DESERT SOUTHWEST REGION
Customer Pre-payment Meeting
Fiscal Year 2018

ANNUAL CUSTOMER MEETING: OCTOBER 5, 2017

DESERT SOUTHWEST REGIONAL OFFICE
615 S. 43RD AVE
PHOENIX, AZ

Western Area Power Administration

POWERING THE ENERGY FRONTIER

Table of Contents

1. MEETING AGENDA 3
2. TABLE OF ACRONYMS 4
3. ACTION ITEMS CAPTURED AUGUST 22nd, 2017 5
4. PRE-PAYMENT FUNDING INTRODUCTION 9
5. FY17 COMPLETED PROJECTS 10
5.1 Facility Ratings Mitigation Year 2 10
6. ACTIVE CONSTRUCTION PROJECTS 12
6.1 Parker - Headgate Rock & Parker- Bouse 161-kV Rebuild 13
6.2 Mesa Substation Remediation 14
6.3 Gila-Knob 161-kV Rebuild 16
6.4 Gila Substation 161-kV Rebuild 17
6.5 Tucson Substation Rebuild 18
6.6 Crossman Peak Microwave Facility 20
6.7 Liberty Series Capacitor Bank 21
7. FY18 PROPOSED PRE-PAYMENT PROJECTS 23
7.1 Seed Funding Summary 23
7.2 FY18 Proposed Funding Plan 24
7.3 Gila-Wellton Mohawk 161-kV Rebuild 25
7.4 Coolidge-Valley Farms Transmission Line AOA Breakdown 28
7.5 Kofa-Dome Tap 161-kV Transmission Line AOA Breakdown 35
7.6 Dome Tap-Gila 161-kV Transmission Line AOA Breakdown 43
8. APPENDICES 50
8.1 Wood vs. Steel Transmission Line Justification 51
8.2 Pre-payment Proxy Voting Ballot 54
8.3 DSW Organization Charts 55

1. MEETING AGENDA

Conference Call Bridge:

- To access the conference call bridge, please dial (888)-283-2963; when requested enter conference code number 13346 and then enter #. When requested provide your name.

Objective(s):

1. FY18 Pre-payment Project Presentation: Report of execution on active projects, present proposed Pre-payment projects and customer vote on funding plan.

Agenda:

1. Welcome
    a. Review Agenda
2. Review action items from August 22nd, 2017
3. Review Pre-payment Projects
    a. Completed Projects
    b. Active Pre-payment Projects
    c. Proposed Projects for FY18
4. FY18 Pre-payment Funding Plan
    a. Financial Review and Accounting of Pre-payment Fund Usage
5. Customer Prepayment Vote
    a. Coolidge Valley Farms
    b. Gila-Wellton Mohawk I-8 Crossing
6. Review Action Items
7. 10-MINUTES BREAK
8. WAPA Asset Management Transformer Risk Strategy

2. TABLE OF ACRONYMS

APS……ARIZONA PUBLIC SERVICE
BES……BULK ELECTRIC SYSTEM
BOR……BUREAU OF RECLAMATION
CAP……CENTRAL ARIZONA PROJECT
CPC……CAPITAL PLANNING COMMITTEE
CTC……CUSTOMER TECHNICAL COMMITTEE
CX……CATEGORICAL EXCLUSION
CIP……CRITICAL INFRASTRUCTURE PROTECTION
DOE……DEPARTMENT OF ENERGY
DSW……DESERT SOUTHWEST REGION
EA……ENVIRONMENTAL ASSESSMENT
E&OC……ENGINEERING & OPERATING COMMITTEE
GFE……GOVERNMENT FURNISHED EQUIPMENT
IDC……INTEREST DURING CONSTRUCTION
IDIQ……INDEFINITE DELIVERY/INDEFINITE QUANTITY
JPA……JOINT PLANNING AGREEMENT
KCMIL……THOUSANDS CIRCULAR MILS
MDCC……MAINTENANCE DESIGN CONSTRUCTION COMMITTEE
NEPA……NATIONAL ENVIRONMENTAL POLICY ACT
NERC……NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
NESC……NATIONAL ELECTRICAL SAFETY CODE
NHPA……NATIONAL HISTORIC PRESERVATION ACT
NRHP……NATIONAL REGISTER OF HISTORIC PLACES
OGW……OVERHEAD GROUND WIRE
O&M……OPERATIONS AND MAINTENANCE
OPGW……OPTICAL OVERHEAD GROUND WIRE
OGW…… OVERHEAD GROUND WIRE
PAD……PARKER SUBSTATION
PCB……POLYCHLORINATED BIPHENYL
PCN……PRE-PAYMENT FUNDS
P-DP……PARKER-DAVIS PROJECT
USDA……UNITED STATES DEPARTMENT OF AGRICULTURE
RFP……REQUEST FOR PROPOSAL
ROM……ROUGH ORDER OF MAGNITUDE COST ESTIMATE
ROW……RIGHT-OF-WAY
SCE……SOUTHERN CALIFORNIA EDISON
SF6……SULFUR HEXAFLUORIDE
TEP……TUCSON ELECTRIC POWER
TYP……TEN YEAR PLAN
UES……UNISOURCE ENERGY SERVICES
WAPA……WESTERN AREA POWER ADMINISTRATION
WCF……WESTERN CONSTRUCTION FUNDS

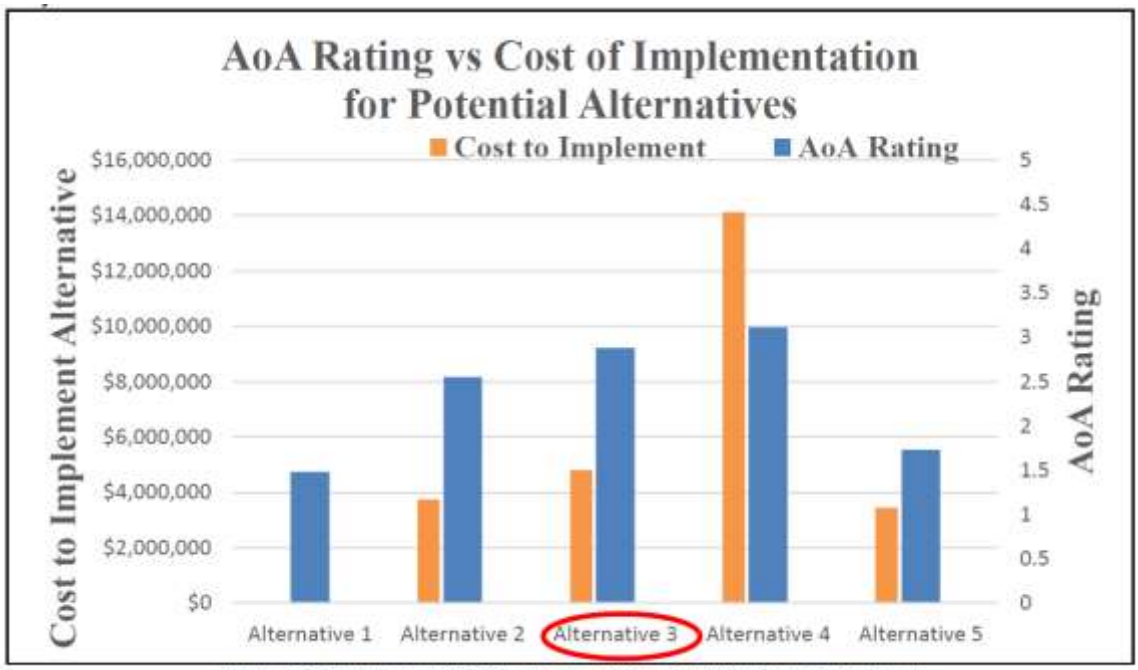
3. ACTION ITEMS CAPTURED AUGUST 22nd, 2017

FY18 New Starts (COL-VAF, KOF-DME, DME-GLA)

1. Schedule site visits with customers to each proposed project

WAPA is currently in the process of defining all required logistical and safety concerns that will be required in order to begin hosting Site Visits with the customers. More information on process and procedures will be shared moving forward. Additional visual aids, field photographs and aerial patrol flight video are being prepared and will be shared with the customers during future presentations.

2. Please update the graphs for each AOA which depict cost and alternative rating for each alternative to include maintenance cost.



This action item is currently in progress. As an initial step, a white paper has been drafted outlining key differences of between wood and steel transmission line structures. Part of this effort was an information gathering process to generate a tool which will allow DSW to perform long term maintenance estimate forecasting for multiple scenarios. The tool is currently being refined and has been used to generate a cost comparison for a hypothetical 40 mile line in the Wood vs. Steel white paper in the appendix of this report (see section 8).

Due to the short window of time between the previous meeting and the required submittal date for materials on the current meeting, a full maintenance accounting of the current projects up for vote was unable to be performed. Moving forward it is the goal of DSW to begin implementing maintenance costs as part of the Alternative Analysis so that the true, specific benefits can be shown in a quantifiable manner. WAPA is interested in further dialogue with customers regarding strategic zonal approaches to determining wood and steel requirements.

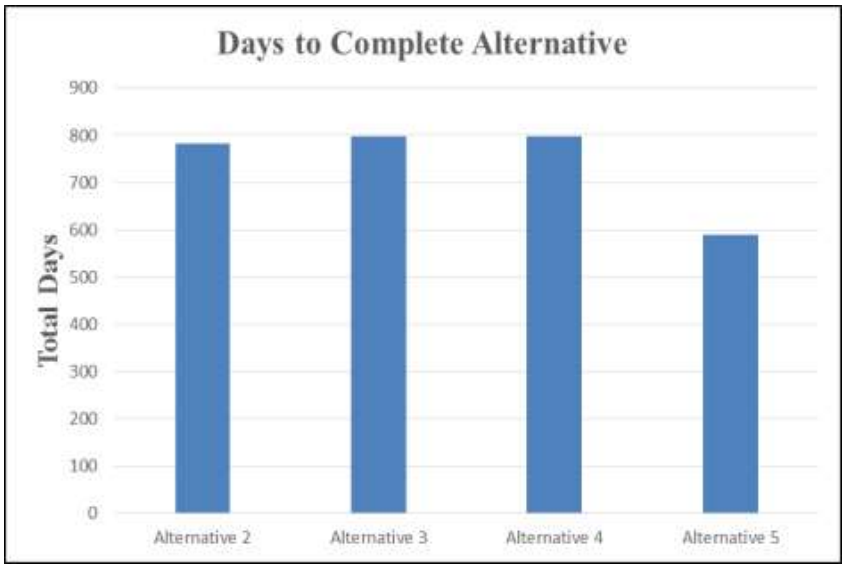
3. Provide Net Present Value on the AOA alternatives (lifetime costs)

A full accounting of Net Present Value (NPV) on all Alternatives is not currently set to be incorporated for future AOAs. This item was originally requested in conjunction with Action Item #2. The full process of performing NPV Lifetime Cost Cycle Analysis under DOE Guidelines found in "DOE Life Cycle Cost Handbook: Guidance for Life Cycle Cost Estimation and Analysis" and "Circular A-94 Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" is a level of effort that would require additional personnel and training.

Lifecycle Cost Estimation (LCCE) and Analysis (LCCA) is not something that WAPA has performed historically and our current fiscal mechanisms and software are not designed to easily transition into that style of cost estimation. The option is still being discussed and will be further explored moving forward but as of this date there are no tentative plans to begin incorporating NPV LCCAs or NPV LCCEs as part of the AOA studies process.

However, as indicated in Action Item 2, WAPA is in the process of incorporating lifetime maintenance costs as part of the AOA process for direct comparison to the Status Quo Option that is analyzed in every AOA study.

4. Provide a schedule slide to the PowerPoint that shows high level scheduling elements. Also note project duration vs. construction duration to avoid confusion.



Detailed schedules are provided in the hand out booklets for each proposed project showing total project duration and construction duration. The PowerPoint presentation will include proposed project milestone dates.

Coolidge-Valley Farms 115kV T-Line

5. Please provide details on the presentation comment, "Significant environmental sensitivities along the right-of-way". Why is the estimated environmental cost so high?

Significant environmental sensitivities occur along the COL-VAF transmission line; generally in the local region. Per the National Historic Preservation Act (NHPA), adverse effects on historic properties require the agency to develop a memorandum of agreement, which involves a very lengthy and complex consultation process usually resulting in the development of a treatment plan. There are significant historic properties (archaeological sites) within the right-of-way and the Coolidge substation and if the project design adversely effects historic properties, then development of the memorandum of agreement may result in archaeological excavations prior to the line rebuild.

The parties involved in the development of a memorandum of agreement under the NHPA are Federally Recognized Indian Tribes, the State Historic Preservation Office, land managing agencies, and other interested parties. The development of a memorandum of agreement often takes six months to a year. WAPA, the State, Land Managers, and Indian Tribes prefer to avoid adverse effects to historic properties through redesign of project work areas when possible due to a myriad of reasons including costs.

Coolidge Substation is also only 1,000-1,500 feet from the Casa Grande Ruins National Monument. Culturally sensitive sites can range anywhere between a few square feet to several acres. Hohokam sites often have subsurface human remains that increase the costs due to consultation, removal, and repatriation if necessary. These factors along with several unknown elements to the rebuild project design, prompted WAPA to develop an environmental cost estimate based upon the worst case scenario of working through Section 106 of NHPA.

Tucson Substation Rebuild

6. Explain the apparent $1.9M cost overrun.

The project experienced significant delays in the planning and development phase due to extensive engagement with the customer regarding the fate of the project. The construction contractor estimate was based on FY12 rates for labor and materials. However, when WAPA awarded in the construction contract in FY16, the construction costs from the contractor were higher than those estimated four years earlier. Additionally, the budget was impacted by WAPA's labor rates which were again based on FY12 budgets. WAPA labor rates from FY12 to FY16 had increased by approximately25%.

Gila Substation Rebuild

7. Explain the apparent $1.9M cost overrun

There is no cost overrun on this project. The total project budget remains at $18.9M as was reported in the August, 2016 Ten Year Plan Presentation.

Gila-Knob T-line Rebuild

8. Explain the apparent $1.9M cost overrun

There is no cost overrun on this project. The total project budget remains the same at $4.3M. Appropriations were utilized in lieu of pre-payments, reducing the Pre-payment funding by approximately $1.9M. The remaining budget is adequate and no additional funding is required.

Parker-Bouse/Headgate Rock

9. What is the CRIT ROW lease length?

The existing CRIT right-of-way is a perpetual agreement. Each right-of-way and easement agreement has its own unique terms based on geographic location and stakeholders. WAPA will continue to negotiate the best possible terms for right-of-way agreements.

10. What are the monetary impacts of the reported tribal issues?

At this date it is not possible to quantify the monetary impacts of the reported issues.

4. PRE-PAYMENT FUNDING INTRODUCTION

The Desert Southwest (DSW) Construction Program is reviewed by Western Area Power Administration's (WAPA) management team annually each June. After review, construction projects are submitted to Congress for funding.

Though some of these projects do receive federal funding, there is more work than the budget can absorb, and as a result, some projects do not receive a funding allocation. The un-funded projects are then set aside as "pre-payment projects".

WAPA and its customers needed to find an alternative approach to fund these projects. In FY2010, WAPA and its customers decided that the best way to address this on-going struggle with project funding was to create a method of pre-payment funding.

Pre-payment funding is comprised of customer input towards the financial requirements of each project. Proposed Pre-payment projects are presented by WAPA to our customers for review and consideration. A customer meeting is held annually in the fall providing a forum for WAPA and its customers to hold an open dialogue about the projects, answering any questions or concerns our customers may have.

An official vote on the proposed pre-payment is conducted in the fall, to ensure only projects that receive customer support for funding through this Pre-payment mechanism are pursued for construction.

Figure 1 Linemen work on a structure above Hoover Dam

5. FY17 COMPLETED PROJECTS

Project Name	Approved Pre-payment Budget	Pre-payment Cost to Date	Power System
Facility Ratings Mitigation Year 2	$8,525,000	$7,716,608	Parker-Davis & Intertie

5.1 Facility Ratings Mitigation Year 2

DSW's Year 2 North American Electric Reliability Corporation (NERC) facility assessment LiDAR surveyed 1,087 miles of transmission line, resulting in 240 potential violations. After field verification, 79 deficiencies were found on four different line segments. Due to the magnitude of resources required to repair deficiencies, DSW developed a specification and awarded a construction contract. Upon completion the project re-conductored approximately (32.6 miles) of 230-kV transmission line, installed (91) floating dead-ends, set (1) steel H-frame structure (GFE), (3) dead-end steel poles, and modified (11) steel lattice structures.

Figure 2 -Installation of double string insulator assemblies

Completion

- March, 2017

Project milestones

- Project currently in financial close-out
- Construction began November 2015
- Construction contract awarded February 2015
- Approved for Pre-payments in FY14

Line Segments Include: Gavilan Peak – Prescott, Prescott – Round Valley, Round Valley – Peacock, and Black Mesa – Topock (CAP)

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$3,225,000	$4,882,096	$8,107,096	$7,716,608	$390,488
Appropriations	$0	$417,904	$417,904	$417,904	$0
Trust Funds*	$0	$336,330	$336,330	$336,330	$0
TOTAL	**$3,225,000**	**$5,636,330**	**$8,861,330**	**$8,470,842**	**$390,488**

Executions to date include expenses, obligations, and commitments through 8/31/17

*Trust Funds provided by CAP via Revolving Maintenance Fund (RMF) account

6. ACTIVE CONSTRUCTION PROJECTS

Project Name	Power System
Parker-Headgate Rock & Parker-Bouse Rebuild	Parker-Davis Project
Mesa Substation Remediation	Parker-Davis Project
Gila-Knob 161kV Rebuild	Parker-Davis Project
Gila Substation 161kV Rebuild	Parker-Davis Project
Tucson Substation Rebuild	Parker-Davis Project
Crossman Peak Microwave Facility	Parker-Davis Project
Liberty Series Capacitor Bank	Intertie Project

6.1 Parker - Headgate Rock & Parker- Bouse 161-kV Rebuild

This transmission line re-build project consists of replacing the existing line from Parker to Headgate Rock (part of the Parker to Blythe system) and partially from Parker to Bouse (part of the Parker to Gila system). The rebuild will replace the existing wood pole structures with steel structures. A majority of these transmission line structures are showing signs of advanced degradation or have far surpassed the recommended life cycle.

A new 230-kV transmission system replacing the existing 161-kV circuits had been originally proposed, but considering load demand and system forecasting models in the service region, an in-kind 161-kV system was selected as the new construction design for this project. The line will be configured as a double circuit shortly after departing from the Parker Substation for the proposed alignment on either the California or Arizona side of the Colorado River. At a point not yet determined, the line will transition to single circuit transmission lines, connecting with the existing Parker-Bouse circuit, and southwest to Headgate Rock Substation pending final routing approval. Several options are now being considered with regard to routing and reuse of existing rights-of-way in an effort to control and reduce total cost to the project.

Figure 3- Right-of-way along the Parker-Bouse/Headgate Rock 161-kV lines

Following Government to Government Consultation, WAPA has received a new proposed and preferred Colorado River crossing location from the Colorado River Indian Tribe (CRIT). The new river crossing is further upstream than the original crossing locations and utilizes CRIT land. WAPA is continuing to coordinate with CRIT to advance the project while also investigating other new alignment options including the use of the existing alignment.

Project Milestones & Schedule Updates

- On July 18th and 19th, 2017, WAPA held public scoping meetings in Parker presenting the California/CRIT alignment and the existing alignment as possible options. The comment period is still open but a meeting summary is being prepared for review.
- Approved for Pre-payment funding in FY13

Projected Energization

- The project is subject to being placed on hold upon the completion of the design package until a final route is identified.

Project Updates

- WAPA is investigating all alignment options to reduce cost and project scope.
- WAPA met with CRIT to present the possible option to make use of the existing alignment.
- No GFE has been purchased to date.

Project Risk(s)

- Construction phase will be on hold until the total project budget is revalidated on an established design and routing plan

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENT	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$17,954,000	($718,906)	$17,235,094	$529,648	$16,705,447
Appropriations	$0	$718,906	$718,906	$718,906	$0
TOTAL	**$17,954,000**	**$0**	**$17,954,000**	**$1,248,554**	**$16,705,447**

Executions to date include expenses, obligations, and commitments through 8/31/17

6.2 Mesa Substation Remediation

The 9.22 acre Mesa substation site entered the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP) in 2012. The substation, which has long-since been decommissioned, is now located in a relatively populated residential area. As an initial step to comply with the VRP, WAPA contracted out a remedial work plan that was approved by ADEQ in summer 2014. The ultimate goal of the remediation effort was to return the site to residential standards in order for proper disposal of the property through the Government Services Administration (GSA).

The demolition and remediation was completed on July 21, 2017. All yard equipment, including support structures, buildings, concrete foundations, and underground oil piping that were left in place have now been fully removed from the site. Prior to entering the GSA process, the final remediation report will be reviewed by ADEQ and receive their approval. The amount realized for the property is undetermined and will depend upon the purchasing entity and provisions provided by GSA.

Figure 4 -Mesa Substation Remediation Results

Project Milestones & Schedule Updates

- Contractor completed on-site remediation work on July 21, 2017
- Environmental service contract awarded in 2016
- Approved for Pre-payment funding in FY14 and FY16

Projected Completion

- October 2017

Project Updates

- Contractor currently working on final remediation report.

Project Risk(s)

- None, all field activities complete.

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS 2016	FUNDING ADJUSTMENTS 2017	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$1,025,000	$2,510,000	($1,379,481)	$2,155,519	$622,861	$1,532,658
Appropriations	$0	$0	$1,379,481	$1,379,481	$1,379,481	$0
TOTAL	**$1,025,000**	**$2,510,000**	**$0**	**$3,535,000**	**$2,002,342**	**$1,532,658**

Executions to date include expenses, obligations, and commitments through 8/31/17

6.3 Gila-Knob 161-kV Rebuild

This project is located near the Arizona Public Service's (APS) North Gila Substation and includes the removal and disposal of existing ACSR conductor, overhead ground wire, and wood pole structures; installation of Government-furnished single and double-circuit steel structures and ACCR conductor; and providing ACSS conductor, optical ground wire (OPGW), and insulator assemblies as part of the 230-kV rebuild of the Gila-Knob 161-kV Transmission Line from structures 4/9 through 5/2. The project includes reattaching existing conductor and overhead ground wire (OGW), moving OGW at structure 4/8 and adding signs at structure 4/6. Two circuits of ACCR Martin conductors and one OPGW will be installed between structures 4/9L and 4/10L; and 4/9R and 4/10R under the APS 500-kV approach spans and shall be completed with the lines energized.

Figure 5 -Looking West from structure 4/9 to 5/2 on North side of Gila North substation

Project Milestones & Schedule Updates

- Project closeout date project for May 2018
- Completion outage date April 06, 2018
- Construction outage to begin January 2018
- Project award July 2017
- Project bid on June 2017
- Design Completed March 2017
- Approved for Pre-payment funding in FY14 and FY16

Projected Energization/Completion

- April 2018

Project Updates

- Project bids were within acceptable margins of the government estimate
- Selected contractor has begun the submittal process in order to begin ordering contractor furnished equipment
- All of the government furnished equipment has been acquired. Includes poles and Martin conductor

Project Risk(s)

- The contractor will be working under three energized APS 500 k-V lines from structures 4/9 to 4/10, both left and right alignments.

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS 2016	FUNDING ADJUSTMENTS 2017	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$2,000,000	$2,030,573	($1,302,415)	$2,728,158	$1,686,698	$1,041,460
Appropriations		$673,627	$1,302,415	$1,976,042	$1,976,042	$0
TOTAL	**$2,000,000**	**$2,704,200**	**$0**	**$4,704,200**	**$3,662,740**	**$1,041,460**

Executions to date include expenses, obligations, and commitments through 8/31/17

6.4 Gila Substation 161-kV Rebuild

The Gila Substation (161-kV, 69-kV, 34.5-kV and 4.16-kV) was originally constructed in 1949. Many components in the yards present safety risks to equipment and personnel. The lack of proper spacing and clearance distances is forcing WAPA to take outages to conduct routine maintenance work in its current configuration. The rebuild of the 161-kV yard to current standards will increase worker safety, lessen the possibility of equipment flashover and failure, while eliminating outages to conduct routine maintenance work.

The Gila Substation Rebuild Project was initiated in 2013 and since inception, numerous vital design changes were necessitated to ensure the reliability of present and future customer's needs. This project will completely rebuild the Gila 161-kV Substation and will operate at 230-kV standards in the future. The rebuild of the 161-kV substation will increase reliability and will also replace aged components that have become unreliable and a detriment to the WAPA System. In addition, a new control building will be constructed to accommodate all needs for the substation. The existing 161-kV yard will be demolished once the new 161-kV system is operational to create space for the future reconstruction of the 69-kV and 34.5-kV yards.

Figure 6 -Gila Substation

Project Milestones & Schedule Updates

- Construction start October 2018
- 100% Submitted to Procurement March 2018
- Prepare Outage Sequencing September 2017
- 75% Design package by September 2017
- Approved for Pre-payment funding in FY14 and FY16

Projected Energization

- July 2020

Project Updates

- Acquisition of required easements are ongoing
- Hydrology report completed and reviewed
- Categorical Exclusion was completed

Project Risk(s)

- Limited outage durations (Yuma Irrigation District restrictions and impacts to local traffic lighting)

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment	$12,000,000	$5,111,761	$17,111,761	$3,332,621	$13,779,140
Appropriations	$0	$1,882,739	$1,882,739	$1,882,739	$0
TOTAL	**$12,000,000**	**$6,994,500**	**$18,994,500**	**$5,215,360**	**$13,779,140**

Executions to date include expenses, obligations, and commitments through 8/31/17

6.5 Tucson Substation Rebuild

Originally constructed in 1951, the Tucson Substation facilities and equipment were found to be well beyond expected service life. Due to the risk posed by the age and condition of the yard, WAPA's customers voted to approve funding that would allow for a new facility to be constructed adjacent to the existing yard. The principal components of the project include: the demolition of an existing warehouse and pump house (including associated site work), construction of a new three-breaker ring bus with two 115-kV bays spaced to 230-kV standards, a new control building, and three (3) new approach spans.

Construction on the project began in September 2016 and is nearing completion. The communication and protection commissioning phases are underway. At this point of the project there are no major changes and all outage dates remain static. The project remains within budget boundaries and no additional funding is expected to meet a mid-January 2018 energization date.

Figure 7 -Tucson Substation Compacting Gravel Surface

Figure 8 -Tucson Substation Control Board Installation

Project Milestones

- Full commissioning to be completed no later than October 2017
- All communication equipment installed no later than September 2017
- Outages on existing Del Bac, Saguaro, and Oracle lines to take place between early October and early November 2017 to facilitate cut over and energization of new facilities.
- Approved for Pre-payment funding in FY15

Projected Energization

- January 2018

Project Updates

- Contract modifications have stayed well within contingency budget
- Fully functional control building expected by late August 2017
- Temporary radio link agreement under review with WAPA contracts and TEP legal

Project Risk(s)

- Project currently on task with no major risks identified

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS 2017	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$7,000,000	($42,646)	$6,957,354	$6,733,367	$223,987
Appropriations	$1,552,116	$492,697	$2,044,813	$2,044,813	$0
TOTAL	**$8,552,116**	**$450,051**	**$9,002,167**	**$8,778,180**	**$223,987**

Executions to date include expenses, obligations, and commitments through 8/31/17

6.6 Crossman Peak Microwave Facility

The scope of this project includes the construction of a WAPA owned microwave communication site on Crossman Peak, adjacent to an existing non-WAPA communication site. Crossman Peak is located east of Lake Havasu City. The new site will support the primary microwave communications between WAPA's existing Christmas Tree Pass and Metal Mountain communication sites. This project includes land acquisition, equipment shelter, transmission tower, backup generator with fuel tanks, a distribution power line for primary power, and an access easement.

Project Milestones & Schedule Updates

- Approved for Pre-payment funding in FY16
- Survey/Legal description and site layout has been completed
- Contract with UniSource Energy/Tucson Electric Power for the distribution line is executed
- Environmental Assessment projected completion by October 2017

Figure 9 -Satellite View of Crossman Peak Future Location

Projected Energization

- December 2018 (pending BLM/NEPA scheduling)

Project Updates

- WAPA headquarters is working with BLM lands to acquire right-of-way and access to site
- WAPA headquarters Design Team has started the design of the 12'x24' communication building
- New project schedule to coordinate with BLM/NEPA schedule in FY17/18

Project Risk(s)

- Project currently on track with no major risks identified

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$4,525,000	$0	$4,525,000	$942,456	$3,582,544
Appropriations	$0	$0	$0	$0	$0
TOTAL	**$4,525,000**	**$0**	**$4,525,000**	**$942,456**	**$3,582,544**

Executions to date include expenses, obligations, and commitments through 8/31/17

6.7 Liberty Series Capacitor Bank

The Liberty 345-kV Cap Bank replacement project is currently in the design phase. The existing capacitor bank (PU1A) was made by Westinghouse and is rated at 345-kV, 110-MVar, and 850 Amps (508 MVA). This station equipment was commissioned in 1969 and has degraded significantly due to its age. Capacitor Bank award will be made in August 2017 and requires a 1 year lead time for delivery. Appropriated funds will be delegated to DSW in which WAPA will utilize a portion for the purchase of the capacitor bank.

Figure 10 -Liberty Substation New Capacitor Bank Line Diagram

Project Milestones & Schedule Updates

- Projected completion of close-out December 2019
- Projected completion of construction June 2019
- Projected to have 95% Construction drawings and specifications by June 2018
- Outage coordination currently being addressed
- Approved for Pre-payment funding in FY16

Projected Energization

- July 2019

Project Updates

- Appropriated funding to be made available for DSW to purchase the capacitor bank
- Capacitor bank to be purchased in August 2017 (1 year lead time for delivery)

Project Risk(s)

- Early load request by Griffith, outage window reduced to October – March (previously May)

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$10,372,000	($3,776,524)	$6,595,476	$373,249	$6,222,227
Appropriations	$0	$3,776,524	$3,776,524	$3,776,524	$0
TOTAL	**$10,372,000**	**$0**	**$10,372,000**	**$4,149,773**	**$6,222,227**

Executions to date include expenses, obligations, and commitments through 8/31/17

7. FY18 PROPOSED PRE-PAYMENT PROJECTS

7.1 Seed Funding Summary

Background

New in 2016 was the implementation of a Seed Funding pilot program. The program was initiated in response to the inherent variability of pre-design construction estimates (preliminary estimates). WAPA's 10-Year Plan Capital Program prioritizes projects and initiates Analysis of Alternatives (AOA) Studies on those projects. AOA studies are performed on the queue of potential construction starts within the one-to-four year window.

The AOA studies provide a Rough Order Magnitude (ROM) project cost estimate based on preliminary design parameters. The limitations of the AOA estimate exist in the variables of the design and its impacts on lands/realty, environmental, outage coordination, procurement, and a host of other cost drivers. Additional estimating constraints exist with projects that span a lengthy period of time which in turn impose complicated outage restrictions, changing market factors, and other cost escalation factors outside the control of WAPA.

WAPA's Response

Using the ROM estimate established in the AOA studies, WAPA project management team engages in progressive elaboration allowing the project estimate to evolve as details of the project design are identified. This process allows continuously improving and detailing the project plan as more detailed and specific information and actual cost become evident. The Seed Funding mechanism allows for the partial funding for the initial planning, development, and design of a required project. For a relatively small upfront investment, WAPA and its stakeholders can further investigate potential hidden cost drivers while pursuing a partial design package.

Process

Using developmental, pre-design information provided in the AOA study, WAPA determines the amount of Seed funding required to develop ~50% of the project design package. The project design package consists of the construction specifications, drawings, and associated procurement documents. The respective Seed Budget supports federal and contract labor required to meet this pre-construction milestone. The identified Seed budget is then compared against available Construction Appropriated funds. If appropriated funds are available, then WAPA enters a phase gate decision milestone, in conjunction with customers, on whether or not to move from the AOA Phase and into the Pre-construction Phase.

Funding Through Completion

Once a project has successfully been funded through the Seed Funding phase, it is then subject to review by WAPA and its customer's for full funding consideration. In the event additional appropriations cannot be secured to fully fund the remainder of the project (beyond the ~50% design package) through closeout, then Pre-payment funds will be requested from the customers. In the event Pre-payment funds are required, the customers would be provided a definitive project cost estimate based on a ~50% design package and a Pre-payment vote would be held.

7.2 FY18 Proposed Funding Plan

WAPA's proposed pre-payment funding plan for FY18 is estimated at $13,230,860. The table below summarizes the FY18 Pre-payment funding request and Appropriated Seed Funding for each project.

2018 PROPOSED PROJECT FUNDING PLAN				
PROJECT	PRE-DESIGN COST ESTIMATE	APPROPRIATED SEED FUNDS PRIOR YEAR(S)	APPROPRIATED SEED FUNDS 2018	PRE-PAYMENT FUNDS REQUESTED 2018
Coolidge-Valley Farms Rebuild	$5,930,349	$0	$0	$5,930,349
Gila-Wellton Mohawk I-8 Crossing Rebuild	$7,520,654	*$220,143	$0	$7,300,511
Kofa-Dome Tap Rebuild	$5,360,022	$0	~$500,000	$0
Dome Tap-Gila Rebuild	$7,401,431	$0	~$500,000	$0
		TOTAL 2018 FUNDING REQUESTED	**$1,000,000**	**$13,230,860**

**Seed funding is an allowance only, not a budget or guarantee of total fund to be expensed.*

PRE-PAYMENT FUNDING SOURCES AND USES 2018				
FY	ACTION	PROJECT NAME	SOURCES	USES
12	Reprogram	ED2-ED4 115-kV Rebuild	$ 133,640	
13	Reprogram	Parker-Headgate Rock	$ 384,730	
14	Reprogram	Black Point-Mesa T-line Reroute	$ 17,688	
14/16	Reprogram	Mesa Substation Remediation	$ 1,379,481	
14	Reprogram	Gila Substation 161-kV Rebuild	$ 111,826	
18	Reprogram	Liberty Series Capacitor Bank	$ 3,776,524	
18	Reprogram	Facility Ratings Mitigation Year 2	$ 419,942	
18	Reprogram	Gila-Knob 161-kV Rebuild	$ 1,302,415	
18	Reprogram	Gila-Wellton Mohawk 161-kV I-8 Crossing		$ 7,300,511
18	Reprogram	Coolidge-Valley Farms 115-kV Rebuild		$ 5,930,349
		New Pre-payment Funding Needed	**$ 5,704,614**	
		FY18 Pre-payment	**$13,230,860**	**$13,230,860**

7.3 Gila-Wellton Mohawk 161-kV Rebuild

The Gila-Wellton Mohawk (GLA-WML) 161-kV transmission line rebuild project was initiated at the beginning of FY17 as part of the Seed Funding Pilot Program. WAPA kicked off the project and began design work to rebuild 2.8 miles of the original wood structures along GLA-WML. The line was erected in 1956 and the structures are well beyond the recommended lifespan and rehabilitation efforts are no longer viable. Many of the poles display visual symptoms of advanced external shell rot, along with weathering and large cracks.

During 2017, a majority of the GLA-WML structures were replaced by WAPA maintenance personnel; however, the stretch of transmission line that traverses rugged, mountainous terrain was not replaced. This was due in part because many of the structures have no existing access roads and those that do require significant roadwork for vehicular travel. In conjunction with the rebuild effort, WAPA will reestablish access roads where economically feasible to reduce the potential for helicopter only access. In addition, overhead optical ground wire will be installed between GLA-WML.

Figure 11 -Gila-Wellton Mohawk Structures 6/7 thru 9/8

Project Milestones & Schedule Updates

- Appropriated Seed Funding approved in FY16
- Phase I (~50% partial design package) Notice to Proceed February 2017
- ~50% Design Package 08/16/2017
- Phase II (Pending Customer Pre-payment Funding Approval) October 5, 2017
- **100% Design January 2018*
- **Construction Start October 2018*
- **Construction Complete March 2019*

**Projected dates contingent on approval of Phases-II, fully funded Customer Pre-payments*

Projected Energization/Completion

- January 2019

Project Updates

- ROW and other lands requirements identified
- Environmental planning in progress
- Geotechnical investigation planned for August 2017
- The ~50% design package will be complete by August 22nd
- Updated project cost estimate will be presented in advance of the October 5th customer meeting

Project Risk(s)

- Due to the terrain, the use of micropiles is being considered for structures in some of the least accessible locations. Micropiles are widely used; however, the technology is new to WAPA.
- There is a risk associated with the planned vs. actual costs associated with the design and construction of the Micropiles.
- The level of environmental compliance associated with the Bureau of Land Management has not yet been determined. There is a risk to the schedule if a full environmental assessment is required.

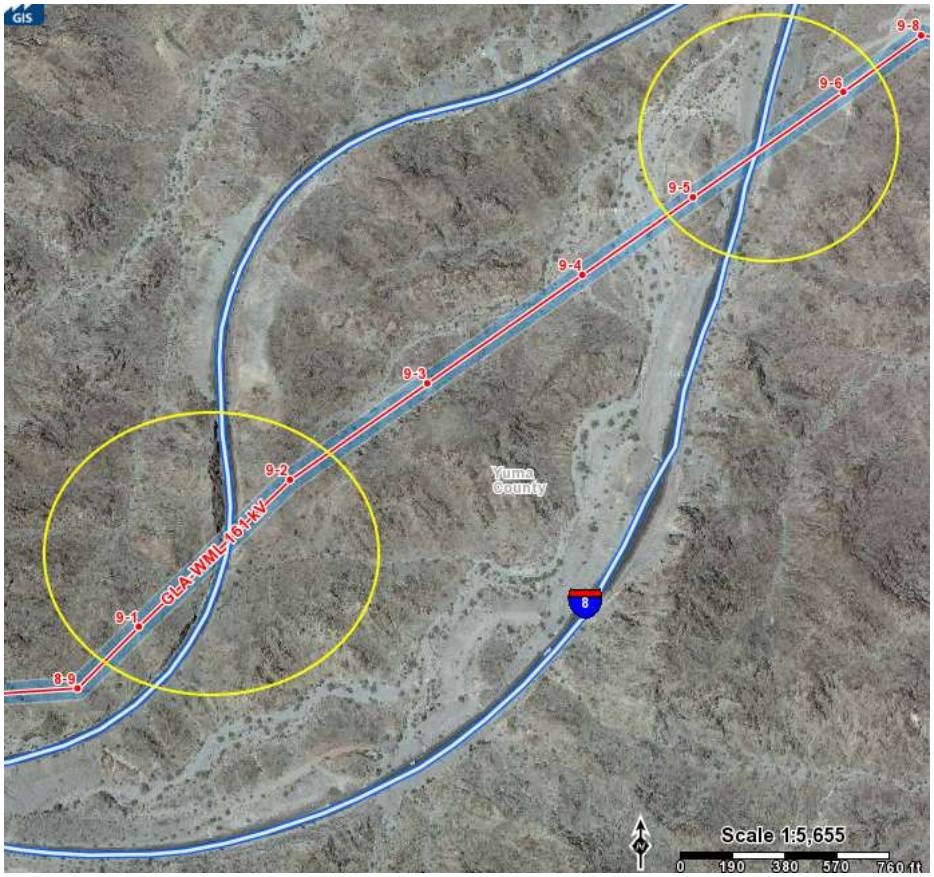


Figure 12 Locations where the GLA – WML crosses the interstate

PHASE I – ~50% DESIGN PACKAGE					
FUND TYPE	**SEED FUNDING ALLOWANCE**	**SUPPLEMENTAL FUNDING**	**TOTAL**	**EXECUTIONS TO DATE**	**REMAINING FUNDS**
Pre-payment (PCN)	$0	$ 0	$0	$0	$0
Appropriations	$500,000	$ 0	$500,000	$220,143	$279,857
TOTAL	**$500,000**	$0	**$500,000**	**$220,143**	**$279,857**

Executions to date include expenses, obligations, and commitments through 8/31/17

CONCEPTUAL PROJECT FUNDING PLAN		
PHASE	**COST ESTIMATE**	**FUND TYPE**
1- Initiation, Planning, & ~50% Design Package	$220,143	Appropriations (WCF)
2- Full Design, Construction, & Closeout	$7,300,511	Pre-payment (PCN)
TOTAL PROJECT BUDGET	**$7,520,654**	

7.4 Coolidge-Valley Farms Transmission Line AOA Breakdown

Project Description

The Coolidge to Valley Farms (COL-VAF) 115-kV transmission line has been identified as a concern in WAPA's BES (Bulk Electric System). The line was originally commissioned in 1943 and runs through flat desert terrain, comprised of farm land and rural housing. The structures are mainly wood H-frame structures strung with a 4/0 copper conductor and two overhead ground wires. The COL-VAF line makes up a 6.1-mile segment of the Coolidge to Oracle (COL-ORA) 45-mile transmission line. This 115-kV system originates in central Arizona and travels to the southeast region of Arizona feeding Bureau of Indian Affairs and numerous regional utility companies in the Tucson region.

Figure 13: Split Pole on Coolidge-Valley Farm Transmission Line

Project Justification

The COL-VAF line is at capacity relative to commitments and alternate paths may be required to provide additional service to the southern Arizona's 115-kV system maintaining status quo. The current capacity of the line is approximately 88MVA and WAPA planning deems that a minimum capacity of 180MVA is required for reliability requirements.

The functional requirements that must be met by all alternatives include the mitigation of existing and imminent NESC clearance violations and increased line capacity to approximately 180MVA (not to exceed 230MVA). Additional goals include the improvement of reliability and safety while reducing operating and maintenance costs associated with excessive resource allocations.

If the COL-VAF 115-kV line is not upgraded in time other temporary mitigation measures will be necessitated. NERC TPL-001-4 Performance Requirements do not allow facility emergency ratings to be exceeded, as a result pre-mitigation actions must be taken to prepare for the possibility that any of the planning event contingencies occur. This could include limiting the amount of allowable load growth in the Valley Farms and Oracle areas. In addition, it could also require actions from the Operations group such as but not limited to load shedding, generation curtailment, and system reconfiguration.

The probability to overload the COL-VAF line under presented contingencies is based on load and generation in the area. Although it is possible to overload the line today under unusual generation patterns with high load, it is more likely that WAPA would begin to see more consistent issues in the summer of 2020. This is based on historical load data, typical load growth for the Valley Farms and Oracle areas, and historical generation use north and south of the COL-VAF line.

This AOA identifies various performance gaps/deficiencies associated with this line and four possible alternatives to addressing these issues.

- NESC clearance violations have been identified and need to be corrected
- Noted deterioration and unsafe structures are significant
- Existing condition of access roads and rights-of-way is poor and limits access
- Additional communication requirements have been identified

NESC Clearance Violations:
Two phase-to-ground clearance violations exist which compromise public health and safety

Line Condition:
Limited at a rating of 88 MVA and in commission since 1943

Access Roads and ROW:
Will require remedial action prior to mobilization

Communication Requirements:
The installation of OPGW provides an alternate and physically independent path for protection, control and communication. Currently microwave provides the only communication path and the addition of an OPGW will allow for the future communication bandwidth needs to be met. Those needs include increased security such as live feed video cameras and IT networks at substations; the addition of these systems will exceed the current communications bandwidth provided by microwave technology.

Proposed Alternative Detailed Breakdown
The following pages provide a detailed breakdown of the preferred alternative, along with a high level view of the rating it received during the study. Each Criteria (Compliance, Reliability and Economical) is broken down into several subgroups and scored as a weighted aggregate.

Alternative 3 (Preferred Alternative) – Upgrade Conductor (180-230MVA), replace all structures with LD steel H-frames, 115-kV and OPGW

Pros:

- Entire COL-VAF transmission line segment would be new and built to current industry standards
- Light duty steel outperforms wood in multiple facets
- Reduces maintenance required over the life of the transmission line
- Significantly improves reliability of WAPA's BES

Cons:

- Light duty steel structures would have a higher up front cost compared to wood pole installation.
- Project scope increases while accomplishing same goals as Alternative 2
- All 19 structures replaced in 2009 would be removed
- Significant environmental sensitivities in the area of the transmission line

Risks:

- Does not address overloading to SGR-ORA or VAF voltage issues with COL-VAF outage

Preferred Alternative - Upgrade conductor, LD Steel H-frame, 115-kV with OPGW

Compliance Category		Score (0-4)
Does This Alternative Meet The Mission Needs?		4
Does This Alternative Meet All Regulatory Requirements?		4
How Much (negative) Environmental Impact Does This Alternative Generate?		2
How Much (negative) Land Impact Does This Alternative Generate?		3
	Average	3.25
	Section Weight	40%
	Weighted Compliance Score	1.3

Reliability Category		Score (0-4)
How Much Risk Does This Alternative Generate?		3
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?		3
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?		4
What Impact Would This Alternative Have On The BES If Implemented?		3
	Average	3.25
	Section Weight	35%
	Weighted Reliability Score	1.14

Economic Category		Score (0-4)
How Long Would Construction Take VS Other Alternatives?		2
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?		3
What Level Of Outages Are Required For This Alternative?		3
How Does This Alternative Affect Load Growth or Power Flow In The Area?		3
	Average	2.75
	Section Weight	25%
	Weighted Economic Score	0.6875

Alternative 3 Final Score	3.13

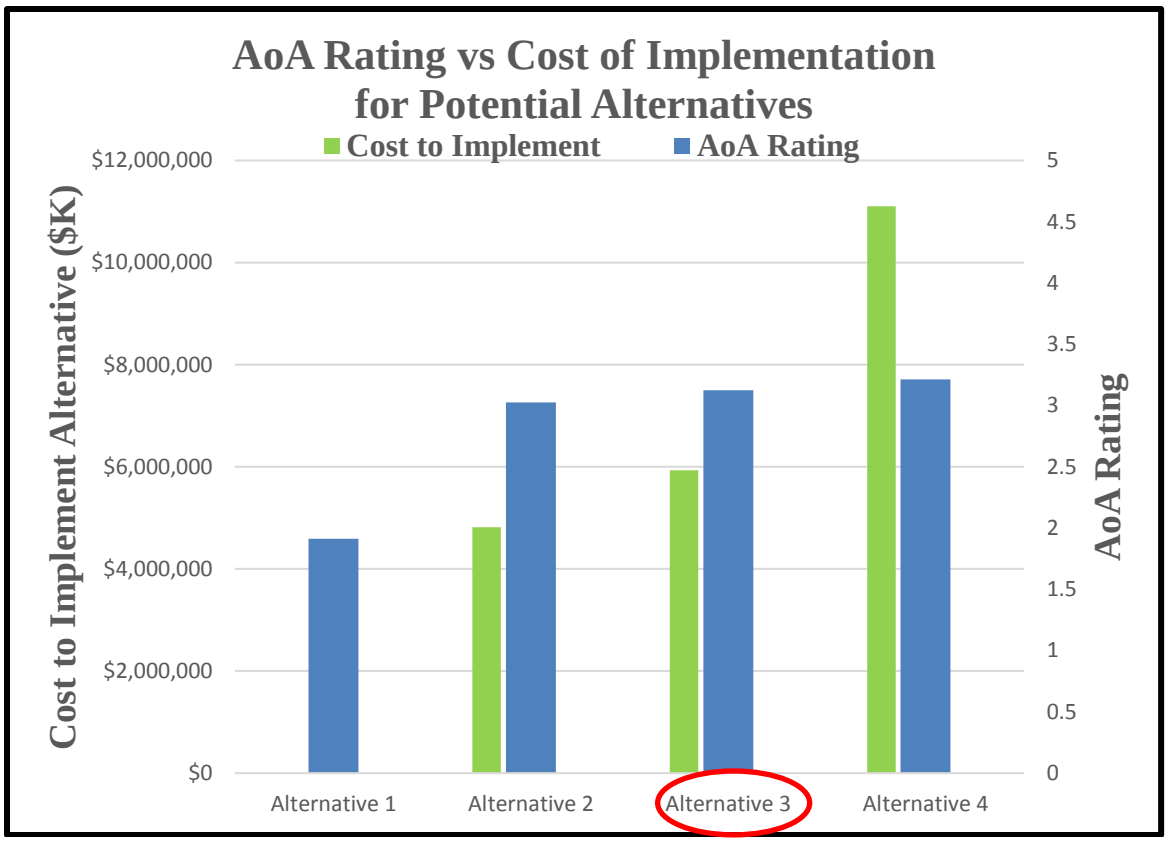


Figure 14- Breakdown of AOA for COL-VAF

Alternative Schedule Comparison

Below is a breakdown of estimated differences in construction scheduled for each respective alternative.

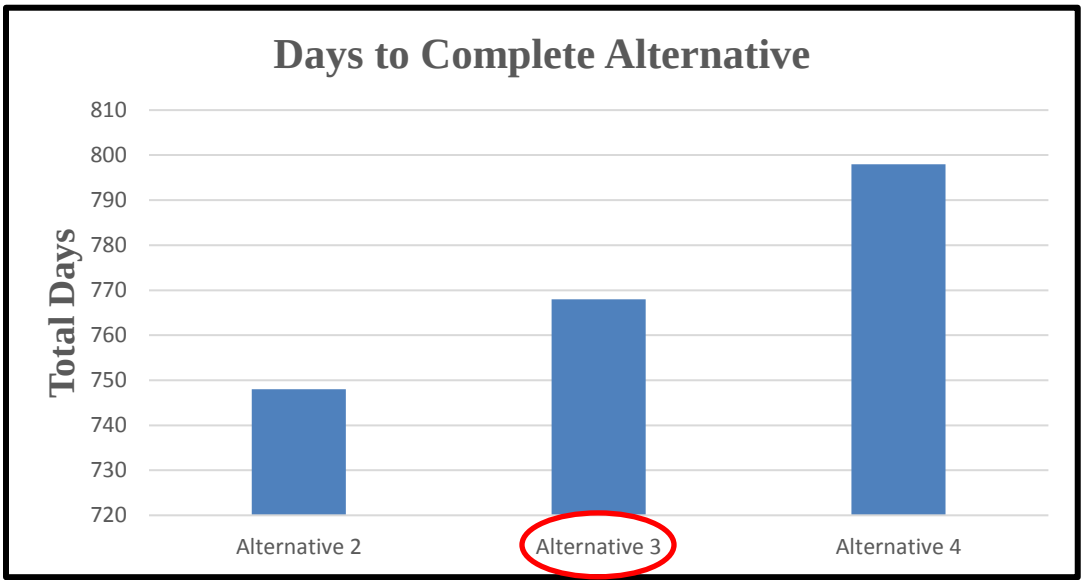


Figure 15- Days to Complete Comparison between Alternatives

The following information is provided to support justifications of the recommended alternative.

Alternative 1, status quo will only manifest future issues for WAPA's BES. Escalating O&M costs are expected with this alternative and with no additional available transmission capacity offsetting these costs would be unfeasible. This alternative fails to meet mission needs and is apparent with the metrics utilized to rank the alternatives without bias.

Alternative 2, ranks very close to Alternative 3 because both accomplish the same mission needs. The offset for choosing Alternative 3 over this Alternative relates to future growth and longevity of the line. Alternative 2 replaces failing structures in-kind with wood H-frames, wood structures have historically demonstrated a lifespan equal to 50% steel structures. Although Alternative 2 is more economical initially, the long term gain offsets the reduced construction cost.

Alternative 3 is the preferred Alternative since it will accomplish all mission needs. Though a higher project cost than Alternative 2, Alternative 3 provides the infrastructure necessary for future growth of loading and contractual power transmission requirements.

Alternative 4 would resolve all issues including voltage issues at Valley Farms as well as overload events at SGR-ORA with an outage on the COL-VAF line. This Alternative would minimize the criticality of the VAF-ORA (Valley Farms to Oracle) 115-kV line and the need to rebuild the VAF-ORA line in the future. However, COL-VAF is a 6.1-mile transmission line and Alternative 4 would require a minimum budget of approximately $11.2 million. Due to project costs versus the benefits to pertinent stakeholders, this Alternative (highest score) was not selected as the recommended Alternative.

Project Pre-design Estimate for Preferred Alternative (Conceptual)

Preferred Alternative #3 Conceptual Estimate	
Rebuild COL-VAF With Light Duty H-Frame Structures	
	TOTAL
Administrative	$1,190,328
Design	$167,199
Environmental	$484,824
Land & Land Rights	$125,466
Government Furnished Equipment**	$1,349,024
Construction	$1,527,094
Commissioning Activity	$98,021
Subtotal	$4,941,956
Contingency (20%)	$988,393
Total Project Budget	**$5,930,349**

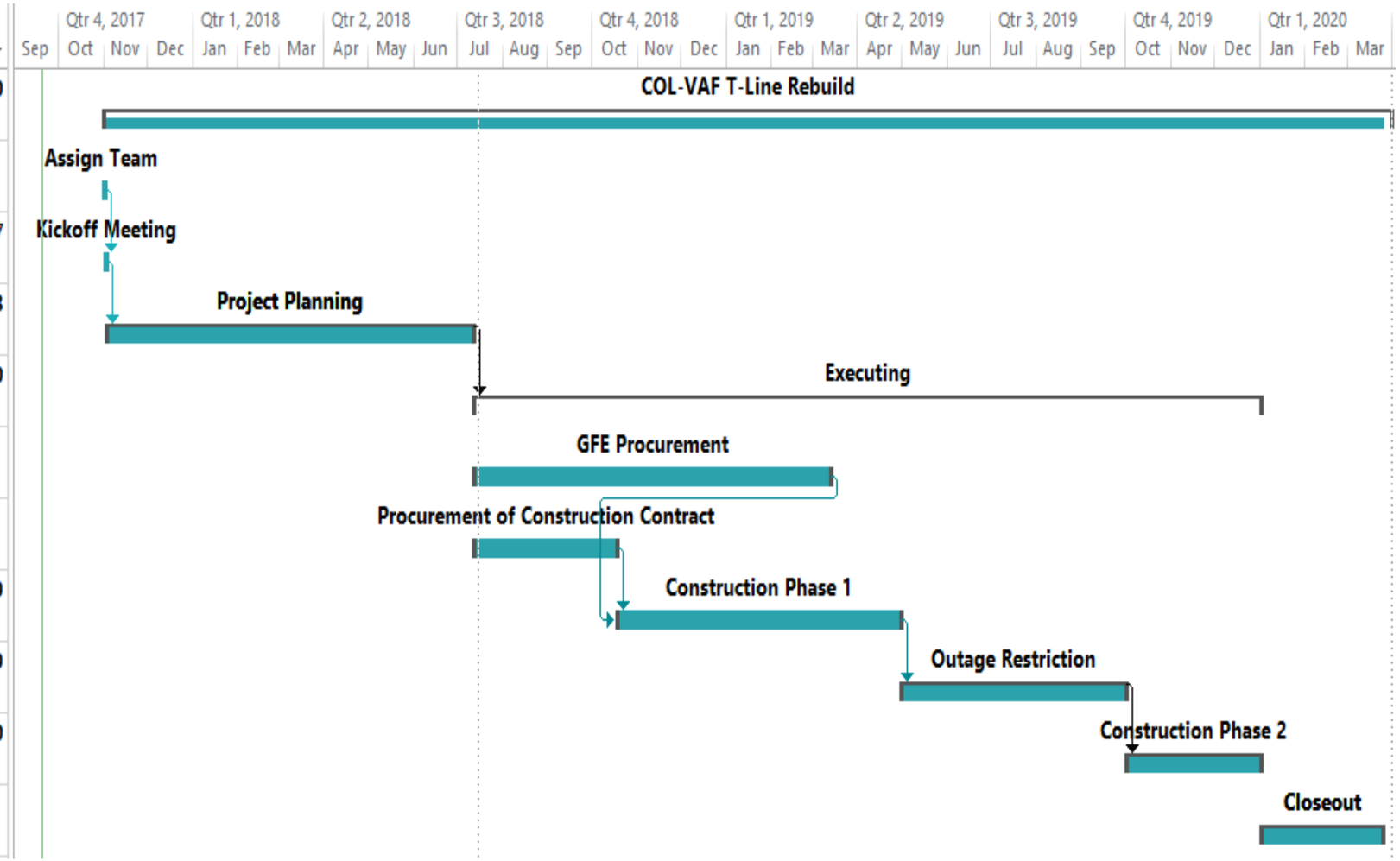
Project Assumptions and Constraints

- Southline Project will not remedy any of the issues present on the COL-VAF line
- All estimates are preliminary with a ± 20% accuracy

Project Predesign Conceptual Schedule for Preferred Alternative (Alternative 3 Conceptual)
Projected Start: Fiscal Year Q4, 2017

Projected In-service Date: Fiscal Year Q1, 2020

Task Name	Duratio	Start	Finish
COL-VAF T-Line Rebuild	630 days	Wed 11/1/17	Tue 3/31/20
Assign Team	1 day	Wed 11/1/17	Wed 11/1/17
Kickoff Meeting	1 day	Thu 11/2/17	Thu 11/2/17
Project Planning	180 days	Fri 11/3/17	Thu 7/12/18
Executing	384 days	Fri 7/13/18	Wed 1/1/20
GFE Procurement	174 days	Fri 7/13/18	Wed 3/13/19
Procurement of Construction Contract	70 days	Fri 7/13/18	Thu 10/18/18
Construction Phase 1	138 days	Fri 10/19/18	Tue 4/30/19
Outage Restriction	110 days	Wed 5/1/19	Tue 10/1/19
Construction Phase 2	66 days	Wed 10/2/19	Wed 1/1/20
Closeout	60 days	Thu 1/2/20	Wed 3/25/20



Western Area Power Administration
Geographic Information System

July 27, 2017 COL-VAF 115kV G5200 Maintenance Report

Maintenance Performed in 2017

	Anchor	Brace	Crossarm	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	TOTALS
Adjusted/Modified												0
Repaired												0
Replaced												0
TOTALS	0	0	0	0	0	0	0	0	0	0	0	0

Note: Totals include RADDS projects and maintenance items.

2017 Inspection Progress

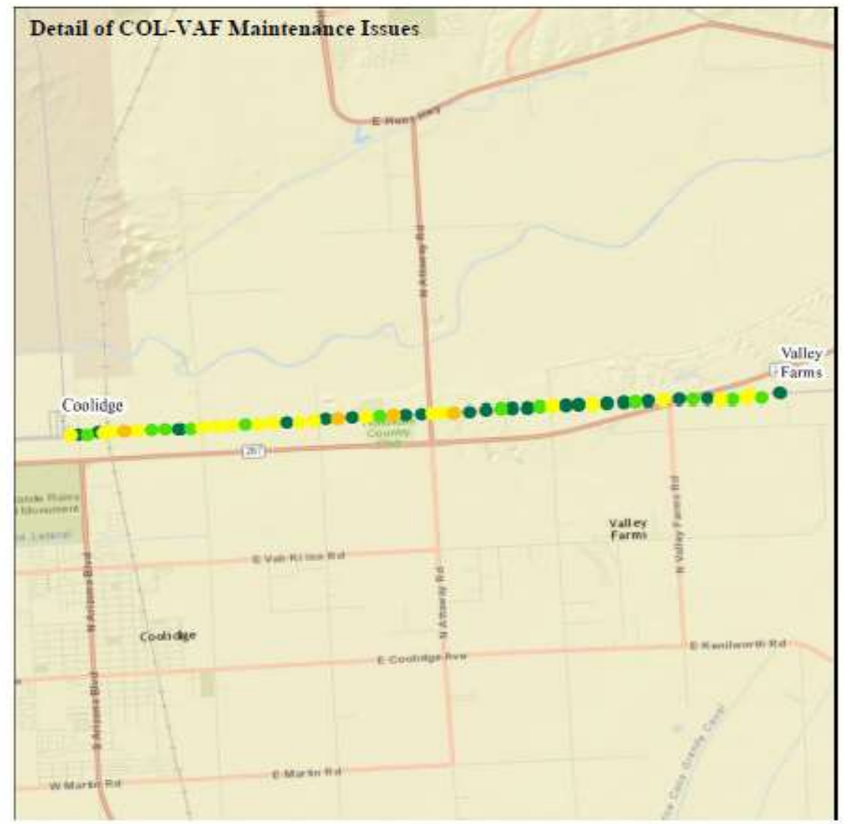
	Structures
Inspected	56
Uninspected	1
Total	57
98%	

Outstanding Maintenance in 2017

Row Labels	C	D	E	Grand Total
Anchor	1			1
Brace		1		1
Crossarm	3			3
Guy	1			1
Insulator	2			2
Phase/Conductor		1		1
Pole	15	3		18
Pole Hardware	3			3
Signs				0
Static Wire				0
Vibration Damper				0
Grand Total	25	5	0	30

Maintenance Priority Codes

A	Good or like new. No action required.
B	Minor defect. Monitor degradation.
C	Moderate defect. Rehabilitation or replacement recommended as scheduled maintenance.
D	Serious defect. Repair, reinforce, or replace as soon as possible.
E	Risk to public safety or system reliability.



7.5 Kofa-Dome Tap 161-kV Transmission Line AOA Breakdown

Project Description

The Kofa to Dome Tap (KOF-DME) is a single-circuit, 7.3-mile, 161-kV transmission line segment along the Parker-Gila 161-kV line built in 1943. The KOF-DME Transmission Line is located in western Arizona running south from the Kofa substation to the Dome Tap substation. Kofa substation is located approximately 16 miles northeast from the city of Yuma, while Dome Tap is located 7.3 miles southwest of Kofa Substation.

The line was originally constructed with 300 kcmil hollow core copper conductors. Most of the wood H-Frame structures have been replaced with light duty steel H-Frame structures, and only seven wood structures remain in service.

Figure 16 Kofa-Dome Tap existing wood pole structure

Project Justification

This AOA identifies various performance gaps/deficiencies associated with this line and five possible alternatives to addressing these issues.

Experienced and/or Observed Issues:

- NERC violations have been identified and need to be corrected
- Safety concerns are significant due to high level of observed deterioration
- Existing condition of access roads and rights-of-way is poor and limits adequate access
- Additional communication requirements have been identified

NERC Violations:
NERC requires all transmission line owners/operators to perform a Facility Rating Analysis of all transmission lines over 100-kV in order to determine the as-built condition and de-rate the line to that condition, or to mitigate the condition to achieve the design rating. There are eight cases of phase-to-ground clearances not meeting the minimum clearance required by the National Electrical Safety Code (NESC) and NERC.

Line Conditions:
There were five structures identified by WAPA's maintenance group as needing replacement and even more replacement recommendations are expected when detailed ground inspection is completed.

Figure 17 Kofa Dome Tap deteriorated wood pole

Access Roads and ROW:
According to maintenance field inspection reports, there are numerous cases of access roads and right-of-way paths requiring improvement to facilitate construction and maintenance activities. In some cases, new access roads will need to be constructed. A lack of prompt access to the transmission line presents reliability, safety, and cost risks.

Communications Requirements:
The installation of OPGW provides an alternate and physically independent path for protection, control and communication. Currently microwave provides the only communication path and the addition of an OPGW will allow for the future communication bandwidth needs to be met. Those needs include increased security such as live feed video cameras and IT networks at substations; the addition of these systems will exceed the current communications bandwidth provided by microwave.

Proposed Alternative Detailed Breakdown
The following pages provide a detailed breakdown of the preferred alternative, along with a high level view of the rating it received during the study. Each Criteria (Compliance, Reliability and Economical) is broken down into several subgroups and scored as a weighted aggregate.

Alternative #3 (Preferred Alternative)- Rebuild With Light Duty Steel H-Frame Structures
Under Alternative 3, WAPA will replace 7.3 miles of three 300 kcmil hollow core copper conductors with three 336.4 kcmil ACSS conductors, replace one steel OGW with OPGW, and install light duty steel H-frame structures to replace the seven wood structures left in the line segment. Install new light duty steel H-frame steel structures as needed to correct clearance issues not corrected by stringing new ACSS conductor. Access roads will be improved as needed.

Pros
- NERC violations would be corrected.
- A redundant communications path with the needed additional bandwidth will be provided.
- Replacing all wood structures would reduce maintenance inspection frequency from every year to once every three years.
- Cost of construction contract could be reduced by approximately $168,500 due to scrap value of removed copper conductor.

Cons
- 161-kV transmission line load capability would limit the potential for future load growth.
- Project cost is the second highest of the five alternatives.

Risks
- Outage coordination will be required among multiple entities. In addition to seasonal constraints, competing projects across the system may limit construction outage windows.
- Potential claims by landowners for damage to property.
- Future conversion to 230-kV system would require a complete rebuild of the transmission line.

Alternative 3 - Rebuild KOF-DME With Light Duty Steel H-Frame Structures

Compliance Category	Score (0-4)
Does This Alternative Meet The Mission Needs?	4
Does This Alternative Meet All Regulatory Requirements?	4
How Much (negative) Environmental Impact Does This Alternative Generate?	2
How Much (negative) Land Impact Does This Alternative Generate?	2
Average	3
Section Weight	40%
Weighted Compliance Score	1.2

Reliability Category	Score (0-4)
How Much Risk Does This Alternative Generate?	3
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?	3
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?	3
What Impact Would This Alternative Have On The BET System If Implemented?	3
Average	3
Section Weight	35%
Weighted Reliability Score	1.05

Economic Category	Score (0-4)
How Long Would Construction Take VS Other Alternatives?	2
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?	3
What Level Of Outages Are Required For This Alternative?	2
How Does This Alternative Affect Load Growth or Power Flow In The Area?	3
Average	2.5
Section Weight	25%
Weighted Economic Score	0.625

Alternative 3 Final Score	2.88

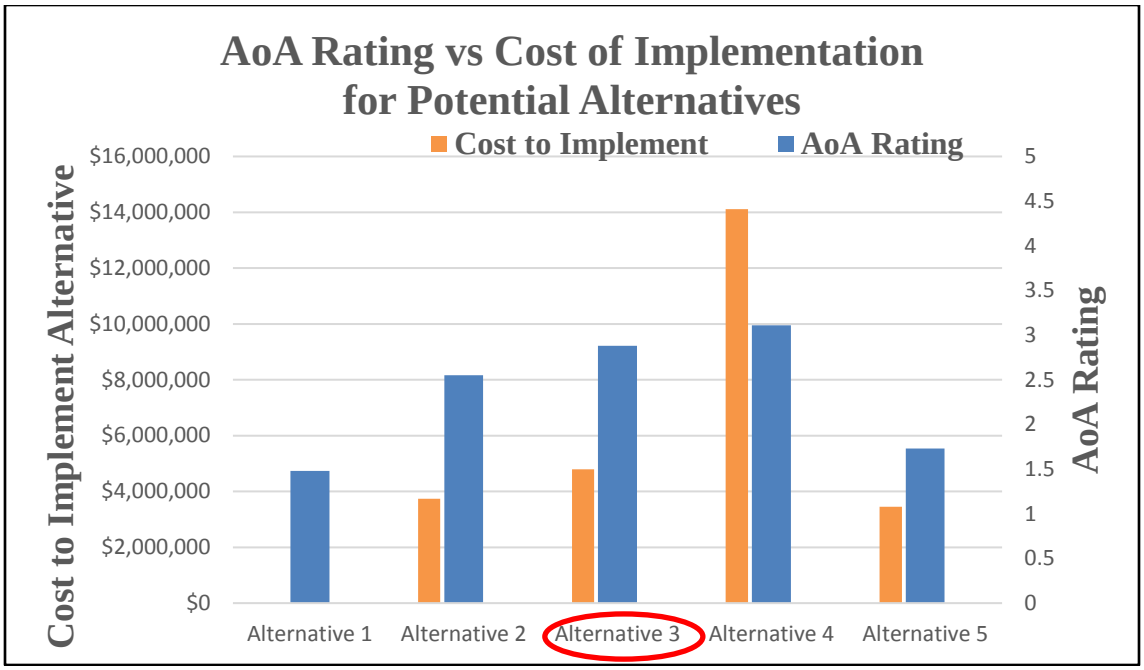


Figure 18 Breakdown of AOA Ratings and Cost for Kofa-Dome Tap Project

Alternative Schedule Comparison

Below is a breakdown of estimated differences in construction scheduled for each respective alternative.

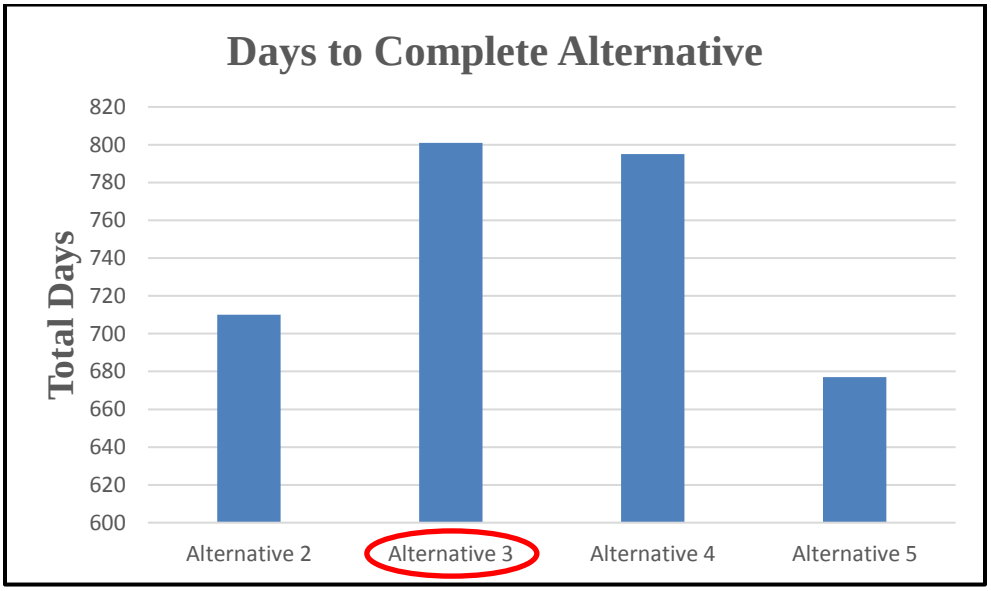


Figure 19 Days to Complete Comparison between Alternative

Project Predesign Estimate for Preferred Alternative (Alternative 3 Conceptual)

Preferred Alternative #3 Conceptual Estimate	
Rebuild KOF-DME With Light Duty H-Frame Structures	
	TOTAL
Administrative	$803,197
EVMS*	$0
Design	$170,433
Environmental	$58,564
Land and Lands Rights	$35,190
Government Furnished Equipment	$1,490,000
Construction	$1,881,811
Commissioning Activity	$27,490
Subtotal	$4,466,685
Contingency (20%)	$893,337
Total Project Budget	**$5,360,022**

*Earned Value Management System (EVMS) is a project management system required by the Department of Energy to manage cost and schedule on projects having a Total Project Cost (TPC) over $20 million.

Project Assumptions & Constraints

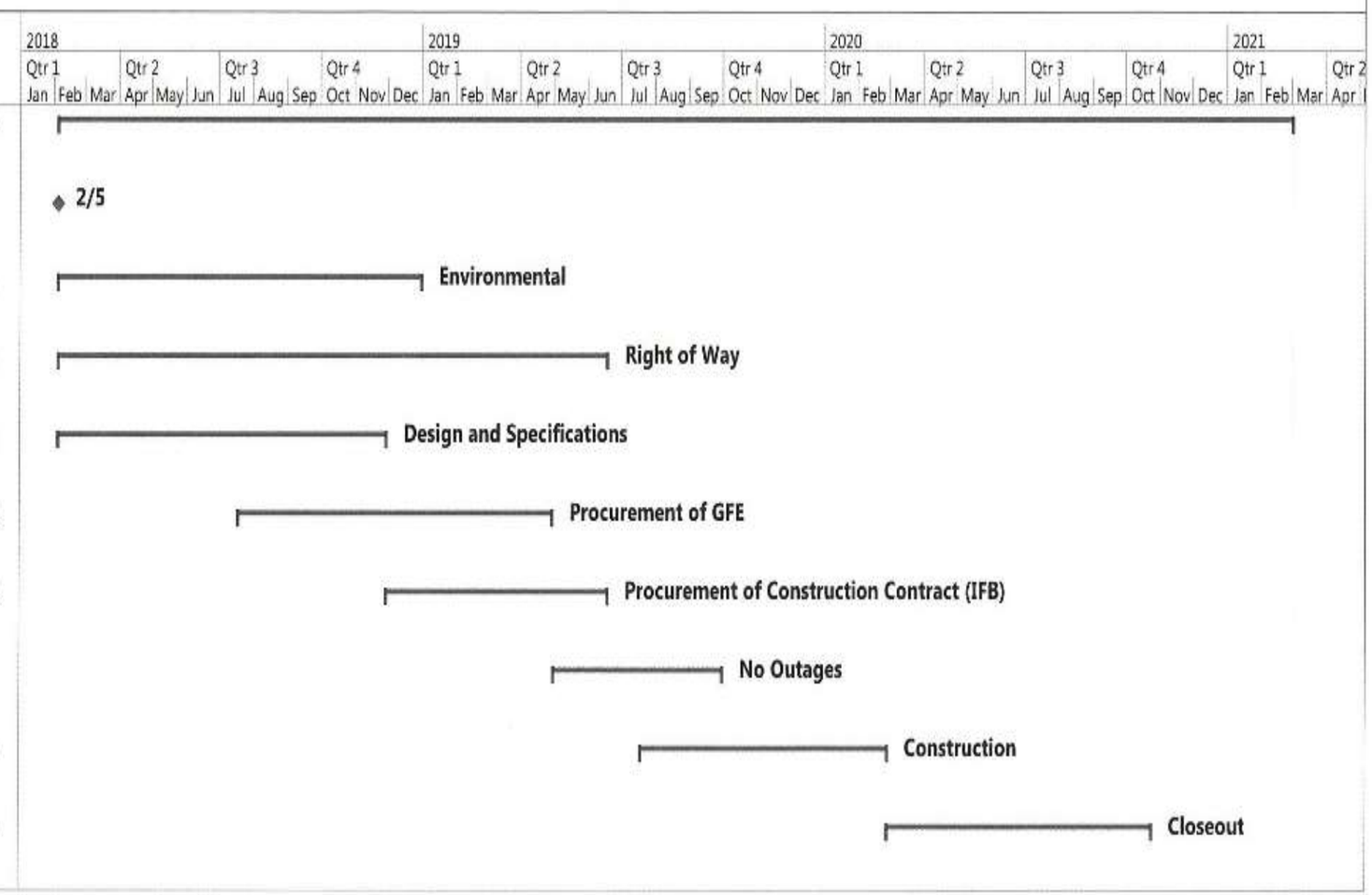
- No new ROW would be needed except for temporary construction permits.
- No line outages are allowed between May 1 and Oct 1 in any given year.
- Cost estimate is conceptual and must be revised before establishing a construction project budget.
- Salvage value of old copper wire will be $1.55 per pound.
- Others have expressed interest in sharing OPGW and cost of installation and maintenance. Evaluations have been done in accordance with Federal laws and regulations.
- Detailed engineering of this project has not been started; all estimates and scheduling are strictly conceptual.
- All estimates are preliminary with a ± 20% accuracy.

Project Predesign Conceptual Schedule for Preferred Alternative (Alternative 3 Conceptual)
Projected Start: Fiscal Year Q2, 2018

Projected In-service Date: Fiscal Year Q2, 2020

KOF-DME 161-kV Transmission Line Rebuild Alternative 3

ID	Task Name	Duration	Start
1	**KOF-DME Reconductor**	**801 days**	**Mon 2/5/18**
2	Project Kickoff	0 edays	Mon 2/5/18
3	**Environmental**	**236 days**	**Mon 2/5/18**
8	**Right of Way**	**357 days**	**Mon 2/5/18**
13	**Design and Specifications**	**214 days**	**Mon 2/5/18**
23	**Procurement of GFE**	**203 days**	**Thu 7/19/18**
29	**Procurement of Construction Contract (IFB)**	**143 days**	**Fri 11/30/18**
39	**No Outages**	**109 days**	**Wed 5/1/19**
41	**Construction**	**160 days**	**Thu 7/18/19**
50	**Closeout**	**171 days**	**Thu 2/27/20**



Western Area Power Administration

Geographic Information System

July 25, 2017 KOF-DME 161kV G5200 Maintenance Report

Maintenance Performed in 2017

	Anchor	Brace	Crossarm	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	TOTALS
Adjusted/Modified												0
Repaired			1								1	2
Replaced												0
TOTALS	0	0	1	0	0	0	0	0	0	0	1	2

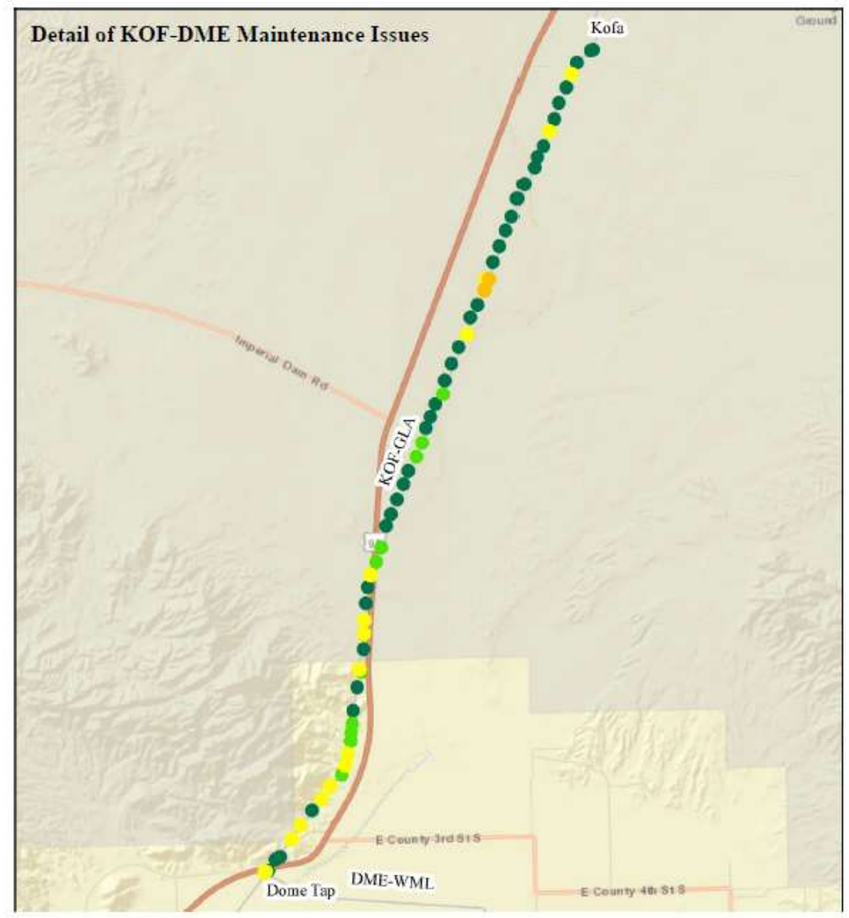
Note: Totals include RADDS projects and maintenance items.

2017 Inspection Progress

	Structures
Inspected	54
Uninspected	7
Total	61
88%	

Outstanding Maintenance in 2017

Row Labels	C	D	E	Grand Total
Anchor				0
Brace	4			4
Crossarm	3			3
Guy	2			2
Insulator	3			3
Phase/Conductor				0
Pole	9	2		11
Pole Hardware	3			3
Signs				0
Static Wire	1			1
Vibration Damper				0
Grand Total	25	2	0	27



Maintenance Priority Codes

A	Good or like new. No action required.
B	Minor defect. Monitor degradation.
C	Moderate defect. Rehabilitation or replacement recommended as scheduled maintenance.
D	Serious defect. Repair, reinforce, or replace as soon as possible.
E	Risk to public safety or system reliability.

7.6 Dome Tap-Gila 161-kV Transmission Line AOA Breakdown

Project Description

Dome Tap (DME) to Gila (GLA) is a single circuit, 7.5 mile, 161-kV transmission line segment of the overall Parker-Gila 161-kV line built in 1943. The line runs through agricultural, residential, and commercial property as well as hills and flat low desert terrain. The northern line section crosses State Route (SR) 95 several times, the Union Pacific Railroad and the Wellton Mohawk Canal. The line traverses BLM land and a Proposed Critical Habitat area around the Gila River. The DME-GLA line is constructed with 300 kcmil hollow core copper conductor on wood H-Frame structures and light duty steel H-frame structures, only 16 wood structures remain in this segment.

Figure 20 Dome Tap-Gila SR95 Crossing

Project Justification

This AOA discusses five possible alternatives to addressing the performance gaps/deficiencies outlined in this section.

Experienced and/or Observed Issues:

- Eight NERC ground clearance violations have been identified and need to be corrected.
- Ten of the 16 wood structures are deteriorated and unsafe requiring replacement.
- Forty-three access roads and right-of-way constraints have been identified where conditions are unsafe and deteriorating.
- Additional communication requirements have been identified.

<u>NERC Violations:</u>

NERC requires all transmission line owners/operators to perform a Facility Rating Analysis of all transmission lines over 100-kV in order to determine the as-built condition and de-rate the line to that condition, or to mitigate the condition to achieve the design rating. There are eight cases of phase-to-ground clearances not meeting the minimum clearance required by the National Electrical Safety Code (NESC) and NERC.

Line Conditions:
The DME-GLA transmission line has a total of 66 structures of which there are 16 wood structures remaining. Based on WAPA maintenance field inspection reports, 10 of the 16 have been identified for replacement. This includes wood structures at two US 95 highway crossings that pose a significant risk to public safety.

Access Roads and Right-of-way:
According to maintenance field inspection reports, there are 43 cases of access roads and right-of-way paths requiring improvement to facilitate construction and maintenance activities. In some cases, new access roads need to be constructed. A lack of prompt access for appropriate resources presents reliability, safety, and cost risks.

Communications Requirements:
The installation of OPGW provides an alternate and physically independent path for protection, control and communication. Currently microwave provides the only communication path and the addition of an OPGW will allow for the future communication bandwidth needs to be met. Those needs include increased security such as live feed video cameras and IT networks at substations; the addition of these systems will exceed the current communications bandwidth provided by microwave technology.

Figure 21 DME-GLA wood pole checking/cracking

Proposed Alternative Detailed Breakdown

The following pages provide a detailed breakdown of the preferred alternative, along with a high level view of the rating it received during the study. Each Criteria (Compliance, Reliability and Economical) is broken down into several subgroups and scored as a weighted aggregate.

Alternative 3 (Preferred Alternative)- Replace Wood Structures

Under Alternative 3, WAPA would clear ROW access roads and pads, replace 7.6 miles of 300 kcmil hollow core copper conductors with 336.4 kcmil ACSS conductors, replace one steel OGW with OPGW, and install light duty steel H-frame structures to replace the 16 wood structures. Light duty steel H-frame steel structures will also be installed as needed to correct clearance issues not corrected by stringing new ACSS conductor. Access roads will be improved as needed.

Pros

- Entire line segment will be light duty H-Frame steel.
- Decrease of inspection and maintenance costs.
- Increased system safety for maintenance personnel.
- Existing steel structures may be utilized providing a cost savings.
- Inset structures may not be needed to fix NERC violations.
- New lighter conductor can be used, creating less sag and greater span lengths.
- Acquisition of ROW access would completed in a single effort and would not require a piecemeal approach.
- Increased line capacity.
- This option will provide a redundant communications path and the needed additional bandwidth.
- Cost of construction contract could be reduced by approximately $175,500 due to scrap value of removed copper conductor.

Cons

- 161-kV transmission line load capability limits load growth.
- Project cost is the second highest of the five alternatives.
- Environmental Assessment (EA) may be required by BLM, a process that can take approximately one year or longer.

Risks

- Potential claims by landowners for damage to property.
- Outage coordination will be required among multiple entities. In addition to seasonal constraints, competing projects across the system may limit construction outage windows.

Alternative 3 - Reconductor and Replace all Wood Structures

Compliance Category		Score (0-4)
Does This Alternative Meet The Mission Needs?		4
Does This Alternative Meet All Regulatory Requirements?		4
How Much (negative) Environmental Impact Does This Alternative Generate?		3
How Much (negative) Land Impact Does This Alternative Generate?		3
	Average	3.5
	Section Weight	40%
	Weighted Compliance Score	1.4

Reliability Category		Score (0-4)
How Much Risk Does This Alternative Generate?		4
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?		4
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?		3
What Impact Would This Alternative Have On The BET System If Implemented?		4
	Average	3.75
	Section Weight	35%
	Weighted Reliability Score	1.31

Economic Category		Score (0-4)
How Long Would Construction Take VS Other Alternatives?		2
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?		4
What Level Of Outages Are Required For This Alternative?		2
How Does This Alternative Affect Load Growth or Power Flow In The Area?		2
	Average	2.5
	Section Weight	25%
	Weighted Economic Score	0.625

Alternative 3 Final Score	3.34

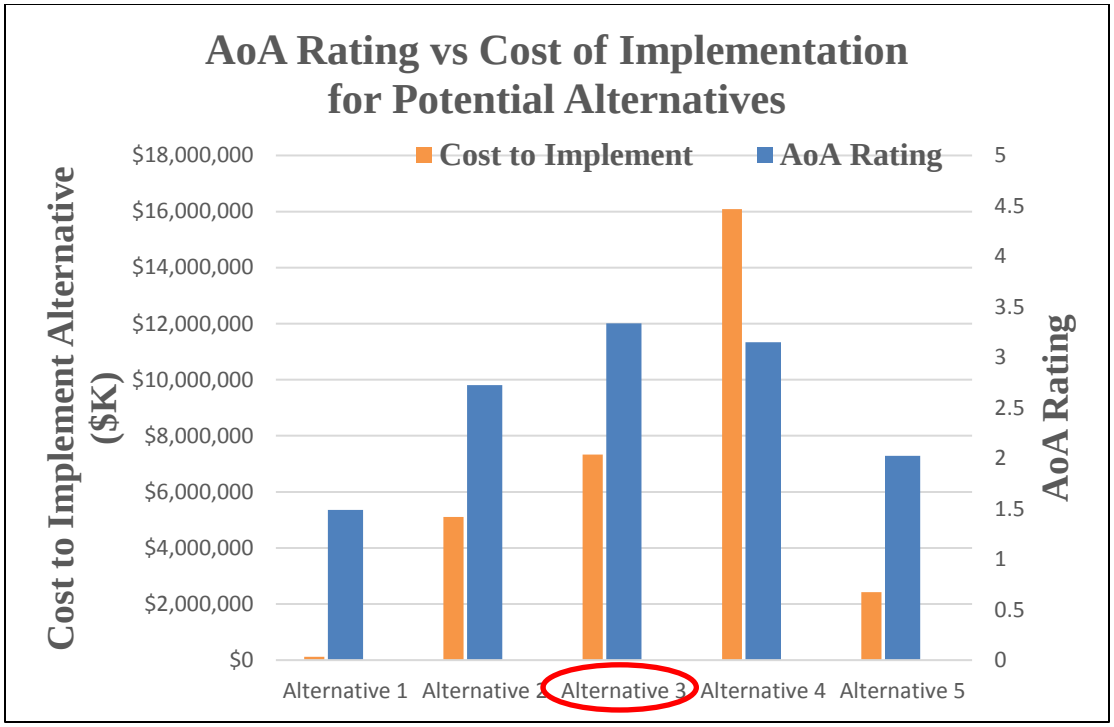


Figure 22- Breakdown of AOA for DME-GLA NERC Mitigation

Alternative Schedule Comparison

Below is a breakdown of estimated differences in construction scheduled for each respective alternative.

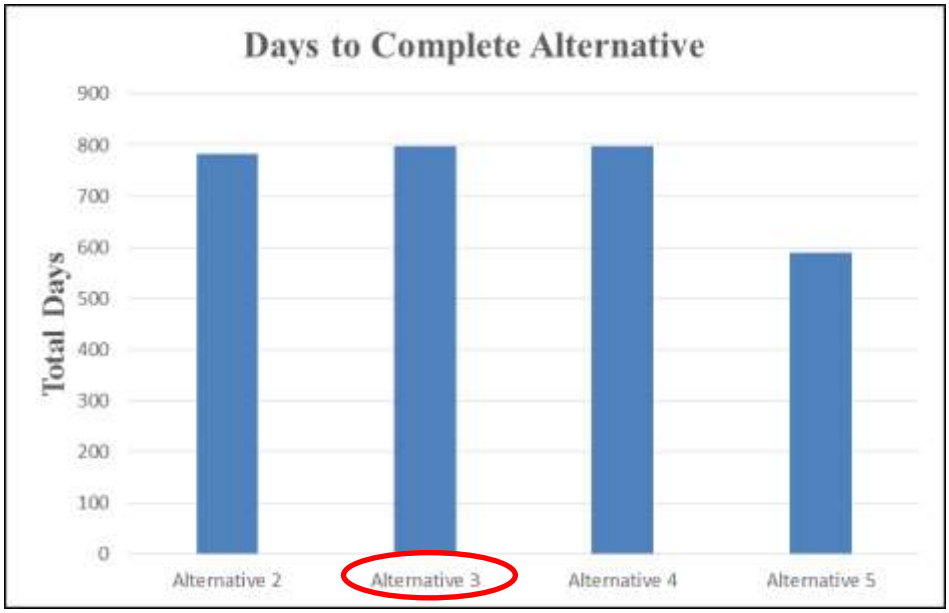


Figure 23 - Days to complete comparison between Alternatives

Project Predesign Estimate for Preferred Alternative 3 (Conceptual)

Preferred Alternative #3 Conceptual Estimate	
Reconductor and Replace all Wood Structures	
	TOTAL
Administrative	$953,031
EVMS*	$0
Design	$242,735
Environmental	$200,834
Land and Land Rights	$90,000
Government Furnished Equipment	$2,790,000
Construction	$1,759,259
Commissioning Activity	$132,000
Subtotal	$6,167,859
Contingency (20%)	$1,233,572
Total Project Budget	**$7,401,431**

*Earned Value Management System (EVMS) is a project management system required by the Department of Energy to manage cost and schedule on projects having a Total Project Cost (TPC) over $20 million

Assumptions & Constraints

Constraints:

- Actions on Federal Land (BLM) require environmental, lands, and design compliance.
- Narrow access roads along canal.
- Deteriorating ROW on access roads and pads.

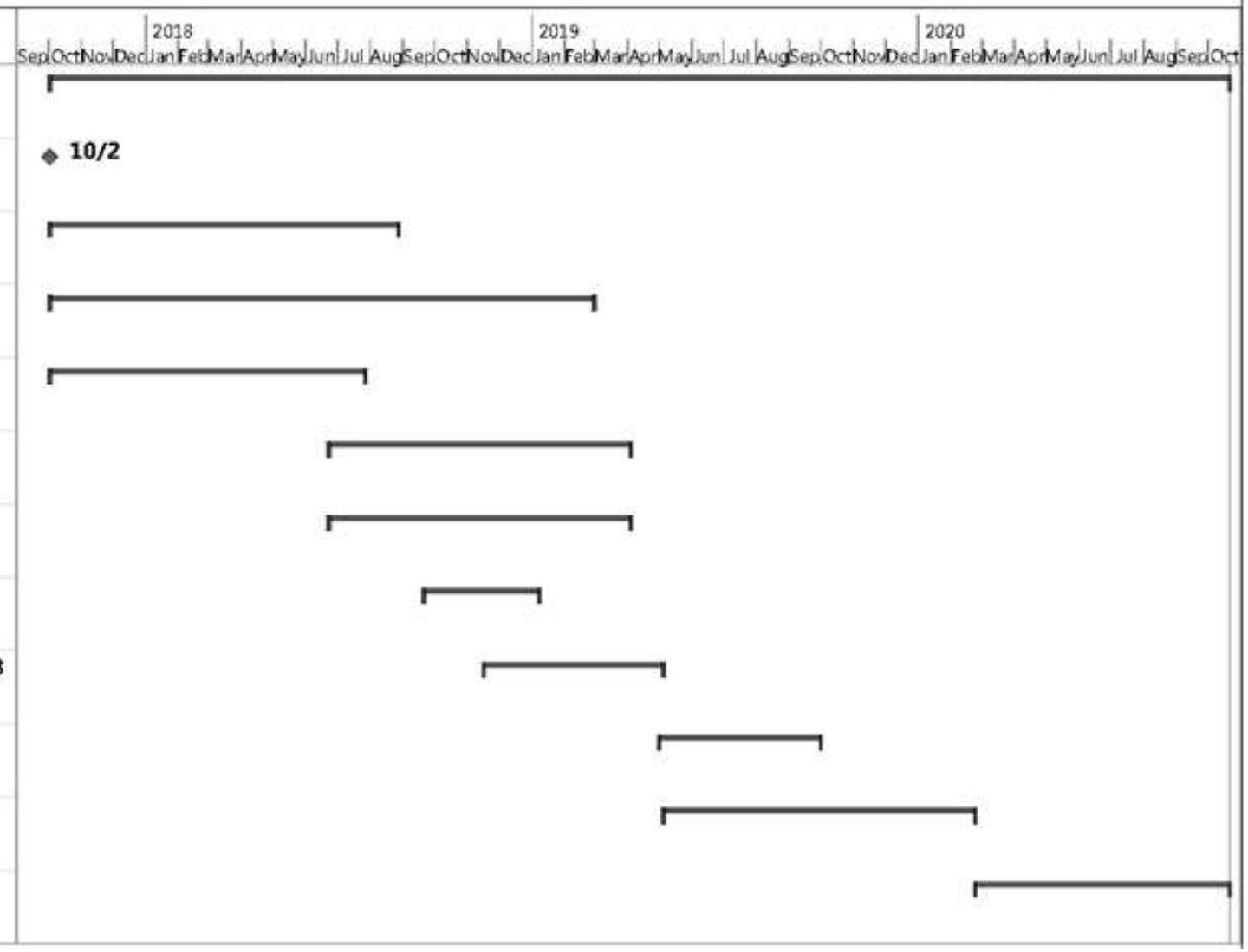
Assumptions:

- The DME–GLA transmission path will continue to operate at 161-kV.
- Structure replacements will not be required until new ROW road is established.
- Civil design work will be completed by WAPA.
- ROW constraints will be addressed one time for entire project.
- The addition of OPGW to the DME-GLA transmission line will require WAPA to apply to the BLM for an additional right-of-way grant.
- The BLM may require an Environmental Assessment (EA) in order to comply with NEPA and with it FLPMA, NHPA, ESA, etc. This moderate risk is that BLM may require an EA to support their reissuing the 0.5 mile-long right-of-way across their lands. This would add 300 hours of federal labor and $125,000 for contractors not reflected in this estimate.
- Final conductor size may change with final design.

Project Predesign Conceptual Schedule for Preferred Alternative (Conceptual)
Projected Start: Fiscal Year Q1, 2018
Projected In-service Date: Fiscal Year Q1, 2020

DME-GLA 161-kV Transmission Line Rebuild Alternative 3

ID	Task Name	Duration	Start
1	**DME-GLA Reconductor Alt #3**	**797 days**	**10/2/2017**
2	Project Kickoff	0 edays	10/2/2017
3	**Environmental**	**236 days**	**10/2/2017**
8	**Right of Way**	**369 days**	**10/2/2017**
13	**Design and Specifications**	**214 days**	**10/2/2017**
23	**Procurement of GFE**	**203 days**	**6/23/2018**
24	**Transmission Line Structures**	**203 days**	**6/23/2018**
29	**Protect & Comm Equip.**	**77 days**	**9/21/2018**
34	**Procure Const. Contract (IFB)**	**121 days**	**11/15/2018**
44	**NO OUTAGE / CONSTRUCTION**	**109 days**	**5/1/2019**
47	**Construction**	**210 days**	**5/4/2019**
56	**Closeout**	**172 days**	**2/23/2020**



8. APPENDICES

- Wood vs. Steel Transmission Line Justification
- Official Pre-payment Voting Ballot
- DSW Organizational Charts

8.1 Wood vs. Steel Transmission Line Justification

DATE REVISED: 09/20/2017
STATUS: Draft

An initial WAPA (Western Area Power Administration) life-cycle analysis was performed in September 2017 on a hypothetical 40 mile line segment. The analysis demonstrated that total costs for wood construction over an 80 year timeframe could be up to 5.5 times more expensive than steel. This is due to several factors. WAPA's Desert Southwest Region (DSW) performs ground patrol inspections once a year on wood transmission lines and once every three years on steel lines, which leads to higher recurring costs. The approximate lifespan of a modern wood pole is 40 years versus the 80 years of a steel pole; due to the short lifespan of wood, poles have to be replaced twice in the same timeframe that steel has to be replaced once. The wood used for H-frame cross arms has demonstrated a failure rate approaching 80 percent every 15-20 years in service, creating another significant spike in maintenance at the 20 and 60 year in-service marks.

Figure 1 below demonstrates that H-frame wood pole construction cost is initially lower than steel (a difference of 40%, or approximately $3.4M), however, by the 20 year mark the replacement of 80 percent of cross arms makes steel construction more cost effective. From the 20 to 40 year period of service, wood pole maintenance increases more slowly until it spikes at the point when all wood structures (including cross arms) would require replacement. By the year 50, maintenance costs on wood structures result in a cost nearly 3.5 times that of steel. This cost difference continues to increase through the 80 year life-cycle of the steel structures, when both types of lines would need to be replaced, thus starting the cycle over.

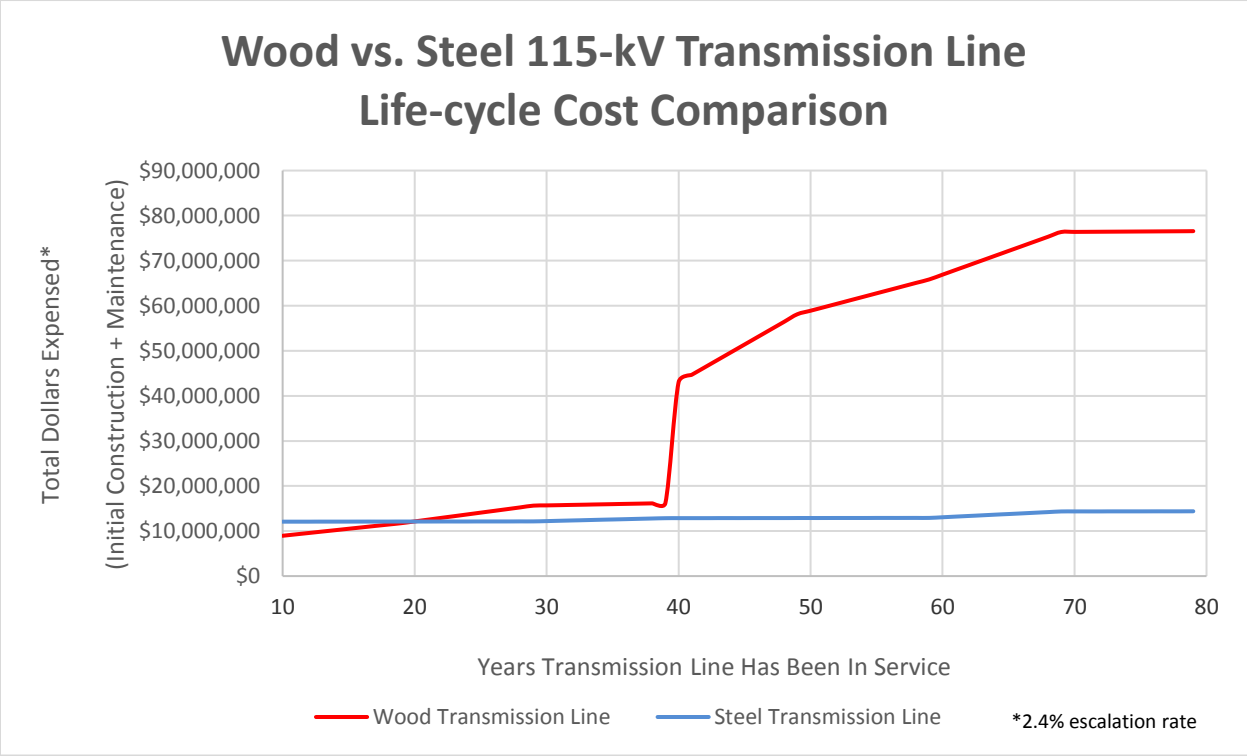


Figure 24 Wood vs. Steel 115-kV Transmission Line Life-cycle Cost Comparison (09-2017)

Wood poles that were installed pre-1950 were of much higher quality due to the fact that they were manufactured using old growth trees. Modern wood poles are manufactured with farm raised trees that grow at a much higher rate of speed, and are therefore much less robust. Though the assumed lifespan of a new wood pole is said to be 40 years, WAPA maintenance personnel have seen many cases where the lifespan is closer to 20-30 years, though WAPA's maintenance group has recorded instances of poles needing to be replaced as little as 15 years after installation.

Figure 25 Image showing difference in density between 1927 wood (left) and modern wood (right)

Wood poles are susceptible to fire, vehicle impacts, rot, woodpeckers and insect infestation; steel in all cases is either completely immune or far more capable of withstanding. Steel poles can also be recycled at the end of useful lifetime and thus the material can be resold and used indefinitely. Due to the chemical treatments that wood undergoes for preservation and insect repelling, wood must be handled per disposal guidelines at the end of its life.

Even in a situation where steel and wood poles are at parity in cost, steel offers a more reliable product in terms of environmental resistance, risk of cascading, and overall construction and design. Steel poles conform to ASTM specifications and tolerances and can be designed as direct wood pole replacements or engineered to meet any specific loading criteria. Steel structures themselves are lighter than wood and an experienced crew can install steel poles at the same rate as wood.

During data collection for WAPA's recent life-cycle analysis, maintenance personnel reported that while wood structures make up only 20% of DSW's total transmission infrastructure, approximately 80% of total maintenance costs are attributed to these structures. These maintenance costs are in turn applied directly to

rates. Other regional utilities, including APS and SRP have already shifted from wood to steel for new installations of 69kV and above due to the same findings that are currently being encountered in this review.

Another finding shows that WAPA responds to approximately 4-5 emergency repairs a year, primarily on wooden transmission lines. A scenario in which three 115-kV H-frame structures fail south of Phoenix would cost approximately $170,000 to repair with two emergency crews. As of today, WAPA has yet to experience a single steel pole failure, emergency issues on steel lines have been limited to hardware failures during severe weather events.

Though the initial cost of construction is higher for steel poles over wood, a host of long term benefits such as cost savings on operations and maintenance to overall system safety and reliability were found to be abundantly clear. This white paper will periodically be updated by WAPA as additional life-cycle analysis and industry research is conducted.

Source 1: SMDI Case Study on Steel vs. Wood Pole use
Source 2: Tucson Electric Power Steel Distribution Pole Case Study
Source 3: WAPA's Wood vs Steel 115-kV 80 Year Life-Cycle Analysis (September 2017)

8.2 Pre-payment Proxy Voting Ballot

Official Proxy Ballot

(Absentee Voting)

WESTERN AREA POWER ADMINISTRATION

Prepayment Funding Process for Construction

Please provide the following information if neither the primary nor the alternate representative is able to attend the meeting.

Check one:	Yes	No
I vote to approve the entire FY 2018 Prepayment Funding Plan.	☐	☐

If the entire Prepayment Funding Plan is not approved, my vote to approve each individual project proposed is:

1. Gila-Wellton Mohawk 161-kV I-8 Crossing Rebuild	☐	☐
2. Coolidge Valley Farms 115-kV Rebuild	☐	☐

Company Name: _____

Date: _____ Name: _____
(Please print name legibly)*

Signature: _____

Please return the signed Proxy Ballot to one (1) of the following addresses:

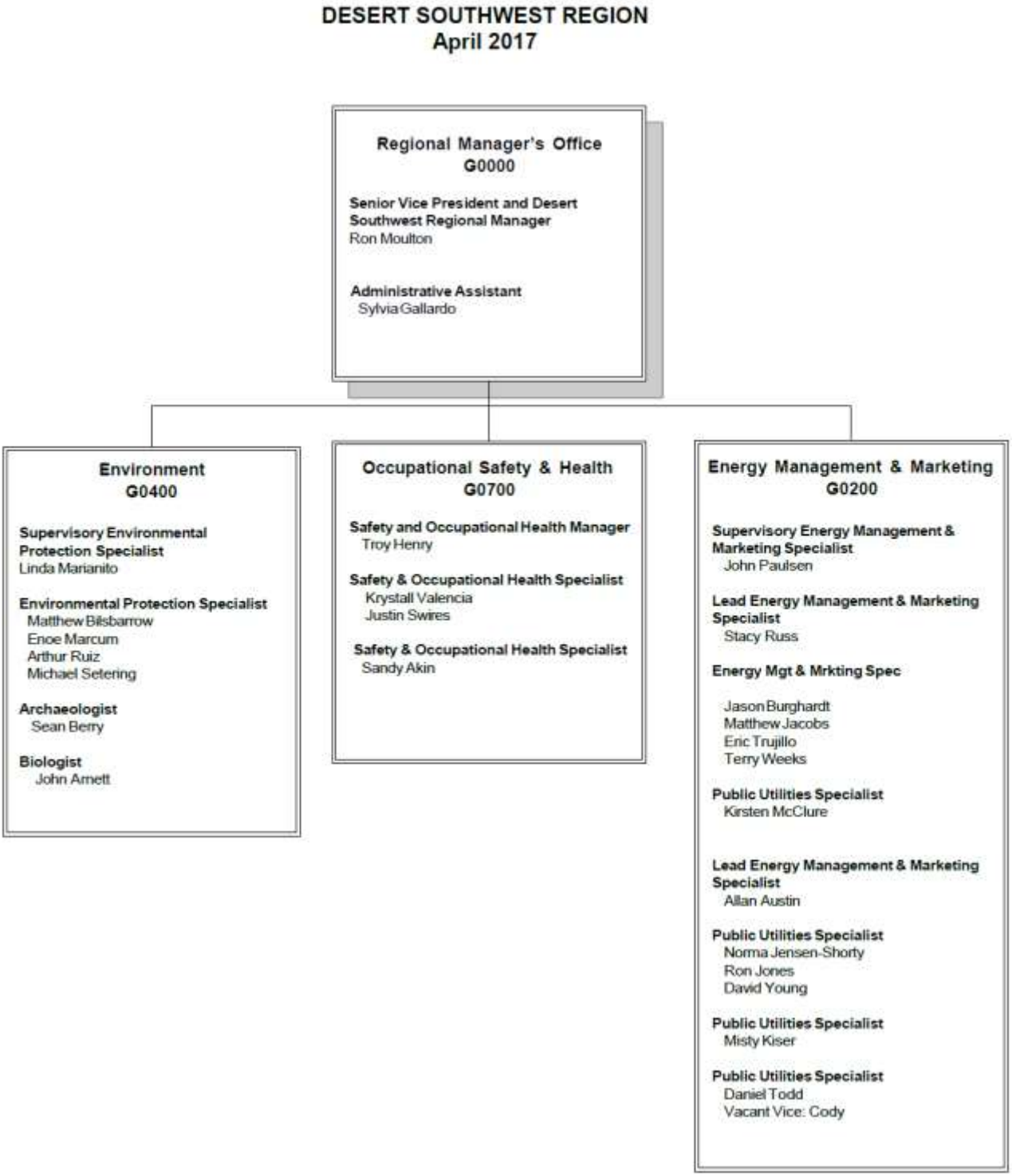
If by First Class Mail:
Western Area Power Administration
Desert Southwest Regional Office
ATTN: G6150
P.O. Box 6457
Phoenix, AZ 85005-6457

If by Overnight Delivery:
Western Area Power Administration
Desert Southwest Regional Office
ATTN: G6150
615 South 43rd Avenue
Phoenix, AZ 85009

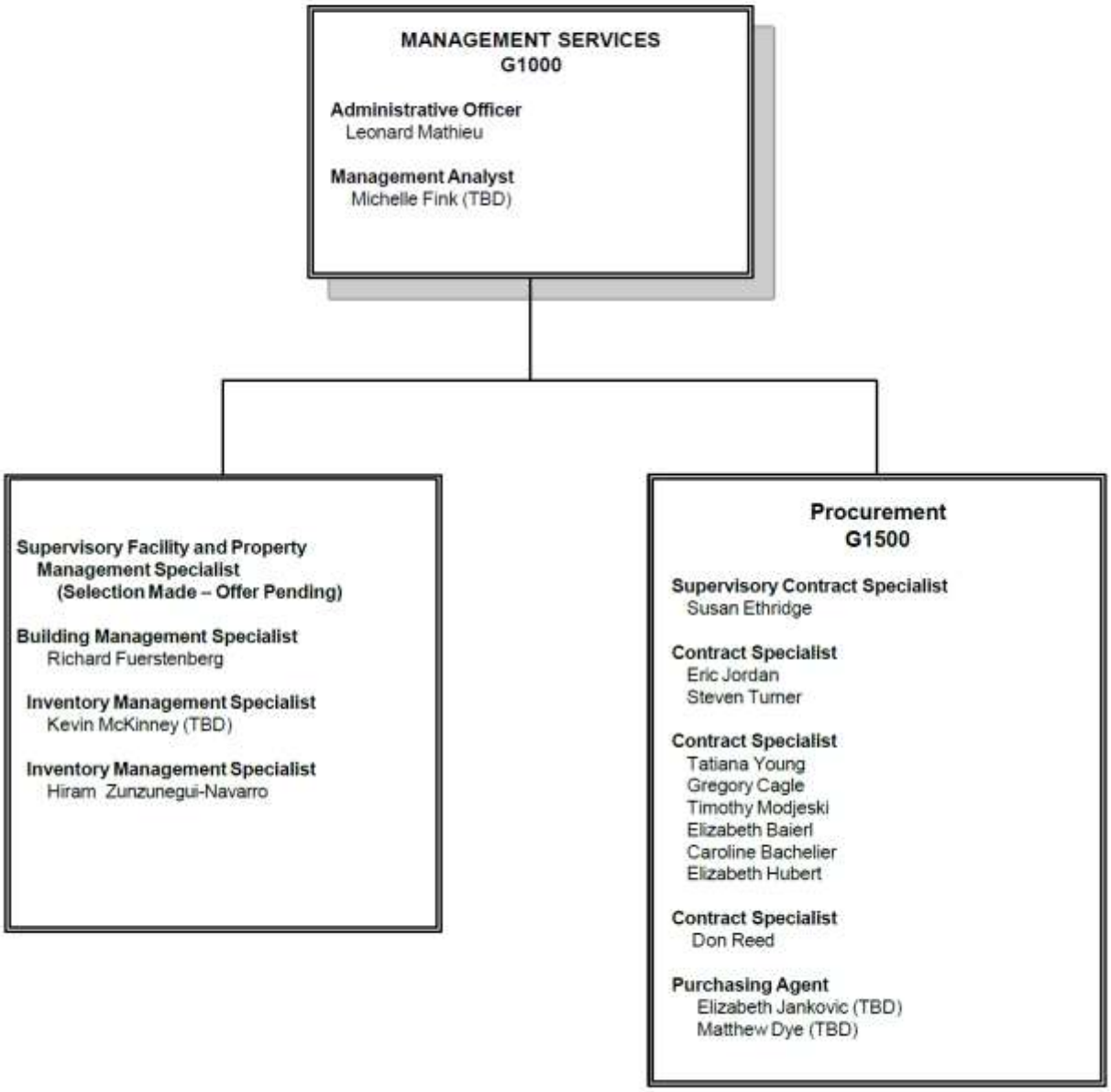
Any questions should be directed to Mrs. Sandra Jacobs at (602) 605-2446 or SJacobs@wapa.gov.

* Signature must be that of the customer's authorized representative.

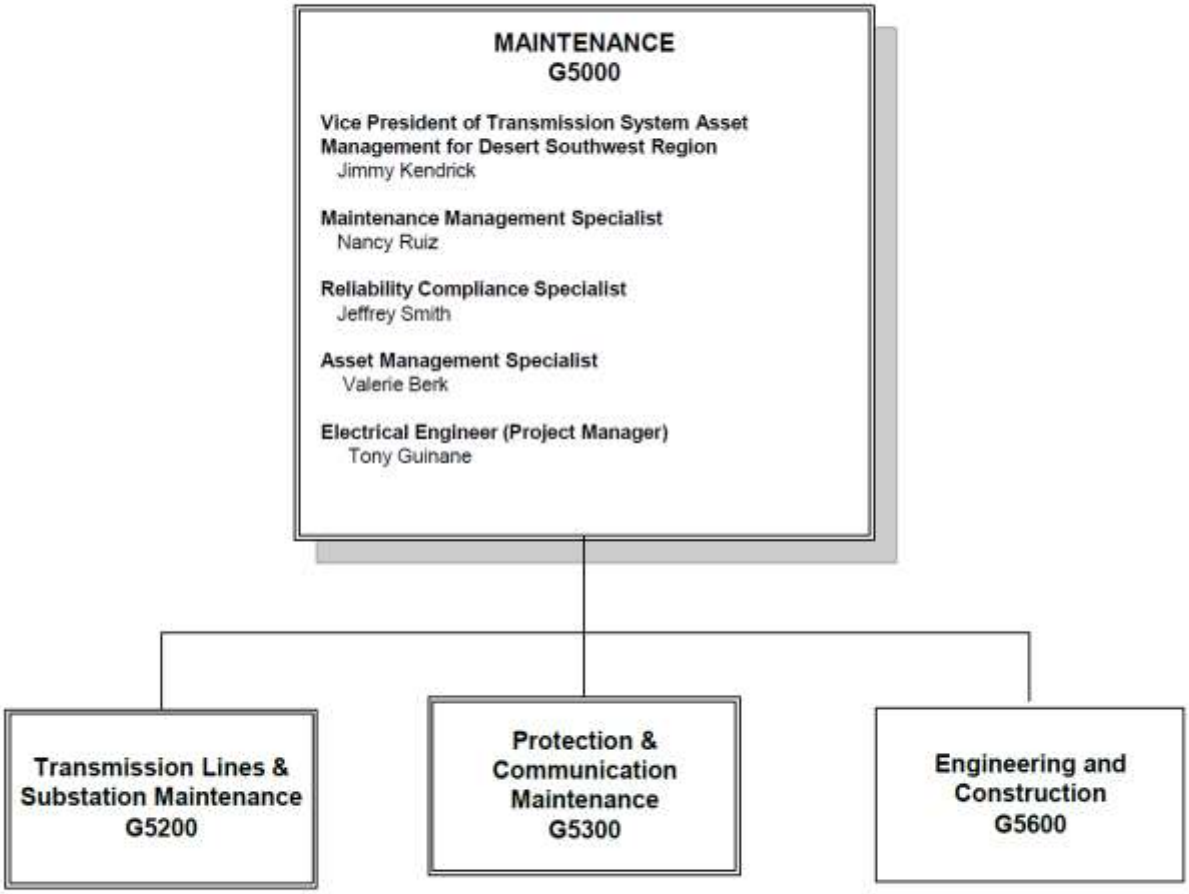
8.3 DSW Organization Charts



DESERT SOUTHWEST REGION
April 2017



DESERT SOUTHWEST REGION
January 1, 2017



DESERT SOUTHWEST REGION
April 2017

TRANSMISSION LINES & SUBSTATIONS MAINTENANCE G5200

Supervisory Transmission Lines & Substations Maintenance Manager
Brett Moad

Vacant Vice: Strawn

Veg & Access Rd Spec
Steven Narolski

Power System Maint Spec
Melissa Wise
Abel Betancourt
James Leach
Vacant Vice: Ruiz Jr.

LINEMAN

Foreman III Lineman
Steven Yeats

Lineman Aerial Obs
David Katich

Foreman II Lineman
Timothy Hibbs

Lineman
Troy Meier
Aaron Byford
John Sheridan
Richard Galindo
Alex Hernandez
Brandon Mullen

Foreman II Lineman
Vacant Vice: Mortensen

Lineman
Scott Cuningham
Alex Robles
Lyle Hager
Kai Bothwell
Horacio Adriano
Victor Van

Heavy Equip Oper
Gary Fletcher

Yuma

Foreman II Lineman
Brian Heisler

Lineman WB-2801
Kevin Halone
Nicholas Beutel
Richard Mortensen

Heavy Equip Oper
Vacant New

PHOENIX

Foreman II Electrician
John Oja

Electrician
Chris Flynn
Policarpio Cachin
Michael Lyle

PAGE

Foreman II Electrician
Anthony Lucero

Electrician
Julie Couts

Electrician CIT
Randy Hammit

PARKER

Foreman II Electrician
Randy Gates

Electrician
Miguel Rodriguez

ELECTRICIANS

Foreman III Electrician
Grover Bray

MEAD

Foreman II Electrician
Randy Strand

Foreman I Electrician
Robert Conklin

Electrician
Michael Lagarde
David Sorrell
Marvin Moone
Paula Sibbley

COOLIDGE

Foreman II Electrician
Steven Aiello

Electrician
Fernando Alcaraz
Martin Brister

GILA

Foreman II Electrician
Rodney Chaffee

Electrician
John Hall
S. (Scooter) Godwin
William Koger

DAVIS

Foreman II Electrician
Ronald Payne

Electrician
Charles Muir

DESERT SOUTHWEST REGION
PROTECTION & COMMUNICATIONS MAINTENANCE
May 1, 2017

PROTECTION & COMMUNICATION MAINTENANCE
G5300

Supervisory Protection & Communication Maintenance Manager
Teresita D. Amaro

Power System Maintenance Spec
Steven Smith

Maintenance Management Spec
Vacant (Vice Harper)

COMMUNICATIONS

Supervisory Electronics Engineer
Silvia C. Perez

Electronics Engineer
Steven Brown

Electronics Engineer
Vacant (Vice Perez)
Nathaniel Lee
Jon Otteman

Electronics Engineer
Kevin Titch

PROTECTION & CONTROL

Supervisory Electrical Engineer
Zachary Eyasu

Electrical Engineer
Greg Shumaker
Sheila Keating (PT)

Electrical Engineer
Muhammad Tayyab
Vacant (Vice Eyasu)

Electrical Engineer
Arthur Ruiz Jr. (May 2017)

COMMUNICATIONS

FOREMAN III Craftsman
Timothy Alme

PROTECTION & CONTROL

FOREMAN III Craftsman
Vacant (Vice Caldwell)

PHOENIX

FOREMAN II P&C Craftsman
David Todd

Foreman I P&C Craftsman
Richard Smith

Electronic Equipment Craftsman
Michael Lindquist
Pete Gutierrez
Richard Peterson
Steven Erickson

MEAD

FOREMAN II P&C Craftsman
Mary (Jodi) Harmon

P&C Craftsman
Demarco Brooks

Meter & Relay Craftsman
Vacant (Vice - Miller)
Bryan Kinder
Vacant (Vice Montoya)

PHOENIX

FOREMAN II P&C Craftsman
Domenic Barone

Foreman I P&C Craftsman
Richard Morgan

P&C Craftsman CIT
Amanda Moore

Meter & Relay Craftsman
Denver Thomas
Brian Jarvis

Meter & Relay CIT Craftsman
John P. Grantham (Page)

P&C Craftsman
David Pence (Mead)
Harold (Scott) Gettinger (Phoenix)

Electronic Equipment Craftsman
Dana Burnham (Coolidge)
Thomas McElroy (Gila)
Richard Potter (Mead)
Thomas Burhyte (Phoenix)

COOLIDGE

FOREMAN II P&C Craftsman
Jon Bryan

Meter & Relay Craftsman
John D. Pereza

P&C Craftsman CIT
Gerardo Quiros

GILA

FOREMAN II P&C Craftsman
Roy Freeman

Meter & Relay Craftsman
Vacant (Vice Ball)

Meter &Relay CIT
Fernando Sepulveda

DESERT SOUTHWEST REGION
April 2017

ENGINEERING & CONSTRUCTION
G5600

Engineering & Construction Manager
Gary Lachvayder

Realty Specialist
Joey James Giustino
Vice: Baumgardt

Electrical Engineering Technician
Kelvin Ellis

Field Construction
G5610

Lead Civil Engineer
Robert Toenjes

Electrical Engineer
Vacant Vice: Toenjes
Gerald Hartill

Civil Engineer
Brent Allen
Vacant Vice: Albarran-Garcia

Construction Representative
James Jennings

Construction Representative
Lawrence Merchant
George McIlveen
Edward Stoll
Michael Fyffe

Office Construction
G5620

Lead Civil Engineer
Roger Moody

Civil Engineer
David Pflanz

Civil Engineer
Jason White
Curtis Williams
Vacant Vice: Pflanz

Civil Engineering Technician
Richard Duarte
Rick Schuler

Electrical Engineer
Omar Cobos

Electrical Engineer
Jorge Alva

Engineering
G5630

Engineer Team Lead
Donald Byron

Project Manager
Michael Garcia
Michael Baird
Vacant Vice: Mueller
Vacant Vice: Rhoades

Project Manager
Roger Wright

DESERT SOUTHWEST REGION
May 1, 2017

POWER MARKETING
G6000

Vice President of Power Marketing for Desert Southwest Region
Jack Murray

Public Utilities Spec (Tech Expert)
Michael Simonton

Rates
G6100

Supervisory Public Utilities Spec
Scott Lund

Public Utilities Spec
Florence Brooks
Todd Statler

Financial Program Analyst
Sandra Jacobs

Public Utilities Spec
Christina Vides
Kevin Schaefer
Ebony Dennis

Financial Program Analyst
Charis Schaeffer

Public Utilities Technician
James Moore

Power Contracts & Energy Services
G6200

Supervisory Public Utilities Spec
Patricia Weeks

General Engineer
Hoai Nam Le
Ryan Nicholson

Public Utilities Spec
Audrey Colletti
Vacant Vice: Weeks

Public Utilities Spec
Kathryn Sheets
Tasha May
Troy Stine

Resource Planning and Settlements
G6300

Supervisory Public Utilities Spec
Tina Ramsey

General Engineer
Xavier Gonzalez

Operations Support Spec
William Beenau

Public Utilities Spec (Metering)
Stephen Paquette

Public Utilities Spec
Rose Statler

Public Utilities Spec
Melissa Cody
Laura Ramirez
Lonnie Waters
Vacant: New

DESERT SOUTHWEST REGION
April 2017

FINANCIAL MANAGEMENT
G8000

Financial Manager
Ethel Redhair

Budget & Alternative Finance
G8100

Supervisory Budget Analyst
Anthony Camp

Budget Analyst
Andrew Pierce
Richard Metcalf
Robbin Rinker
Cherie Cottrell

Financial Program Analyst
Mark Krause

Accounting
G8200

Supervisory Accountant
A. Beth Kozik

Accountant
Gregory Gonzales
Kristi Beshaw
Paul Hill
Chenguang Wang
Shannon Joya

Accountant
Dawn Hanby

Public Utilities Specialist
Charis Schaefer
Tamara Densmore

Public Utilities Specialist
Dawn Hanby
Beatrice Brown Herder