantity Take-Off Calculation Report for the project. Preparation of a quantity take-off calculation report provides an excellent QC tool for coordinating the project plans with the specifications and estimate, and for ensuring that major items of work are properly addressed in a logical and consistent manner. To ensure that this task is addressed at the proper level of detail, the following order of submittals will be adhered to:

- Preparation and submittal of a quantity take-off calculation report covering the major pay items with the Final Design Phase and Initial PS&E Phase Submittals
- Preparation and submittal of a quantity take-off calculation report, including all pay items, with the Final PS&E Phase Submittal
- Revision of the report as necessary and submittal with the final plans

### Format of Calculation Report

The format of the calculation report will be as follows:

- Three-hole punched and bound with a hard cover identifying the project by name, project number, level of submittal, and date.
- Immediately following the cover will be the quantity take-off summary, sorted sequentially by pay item number. Each pay item will include the correct verbal description of the quantity, the unit of measurement, the quantity, and the cost.
- Immediately following the quantity take-off summary will be the quantity calculations for each pay item.
- Quantity calculations will be documented on a suitable computation form that identifies the project, the level of submittal, date, the person performing the calculation, the Checker, and the Backchecker.
- No more than one pay item will be documented on a single computation sheet.

- The computation sheets will be in numerical order and in the same sequence as the quantity take-off summary.
- Quantities for each pay item will be identified by station offset and plan sheet if appropriate. Paving and earthwork calculations and lump-sum item calculations will provide sufficient information regarding location and method to facilitate review by the County reviewer.
- Computer generated quantities will include sufficient documentation to adequately review the output.
- The Calculation Report will be sealed, signed, and dated by the responsible engineer in accordance with State Technical Board of Registration Regulations.

**APPENDIX 3-C**  
**Preliminary Design Notification**  
*(Sample)*

Project Name: \_\_\_\_\_

Project Number: \_\_\_\_\_ Project Location (Township/Range/Section): \_\_\_\_\_

Project Description: \_\_\_\_\_

\_\_\_\_\_

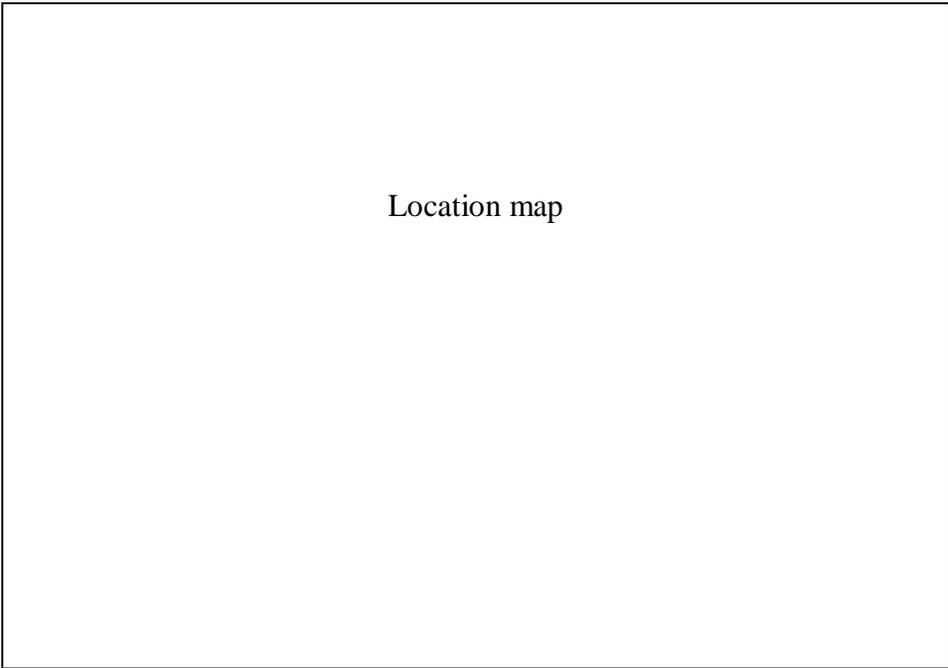
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Utility Coordinator: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Estimate Completion of Preliminary Plans for Utilities: \_\_\_\_\_



## **APPENDIX 3-Da Public Involvement Plan Guidance**

### **Public Involvement Responsibility**

Pima County Project Managers are ultimately responsible for ensuring a successful public participation process that is in compliance with the provisions of the *Community Participation and Mitigation Ordinance*. The Project Manager, Design Team, and Community Relations staff should think of themselves as a team in conducting public involvement.

### **Public Involvement Plan Preparation**

A Public Involvement Plan is prepared to guide the outreach to the public over the course of the project development. The plan should meet the requirements of the County's *Public Involvement and Mitigation Ordinance* (see Chapter 1, Appendix 1-A). The checklist that follows provides a basic list of items for consideration in preparing a Public Involvement Plan. Some additional items that might be considered for more complex projects are also provided. The plan should address how each activity will be conducted, including by whom, where, when, and materials needed and how public comments will be solicited, reviewed, and responded to. Public Involvement Plans should be reviewed periodically and revised or updated as needed.

### **Public Involvement Documentation**

The Public Involvement Plan and all related materials (e.g., mailing list, copies of meeting notices, meeting sign-in sheets, public surveys) should be compiled in a file or notebook so that the complete record can be easily accessible for review.

**APPENDIX 3-Db  
Public Involvement Plan Checklist**

- Prepare Public Involvement Plan**
  - \_\_\_ Who will prepare plan and when?
  - \_\_\_ Who will review plan?
  - \_\_\_ Who will review and update plan as necessary during project development?
  
- Identify Stakeholders**
  - \_\_\_ Who will identify stakeholders, including:
    - \_\_\_ All property owners within at least one-quarter mile
    - \_\_\_ All businesses
    - \_\_\_ The president or secretary of homeowner associations adjacent to the project
    - \_\_\_ Other
  - \_\_\_ When will stakeholders be initially identified?
  
- Develop Mailing List (based on identified stakeholders)**
  - \_\_\_ Who will develop the mailing list and when?
  - \_\_\_ Who will update the mailing list with the names of those who have requested to be added (e.g., through meeting sign-in sheets and phone calls)?
  
- Establish Community Advisory Committee (CAC) Membership**
  - \_\_\_ Who will oversee establishment of the CAC?
  - \_\_\_ When will CAC be established?
  - \_\_\_ Who will prepare newspaper ad introducing project and announcing opportunity to become a CAC member? (*Note: Notice must be published in a major newspaper of general circulation not less than 15 days prior to appointment of CAC members.*)
  - \_\_\_ Who will prepare, review, and distribute flyer on CAC membership opportunity?
  
- Plan CAC Meetings\***
  - \_\_\_ When and where will CAC meetings be held?
  - \_\_\_ How will special needs be accommodated (e.g., ADA, translation)?
  - \_\_\_ Who will plan CAC meeting agendas?
  - \_\_\_ Who will be in charge of preparing materials for CAC meetings (e.g., displays, handouts)?
  - \_\_\_ Who will be in charge of documenting questions/issues raised by CAC members?
  - \_\_\_ What project documents will the CAC receive for review and when?

**Notify CAC Members re Meetings**

- \_\_\_\_\_ Who will prepare CAC meeting notices?
- \_\_\_\_\_ Who will review meeting notices?
- \_\_\_\_\_ How will CAC members be notified about meetings?

**CAC Report**

- \_\_\_\_\_ Who will track the preparation of the CAC Report? *(Note: The CAC report must be available 45 days before the Board of Supervisors Public Hearing on either the Location Report or Environmental Assessment and Mitigation Report?)*

**Prepare Project Status Reports (re: substantial project change)**

- \_\_\_\_\_ Who will prepare status reports?
- \_\_\_\_\_ How will they be distributed to the CAC?

**Arrange and Conduct Public Open House Meeting(s)\***

- \_\_\_\_\_ When (date and time) will Public Open House(s) be held? *(Note: An Open House must be held for a minimum of two hours. Consideration should be given to a time that is convenient for the stakeholders. Also possible conflicting meetings and/or events should be considered in scheduling an Open House.)*
- \_\_\_\_\_ Where will Public Open House(s) be held? *(Note: Must be held in reasonable proximity to proposed project and ADA accessible.)*
- \_\_\_\_\_ Will a formal presentation be incorporated into the Open House format? If “yes,” who will arrange presentation, and who will review it for accuracy, and understandability?
- \_\_\_\_\_ Will there be refreshments? If so, who will arrange?
- \_\_\_\_\_ Who will staff Open Houses and who will arrange staffing?
- \_\_\_\_\_ When will Design Team and Community Service staff, as well as other staff as appropriate, meet prior to the Open House to be briefed on the project status so that answers to the public are as consistent and accurate as possible?
- \_\_\_\_\_ Who will identify materials needed for Open Houses (e.g., displays, fact sheets and other handouts, comment sheets, sign-in sheets), and who will prepare?
- \_\_\_\_\_ Who will review Open House materials for accuracy and appropriateness for non-technical audiences?
- \_\_\_\_\_ Who will be responsible for preparing summary(ies) of the Open House(s), including written and oral comments received from participants. *(Note: Open House staff should address both written and oral public comments in the meeting summary.)*

**Prepare and Place Public Open House Notification**

- \_\_\_\_\_ Who will prepare display advertisement?
- \_\_\_\_\_ Who will review display advertisement?

\_\_\_\_\_ In what newspaper will ad be placed and when? (*Note: Must be a daily newspaper of general circulation in Pima County, and must be published not less than 15 calendar days and not more than 30 calendar days in advance of the Public Open House Meeting.*)

**Develop, Distribute, and Review Surveys re Project**

\_\_\_\_\_ Who will prepare Survey soliciting public opinion concerning the project design and environmental impact and mitigation as appropriate?

\_\_\_\_\_ Who will distribute Survey?

\_\_\_\_\_ Who will review and compile responses to the Survey?

\_\_\_\_\_ How will Survey responses be considered in design development?

\_\_\_\_\_ Who will prepare Survey summary for Board of Supervisors review, including the numbers of surveys distributed, the number of completed surveys received, the input received, and how the input was responded to?

**Prepare Public Involvement Information for Inclusion in Project Documents**

\_\_\_\_\_ In which documents will a discussion of public involvement activities, input received, and response to the input be included (e.g., Location Report, Design Concept Report, Environmental and Mitigation Assessment Report)?

\_\_\_\_\_ Who will prepare the public involvement information for inclusion in the appropriate documents?

\_\_\_\_\_ Who will review public involvement text for inclusion in the document(s)?

**Hold Public Hearing**

\_\_\_\_\_ Who will arrange notice of the Public Hearing? (*Note: Notice must appear in a daily newspaper of general circulation in Pima County not less than 30 calendar days and not more the 45 calendar days before the public hearing. The document to be considered at the Public Hearing must be available for public review at the time the hearing notice is published*) Refer to Appendix 3-O for further information.

**Consider Possible Additional Public Involvement Items**

\_\_\_\_\_ Press releases and media briefings

\_\_\_\_\_ Newsletter, Website, and/or other means of providing project information to public

\_\_\_\_\_ Project presentations to interested organizations and groups

\_\_\_\_\_ Additional meeting notification (e.g., other print and/or broadcast media)

\_\_\_\_\_ Other

\* *The Pima County Community Participation and Mitigation Ordinance provides suggested timing for CAC Meetings, while Chapter 4 of this Roadway Design Manual specifies timing for a Public Open House and a CAC Meeting for projects designated as environmentally sensitive roadways.*

**APPENDIX 3-Dc  
Public Involvement Summary\*  
(Sample)**

<b>Public Activities</b>	<b>Date, Time, and Location or Date and Means of Distribution</b>	<b>Notification</b>	<b>Attendance or Distribution Numbers, or Coverage</b>	<b>Methods of Public Input Documentation and Response</b>
<i>Project Mailing List</i>	NA	NA	Total # of names on mailing list at beginning of project and end of project, and categorization (.e.g., property owners within ¼ mile of project)	NA
<i>CAC Formation</i>	NA	# of ad(s), name of newspaper, date(s) of publication, # of notices mailed re membership opportunity and to whom	NA	# of membership applications received and final composition of CAC (e.g., 2 property owners, 3 residents)
<i>CAC Meeting(s)</i>	Date, time, and location of each CAC Meeting	# of ad(s), name of newspaper(s), ad publication date for each CAC meeting	# CAC members in attendance; # of members of general public in attendance for each CAC meeting	Summary such as: "CAC comments from general public in attendance were discussed during meeting and documented and addressed in CAC meeting summary(ies) dated (insert date[s]). Comments were also addressed in (insert names of other project documents, Website, etc. as appropriate)."
<i>CAC Reports</i>	Date CAC Report was submitted to Pima County	NA	Date distributed to each member of the Board of Supervisors	NA

<b>Public Activities</b>	<b>Date, Time, and Location or Date and Means of Distribution</b>	<b>Notification</b>	<b>Attendance or Distribution Numbers, or Coverage</b>	<b>Methods of Public Input Documentation and Response</b>
<i>Public Open House(s)</i>	Date, time, and location of each Open House	# of display ads, name of newspaper(s), ad publication date for each Open House  # of invitations distributed and to whom (i.e., all names on project mailing list)	# of public attending each Open House -- based on sign-in sheets (exclusive of any staff names)	Summary such as: "Written comments were collected and oral comments were documented to the greatest extent possible. Many comments and questions were addressed during the Public Open House. Comments were also addressed in (insert names of other project documents, Website, etc.)."
<i>Survey</i>	Date distributed, method of distribution (e.g., first class mail)	NA	# of Surveys distributed and to whom (e.g., all names on project mailing list)	Include statement such as "Results reported to CAC (method & date), Design Team (method & date) and included in (insert names of project documents, Website, etc.)."
<i>Document Review</i>	Name of location(s) project documents were made available for public review.	Indicate how document(s) availability was noticed.	NA	NA
<i>Public Hearing</i>	Date, time, location of public hearing(s) (i.e. after Location Report and/or after EAMR)	# of display ad(s), name(s) of newspaper(s), date(s) of publication for each Public Hearing	NA	Public hearing comments included in hearing transcription.

Public Activities	Date, Time, and Location or Date and Means of Distribution	Notification	Attendance or Distribution Numbers, or Coverage	Methods of Public Input Documentation and Response
<i>Media Outreach</i>	Type of media outreach, date(s) (e.g. press release)	NA	Extent of media outreach effort (e.g., # of press releases distributed, # of editorial board briefings, etc.); coverage gained (e.g., title and date of newspaper, TV, radio stories)	NA
<i>Website</i>	Type and date(s) of posted project information	Identify notifications posted	If hits calculated, include	# of public comment e-mails and e-mail responses. Include with other comments for addressing in project documents.
**				

\* Copies of ads, notices, public comments and responses should be retained for inclusion in the EAMR Appendices (see Section 3.18) and other project documents as appropriate.

\*\* For additional public involvement activities undertaken add rows.

**APPENDIX 3-E**  
**Pima County Public Art Program**  
**(BOS Policy C3.3)**

**PURPOSE**

The purpose of this policy is to establish the Pima County Public Art Program, state the goals of the program, set forth its basic program principles, and direct the County Administrator to promulgate administrative procedures to carry out this policy.

**PIMA COUNTY PUBLIC ART PROGRAM: ESTABLISHMENT AND POLICY**

The Board of Supervisors establishes the Pima County Public Art Program. The Board of Supervisors intends the Pima County Public Art Program to serve multiple community goals and to operate according to provisions set forth in this policy and its implementing administrative procedures.

**GOALS OF THE PIMA COUNTY PUBLIC ART PROGRAM**

The Pima County Public Art Program will achieve multiple community benefits, including but not limited to the following goals:

- Enrich our environment and our lives, engage our eyes, our minds and our spirit;
- Affirm our uniqueness as a community, celebrate our cultural heritage and diversity, and express the hopes and dreams of people living in vibrant neighborhoods;
- Help to develop public awareness of and interest in the visual arts;
- Increase employment opportunities in the arts, actively encourage emerging artists of culturally diverse backgrounds, and use the arts to advance other community goals, such as youth development and delinquency prevention;
- Increase the likelihood that public art will be an integral part of Pima County capital improvement projects.

**BASIC PROGRAM PRINCIPLES**

The Board of Supervisors will structure the Pima County Public Art Program according to the following basic program principles:

- Pima County departments carrying out capital improvement projects will appropriate 1% of the planning, design and construction costs of each project for public art. If other governmental entities participating in the funding of a capital improvement project preclude the use of their revenues for public art, the County will reduce the set-aside for public art accordingly.

- The Pima County Public Art Program will emphasize the community's cultural heritage and diversity in terms of race, ethnicity, and gender in the selection of artists, artworks, artistic content and theme, as well as design and materials.
- The Board of Supervisors will appropriate funds for public art projects in the annual capital improvement budget.
- Public art projects will be publicly announced and advertised. Artists and artwork will be selected by means of open entry competitions, by panels chosen to represent a variety of community interests.
- Initiation of the public art process will begin as early as possible in the planning and design process of capital improvements.
- The member of the Board of Supervisors will appoint at least one of two community members to each selection panel for any public art project to be carried out within that member's district.
- The Public Art Program will operate in strict conformance with the Pima County Procurement Code. All artworks created by or purchased through the Pima County Public Art Program become the property of Pima County.
- To the extent determined by the Board of Supervisors, the County will operate the Pima County Public Art Program parallel to the City of Tucson Public Art Program.
- Pima County will contract with the Tucson Pima Art Council to obtain its services in operating the Pima County Public Art Program.
- The Board of Supervisors creates the Public Art Program at its sole discretion. The Board retains final authority to grant exemptions to the policy and procedures on a case-by-case basis.

## **ADMINISTRATIVE PROCEDURES**

The County Administrator will develop Administrative Procedures to carry out the policy of the Pima County Public Art Program. The County Administrator will submit all such administrative procedures, and amendments to the procedures, to the Board of Supervisors for review and approval.

## **SUNSET PROVISION**

The Board of Supervisors will review this policy for continuance by December 31, 2001.

Effective Date:

January 29, 1990

Reviewed/Amended:

February 1, 1997

December 16, 1997

Refer to Administrative Procedure 3-16

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**ADMINISTRATIVE PROCEDURES**  
**Procedure 3 - 16**

**I. STATEMENT OF PURPOSE**

The purpose of this Administrative Procedure is to establish the procedures for carrying out the Pima County Public Art Program and to assign responsibilities for execution of these procedures.

**II. ELIGIBLE WORKS OF ART/ARTISTS AND ORGANIZATIONS**

**A. Eligible Works of Public Art**

For the purposes of the Pima County Public Art Program, eligible works of art will mean:

1. Any tangible work of visual art, including but not limited to, a drawing, painting, mural, fresco, sculpture, mosaic, photograph, works of calligraphy, works of graphic art (including an etching), works in clay, textile, fabric, glass and like materials, or mixed media (including a collage, assemblage, or any combination of the above art media), stained glass, relief or freestanding sculptures, fountains, arches, mobiles, and environments.
2. Works of art installed in public spaces with public visibility and impact.
3. Permanent structures that retain their value for the useful life of the capital improvement to which they are associated or the term of bonds used to fund them.

Eligible works of art will not include objects that are:

1. Massed-produced of standard design (such as playground equipment or fountains),
2. Reproductions of works of art, performing or literary arts (such as dance, voice, music or poetry),
3. Landscaping or signage unless designed by an artist.

Public art will be installed only on publicly owned property. Eligible works of public art may be an integral part of a structure, attached to a structure or detached from the structure within or outside it. Public art may be located on publicly-owned property where there are no structures.

**B. Artists Eligible for Participation in the Public Art Program**

All professional artists are eligible to participate in the Public Art Program. Professional artists may include, but not be limited to:

1. Individuals who are engaged full-time or part-time in the production of eligible works of art,
2. Teachers of art,
3. Emerging professional artists,

4. Participants in community programs headed by professional artists which use the arts to foster youth development and juvenile delinquency prevention. Artists may participate on their own or in collaboration with other artists or may supervise the work of non-artists.

## **II. FUNDS FOR THE ACQUISITION OF PUBLIC ART**

### **A. 1 Percent Appropriation for Public Art**

Funds for public art become available only pursuant to an annual appropriation in an adopted capital improvement budget. In appropriating funds for public art, the Board will budget 1 percent of the cumulative planning, design and construction costs of a project. The Board of Supervisors will make appropriations for public art on a project-by-project basis. Eligible projects are limited to those projects in an adopted annual budget. Annually, ten percent of the public art set aside will be allocated to fund arts programs associated with youth development and juvenile delinquency programs; these funds will be allocated by processes maintained by the Community Resource department. The Pima County Public Arts Program will permit consolidation of small project-by-project public arts allocations.

### **B. Exemptions from the 1 Percent Appropriation for Public Art**

Only the Board of Supervisors has the authority to exempt projects from the requirements of the Public Art Program. At its own discretion, the Board may exempt a project or choose to raise or lower the set-aside from 1 percent.

Grounds for exempting a capital improvement project from the requirements of the Public Art Program or lowering the set-aside from 1 percent might include, but not be limited, to the following:

1. No construction or other substantial construction-related activities are included in the capital improvement project, such as projects that involve only land acquisition, planning and design, or build-out and remodeling of existing facilities.
2. Capital improvement projects where construction does not result in facilities that have high visibility or impact (such as underground facilities, facilities in areas of the County that are remote, or facilities in which public access is prohibited or controlled).
3. Projects for which the Board of Supervisors determines the diversion of 1 percent of planning, design and construction costs would significantly compromise the operational integrity of the facility.
4. Projects associated with Cultural Resources/Historic Preservation and Neighborhood Reinvestment.
5. Projects associated with Wastewater Management and Solid Waste Management capital improvements, for which the 1 percent set aside will be allocated to fund environmental enhancement.

The Board of Supervisors has sole discretion to raise the public art set-aside for a capital improvement project above 1 percent, for reasons including but not limited to a determination that raising the 1 percent set aside would commensurately enhance the artistic integrity and value of public artwork, in response to strong community support to do so, or where public access or view is high or unique. The County Administrator will advise the Board of Supervisors to whether raising the 1 percent set-aside would adversely affect functionality of the capital improvement project.

### **C. Capital Improvement Projects with Multiple Sources of Funds**

Capital improvement projects are often financed from multiple sources of funds, often provided by other units of government. Each funding source will contribute to public art in proportion to their individual contributions to the overall project. If the contributing jurisdiction, however, declines, for whatever reason, to participate in the acquisition of public art, Pima County will reduce the 1 percent set-aside accordingly.

### **D. Calculation of 1 Percent Appropriation for Public Art Based Upon Construction Costs**

Pima County will base calculation of the 1 percent set-aside for public art upon the actual costs of planning, design and construction of participating capital improvement projects. All costs associated with administration, land acquisition and relocation, and utility relocation are excluded from calculation of the 1 percent set-aside.

## **IV. PROGRAM RESPONSIBILITIES**

### **A. Pima County Board of Supervisors**

The Pima County Board of Supervisors will:

1. Appoint one (1) voting member to the Tucson Pima Art Council Board of Directors.
2. Each Board member designates one (1) member to the Public Art and Community Design Committee of the Tucson Pima Arts Council.
3. Review projects to include public art when they review capital improvement budgets.
4. Appropriate revenues for expenditures on itemized public art projects in the adopted capital improvement budget for the fiscal year within which the public art project will be created.
5. Contract with the Tucson Pima Arts Council for operation and implementation of the Pima County Public Art Program.
6. Select at least on (1) of two community representatives on public art selection panels.

### **B. County Administrator**

The County Administrator will:

1. Provide the Public Art Coordinator with annual updates of the proposed and adopted five-year Capital Improvement Plan of Pima County. Itemize specific public art projects in the recommended capital improvement budget for the fiscal year within which the public art project will be started.
2. Receive comments from the Risk Management Department on public safety issues relating to proposed public art projects.
3. Designate one (1) member of the Public Art and Community Design Committee.
4. Review and approve itemized budgets submitted by the Public Art Coordinator to cover administrative costs as described at Section IX.
5. Prepare and submit to the Board for its approval an annual contract with the Tucson Pima Arts Council for operation and implementation of the Public Art Program.
6. Review recommendations on selection of public art and artists of Tucson Pima Arts Council.

### **C. Pima County Departments**

Pima County departments responsible for implementing budgeted capital implement projects will:

1. Coordinate with the Public Art Coordinator on the implementation of public art projects.
2. Involve the Public Art Coordinator and artists early in design of capital improvement projects regarding public art, to the extent practicable.
3. Solicit comments from the community within which a capital improvement project designated for public art is located, from departmental advisory committees, or from the public using the facility on their desires for public art.
4. Solicit the County's Americans with Disabilities Act Coordinator's comments on access issues about public art projects.
5. Submit a request to the Public Art Coordinator to initiate the public art process, including guidelines for the "call to artists."
6. Notify the County Administrator on the results of public art selection processes and prepare a report on the selected artists and artworks to be forwarded to the Board of Supervisors for their information.
7. Prepare contracts for artists in conformance with the Pima County Procurement Code.

### **D. Tucson Pima Arts Council**

The Tucson Pima Arts Council will:

1. Appoint seven (7) members to the Public Art and Community Design Committee who typify the community, to include minorities and women.
2. Hire a Public Art Coordinator who will be responsible for day-to-day administrative responsibilities of the TPAC contract for the Public Art Program.

3. Contract with Pima County for implementation of the Public Art Program.
4. Review and approve recommendations from the Public Art and Community Design committee for artists and artwork for the Public Art Program.

#### **E. Public Art and Community Design Committee**

1. Appoint one (1) arts professional and two (2) artists to public art selection juries for each public art project.
2. Review and approve recommendations from public art selection juries and forward recommendations to TPAC Board of Directors and County Administrator.

#### **F. Public Art Coordinator**

The Public Art Coordinator will coordinate day-to-day administrative duties of TPAC regarding the Public Art Program and will:

1. Create a database/file of information on artists and organizations who are eligible for commissions to create works of public art.
2. Develop a database/file of information about arts professionals and artists qualified to serve on public art selection juries.
3. Prepare the "call to artists" in consultation with the implementing department.
4. At least one month before scheduled meeting of a public art selection jury, issue the "call to artists." The Public Art Coordinator will publish the "call to artists" once in a newspaper of general circulation and distribute it by direct mail to eligible artists and organizations. The Public Art Coordinator will employ any other appropriate means to ensure the widest possible circulation of the "call to artists."
5. Convene public art selection juries and preside at all meetings of public art selection juries.
6. Ensure that public art selection juries meet at times that are convenient for the public to attend and strive to achieve the widest possible notification of public art selection jury meetings.
7. Forward recommendations of public art selection juries to the Public Art and Community Design Committee for its review and approval.
8. Forward Public Art and Community Design Committee recommendations to the TPAC Board of Directors for review and approval.
9. Forward the TPAC Board of Directors' recommendations to the County Administrator.
10. Prepare budgets for allowable administrative costs as described at Section IX and submit budgets to the implementing department for review and approval. Monitor all public art projects to certify progress and conformance with the approved project scope, budget, and contractual responsibilities.
11. Recommend payments to the artist(s) as scheduled in contracts.
12. Prepare and submit semiannual progress reports on the Public Art Program to the County Administrator.

13. Perform other duties as required to coordinate the Public Art Program effectively.

## **V. SELECTION OF ARTISTS AND ARTWORKS**

Pursuant to Pima County Procurement Code, Section 11.12.030, the County Administrator developed and approved this contractor selection process for the selection of artists and artworks.

### **A. Initiation of Public Art Projects**

1. The five-year capital improvement plan of the County will list all capital improvement projects and include a tentative allocation of 1 percent of planning, design and construction costs for public art. Capital improvement plans are not budget documents and do not represent appropriation of funds for any purpose.
2. Unless the Board of Supervisors grants an exemption, initiation of the public art process begins in the implementing department, with initiation of planning or design, whether done by County staff or through selection of a project architect or engineer.
3. The implementing department will develop guidelines for each public art project on appropriateness of:
  - a. Content,
  - b. Design and materials,
  - c. Safety,
  - d. Compliance with Americans with Disabilities Act access,
  - e. Operations and maintenance cost.
4. To the extent practicable, the implementing department will gather public comments on these guidelines.
5. The implementing department will also gather comments on access issues from the Pima County Americans with Disabilities Act Coordinator.
6. At its discretion, the department may request assistance from the Public Art Coordinator in development of these guidelines.
7. The implementing department will forward these guidelines to the Public Art Coordinator with a request that a "call to artists" be developed according to guidelines proposed by the department.

### **B. General Provisions Regarding Selection of Artists and Artworks**

1. The County will select artists or organizations through an open and competitive process in which any professional artist is eligible to enter.
2. The Public Art Coordinator will maintain and update registries of qualified artists and organizations. Any qualified artists or organization may request inclusion in these registries and all such registries will be public documents open for inspection to anyone requesting to do so.

3. Selection of artists and artworks will be based upon criteria of artistic quality and responsiveness to guidelines submitted by the implementing department.

### **C. Call to Artists**

1. When the implementing department so requests, the Public Art Coordinator will draft a "call to artists" for the review and concurrence of the implementing department.
2. The "call to artists" will include a description of the capital improvement project to which a work of public art will be associated and the guidelines submitted by the implementing department.
3. The Public Art Coordinator will distribute the "call to artists" as widely as possible. At a minimum, the Public Art Coordinator will publish the "call to artists" at least once in a publication of general circulation, and mail it to a registry of qualified professional artists and organizations.

### **D. Public Art Selection Juries**

- A. The Public Art Coordinator will convene a new public art selection jury for each budgeted public art project.
- B. Each public art selection jury will consist of seven members, which will include:
  - a. One arts professional who does not earn his/her living as an artist, but is knowledgeable about the discipline under review. Such persons may include, but not be limited to, art critics, collectors, educators, trustees or others with an aesthetic knowledge about the particular discipline. The Public Art Coordinator will make this appointment with input from the Public Art and Community Design Committee.
  - b. One designee appointed by the implementing department funding the project;
  - c. Two artists appointed by the Public Art Coordinator with input from the Public Art and Community Design Committee;
  - d. Two community representatives at least one (1) of which will be selected by the Board member within whose district the public art project will be located;
  - e. One person who is the project or design principal.

### **Selection Procedures**

1. While not subject to the Open Meetings Law, public art selection jury deliberations will be open to the public. The Public Art Coordinator will publicly notice meetings of public art selection juries and schedule them to be convenient for the public.
2. The Public Art Coordinator will provide instructions to the public art selection jury about their duties and responsibilities under the Public Art Program and the Pima County Procurement Code. Furthermore, the Public Art Coordinator will brief the jury on the guidelines developed by the implementing department for the work of public art.

3. The public art selection jury will hold at least two meetings, advertised and open to the public, for their deliberations.
4. At the first meeting, the public art selection jury will review submissions by artists and organizations and will select no more than three finalists. At this meeting, the public art selection jury will select finalists based upon presentations of prior artwork and ideas for the advertised project.
5. The public art selection jury will ask finalists selected by the jury to submit specific artwork proposals for the juried competition.
6. Finalists will prepare specific proposals for the work of public art associated with the particular capital improvement project. In addition to the artwork proposal, finalists will also submit a project budget. Project costs may include, but not be limited, to the following:
  - a. The artist's fee;
  - b. Labor of assistants, materials, and contracted services required for production and installation;
  - c. Permit fees, as required;
  - d. Business, insurance, and legal costs directly related to the project;
  - e. Dealer's fees, if any;
  - f. Communication, mailing, and other indirect costs;
  - g. Transportation and travel expenses, if any;
  - h. Site preparation;
  - i. Installation of the completed artwork;
  - j. Any applicable taxes.
7. Finalists will make presentations at the second meeting of the public art selection jury. This meeting will be open to the public and the public may ask questions of the finalists and provide comments directly to the public art selection jury.
8. The public art selection jury will decide the winning artists at this second meeting, or if necessary, a subsequent meeting open to the public. The jury will decide by public vote, with each juror casting one vote. A simple majority of four (4) will be necessary to carry the recommendation of the public art selection jury. The public art selection jury will have the option of making no selection. In this event, the public art selection jury may ask that the finalists submit and present new proposals or refer the process to the Board of Supervisors. The Board may exempt the project from public art or initiate a new selection process.
9. The Public Art Coordinator will submit the recommended public artwork to the County's Risk Manager for review of the project from a public safety standpoint and to the County Americans with Disabilities Act Coordinator for a review as for full accessibility.
10. Upon approval by the Risk Manager and ADA Coordinator, the Public Art Coordinator will submit recommended artwork to the Public Art and Community Design Committee and, if approved, to the Arts Council Board of Directors for formal vote.

11. If approved by the Arts Council Board of Directors, the Public Art Coordinator will prepare a report to the County Administrator. The Public Art Coordinator will describe the artwork recommended and document that the selection process met the requirements of Board of Supervisors Policy C 3.3 and this Administrative Procedure.
12. If in concurrence with the recommendation of the Arts Council, the County Administrator will direct the implementing department to prepare the required contract and copy the Public Art Coordinator of his/her decision. If the County Administrator does not concur with the recommendation of the Arts Council, the County Administrator will transmit the recommendation of the arts council to the Board of Supervisors for a final decision.

## **VI. PREPARING AND ADMINISTERING A COUNTY CONTRACT WITH THE ARTIST OR ORGANIZATION**

- A. Pima County will commission and purchase all works of public art through a contract executed with the artist or organization
- B. The implementing County department, with the assistance of the Public Art Coordinator if requested, will prepare contracts for works of public art.
- C. Contracts will be in the format of the standard County contract for professional services and will include the following:
  1. A schedule for creation of the artwork,
  2. A payment schedule,
  3. Responsibilities of site preparation and installation of the artwork,
  4. Terms and condition of ownership of the artwork by Pima County,
  5. Restrictions, if any, on reproduction of the artwork,
  6. Insurance coverage the County requires.
- D. The County will process contracts in accordance with Board of Supervisors Policy D.29.4 and Procurement Procedures, Contracts for Services.
- E. The Public Art Coordinator and designee of the implementing department will be responsible for inspecting the art project at required intervals to certify progress and recommend payments pursuant to the schedule in the contract. The Public Art Coordinator and designee of the implementing department will coordinate on-site activity concerning artwork installation.

## **VII. GIFTS AND DONATIONS**

- A. proposed for donation to the County. Areas of review will include conservation/preservation expenses, placement of the artwork, and appropriateness of the artwork. The Public Art and Community Design Committee will ask the county risk Manager to conduct a safety and liability review of proposed donations.

- B. Based upon the comments of the Public Art and Community Design Committee and the Risk Manager, the County Administrator will decide whether to recommend acceptance of the artwork. C. improvement budget with the intent of donating the artwork to the County, County employees may only be involved in the commissioning if they follow the art selection procedures of the Public Art Program.

### **VIII. CONSERVATION AND PRESERVATION OF PUBLIC ART**

- A. Pima County will be responsible for conservation and maintenance of public art owned by the County and purchased through the Public Art Program.
- B. The Public Art and Community Design Committee and the Public Art Coordinator will periodically survey the condition of Pima County public art. The Committee will report the condition of each piece of public art to the County Administrator and make prioritized recommendations for restoration and preservation if necessary.
- C. If a work of art needs repairs, the County will give the artist the opportunity to make the repairs at a reasonable cost. If the County and artist cannot agree, the County may make other arrangements to repair the artwork.
- D. The County will consult with the Public Art Coordinator before undertaking non-emergency conservation, preservation or maintenance activities, but retains sole discretion to undertake such activities.
- E. To the extent practicable, the County will consult the Public Art Coordinator before undertaking emergency conservation, preservation and maintenance activities. The County will act without such consultation when public safety requires such action.

### **IX. ADMINISTRATIVE COSTS THAT MAY BE PAID TO TUCSON PIMA ARTS COUNCIL**

- A. Performance of its responsibilities under the Public Art Program.
- B. Eligible administrative consist will include, but not be limited to costs related to:
  - 1. Publication and dissemination of the "call to artists,"
  - 2. Selection of jury panel members,
  - 3. Presiding over and advertising of public art selection jury meetings,
  - 4. Reporting on recommendations of public art selection juries to the Public Art and Community Design Committee, Arts Council Board of Directors, and County Administrator.
- C. Eligible expenses will include salaries and benefits of staff members of the Tucson Pima Arts Council assigned to the Public Art Program, overhead charges and costs of publication and advertisement, postage, rental of meeting facilities, supplies, and other incidental costs.
- D. The Tucson Pima Arts Council may incur only those administrative costs directly related to execution of the selection process for each particular public art project.

- E. The County will reimburse the Tucson Pima Arts Council for administrative costs not to exceed 10% of the approved budget for the project. Implementing departments will approve agreements for services for allowable administrative costs before the Tucson Pima Arts Council incurs such costs.

## **X. References**

Pima County Code, Title 11, Procurement

Board of Supervisors Policy D 29.4

Procurement Procedures, Contracts for Services

## APPENDIX 3-Fa

### Environmental Screening: Questionnaire for Establishing Potential Areas of Impact

#### Instructions for Completing the Questionnaire

This questionnaire is intended to provide early information about potential effects of the proposed project on the surrounding natural, physical, social, and cultural environment. The full Design Team should review the completed questionnaire during the development of the concept plan with the goal of avoiding or minimizing potential impacts to the extent possible.

A Design Team member who is involved in the assessment of project impacts should complete the questionnaire. For those questions for which the answer is “yes,” a brief description and/or explanation should be provided. Additionally the information sources used in answering individual questions should be cited, including reports, correspondences, reference documents, and team members or others who provided technical information.

#### INTRODUCTORY INFORMATION

##### **Project Identification**

- Project Name:
- Pima County Project Manager:

##### **Project Location and Limits**

- Location of project within Pima County:
- Limits of project:

*From end to end:*

*From side to side:*

##### **Funding Source**

- Funding source anticipated for use in construction project?

*County funding:* Y \_\_\_\_ N \_\_\_\_

*Federal funding:* Y \_\_\_\_ N \_\_\_\_

*Other:*

Source:

##### **Primary Project Purpose**

- Primary purpose of project:

*Modernize roadway (e.g., resurface, restore, rehabilitate, reconstruct, add shoulders, or add auxiliary lanes):* Y \_\_\_\_ N \_\_\_\_

*Increase capacity:* Y \_\_\_\_ N \_\_\_\_

Add bicycle lanes: Y \_\_\_\_ N \_\_\_\_

Improve safety: Y \_\_\_\_ N \_\_\_\_

Other:

Source:

### Existing Conditions within Project Limits

- Roadway specifications?

*Right-of-way:* \_\_\_\_ feet

*Pavement width:* \_\_\_\_ feet

*Number of through lanes in each direction:*

- Number of turning lanes?

*Right-turn lanes:* \_\_\_\_

*Left-turn lanes:* \_\_\_\_

- Existing intersections?

*Number of signalized intersections:* \_\_\_\_

*Number of un-signalized intersections:* \_\_\_\_

- Existing parking (e.g., on-street)? Y \_\_\_\_ N \_\_\_\_

Existing bicycle lanes: Y \_\_\_\_ N \_\_\_\_

- Existing sidewalk: Y \_\_\_\_ N \_\_\_\_

- Existing transit stops: Y \_\_\_\_ N \_\_\_\_

- Other:

- Note: If no existing roadway, describe site conditions (e.g., undeveloped land, etc.):

Source:

### Project Components

- Anticipated specifications of the project?

*Amount of additional right-of-way to be acquired:*

Under 1 acre \_\_\_\_ 1 - 5 acres \_\_\_\_ 5 - 10 acres \_\_\_\_ Over 10 acres \_\_\_\_

*Change in the vertical or horizontal alignment:* Y \_\_\_\_ N \_\_\_\_

*New alignment:* Y \_\_\_\_ N \_\_\_\_

*Pavement width to be added:* \_\_\_\_

*Number of through lanes to be added:* \_\_\_\_

*Number of turn lanes to be added:* \_\_\_\_

Right-turn lanes \_\_\_\_

Left-turn lanes \_\_\_\_\_

Any associated parking (e.g., on-street): Y \_\_\_\_\_ N \_\_\_\_\_

Bicycles lanes to be added: Y \_\_\_\_\_ N \_\_\_\_\_

Sidewalk to be added: Y \_\_\_\_\_ N \_\_\_\_\_

Landscaping to be added: Y \_\_\_\_\_ N \_\_\_\_\_

- Number of intersections to be signalized: \_\_\_\_\_
- Other:

Source:

**Phasing**

- Is the project:

A portion or phase of a unified development plan? Y \_\_\_\_\_ N \_\_\_\_\_

One of a series of projects that may result in a cumulative set of environmental impacts on an identifiable area? Y \_\_\_\_\_ N \_\_\_\_\_

Source:

**Traffic:**

- Existing average daily traffic (ADT) in the project area?

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Other: \_\_\_\_\_ ADT: \_\_\_\_\_

- Projected ADT in the project area for the build year?

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Street: \_\_\_\_\_ ADT: \_\_\_\_\_

Other: \_\_\_\_\_ ADT: \_\_\_\_\_

Source:

**Land Uses**

- Existing adjacent land uses? Check all that apply and circle primary uses.

Commercial (e.g., retail businesses, service businesses): Y \_\_\_\_\_ N \_\_\_\_\_

Institutional (e.g., schools, hospitals, social services agencies): Y \_\_\_\_\_ N \_\_\_\_\_

Residential (e.g., single family houses, apartments, townhouses): Y \_\_\_\_ N \_\_\_\_

Vacant lots: Y \_\_\_\_ N \_\_\_\_

Industrial (e.g., light industry, heavy industry): Y \_\_\_\_ N \_\_\_\_

Recreational (e.g., parks, sports fields): Y \_\_\_\_ N \_\_\_\_

Other:

Source:

### Property Ownership

- Existing land ownership:

Majority public: Y \_\_\_\_ N \_\_\_\_

Majority private: Y \_\_\_\_ N \_\_\_\_

About evenly divided between public and private: Y \_\_\_\_ N \_\_\_\_

Other:

Source:

## ENVIRONMENTAL CATEGORIES

### Drainage

- Will any storm water drain from the project discharge into detention or retentions basins on site? Y \_\_\_\_ N \_\_\_\_

Source:

### Section 401/404

- Are any culverts likely to be installed, replace, or extended? Y \_\_\_\_ N \_\_\_\_
- Are there any bridges being upgraded, extended, or replaced? Y \_\_\_\_ N \_\_\_\_
- Is there any bank protection required in the construction of this project? Y \_\_\_\_ N \_\_\_\_
- Are there any wetlands within the project area? Y \_\_\_\_ N \_\_\_\_
- Are there any riparian areas within the project vicinity? Y \_\_\_\_ N \_\_\_\_
- Is it anticipated that there will be any discharge of dredged or fill material into “waters of the United States”? Y \_\_\_\_ N \_\_\_\_

Source:

### Floodplain

- Is the project area within a 100-year floodplain delineated on the Federal Emergency Management Agency Flood Insurance Rate Map? Y \_\_\_\_ N \_\_\_\_ If “yes,” will the project substantially modify the topography of the floodplain either by placement or removal of materials within the floodplain? Y \_\_\_\_ N \_\_\_\_

Source:

**Biological Resources**

- Are there listed threatened, endangered, proposed, and/or candidate species likely to be found in the project vicinity? Y \_\_\_\_ N \_\_\_\_
- Are listed special status species likely to be found in the project vicinity? Y \_\_\_\_ N \_\_\_\_
- Are protected native plants likely to be found in the project vicinity? Y \_\_\_\_ N \_\_\_\_
- Are construction activities anticipated to remove/disturb any vegetation? Y \_\_\_\_ N \_\_\_\_
- Is the project within the Conservation Land System? Y \_\_\_\_ N \_\_\_\_
- Is the project along a designated Scenic Route? Y \_\_\_\_ N \_\_\_\_

**Air Quality**

- Is the project in an:  
*Attainment area?* Y \_\_\_\_ N \_\_\_\_  
*Nonattainment area?* Y \_\_\_\_ N \_\_\_\_ If “yes,” what are the pollutants of concern?  
*Maintenance area?* Y \_\_\_\_ N \_\_\_\_ If “yes,” what are the pollutants of concern?

Source:

**Noise**

- Are there sensitive noise receptors in the area? Y \_\_\_\_ N \_\_\_\_ If “yes,” identify type of noise receptors and briefly describe:  
*Residences:* \_\_\_\_  
*Schools:* \_\_\_\_  
*Hospitals:* \_\_\_\_  
*Churches:* \_\_\_\_  
*Parks:* \_\_\_\_  
*Other:* \_\_\_\_
- When the project is completed and used as anticipated, is it likely to contribute to any exceedances of noise quality standards. Y \_\_\_\_ N \_\_\_\_

Source:

**Utilities**

- Will the construction include any utility involvement? Y \_\_\_\_ N \_\_\_\_ If “yes”, what kind of work is anticipated?  
*Utility relocation:* \_\_\_\_  
*Temporary disconnection of service:* \_\_\_\_  
*Utility replacement:* \_\_\_\_

- Are there any scheduled plans for utility upgrades in the vicinity that are not related to the project? Y \_\_\_\_ N \_\_\_\_

Source:

### **Hazardous Materials**

- Is it likely that any hazardous wastes or hazardous substances in the past have been generated, treated, stored, released, discarded or disposed of on site or are any such wastes now accumulated on site? Y \_\_\_\_ N \_\_\_\_ Don't know \_\_\_\_
- Have any test borings been performed? Y \_\_\_\_ N \_\_\_\_ If "yes", were any wastes discovered on the premises in the course of the test borings or excavation work for the project? Y \_\_\_\_ N \_\_\_\_

Source:

### **Historic Preservation (Based on feedback from Pima County OCRHP)**

- Are there any cultural resources (archaeological or historic) in the vicinity of the project area that are listed on or eligible for the National Register of Historic Places? Y \_\_\_\_ N \_\_\_\_
- Are any of these sites considered "Priority Cultural Resources"? Y \_\_\_\_ N \_\_\_\_
- If the answer is "yes," to either or both the questions above, please list the resource(s)/site(s):
- Of those properties listed or eligible, are any located near enough to the project to be affected by the project location, construction, or anticipated future traffic? Y \_\_\_\_ N \_\_\_\_ If "yes," please specify the properties and very briefly the anticipated effect.
- Are there any structures likely to be 50 years old or older within or adjacent to the project area? Y \_\_\_\_ N \_\_\_\_ If "yes," please list addresses below:

Source:

### **Visual Impact**

- Is the project likely to affect noticeably the views from adjacent properties?  
Y \_\_\_\_ N \_\_\_\_ If "yes", briefly describe:
- Is the project likely to cause a noticeable change in the foreground, middle-ground, or background views from the road? Y \_\_\_\_ N \_\_\_\_

Source:

### **Neighborhood/Social Impact**

- Is there likely to be any commercial or residential displacement due to the construction of this project? Y \_\_\_\_ N \_\_\_\_
- Are there likely to be any temporary changes in:  
*Business access:* Y \_\_\_\_ N \_\_\_\_  
*Parking:* Y \_\_\_\_ N \_\_\_\_

*Other:*

- Are there likely to be any permanent changes in:

*Traffic service:* Y \_\_\_ N \_\_\_

*Traffic circulation:* Y \_\_\_ N \_\_\_

*Parking:* Y \_\_\_ N \_\_\_

*Other:*

- Is the project likely to affect continuity in neighborhoods in the vicinity? Y \_\_\_ N \_\_\_

Source:

### **LOCAL JURISDICTION/AGENCY COORDINATION**

- Are there local jurisdictions and governmental agencies with whom coordination is anticipated or has begun? Y \_\_\_ N \_\_\_ If “yes,” who are they?

*City of South Tucson* \_\_\_

*City of Tucson* \_\_\_

*Oro Valley* \_\_\_

*Pascua Yaqui Tribe* \_\_\_

*Tohono O’odham Nation* \_\_\_

*Town of Marana* \_\_\_

*Town of Sahuarita* \_\_\_

*Arizona Department of Environmental Quality* \_\_\_

*Arizona Department of Transportation* \_\_\_

*Arizona Game and Fish Department* \_\_\_

*Arizona State Land Department* \_\_\_

*U.S. Army Corps of Engineers* \_\_\_

*U.S. Bureau of Land Management* \_\_\_

*U.S. Environmental Protection Agency* \_\_\_

*U.S. Federal Highway Administration* \_\_\_

*U.S. Fish and Wildlife Service* \_\_\_

*Other* \_\_\_\_\_

- Note any issues for coordination that have been identified to date:
- Briefly describe coordination efforts planned or underway:

Source:

**PUBLIC INVOLVEMENT**

- Has a Public Involvement Plan been developed for the project? Y \_\_\_ N \_\_\_
- Has a Citizen Advisory Committee been formed, or is one being formed? Y \_\_\_ N \_\_\_
- Have any public meetings been scheduled? Y \_\_\_ N \_\_\_ If “yes”, have any meetings been held to date? Y \_\_\_ N \_\_\_
- Has any information useful to project development been identified through any public interaction to date? Y \_\_\_ N \_\_\_ If “yes”, briefly describe:
- Is there any known controversy over this project to date? Y \_\_\_ N \_\_\_ If “yes”, briefly describe:

Source:

**PERMITS**

- Anticipated permits and/or approvals?  
*404 Permit:* \_\_\_  
*401 Certification:* \_\_\_  
*Sole Source Aquifer:* \_\_\_  
*State Historic Preservation Officer (SHPO) clearance:* \_\_\_  
*Nonpoint Pollutant Discharge Elimination System (NPDES):* \_\_\_  
*Other*

Completed by: \_\_\_\_\_  
(name and title)

Date: \_\_\_\_\_

**APPENDIX 3-Fb**  
**Environmental Screening: Summary Impact Matrix**

**Instructions for Completing the Summary Impact Matrix**

First review the project construction and operation activities listed in the second column of the matrix and then, in the first column, put a checkmark next to each activity that is applicable to the project. Next, review the completed *Questionnaire for Establishing Potential Areas of Impacts* (see [Appendix 3-Fa](#)) and then use the symbols below to indicate the potential for adverse impacts on the environmental categories (listed across the top of the matrix) from each of the applicable activities.

If there are additional activities that are important to the construction or operation of the project, or if there are additional environmental categories that should be considered, expand the matrix accordingly.

**0 = no involvement** (*e.g., if there is no protected wildlife in the area then there would be no involvement with wildlife during project activities*)

**X = potential involvement, but no or minimal impact** (*e.g., there may be listed wildlife in the vicinity of the project, but no evidence of wildlife in the project area itself, therefore there would be no or minimal impact*)

**M = potential moderate impact** (*e.g., one protected plant is found that would be affected*)

**H = potential high impact** (*e.g., a cluster of protected plants are found; the area serves as habitat for a protected species*)

**APPENDIX 3-Fb  
Environmental Impact Screening Summary Impact Matrix\***

**PROJECT NAME:** \_\_\_\_\_

**PROJECT LIMITS:** \_\_\_\_\_

	Potentially Affected Environmental Categories ➡	Water quality	100-year floodplain	Protected waterways	Visual Quality / Viewsheds	Protected plants / vegetation	Protected animals / wildlife	Cultural res. (archaeological and historic)	Air quality	Noise	Hazardous materials	Land Uses/Community Character	***
<b>Applicable to project (✓)</b>	<b>Project Construction and Operation Activities ↓</b>												
	Change in the vertical or horizontal alignment												
	New alignment												
	Added capacity (i.e., through lanes)												
	Milling/grading												
	Change in access (e.g., driveways, intersections)												
	Clearing and grubbing												
	Excavation												
	Cut slope												
	Demolition												
	Demolition debris disposal												
	Acquisition of additional right-of-way												
	Temporary Construction Easements												
	Discharge of dredge or fill material												
	Channeling and dredging												
	Hauling												
	New signals												
	Storm water drainage												
	Construction equipment												
	Detour route												
	**												

\* See instructions presented on Page 1 of this appendix (3-Fb)  
 \*\* Add rows as necessary for other construction activities that should be considered  
 \*\*\* Add columns as necessary for other environmental categories that should be considered

**APPENDIX 3-Fc**  
**Environmental Screening: Results Memorandum**

**Instructions for Preparing the Results Memorandum**

The Results Memorandum should be a concise document (approximately 2-5 pages) that summarizes the environmental screening process and findings. The memorandum should include the following:

- Screening process description (e.g., when it was undertaken; who conducted the screening; sources consulted, including any field work conducted; when Environmental Coordination meeting was held and with whom)
- Identification of any technical studies completed during the screening process
- Environmental issues identified through the screening process
- Suggestions on addressing issues through design modifications and/or alternative investigation
- Identification of any additional technical analyses needed beyond that specified in original scope of work for the Environmental Assessment and Mitigation Report
- Attachments
- Completed Questionnaire for Establishing Potential Areas of Impact
- Completed Summary Impact Matrix

**APPENDIX 3-G**  
**Matrix for Comparison of Alternatives**  
*(Sample)*

**Instructions for Completing Alternative Comparison Matrix**

**Note:** The following approach to comparing alternatives can be used for alternatives studied in conjunction with the Location Study or for alternatives concepts presented in the Design Concept Report (DCR).

**Instructions:** Fill in brief description of alternatives considered (e.g., alignment north of wash; alignment south of wash) and categories for comparison (e.g. cost; impacts to biological, cultural, and visual resources; impacts on adjacent neighborhoods; construction duration; effect on utilities).

The effect of alternatives on each category can be designated in different ways – e.g., by simple plus, minus, or zero symbols (+, -, o); by open, half open, or filled circles (A, X, Δ); or by brief word descriptors (none, some, significant). Make sure the meaning of the symbols/words works for each category, and/or provide a key that makes it clear how the symbols should be interpreted for the different categories. Alternatively, a simple numerical ranking system can be used; however totaling the ranking scores for each alternative may be misleading unless the categories are weighted.

The purpose of the matrix is to provide a summary of how alternatives studied compare in terms of different categories that are important. The rationale for the final recommended alternative should be explained in more detail in the text of the document (i.e., Location Report, DCR).

**Alternative Comparison Matrix**

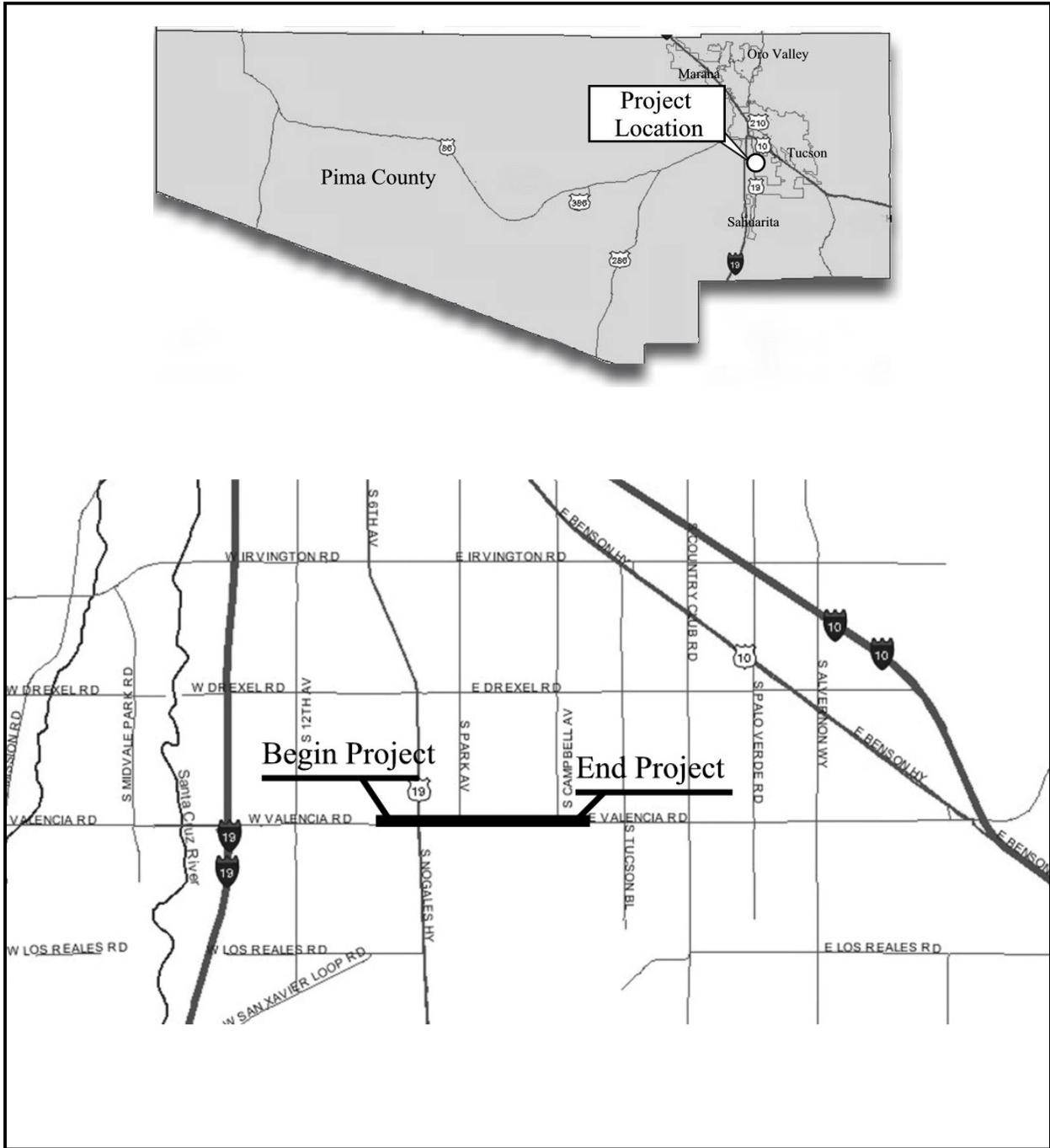
Comparison Categories*	Alt. #1	Alt. #2	Alt. #3	***	Comments on Key Issues in category
Cost					
Displacement of Residents/Businesses					
Impact to Development					
Traffic Operational Impacts					
Impacts to Utilities					
Construction Duration					
Impacts to Biological Resources					
Impacts to Cultural Resources					
Impacts to Visual Resources					
Impacts to Neighborhoods					
**					

\* Provide a key if symbols are used.

\*\* Add rows as necessary to include other categories that should be considered in the comparison of alternatives.

\*\*\* Add columns as necessary for additional alternatives.

**APPENDIX 3-H**  
**Location Map**  
*(Sample)*



**APPENDIX 3-I**  
**Design Concept Report**  
**Table of Contents**

**Contents**

Executive Summary

Table of Contents (Chapters, Sections, List of Exhibits, Appendices)

Abbreviations

- 1.0 Project Overview
- 2.0 Project Description
- 3.0 Project Area Characteristics
- 4.0 Traffic and Accident Data
- 5.0 Design Standards and Criteria
- 6.0 Major Design Features
- 7.0 Social, Economic, and Environmental Considerations
- 8.0 Public Involvement
- 9.0 Agency Coordination
- 10.0 Alternatives
- 11.0 Conclusions and Recommendations
- 12.0 Cost Estimate
- 13.0 Budget Considerations
- 14.0 Delivery Method
- 15.0 Recommendations and Conclusions

**Exhibits**

- Location Map
- Alternative Comparison Matrix if appropriate
- Environmental Screening Matrix
- Cost Estimate
- Other Illustrations as appropriate: Diagrams, photos, tables, etc. that help summarize or clarify points made in the text are encouraged. Exhibits may be located within the text or grouped at the end; or alternatively, an exhibit of more than a few pages, may be included as an appendix to the DCR.

**Appendices**

- Initial Design Phase Concept Plans (see Section 3.20)
- Right-of-Way Requirements Plans
- Public Involvement Results to Date
- Cost Estimate
- Other Items as Appropriate

**APPENDIX 3-J**  
**Items for Cost Estimate**

The cost estimate should include the following items:

**1. Engineering**

- a. Design Consultant fee
- b. Pima County administrative cost

**2. Utilities**

- a. Tucson Water
- b. Pima County Regional Wastewater Reclamation
- c. Other utilities with prior rights
- d. Undergrounding electrical lines
- e. Engineering costs

**3. Right-of-Way**

- a. Acquisition
- b. Relocation
- c. Cost to Cure
- d. Administration

**4. Construction**

- a. Clearing and grubbing
- b. Removal of structures and obstructions
- c. Earthwork
- d. Pavement structure
- e. Bridges
- f. Cross-drainage structures
- g. Storm drain system
- h. Bank protection
- i. Noise and retaining walls
- j. Signalization and lighting
- k. Traffic control
- l. Landscaping, irrigation, and plant salvage
- m. Mobilization (An appropriate target percentage is 8 – 10%)
- n. Other major items
- o. Contingency Amounts (Based on Project Phase)
- p. Construction administration including post design consultant services (Note: An appropriate target percentage is 15%)

**APPENDIX 3-K**  
**Environmental Mitigation and Assessment Report (EAMR)**  
**Table of Contents**

**Contents**

Executive Summary

Table of Contents (Chapters, Sections, List of Exhibits, Appendices)

Abbreviations

1.0 Background

1.1 Project Cost and Funding

1.2 Direction by Board of Supervisors

1.3 Project Design Process

2.0 Project Purpose And Need

3.0 Project Setting

4.0 Proposed Project

5.0 Environmental Screening

6.0 Environmental Assessment And Mitigation

*(Address the following for each category: existing conditions, adverse impacts, recommended mitigation, and associated permits. See Section 3.18 and Appendix 3-N for further explanation.)*

6.1 *Natural/Physical Environment*

6.1.1 Biological Resources\*

6.1.2 Drainage/Section 401/404

6.1.3 Floodplain

6.1.4 Air Quality

6.1.5 Noise

6.1.6 Utilities

6.1.7 Hazardous Materials

6.1.8 Construction

6.1.9 Historic/Cultural Resources\*

6.1.10 Visual Resources\*

6.2 *Neighborhood/Social Environment*

➤ Right-of-Way Acquisition and Displacement

➤ Temporary and Permanent Access and Parking Impacts

- Neighborhood Disruption
- Parks and Recreational Areas
- Consistency with Other Plans

7.0 Agency Coordination

8.0 Public Participation

8.1 Public Participation Plan

8.2 Community Advisory Committee

8.3 Public Meetings

8.4 Community Concerns

9.0 Conclusion and Recommendations

10.0 References

Tables

Figures

Project Documents

**Exhibits (as applicable)**

- Location Map
- Aerial Photo (project limits and prominent physical features)
- Existing Conditions Photos (captioned)
- Noise Measurement Location Map
- View Analysis Location Map and Photos of Analysis Locations
- Existing Land Use Map
- Alternative Transportation Routes Map (e.g., bus routes, sidewalks, and designated trails)
- Park and Recreational Facilities Map
- *Optional:* Photo simulations of the proposed project
- *Other as appropriate*

**Appendices (as applicable)**

- \* If project is designated as an Environmentally Sensitive Roadway, see Chapter 4 for information on conducting this assessment.

**APPENDIX 3-L**  
**Environmental Assessment and Mitigation Report**  
**Executive Summary Outline**

- 1.0 Project Overview
  - Project Name
  - Project Number
  - Project Location
  - Project Limits (Include Location Map – Appendix 3-H)
  - Estimated Cost
  - Funding Source(s)
  - Construction Fiscal Year(s)
- 2.0 Project Purpose and Need
- 3.0 Project Elements
- 4.0 Project Impacts and Recommended Mitigation
  - Summary Table (See Appendix 3-M)
- 5.0 Agency Coordination
- 6.0 Public Involvement
  - Summary Table of Public Involvement Activities (see Appendix 3-Dc)

**APPENDIX 3-M**  
**Environmental Assessment and Mitigation Report**  
**Impact and Mitigation Summary**  
*(Sample)*

<b>Potential Impacts</b> <i>(Examples only)</i>	<b>Recommended Mitigation**</b> <i>(Examples only)</i>	<b>Agency Coordination and Consultation</b> <i>(Examples only)</i>	<b>Parties Responsible For Implementation</b> <i>(Examples only)</i>
Removal of native plants	Replace with native, drought tolerant plants in keeping with mitigation requirements outlined in the Arizona Plant Law, and as applicable, the Environmentally Sensitive Roadway Standards.	Arizona Game and Fish Department	Pima County Contractor
Possible effect of construction activities on desert tortoises	If desert tortoises are found during construction, they must be removed from the construction area	Arizona Game and Fish Department	Contractor
Disturbance of critical habitat	Moratorium during breeding season	U.S. Fish and Wildlife Service, Arizona Fish and Game Department	Pima County Contractor
Particulate disturbance during construction.	Utilize dust abatement during construction		Contractor
Exceeds Pima County noise abatement standard with project in place	Noise walls		Pima County Contractor
Demolition of a designated historic property	Recordation	State Historic Preservation Officer	Designer
*			

\* Add rows as necessary for identified impacts.

\*\* If the project roadway is a designated Environmentally Sensitive Roadway, mitigation measures for biological, cultural, and visual impacts must follow the guidelines presented in Chapter 4.

**APPENDIX 3-N  
Environmental Assessment and Mitigation Report - Environmental Categories and Assessment Guidance**

CATEGORY	ASSESSMENT GUIDANCE
	<b>Natural Environment</b>
<i>Biological Resources.</i>	<p>Using the U.S. Fish and Wildlife Service (USFWS) and Arizona Department of Game and Fish (AGFD) lists, identify listed, threatened, endangered, proposed, candidate species, and/or special status species in the vicinity.</p> <p>Using the AGFD list, identify special status species and native plants found in the project area.</p> <p>If protected habitats or species are indicated as being highly likely within the project area, undertake the appropriate surveys following the appropriate protocol. Describe construction and operation activities that may impact species identified in the project area. Identify mitigation measures – e.g., building moratorium during a breeding season, re-vegetation, etc.</p>
<i>Drainage/ Section 404/401</i>	<p>Identify major washes, existing storm drain facilities, and existing cross drainage facilities within the project area. Describe potential impacts to the washes and facilities from the project. Identify recommended measures to mitigate impacts to natural and built drainage facilities.</p> <p>Address whether the project will involve the dredging or filling of any “washes of the United States,” which are under jurisdiction of the U.S. Army Corps of Engineers. If the project affects “waters of the United States,” discuss whether a Nationwide or an Individual 404 permit will be sought.</p>
<i>Floodplain</i>	<p>Determine whether the project area or a portion of the project area is located within the 100-year floodplain by reviewing a copy of the FEMA, Flood Insurance Rate Map (FIRM) and/or Flood Hazard Boundary Map, and the FIRM Index Panel. If floodplain status cannot be determined, or if there are questions, contact Pima County Flood Control for assistance. Document whether the project area is within the 100-year floodplain and indicate whether the project will affect the floodplain. The latter would generally occur due to placement or removal of materials within the floodplain that substantially modifies the topography within the floodplain. If the project does impact the floodplain, discuss recommended measures to mitigate the effects.</p>
<i>Air Quality</i>	<p>Identify the Environmental Protection Agency designation for the area’s conformance with the National Ambient Air Quality Standards (i.e., an attainment area, nonattainment area, or maintenance area). If the project is within a nonattainment or maintenance area, identify pollutant(s) at issue. Describe the results of any air quality monitoring performed in the area by the Pima Association of Governments or the Pima County Department of Environmental Quality.</p>
<i>Noise</i>	<p>Identify the sources of noise from the project when it is built. Identify noise-sensitive sites within the project area (e.g., residences, schools, hospitals, libraries, passive park areas, and other areas where quiet is important). Describe the results of the noise modeling of existing traffic and roadway conditions used to determine existing baseline noise levels at all adjacent properties along the proposed roadway right-of-way. Using noise modeling, identify the noise impacts of the proposed project on the properties adjacent to the property. Discuss the predicted noise levels and recommended mitigation with reference to Pima County’s most current noise abatement standard.</p> <p><u>Exhibit:</u> Plan showing the noise measurement locations with the project area.</p>

CATEGORY	ASSESSMENT GUIDANCE, CONTINUED
	<b>Physical Environment</b>
<i>Utilities</i>	Identify any utilities within the project area (e.g., gas, phone, electric, telecommunications, etc.). Discuss whether the project construction will affect these utilities in any way (e.g., relocation, temporary disruption of service, etc.) If utilities will be affected, note who will do the work (e.g., Pima County, contractor, utility company, etc.) Note who will notify customers about the utility work prior to its commencement and how (e.g., door-to-door notices, mailings, etc.). Include the latter as a mitigation measure under “Conclusions and Recommendations” at the end of the EAMR.
<i>Hazardous Materials</i>	Complete a PISA. Report whether any hazardous material concerns were identified, and if so the recommended mitigation measures. Also state that if any suspected hazardous materials are encountered during construction, work shall cease at the location and the Pima County Engineer shall be contacted to arrange for proper assessment, treatment, or disposal of those materials. Include this latter statement, along with any specific recommendations for dealing with identified hazardous materials, in the “Conclusions and Recommendations” at the end of the EAMR.
<i>Construction Activities</i>	Discuss temporary construction-related impacts such as traffic control, detours, dust abatement, noise, etc. [Note: Any detours planned outside of the project area should be assessed for each applicable environmental category.]
<i>Cultural Resources</i>	<p>Cultural resources typically are defined to include sites, buildings, structures, districts, and objects.</p> <p>Pima County requires consideration of possible effects to cultural resources in accordance with Resolution 1983-104 for which the underlying authority is the Arizona Antiquities Act, ARS §41-841, et. seq. ARS §41-844 and ARS §41-865, which pertain to disturbance of human burials on state, County, or municipal property and on private property, respectively; and Board of Supervisors Policy C 3.17 Protection of Cultural Resources. The Arizona Historic Preservation Act provides the authority for review of Pima County projects by the State Historic Preservation Officer (SHPO).</p> <p>Cultural Resource Survey efforts shall be completed/coordinated thru the Pima County Office of Cultural Resources and Historic Preservation.</p> <p>Typically, two levels of survey are completed as part of the assessment. First, a records search and literature review, and second a field survey. If the records search is completed in conjunction with the Environmental Screening (see Section 3.8), the results should be reported in the EAMR, along with the results of the field survey.</p> <p>As part of surveys that are undertaken, for any archaeological and/or historical sites identified, the determination as to the effect of the project on identified sites, and any mitigation measures (e.g., including additional assessment, recordation, etc.) proposed to address potential effects of the project on cultural resources. Also state that if previously unidentified cultural resources are encountered during activity related to the construction of the project, the contractor should stop work immediately at that location and should take all reasonable steps to secure the preservation of those resources. Include this latter statement, along with any specific recommendations for dealing with identified cultural resource impacts, in the “Conclusions and Recommendations” at the end of the EAMR.</p> <p><u>Exhibit:</u> Plan showing locations of any designated historical sites within the project area</p>

CATEGORY	ASSESSMENT GUIDANCE, CONTINUED
<i>Visual Resources</i>	<p>Describe the characteristics of the viewsheds in the project area (e.g., level of development, natural drainage features, vegetation, topography). Describe how the project would affect the visual experience for both the viewer looking toward the project (e.g., residents and tenants on/in properties adjacent to the property area) and viewers within the project area (e.g., drivers, bicyclists, pedestrians). For the latter, describe the following views:</p> <ul style="list-style-type: none"> <li>➤ Foreground - <math>\leq</math> ¼ mile from observer</li> <li>➤ Middleground - ¼ to 1 mile from observer</li> <li>➤ Background views - beyond 1 mile from observer</li> </ul> <p>First describe each of the existing views to and from the project, and then describe how each of the existing views would be affected by the project. Describe what mitigation measures are being taken to address potential adverse impacts and who will be responsible for the implementation of those mitigation measures. Include these mitigation measures under “Conclusions and Recommendations” at the end of the EAMR.</p> <p><u>Exhibit:</u> Include an aerial indicating the vantage points from which the three views were analyzed and photographs depicting the existing views. If photo simulations of the project in place from the same vantage points are available, they can also be included in the EAMR.</p>
	<b>Neighborhood/Social Environment</b>
<i>Right-of-Way Acquisition and Displacement</i>	<p>Indicate the land uses in the area, zoning in the area, and any known planned development. If new right-of-way and/or temporary easements are required, describe their size (in acres), the location, and parcel ownership.</p> <p>Discuss any displacement of uses that will occur due to the project and how the displacement is being addressed.</p> <p><u>Exhibit:</u> Include a map showing existing land uses within and adjacent to the project site.</p>
<i>Temporary and Permanent Access and Parking Impacts</i>	<p>Provide a general description of access to and parking for properties within and adjacent to the project area. Address any temporary and permanent restrictions or modifications to access and parking from project construction and operation. Consider access for all types of transportation, including pedestrian, bicycle, and motorized vehicle, as well as for compliance with the Americans with Disabilities Act.</p>
<i>Parks and Recreational Areas</i>	<p>Identify parks and recreational facilities in the project area, including public parks, designated trails, school facilities, national forests or parks, golf courses, and sports fields. Describe whether the project will affect access to the facilities.</p> <p><u>Exhibit:</u> Provide a map showing existing and/or planned public parks or recreational facilities within or adjacent to the project area.</p>
<i>Consistency with Other Plans</i>	<p>Describe whether the proposed project is consistent with Pima County’s Comprehensive Plan, the Pima Association of Governments’ Regional Transportation Plan, and other relevant plans. If the project is inconsistent with other relevant plans, identify the elements in conflict and how the conflicts have been addressed.</p>

**APPENDIX 3-O  
Environmental Assessment and Mitigation Report  
Hearing Notice and Approval Process**

<u><b>Action</b></u>	<u><b>Timeframe</b></u>
<p>Establish Hearing Date – Review the Board of Supervisor’s (Board) Calendar, identify a Board meeting approximately 60 days from the initiation of this effort to allow sufficient time for project notice/mailings, EAMR Board package preparation and submittal, public information postings, and advertisement requirements for legal notice. Project Manager &amp; Key Team Members</p>	<p>N/A</p>
<p>Mailing - Prepare mailing to residents and citizens announcing Board’s upcoming hearing and the availability for review of the EAMR at the library.  Community Relations</p>	<p>Approximately 35 days in advance of planned hearing date complete and mail to effected residents and citizens mailing. Note: The actual mailing must be received no later than 30 days prior to Board’s Hearing date.</p>
<p>Board Package - Submit Board Package for EAMR to Clerk of Board and provide EAMR documents for posting at public library.          Project Manger &amp; Community Relations</p>	<p>Approximately 30 to 45 days in advance of the planned Board of Supervisor’s hearing date, complete and submit Board Package which will include the following:</p> <p align="center">Agenda Item Summary EAMR CAC Recommendation Letter* Director’s Memo to Board*</p> <p>Concurrent with submittal to Board, EAMR is submitted for posting at public library.</p>
<p>Advertise - Prepare and place advertisement notice pertaining to upcoming Board Hearing.  Community Relations</p>	<p>Approximately 20 days in advance of the planned Board Hearing, place advertisement notice. Note: The actual advertisement must be published no later than 15 days prior to Board Hearing date.</p>
<p>* Should the CAC letter not be available at the time of assembly of the Board Package, a placeholder shall be included in the Board Package, with the CAC letter and Director’s Memo to the Board being submitted as a separate submittal, provided it is done in accordance with the normal agenda item submittal time frame (2-3 weeks in advance of planned hearing date). Note that the CAC shall be contacted and advised that they need to provide whatever comments they have at this time, or the item will need to be withdrawn from the Board Agenda, incurring a project delay.</p>	

**APPENDIX 3-P**  
**Checklists**  
**Right-of-Way Plans, Parcel Maps, and Legal Descriptions**

**Right-of-Way Plans Checklist**

- Plan view(s) for entire project
- North arrow and scale of 1" = 40'
- Section, Quarter section, and Sixteenth section lines.
- Stationing references
- Existing right-of-way/easements granted to Pima County within the project limits
- Existing utility easements including Book and Page (with year of recording)
- Street names and wash/river names
- Differentiated Line Weights/Styles between existing and proposed features
- Proposed Parcel Takes (shaded)
- All abutting parcels including:
  - \_\_\_ Owner names
  - \_\_\_ Assessors parcel numbers
  - \_\_\_ Property address
  - \_\_\_ Subdivision Book and Page (with year of recording) and lot number or "Unsubdivided"
  - \_\_\_ Parcel identification letter and sheet number in hexagon symbol for affected parcels
- Proposed new right-of-way/easements with bearings and distances for each line
- Existing right-of-way/easements including Book and Page (with year of recording), as well as property lines with bearings and distance
- Right-of-way center or control line with ties to cross streets
- Proposed improvements adjacent to the parcel
- Proposed new right-of-way/easements specifying type, providing distance and bearings
- Existing structures/private improvements on parcels adjoining project improvements
- Existing utilities (if included as part of a prior rights review).
- Existing prominent physical features (screened at 50%)
- Existing and proposed access, if affected
- Existing and proposed right-of-way width
- Parcel Area Table for affected parcels:
  - \_\_\_ Parcel identification letter and sheet number in hexagon symbol
  - \_\_\_ Pima County Tax ID number
  - \_\_\_ Docket and page of the parcel deed
  - \_\_\_ Owner name
  - \_\_\_ Gross area

- \_\_\_ Type of acquisition
- \_\_\_ Size of area to be acquired
- \_\_\_ Size of remainder
- \_\_\_ Size of temporary construction easement

**Rectified Digital Orthophoto Checklist**

- Orthophotos shall be referenced to the project control and the predesign survey requirements. The orthophoto size shall be produced in 22" x 34" format and in the scale of 1" = 40', with the following layers:
  - \_\_\_ Existing rights-of-way and easements
  - \_\_\_ Proposed rights-of-way and easements
  - \_\_\_ Proposed curb lines and sidewalks
  - \_\_\_ Curb cuts and driveway openings
  - \_\_\_ Median cuts and turn bays
  - \_\_\_ Travel lanes (vehicular and multi-purpose)

**Parcel Depiction Checklist**

- 8-1/2" x 11" parcel map of entire parcel(s) under one ownership, including reference location map
- Consulting firm's name
- Date written and date(s) of any revisions
- North arrow and scale
- Differentiated Line Weights/Styles between existing and proposed features
- Proposed new right-of-way/easements specifying type, providing distance and bearings
- Assessor's parcel number, property owner and address
- Parcel identification letter and sheet number in hexagon symbol
- Area in square feet or acres for part taken
- Cross hatch or otherwise indicate part to be acquired

**Legal Description Checklist**

- Consulting firm's name and logo
- Sealed by an Arizona Registered Land Surveyor
- Assessor's parcel number
- Date written and date of any revision
- Property owner name
- Type of acquisition such as "Fee Right-of-Way," "Drainage Easement," "Temporary Construction Easement," etc.

**APPENDIX 3-Q  
Final Design Phase  
Initial Construction Plan Checklist**

The following describes the plan sheets that should be included as part of the initial construction plan submittal, and the information that should be shown on those sheets.

**Cover Sheet**

The cover sheet should include the following information:

- Sheet index
- Legend of any nonstandard symbols or line types
- Basis of elevation and bearing
- Standard and special notes
- Design data such as design speed and design vehicle
- Water and sewer modification notes unless separate water and/or sewer modification plans are being prepared

**General Notes**

General Notes typically include the following:

- Sheet index
- Legend of any nonstandard symbols or line types
- Basis of elevation and bearing
- Standard and special notes
- Design data such as design speed and design vehicle
- Water and sewer modification notes unless separate water and/or sewer modification plans are being prepared

**Typical Sections**

Base typical roadway sections should show:

- Construction control line and profile grade control lines if different from construction control line
- Right-of-way control line and right-of-way widths
- Median, travel lanes, paved shoulder, lane assignments, shoulder, clear zone widths
- Cross-slope of pavement, shoulders, and recovery area if applicable

- Curb location and type
- Sidewalk location and detail
- Cut and fill slopes
- Pavement section referenced by number and showing limits by station as applicable
- Limits of each typical roadway section by station
- As applicable, a superelevated section corresponding to each base typical section with axis of rotation shown
- As applicable, left-turn and right-turn lane sections corresponding to each base typical section
- Separate typical sections for side streets

### **Pavement Structure Sections**

Pavement structure sections for various roadways and locations should be denoted by consecutive numbers and include the following as applicable:

- Asphalt layer thickness and mix number
- Tack coat
- Aggregate base thickness
- Chip seal (single/double) if applicable
- Sub-base and sub-grade treatment

### **Horizontal Control**

Horizontal control for the roadway construction and right-of-way can be shown on the roadway plans or, if too cluttered, on separate sheets. Information should include:

- Section corner ties needed to establish on the ground the horizontal geometry of the roadway
- Construction control line including curve data
- Median geometry
- Street names
- Pertinent existing easements
- Right-of-way along the mainline, side streets, and drainage ways tied to the construction control line

## Initial Roadway Plans

Plan view and profile should be combined on single sheets if horizontal curvature and elevation differential allows. If not, separate plan and profile sheets may be provided. Information shown in the roadway plan view includes:

- Edge of pavement defined
- Curb return data at major and minor streets
- Sidewalks if applicable
- Construction control line labeled and control data provided
- Property name, tax code number, and lot number if separate right-of-way plans are not being prepared
- Record property lines
- Limits of incorporated areas if applicable
- Culture
- Utilities
- North arrow (north to top or to right)
- Scale shown in bar form to accommodate reduced sizes
- Existing right-of-way and utility, drainage, and access easements
- Proposed right-of-way, drainage, slope, utility, and access easements
- Section lines identified
- Construction control line stationing labeled at 500-foot spacing
- Tick marks at 100-foot spacing
- Side street name, control line, and control data
- New driveways control and widths
- Median location and openings
- Station equations at side streets and drainage crossings
- Approximate limits of reconstruction for driveways and side streets
- Anticipated location of cross drainage structures, location and preliminary size, dip crossings
- Curb access ramps
- Benchmarks
- Initial storm drain locations

The following is needed in the roadway profile view:

- Existing grade profile along control lines appropriately labeled
- Finish grade profile along control lines appropriately labeled
- Superelevation diagrams associated with each profile
- Vertical curve data: BVC, PVI, EVC stations and elevations, curve length, grade breaks, stopping sight distance, and tangent grades shown as positive or negative for ascending or descending grades
- Accurately plotted cross-drainage structures with size labeled
- Utility locations, elevations, sizes, and types
- Profile information shown on a station/elevation grid

### **Initial Cross Drainage Plans**

Plan and profile for channels, culverts, and other cross-drainage improvements are needed as well.

The plan view should include:

- Control line with tie to roadway control line
- Right-of-way/ easements
- Roadway improvements
- Size, skew, and dimensions of culvert
- Horizontal definition of channel geometry including typical section
- Existing utilities

The profile view should include:

- Finish grade of channel and culvert including invert, top of bank, longitudinal section of culvert, and so forth along an appropriate control line
- Section of proposed roadway taken along the same control line
- Existing grade profile along the control line
- All finish grade and existing grade profiles labeled
- Existing utilities
- Headwater elevation of culverts
- $Q_{100}$  and  $V_{100}$  for channels

### **Initial Storm Drain Plans**

The plans should include:

- Catch basin locations
- Trunk line and lateral locations with preliminary sizing
- Trunk line profile

### **Landscape Plans**

Provide a preliminary planting plan on one sheet showing the proposed plant palette and density.

### **Pavement Marking Plans**

Show initial pavement marking plan for the entire roadway with major dimensions only.

### **Water and Sewer Conflicts**

Identify any anticipated conflicts with existing water and sewer facilities and determine the scope of water and sewer system modifications.

### **Initial Bridge Plans**

If bridges or other major structures are involved, the Final Design Phase plans (see Section 3.20) should show layouts and primary features. Bridge information should be based on the recommendations provided in the Structure Selection Report and will include:

- Longitudinal and transverse cross-sections of major structures
- Pier and abutment type, locations, and dimensions
- Superstructure type and major dimensions such as structure depth, type and spacing of girders, and size of cast-in-place boxes
- Deck thickness and method of construction
- Existing culture, utilities, and right-of-way
- Approach slab
- Abutment drainage system

Provide applicable structural calculations with the Final Design Phase submittal.

**APPENDIX 3-R  
Initial PS&E Phase  
Preliminary Construction Plan Checklist**

Initial PS&E Phase plans should include the revisions agreed to from the Final Design Phase Plan Submittal. Additionally the plans should include the following:

**Storm Drain Plans**

- Plan view of storm drain system including horizontal control
- Storm drain main and lateral profiles including the profile of the pipe and the proposed roadway along the pipe centerline, existing grade profile along the pipe centerline, the hydraulic grade line, existing utilities including size and type, pipe size, slopes, type, inverts
- Catch basin and pipe summary sheets

**Landscape Plans**

- Irrigation system
- Water service location
- Electric service location
- Landscape schedule
- Sight triangles
- Special details
- Grading
- Irrigation equipment schedule

**Traffic Signal Plans**

- Note sheet
- Detection loop layout details
- Plan sheets including traffic phasing diagrams, detection loop and type, signal poles, heads, conduit, pull-box locations, intersection pavement marking, signing, and electric service location
- Pole, conduit, and conductor schedule

**Lighting and ITS Plans**

- Note sheet
- Plan sheets showing light poles, pull-box locations, cabinets, and electric service location
- Pole, conduit, and conductor schedule

### **Signing Plans**

- Note Sheet
- Sign layout table
- Signing summary table
- Plan sheets reflecting signing layout

### **Pavement Marking Plans**

- Pavement marking labeled and dimensioned
- Pavement marking quantities
- Pavement marking notes
- Pavement marking details
- Quantity summary table

### **Staking Plans**

Spot elevations in areas that are not directly covered by profile and typical roadway sections such as major intersections and nonstandard turn bays. Use a scale appropriate for the particular situation. Include dimensions necessary to horizontally locate spot elevations.

### **Noise Wall Plans**

- Plan view
- Typical wall cross section
- Elevation showing top of wall and footing elevations
- Structural details

### **Retaining Wall Plans**

- Typical wall cross section
- Plan view
- Elevation

### **Special Provisions**

- Initial Draft Document

### **Water and Sewer Modification Plans**

Provide construction plans for any proposed water, reclaimed water and/or sanitary sewer modifications when required and in accordance with the standards of the appropriate agency.

## Bridge Plans

Preliminary layout of structural sheets for bridges and other major structures as applicable.

- General plan sheets
  - \_\_\_ Culture, utilities, and right-of-way
  - \_\_\_ Base lines
  - \_\_\_ Curve data
  - \_\_\_ Point of minimum vertical clearance
  - \_\_\_ Roadway widths
  - \_\_\_ Structure width
  - \_\_\_ Approach slabs
  - \_\_\_ Centerline of piers
  - \_\_\_ Skews
  - \_\_\_ Begin and end bridge stations
  - \_\_\_ Existing topography (50% screen)
  - \_\_\_ Bank protection limits
  - \_\_\_ Boring locations
  - \_\_\_ Deck drain locations
- Profile sheets
  - \_\_\_ Vertical curves and grades on profile
- Elevation sheets
  - \_\_\_ Distance center-to-center of end bearing
  - \_\_\_ Minimum vertical clearance
  - \_\_\_ Berm elevations
  - \_\_\_ Horizontal clearance
  - \_\_\_ Rip-rap
  - \_\_\_ Span length
  - \_\_\_ Stations and grade elevations
  - \_\_\_ Bridge length
  - \_\_\_ Existing ground line
  - \_\_\_ Datum
  - \_\_\_ Substructure elements
  - \_\_\_ Fixed and expansion piers
  - \_\_\_ Future expansion if applicable

- Typical sections
  - \_\_\_ Traffic lanes and shoulders
  - \_\_\_ Distance to construction centerline
  - \_\_\_ Bridge rail type and width
  - \_\_\_ Structure depth
  - \_\_\_ Piers
  - \_\_\_ Out-to-out deck dimension
  - \_\_\_ Future bridge expansion if applicable
- Note sheet
  - \_\_\_ General notes
  - \_\_\_ Construction staging notes
  - \_\_\_ Construction notes
- Boring log sheets
  - \_\_\_ Location of borings
  - \_\_\_ Legend of soil symbols
  - \_\_\_ Legend of boring operations
  - \_\_\_ Dates of borings
  - \_\_\_ Water table elevation
- Foundation layout sheets
  - \_\_\_ Dimension along centerline of piers to project centerline
  - \_\_\_ Skew angle
  - \_\_\_ Pier number
  - \_\_\_ Existing utilities
- Abutment detail sheets
  - \_\_\_ Plan view
  - \_\_\_ Front elevation
  - \_\_\_ Wing wall elevation
  - \_\_\_ Wing wall section
  - \_\_\_ Centerline of bearing station at project centerline
  - \_\_\_ Centerline of bearing skew angle
  - \_\_\_ Abutment drainage system
- Pier detail sheets
  - \_\_\_ Plan view

- \_\_\_ Elevation (looking up-stationing)
- \_\_\_ Layout data and skew angle
- \_\_\_ Cap beam section
- Pre-stressed concrete detail sheets
  - \_\_\_ Elevation
  - \_\_\_ Section showing tendon pattern at mid-span
  - \_\_\_ Section showing tendon pattern at supports
  - \_\_\_ Concrete strength at transfer and at 28 days
  - \_\_\_ Framing plan
- Pre-stressed concrete girder detail sheets
  - \_\_\_ Elevation
  - \_\_\_ Section showing strand pattern at mid-span
  - \_\_\_ Section showing strand pattern at end of girder
  - \_\_\_ Concrete strength at transfer and at 28 days
- Steel girder detail sheets
  - \_\_\_ Framing plan
  - \_\_\_ Section showing diaphragm
  - \_\_\_ Section showing bracing
  - \_\_\_ Size of rolled section or welded plates and weld sizes
- Deck detail sheets
  - \_\_\_ Plan view
  - \_\_\_ Transverse section showing webs and diaphragms
  - \_\_\_ Barrier details
  - \_\_\_ Removable barrier details if applicable
  - \_\_\_ Barrier rails
  - \_\_\_ Handrail elevation
  - \_\_\_ Deck drain spacing and details
  - \_\_\_ Light pole base details if required
  - \_\_\_ Expansion joint block outs
  - \_\_\_ Cross sections

**APPENDIX 3-S**  
**Final PS&E Phase**  
**Detailed Construction Plan Checklist**

Final PS&E Phase plans should include the revisions agreed to from the Initial PS&E Phase submittals. Additionally the plans should include the following:

- References finalized
- Sheet numbering finalized
- Storm Water Pollution Prevention Plan
- Construction sequencing if necessary
- Traffic control if necessary
- Special Provisions (Final)
- Traffic Signal Plans
- Lighting and ITS Plans
- Signing Plans
- Pavement Marking Plans



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## **APPENDIX 3-U SPECIFICATIONS, GENERAL NOTES, SPECIAL PROVISIONS GUIDELINES**

### **Specifications**

Specifications are the compilation of provisions and requirements for the performance of the prescribed work and consist of Standard Specifications, General Notes, and Special Provisions. Standard Specifications refer to the latest edition of the City of Tucson/Pima County Standard Specifications for Public Improvements and are incorporated into the bid documents by reference.

### **General Notes**

General Notes provide general information about the project, contract expectations, and addresses items of special emphasis. There are two types of General Notes: stored and unique. Stored General Notes are used on all projects, and unique General Notes apply only to a specific project. The designer is directed to the Department's website for the latest stored General Notes.

### **Special Provisions**

Special provisions are additions and revisions to the Standard Specifications covering conditions and requirements relevant to a project. Like General Notes, there are two types of Special Provision, Stored and Unique, both of which serve several important functions:

- Provides a means for adapting the Standard Specifications to meet the unique requirements of a specific project;
- Directly modifies the existing Standard Specifications by adding, deleting, or revising language in an existing section, or by adding a new section;
- Adds a stand-alone specification to the bid documents that does not directly modify the Standard Specifications;

The importance of a properly written special provision cannot be over emphasized given their order of precedence in the hierarchy of documents when resolving conflicts, discrepancies, and ambiguities between bid documents. Special Provisions should be developed in conjunction with the project plans and cost estimate to insure agreement with the scope of work, plan notes, and bid item measurement and basis of payment.

### **Stored Special Provisions**

Stored Special Provisions are specifications developed, maintained, and administered by the department. Stored Special Provisions are further broken down into Recurring and Specific.

Recurring Stored Special Provisions are used on all projects. The designer is directed to the department's website for a list of current recurring stored special provisions.

Specific Stored Special Provisions are used only when (1) a project includes specific items of work for which the department has developed a special provision such as drilled shaft

foundations, water pipe, and sewer manholes; and (2) a Standard Specification that pertains to a project makes reference to the Special Provisions for specific information. A list of Standard Specifications requiring specific information to be provided within the Special Provisions or plans may be found in Exhibit 3-U-1 at the end of this appendix.

Stored Special Provisions are *not* to be changed except as indicated below. Keep the Stored Special Provision reference with the revision dates intact:

- Subsection 107-21 of the stored special provisions regarding utilities should be revised on each project to reflect the most current list of utility contacts.
- There are several options for Section 701 - Maintenance and Protection of Traffic available as stored special provisions. Check with Field Engineering to determine which version is preferred for the current project.

### **Unique Special Provisions**

Unique Special Provisions are specifications that pertain exclusively to a specific situation on a project that is not covered by a stored special provision or standard specification. A Unique Special Provision is intended for a single use on a specific project. All Unique Special Provisions should be approved by the department before inclusion into the specifications.

### **Structure of a Special Provision**

Special Provisions shall use the same structure as the Standard Specifications including subsection layouts. The use of the standardized structure of the Standard Specifications provides a common outline for special provisions that helps to ensure that all the necessary information is provided. The designer should review the Standard Specifications before writing a special provision in order to become familiar with the structures and typical phrasing used throughout.

The standard structure for Special Provisions consists of the following sections: Description, Materials, Construction Requirements, Method of Measurement, and Basis of Payment.

#### Description

Briefly, but completely describe the scope of work to be performed, with references to specifications, plans, or other special provisions that further define the work. Where necessary or desirable for clarity, describe the relationship of this work to other work or other phases of construction. Do not editorialize.

#### Materials

List the materials to be used in the work and clearly indicate the criteria for acceptance of the materials. Define the specifications and properties of each material and the method of test for acceptance. Use references to the Standard Specifications' material sections as much as possible. References may be made to AASHTO, ASTM, or other recognized specifications if the materials are not addressed in the Standard Specifications. Ensure the reference to ASSHTO, ASTM, or other specifications or test methods from agencies outside of the Department are

accurate and up to date. If a certification is required, ensure that the certification type fits the situation and that information required in the certifications is clearly defined.

A prime consideration in establishing materials requirements is whether the material will be tested by the Department and if the Department has the capability to perform the test. Field Engineering, Materials Section can provide guidance for specifying materials testing and acceptance criteria.

### Construction Requirements

The construction requirements should be written in the logical order in which field operations are anticipated to proceed. Clearly define the requirements for general conditions, types of construction, and quality of workmanship. Do not leave the contractor in doubt as to what is required.

Describe the sequence of construction operations (method specifications) or the desired end product (performance-based specifications) as preferred. The construction requirements should define tolerance, limits, restrictions, preparations, or the other criteria related construction of the work that must be satisfied for an acceptable product. These requirements can include, but are not limited to, dimensions, on-site test criteria, weather conditions, traffic conditions, or time limits.

### Method of Measurement

Describe the components of the completed work that will be measured to determine the pay quantity for the pay item as it is identified in the bid schedule. Define the units of measurement and whether the item will be measured in original position, in transporting vehicles, or in the completed work. Designate modifying factors or other requirements needed to establish a definitive, measurable unit. A prime consideration for method of measurement should be the degree of difficulty that field personnel will encounter in making measurements.

### Basis of Payment

Define the measured units for which payment will be made. Include the pay item name as it will appear in the bid schedule and define the scope of work included in payment. Determine and identify which work is to be paid for as an individual pay item, what work is to be included in the cost of that pay item, and what work is to be included in the cost of other pay items. The Basis of Payment must clearly identify to the contractor what work is and is not to be included in the unit of cost of the pay item. For work that is not included in the pay item in the provision, the designer must then determine and clearly state where the cost of such work is to be placed.

### **Writing a Special Provision**

A Special Provision may be written using either a Standard or Item Format. The Standard Format is preferable; however, an Item Format may be more appropriate under certain circumstances. Special Provisions shall use a typeface of Times New Roman, font size 12-point and 8-point for headings. Refer to the stored Special Provisions for samples of heading formatting.

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Standard Format

Sections, subsections, paragraphs, and sentences of the Standard Specifications may be modified by appending key phrases to the end of the section or subsection heading as follows:

- i. Adding language to an *existing* standard specification subsection, the key phrase “of the Standard Specifications is modified to add:” is placed after the subsection heading as reflected in the following example.

**203-8 BORROW**

**203-8.01 Description** of the Standard Specifications is modified to add:

It shall be the responsibility of the Contractor to contact RBS Plumbing ....

- ii. Adding a *new* section to the standard specifications, the key phrase “ is hereby added to the Standard Specifications:” is placed after the section heading as reflected in the following example.

**SECTION 413 - ASPHALTIC CONCRETE (ASPHALT-RUBBER)** is hereby added to the Standard Specifications:

- iii. Revising the wording of a paragraph or sentence within an *existing* subsection of the standard specifications, the specific paragraph or sentence is identified and the key phrase “ of the Standard Specifications is revised to read:” is placed after the section or subsection heading as reflected in the following examples.

**404-3.05 Application of Bituminous Materials** the fourth paragraph of the Standard Specifications is revised to read:

Bituminous materials shall be heated by kerosene burner in such a manner...

**807-3 Contractor’s Responsibility** the second sentence of the fourth paragraph of the Standard Specifications is revised to read:

It shall be the responsibility of the contractor to notify property owners 72 hours in advance of the work.

- iv. Deleting a section, subsection, paragraph, or sentence of the standard specifications, the key phrase “of the Standard Specifications is hereby deleted:” is placed after the section or subsection heading as reflected in the following example.

**506-5 BASIS OF PAYMENT** the last sentence of the third paragraph of the Standard Specifications is hereby deleted.

Item Format

Although not the most desirable format, the item format may be used at times when the modifications to the Standard Specifications will be numerous and cumbersome and when

specifications for a specific construction element may require references to several sections of the Standard Specifications, as well as other non-Pima County/COT specifications. In such instances, the Item Format can provide a method of addressing multiple references in a simple, concise way. The key to this type of special provision is that the specifications focus on the bid item or series of similar bid items.

The Item Format must contain the same five major sections as the Standard Specifications:

- 1. DESCRIPTION**
- 2. MATERIALS**
- 3. CONSTRUCTION DETAILS**
- 4. METHOD OF MEASUREMENT**
- 5. BASIS OF PAYMENT**

In the Materials and Construction Details sections, references can be made to specific subsections of the Standard Specifications or to other specifications. The other subsections must be written out entirely without references. If a subsection is not applicable, the subsection heading along with the wording “(None Specified)” should still be included. A list of stored special provisions using the Item Format is available from the Department upon request.

### **Special Provisions Format and General Order**

The following is a listing of the order of the specifications. Because specifications are included in the bid documents along with other contract information, they should be numbered as SP-1, 2, etc. Refer to Exhibit 3-U-2 for a sample Special Provision.

#### **I. SPECIAL PROVISIONS COVER SHEET**

*Cover sheet provided by the Department and is required in all contracts.*

#### **II. TABLE OF CONTENTS**

#### **III. GENERAL NOTES**

*Unique General Notes (Outline provided by the Department, amended by the designer for a specific project, required in all contracts as needed);*

*Stored General Notes (Provided by the Department, required in all contracts).*

#### **IV. SPECIAL PROVISIONS**

*Special provisions shall listed sequentially by section and item numbers. The designer shall contact the department for the latest list of recurring stored special provisions.*

#### **V. APPENDICES**

*Include environmental permit conditions, county ordinances and special details as required for the project.*

**EXHIBIT 3-U-1**  
**LOCATIONS IN THE STANDARD SPECIFICATIONS REFERENCING**  
**REQUIREMENTS IN THE SPECIAL PROVISIONS OR ON THE PLANS:**

208-2	Survivability of geotextile
301-3.03	Rate of application
404-2.01	Type, grade of bituminous material
404-3.05	Type, grade and rate of application of bituminous material
404-3.06	Cover material rate of application
404-3.12	Rate of application of blotter material
404-3.15	Rate of application of tack used for bidding purposes
404-3.16	Rate of asphaltic-rubber material
508-3.03	Testing information (RCP pg. 289)
	Testing information, trench detail and burial depth (HDPE pg.'s 292 & 294)
508-3.05	Testing for replacement sewers
510-2.03	CLSM mix design
510-3.04(D)	(1) DIP; (2) CCP; (3) HDPE Approved Materials List, SDR/DR rating HDPE Fittings; (4) PVC; (5) Steel; (6) Copper Pipe Approved Materials List
510-3.04(E)	(2) Tapping Sleeve Manufactures approved list
510-3.04(F)	(2) CCP Non-destructive testing on welds
601-1	Pre-cast unit specs
603-1	Load test on test piles
610-3.02	Method of cleaning
710-4.03	Method of measurement for detour
706-2.05	Approved manufacture for bituminous adhesive
732	Numerous references - read this Section carefully
734-2.01(D)	Pre-approved list of controller equipment
734-2.01 (E, F)	Location for delivery
736-2.04	Sign legends
803-3.01	Compaction of platting material
805-2.03(A)	Type and rate of mulch
805-3.01	Class and variety of seed and rate of application
805-3.02(B)	Seed planting method and rate; mulch type and rate; tacking agent –type, rate, and manner of application
805-3.03	Rates seed, mulch, tacking agent
806-3.01	Specify planting season
806-3.05	Specify care including weed control
807-1	Landscape establishment period
807-3.03	Irrigation system component testing
906-3	Cattleguard precast requirements
	<ul style="list-style-type: none"> <li>▪ 920-2.05 Estimated percentage of cementitious material</li> <li>▪ 1005-3.01 Asphalt cement pressure aging temperature <ul style="list-style-type: none"> <li>▪ 1006-3.01 Requirement for air entraining admixtures</li> </ul> </li> </ul>
1006-4.03(A)	Concrete testing requirements
○	1010-4 Approved list of pipe and appurtenances
1014-4	Fabric survivability rate

**EXHIBIT 3-U-2**  
**SAMPLE SPECIAL PROVISIONS COVER SHEET**

**SPECIAL PROVISIONS**

**PIMA COUNTY DEPARTMENT OF TRANSPORTATION**



**Project Name**

**Pima County Project No. \_\_\_\_\_**

Date

**PIMA COUNTY BOARD OF SUPERVISORS**

**RAMON VALADEZ, CHAIRMAN**

**DISTRICT 2**

**ALLY MILLER  
SHARON BRONSON  
RAYMOND CARROLL  
RICHARD ELIAS**

**DISTRICT 1  
DISTRICT 3  
DISTRICT 4  
DISTRICT 5**

**PRISCILLA S. CORNELIO, P.E., DIRECTOR**

SP-1

**SAMPLE REGISTRANT'S SHEET**

*Special Provisions*  
*[Insert project name]*

*Pima County DOT*  
*Project No. xxxxxxxx*

PROFESSIONAL SEALS

These specifications were prepared under the direction of the following individuals:

- (a) John H. Doe, PE, Civil Engineer, River Engineering, Inc.
- (b) Susan Hines, RLS, Surveyor, Hines Survey.
- (c) Pete Martin, RLA, Landscape Architect, Sonoran Design.
- .
- .
- .

Their seals, affixed below, attest that those portions of these specifications which relate to the drawing sheet numbers appearing next to the seal were prepared under their direction.

**SAMPLE TABLE OF CONTENTS**

*Special Provisions*  
*[Insert project name]*

*Pima County DOT*  
*Project No. xxxxxxxx*

**INDEX TO THE SPECIAL PROVISIONS:**

General Notes.....5

Section 101 – Abbreviations and Terms.....10

Section 102 – Bidding Requirements and Conditions.....11

Section 103 – Award and Execution of Contract.....12

Section 104 – Scope of Work.....12

Section 105 – Control of Work.....13

Section 106 – Control of Materials.....14

Section 107 – Legal Relations and Responsibility to Public.....20

Section 108 – Prosecution and Progress.....21

Section 109 – Abbreviations and Terms.....21

Section 201 – Abbreviations and Terms.....27

Item 2010004 – Preservation Fencing.....32

Section 202 – Removal of Structures and Obstructions.....34

Item 2020061 – Relocate Mailbox.....35

Section 203 – Earthwork.....35

Section 303 – Aggregate Base Course.....36

Section 404 – Bituminous Treatments.....39

Section 406 – Asphaltic Concrete.....39

**APPENDICES:**

- Appendix A - Stormwater Pollution Prevention Plan Booklet (Provided on CD)
- Appendix B - Categorical Exclusion Environmental Clearance (Mitigation Measures and Approval Letter)
- Appendix C - Pima County Noise Ordinance
- Appendix D - Geotechnical Evaluation, Romero Road Soils Testing and Pavement Design
- Appendix E - Pima County Standard Details
- Appendix F - Utility Clearance Letter

**SAMPLE PROJECT GENERAL NOTES**

*Special Provisions*  
*[Insert project name]*

*Pima County DOT*  
*Project No. xxxxxxxx*

**GENERAL NOTES**

**1. Project Location**

This project is located within Section 22 of Township 13 South, Range 13 East, Gila and Salt River Meridian, Pima County, Arizona.

**2. Scope of Work**

The project consists of reconstructing a total of approximately 2,495 linear feet of existing two-lane roadway. The construction consists of constructing a three-lane roadway with paved shoulders, concrete curbs and sidewalks, and drainage facilities.

**3. Contract Time**

The work specified shall be completed within **125** working days.

**4. Permits**

Before undertaking work at any location covered by this project, the Contractor shall obtain all applicable permits, including but not limited to: water and air quality permits, street closure permits and permits for excavation/construction in the public rights-of-way, from City of Tucson or Pima County, whichever agency has jurisdiction over the area where the work is located.

**5. Maintenance & Protection of Traffic**

Two-way traffic on Romero Road and side streets shall be maintained by the Contractor on a minimum of a graded and compacted surface. Access for residential, commercial, church and school activities should also be maintained by the Contractor on a minimum of a graded and compacted surface. Access for mail deliveries and garbage pick-up should be accommodated in the Contractor's Traffic Control plan, with temporary closures not to exceed two (2) hours.

The Contractor shall notify residents one week in advance of when construction will occur that will affect access to their residence. The Contractor will advise residents to not park in the areas affected by construction for the duration necessary and shall limit the duration of construction to the minimum possible.

The Contractor shall be responsible for all construction zone traffic control in accordance with Section 701 of the Standard Specifications and these Special Provisions. The Contractor's compensation for maintaining traffic on an approved surface with detours is included under Bid Item 7010005 - Traffic Control.

**SAMPLE OF RECURRING STORED SPEC (NOTE THE REFERENCE & DATE)**

Special Provisions  
[Insert project name]

Pima County DOT  
Project No. xxxxxxxx

**(102BID\_REQ, 5/26/06)**

**SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS**

**102-4 CONTENTS OF BID DOCUMENT** the 2<sup>nd</sup> paragraph of the Standard Specifications is revised to read:

All papers bound with or attached to the bid document are considered a part thereof. Bid forms may be detached and submitted as the bid. It is the contractor's responsibility to include and execute all necessary bid forms.

**102-9 AFFIDAVIT AND CERTIFICATION FORMS** of the Standard Specifications is hereby deleted.

**102-11 DELIVERY OF BIDS** the last sentence of the Standard Specifications is hereby deleted.  
**(103FHWA\_AWARD\_LISC, 11-4-05)**

**SECTION 103 - AWARD AND EXECUTION OF CONTRACT**

**103-2 AWARD OF CONTRACT** of the Standard Specifications is modified to add:

This contract is funded, either wholly or in part, by federal funds, and the award of contract may be made contingent upon the successful bidder obtaining an appropriate license from the State Registrar of Contractors, in accordance with Arizona Revised Statutes 32-1101 through 32-1170.03. The license must be obtained within 60 calendar days following opening of bid proposals. No adjustment in proposed bid prices or damages for delay will be allowed as a result of any delay caused by the lack of an appropriate license.

Failure to acquire the necessary licensing within the specified period of time shall result in either award to the next lowest responsible bidder, or re-advertisement of the contract, as may be in the best interests of the Agency.

Licensing information is available from:

Registrar of Contractors  
800 W. Washington, Sixth Floor  
Phoenix, AZ 85007  
Phone: (602) 542-1502

**SAMPLE OF A STORED ITEM SPEC (NOTE THE SECTION REFERENCE & DATE)**

Special Provisions  
[Insert project name]

Pima County DOT  
Project No. xxxxxxxx

**(203OVEREXC\_UNSUITABLE, 1/4/12)**

**ITEM 2030500 EXCAVATION (OVEREXCAVATION)**

**1. DESCRIPTION**

The work under this item consists of performing all operations necessary to perform the overexcavation required to remove the unsuitable material at the locations shown on the plans and in accordance with requirements of these specifications.

**2. MATERIALS (None Specified)**

**3. CONSTRUCTION DETAILS**

The unsuitable removal construction requirements shall be in accordance with the plans, these Special Provisions, Section 203 of the Standard Specifications, and as directed by the Engineer.

**4. METHOD OF MEASUREMENT**

The method of measurement for unsuitable material removal will be by the cubic yard in the original space occupied. The volume of material removed will be computed according to the provisions of Section 109.

**5. BASIS OF PAYMENT**

The accepted quantities of unsuitable material removal, measured as provided above, will be paid for at the contract unit price per cubic yard. The price shall include full compensation for the work complete, including hauling, stockpiling, and placement within allowable embankment areas on the project. The allowable embankment areas are defined as those areas that are not within the original space occupied and not within 3' of the finished subgrade.

**SAMPLE OF UNIQUE ITEM-TYPE SPECIAL PROVISION**

*Special Provisions*  
*[Insert project name]*

*Pima County DOT*  
*Project No. xxxxxxxx*

**ITEM 9142002 - SIGN WALL AT SUN VIEW APARTMENTS (2201 S. AJO WAY)**

**1. DESCRIPTION**

The work under this item shall consist of furnishing labor, equipment and materials to construct a masonry sign wall 8' (L) x 2'(W) x 6'(H) at location outside of right-of-way as identified by Juan Martinez, apartment manager. Work will include the construction of concrete footings on compacted subgrade.

**2. MATERIALS**

Concrete Masonry Units. CMU shall be...

Mortar and Grout. Mortar and grout shall conform to the requirements of Section 914 of the Standard Specifications...

Stucco. Stucco finish to be...

Paint. Stucco shall be painted with...

Reinforcement. Reinforcing steel shall meet the requirements of...

**3. CONSTRUCTION DETAILS**

The wall footings will be constructed in accordance with...

Shop Drawings. Shop drawings shall be submitted for fabrication...

Installation. Only skilled, experienced masons shall be ...

**4. METHOD OF MEASUREMENT**

Masonry Sign Walls will be measured by the lump sum amount for each wall.

**5. BASIS OF PAYMENT**

The accepted quantities of masonry sign walls, measured as provided above, will be paid for at the contract unit lump sum price for each wall, complete in place, including all excavation, backfill, compaction, formwork, concrete and reinforcement for footings, reinforcement for walls, grout, stucco, painting, and wall treatments, labor, equipment, materials and incidentals necessary to complete the work.

SP-7

**SAMPLE TYPICAL APPENDIX**

*Special Provisions*  
*[Insert project name]*

*Pima County DOT*  
*Project No. xxxxxxxx*

**APPENDIX A**  
**STORMWATER POLLUTION PREVENTION PLAN BOOKLET**  
**(PROVIDED ON CD)**

**APPENDIX 3-V  
SAMPLE UTILITY MEMORANDUM OF AGREEMENT**

**MEMORANDUM OF AGREEMENT  
BETWEEN  
PIMA COUNTY DEPARTMENT OF TRANSPORTATION  
AND  
XYZ UTILITY COMPANY**

**1. GENERAL**

Pima County Department of Transportation (“Department”) has been given approval and authorization by the Board of Supervisors and Regional Transportation Authority to design and construct improvements along Busy Bee Road, Section 21, T12S, R13E, project number 4RBEEE (“Project”). The project consists of reconstructing 5000 feet of roadway from 2-lanes to 3-lanes. The XYZ Utility Company (“Utility”) has facilities located within the project’s boundaries that impact the Project and will require adjustment, removal, and modification.

The Utility will relocate and remove some of the impacted facilities prior to construction of the Project and is requesting that the remaining facilities be installed, removed, and modified (“Work”) be incorporated into the Project.

The Department has determined that it would be in the best interest of the county and Utility to include the Work in the Project with the understanding that all costs of the Work are to be reimbursed to the Department in accordance with the terms and conditions of this Memorandum of Agreement (“Agreement”).

**2. PURPOSE**

The purpose of this Agreement is to establish the roles, responsibilities, and compensation between Utility and Department related to the Work.

**3. DESCRIPTION OF WORK**

The Work consists of the removal of an estimated 3000 linear feet of 6” PVC conduit (bid item 2020333); removal and backfilling of three (3) 6’ x 10’ x 12’ concrete vaults (bid item 2020018); trench and backfill of 4500 linear feet of 2 foot wide trench per sheet 34 of 233 for the placement of 2- 4” PVC conduit by others (bid item 9300124); and installation of 25-feet of 6” diameter galvanized sleeve through the east bridge abutment as shown on sheet 55 of 233 (bid item 9300178).

The Work shall also include the design, drawings, and special provisions of the work items described in the above paragraph. The Utility has elected to use the Department’s consultant, Superior Engineering, Inc., for development of the design, drawings, and special provisions

**4. ROLES AND RESPONSIBILITIES**

**4.1 Pima County Department of Transportation**

- a. Construct, administer, and supervise the items of Work.
- b. Apply for a Pima County Right-of-way Use Permit.
- c. Coordinate with the Utility’s designated contact the excavation and backfill of bid item 9300124 and 9300178 in accordance with the project’s special provisions.
- d. Notify the Utility within 24 hours of the start of all Work items.

- e. Include within the project’s contract documents the Work drawings, bid items, and special provisions provided by the Utility (item d, Section 4.2).

**4.2 XYZ Utility Company**

- a. Reimburse the Department for all cost incurred in the performance of the Work.
- b. Utility will contract directly with Superior Engineering, Inc. for development of the design, drawings, and special provisions.
- c. Provide timely inspection.
- d. Submit to the Department on or before January 12, 2014 for inclusion into the Project’s contract documents the drawings, bid items, and special provisions associated with the Work described in Section 3.

**5. COMPENSATION AND BILLING**

**5.1 Costs**

The Utility will reimburse the Department for all costs incurred in the performance of the Work identified in Section 3. The cost of the work is estimated to be \$98,095. This amount represents \$9,000 (2020333); \$7,000 (2020018); \$67,000 (9300124); \$2,300 (9300178); and \$12,795 (15% administration and inspection fee).

**5.2 Billing**

Upon completion and acceptance of the Work by the Utility, the Department will invoice for the cost of the Work on a monthly basis. Payment is to be received within forty-five (45) business days of receipt of the invoice.

**6. MODIFICATION AND TERMINATION**

This Agreement may be modified or terminated at any time only by mutual written consent of XYZ Utility Company and Pima County Department of Transportation.

**7. ENTIRE AGREEMENT**

This Agreement constitutes the entire agreement hereto and supersedes any prior understanding or written or oral communications between XYZ Utility Company and Pima County Department of Transportation respecting the subject matter hereof.

**8. EFFECTIVE DATE, TERM AND SIGNATURE**

This Agreement shall be effective on the date on which both parties sign hereto, whichever date is later, and end June 30, 2014, or until the Agreement is terminated pursuant to the terms contained herein, whichever event occurs first.

Authorized signatures and dates

\_\_\_\_\_  
(Insert name), XYZ Utility Company Director

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Inset name), Deputy Director, Department

\_\_\_\_\_  
Date

### SUBGRADE ACCEPTANCE CHART FOR PIMA COUNTY R<sub>PC</sub> VALUES

Design R-Value = 15 to 60

Note: For any chosen Design R-value, if the tested plasticity index and percent fines of a soil plot below that R-value line, the soil is considered to be acceptable. If the plasticity index and percent fines of a soil plot above that R-value line, the soil is considered to be unacceptable and shall not be used as subgrade material. Also, the X-value shown in the legend for each R-value represents the maximum X-value for each Design R-value based on the equation,  $X = (\text{Percent Fines}) + [2.83(\text{PI})]$ .

