DESERT SOUTHWEST REGION
TEN-YEAR PLAN
Fiscal Year 2018-2027

ANNUAL CUSTOMER MEETING: AUGUST 22, 2017

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

Western Area Power Administration

POWERING THE ENERGY FRONTIER

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1. MEETING AGENDA

Conference Call Bridge:

- To access the conference call bridge, please dial (888)-283-2963; when requested enter conference code number 51599 and then enter #. When requested provide your name.

Objective(s):

- To preview and solicit feedback from Parker-Davis Project (P-DP) and Intertie Customers on WAPA DSW's 10-Year Capital Plan. Have an open exchange on the proposed projects, emerging issues, and developments within the program.

Agenda:

1. Welcome
2. Review Action Items
3. 10-Year Plan Program Updates
4. Completed Project(s)
5. Active Project Updates
    a. Pre-payment Project(s)
    b. Seed Funding Project(s)

10 MINUTE BREAK

6. Proposed FY18 Project(s)
7. 10-Year Plan Review
8. FY17 Budget vs. Execution
9. Southline Project Updates
10. Next Steps
    a. September 12th, 2017 – WAPA HQ 10-Year Plan (Hosted by HQ)
        - Open HQ Budget formulation discussion
        - FY 2020 Budget Guidance
    b. October 5th, 2017 – Pre-payment Presentation & Vote (Hosted by DSW)

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. INTRODUCTION

Western Area Power Administration (WAPA) markets and delivers reliable, cost-based hydroelectric power and related services within a 15-State region of the central and western parts of the United States. WAPA is one of four power marketing administrations within the U.S. Department of Energy whose role is to market and transmit electricity from multi-use water projects. WAPA's transmission system carries electricity from 57 power plants. These power plants are operated by agencies such as the Bureau of Reclamation, U.S. Army Corps of Engineers, the International Boundary and Water Commission, as well as a number of private entities. These plants combined have an installed capacity of 10,395 Megawatts.

WAPA is divided into four primary regions. Upper Great Plains (UGP) located in Billings, Montana; Rocky Mountain Region (RMR) located in Loveland, Colorado; Sierra Nevada Region (SNR) located in Folsom, California; and Desert Southwest Region (DSW) located in Phoenix, Arizona. In addition to the four operating regions, a Management Center is located in Salt Lake City, Utah. All the regions are supported by a central Headquarters (HQ) office located in Lakewood, Colorado. WAPA's HQ serves many diverse customers, ranging from Congress to Native American power customers, special interest groups and WAPA's regional offices. HQ is responsible for designing WAPA's electrical projects and handles most of the support services such as legal, and human resources.

The Desert Southwest Region (DSW) sells power in Arizona, Nevada, southern California, and portions of the Southwest. The recipients of this power include wholesale customers such as towns, rural electric cooperatives, public utility and irrigation districts, Federal, state and military agencies, Native American tribes, investor-owned utilities, power marketers and U.S. Bureau of Reclamation customers. DSW is committed to maintaining and operating a reliable transmission system. The 10-Year Capital Program (TYP) provides both a capital investment plan, as well as a funding plan, that will maintain reliable power delivery to WAPA's customers.

The purpose of the Capital Program presentation for WAPA's Desert Southwest Region (DSW) is to clearly describe challenges, goals, objectives, strategies, and accomplishments, as well as provide a mechanism for customer collaboration.

The Capital Program is revised annually in response to:

- Approved funding allocations for the budget year
- Optimized project priorities
- Emerging issues within the transmission system
- Mandates or regulatory requirements
- New contractual requirements

4. DESERT SOUTHWEST POWER SYSTEMS

4.1 Boulder Canyon (BC)

Hoover Dam is the backbone of the Boulder Canyon (BC) Project. The Hoover Power plant has 19 generating units, including 2 house units, with an installed capacity of 2,079 Megawatts (MW). For the last ten years Hoover has generated, on average, 3,800,000 Megawatt hours (MWh) of energy, which can serve the annual electrical needs of nearly 1.1 million people. Power from this project is marketed as long-term contingent capacity with associated firm energy. This contingent capacity and associated firm energy is available, as long as there are sufficient water releases to generate the power. The majority of WAPA's facilities for BC are 230-kV transmission lines, extending approximately 12 miles from Hoover Dam to the Mead Substation.

System Information

Substations	1
Transmission Line Structures	424
Total Circuit Miles	53.3

Figure 1 - Hoover Dam & Lake Mead

4.2 Central Arizona Project (CAP)

The Central Arizona Project (CAP) is one of three related water development projects that make up the Colorado River Basin Project. The CAP was developed to provide water throughout Arizona and New Mexico. DSW operates and maintains the power system required for the CAP system. Surplus CAP and Navajo transmission along with surplus power from the United States share of the Navajo Generating Station are marketed by DSW on behalf of the Bureau of Reclamation.

System Information

Substations	9
Transmission Line Structures	2,077
Total Circuit Miles	288

Figure 2-Figure 2- Black Mesa Substation

4.3 Colorado River Front Work and Levee (Levee)

The Colorado River Front Work and Levee System (Levee) extends from Lees Ferry, Arizona (the division point between the Upper and Lower Colorado River Basins) to the International Boundary between the United States and Mexico. Spanning a distance of approximately 700 river miles, the purpose of this system is to control floods, improve navigation, and flow regulation of the Colorado River.

This multi-purpose program encompasses control of sediment movement, protection of communities, transportation facilities, and maintenance of agricultural land by controlling the bed and banks of the river. This system also supports the preservation and enhancement of fish, wildlife, and recreation facilities. WAPA's 34.5-kV and 69-kV system in the Yuma area primarily supports the pumping load required by the Bureau of Reclamation to carry out the activities described above.

System Information

Substations	3
Transmission Line Structures	348
Total Circuit Miles	27

4.4 Salinity

The purpose of this system is to regulate the salinity levels of the Colorado River water delivered to Mexico. This program utilizes WAPA's 34.5-kV and 69-kV system in the Yuma area primarily by supporting the pumping of ground water to meet the salinity requirements.

System Information

Substations	3
Transmission Line Structures	408
Total Circuit Miles	34

4.5 Colorado River Storage Project (CRSP)

The CRSP provides water-use developments in the upper Colorado River Basin and the lower Colorado River, as required by the Colorado River Compact. Five Federal power plants are associated with the project. Of the five power plants, Glen Canyon generation provides 1340 MW and is the primary CRSP source of power for the DSW region. DSW maintains the Western Area Lower Colorado System (WALC), including Shiprock, Kayenta, Longhouse Valley, Glen Canyon, Flagstaff, and Pinnacle Peak substations. In addition, DSW operates and maintains, Mexican Hat, Zilner, Glen Canyon, Preston Mesa, Elden Mountain, Mingus Mountain, Tower Mountain, Thompson, and Lolamia Point communication sites.

CRSP provides for the electrical needs of more than one million people spread throughout Colorado, Utah, New Mexico, and Arizona; as well as portions of southern California, Nevada, and Wyoming. More than 2,323 miles of high-voltage transmission lines exist within these states to deliver power to customers.

System Information

Substations	9
Transmission Line Structures	2,077
Total Circuit Miles	288

Figure 3 - Aerial view of Glen Canyon Dam

4.6 Pacific Northwest/Southwest Intertie (Intertie)

The Pacific Northwest-Pacific Southwest Intertie (Intertie) was authorized by the Pacific Northwest Power Marketing Act. Originally, Intertie was planned to be an AC and DC system which would connect the Pacific Northwest with the Pacific Southwest. As authorized, the overall project is a co-operative construction venture between Federal and non-Federal entities. Due to delays in construction funding, interest among the potential users has waned; resulting in the indefinite postponing of DC line construction. Consequently, the facilities constructed provide AC transmission service.

WAPA's portion of Intertie consists of two parts: a northern portion and a southern portion. The northern portion is administered by WAPA's Sierra Nevada Region, and the southern portion by DSW. The southern portion is treated as a separate (stand-alone) project for repayment and operational purposes.

The southern portion consists of a 345-kV transmission line from Mead Substation to Liberty Substation, a 230-kV line from Liberty Substation to Westwing Substation, a 230-kV line from Westwing Substation to Pinnacle Peak Substation, and two 500-kV segments from Mead Substation to Perkins Substation and Mead Substation to Marketplace Substation.

<u>System Information</u>

Substations	9
Transmission Line Structures	2,580
Total Circuit Miles	951

Figure 4 - Mead Substation

4.7 Parker – Davis (PD)

Parker-Davis has the majority of the DSW regional power facilities, and was formed by consolidating two projects in 1954; Parker Dam and Davis Dam. Parker Dam and Power plant, which created Lake Havasu (155 miles below Hoover Dam on the Colorado River), were authorized by the Rivers and Harbors Act of 1935. The Parker Power plant has 4 generating units with an installed capacity of 120 MW.

Davis Dam located on the Colorado River, 67 miles below Hoover Dam, created Lake Mohave. Davis Power plant has 5 generating units with an installed capacity of 255 MW. Parker-Davis is operationally integrated with the Hoover Power plant. In the event that Parker-Davis generation is insufficient to meet firm contractual obligations, banked Hoover generation maybe used. Alternatively, WAPA may purchase power from other resources.

The Parker-Davis Project supplies the electrical needs of more than 300,000 people. Power generated from this project is marketed to customers in Nevada, Arizona, and California. The DSW facilities that are part of the Parker-Davis Project include substations such as Davis, Parker, Gila, Lone Butte, Coolidge, and Tucson. Transmission lines within this project range from 34.5-kV to 230-kV, and are constructed of wood, steel, or concrete.

System Information

Substations	53
Transmission Line Structures	9,993
Total Circuit Miles	1,534

Figure 5 - Aerial Photo of Parker Substation & Dam

5. CONSTRUCTION PROJECT FUNDING HISTORY

Construction projects, in comparison to RRADs, are typically more complex in nature and require the use of an outside construction contractor in lieu of Federal labor. These projects are multi-year funded, and the majority will cross fiscal years and take extended periods of time to complete. Federal labor and contract labor are utilized to complete the project design and specifications, environmental requirements, procurement of equipment and construction contracts, construction management, project tracking, financial management, commissioning, and closeout. The construction contractor will typically install the physical components of the project, such as circuit breakers, transformers, steel structures, control buildings, transmission lines, structures, and conductors.

The construction project list may be adjusted in order to accommodate any changes in the amount of funding received and the time of year the funding is provided. For example, a Continuing Resolution (CR) (or any other delay in funding) dramatically impacts DSW' s ability to execute funds in a timely manner. A CR not only restricts the amount of funds available for construction contracts, but also restricts the amount of federal labor that can be expended to get the design and specifications for a project completed prior to fiscal year end.

In FY10, WAPA and its customers collaborated to address this ongoing struggle with project funding and collectively decided to create a method to use pre-payment funding for selected construction projects. Projects that are proposed for the use of pre-payments funds are first submitted for funding through the appropriated funding process. If adequate appropriations are not received, then the approved pre-payment project(s) are executed using pre-payment funding.

The Construction Program is reviewed by WAPA's management team annually in June. Potential projects suitable for pre-payment funding are selected from the list of projects previously submitted to Congress for the receipt of appropriated funding. Proposed pre-payment projects selected by WAPA are then presented to WAPA's customers for review and consideration in the Ten-Year Capital Program booklet, published annually.

Customers are engaged in an early summer Ten Year Capital Plan (TYCP) preview meeting, providing a forum for WAPA and its customers to have an open dialog about the projects, answering any questions or concerns that the customers may have, and optimizing project priorities. Then in the late summer or fall DSW presents its annual TYCP to the customers. An official vote on the proposed pre-payment projects is conducted approximately one month after the annual TYCP meeting each year, to ensure that only projects that receive customer support for funding through this mechanism are pursued.

6. 10-YEAR PLAN PROGRAM UPDATES

6.1 What's New

1. **New Budget/Finance Meetings** - A new series of annual meetings are being created specifically to discuss DSW budget and finance with Parker-Davis and Intertie customers. The meetings will be hosted by WAPA DSW and tentatively scheduled for April and December of each year. The information presented will be in concert with DSW' s 10-Year Plan quarterly meetings and allow additional opportunity to discuss important financial topics and process improvements. Topics of discussion may include but are not limited to:
    - Budget vs. Actual reporting
    - Year-to-year execution comparisons
    - Budget formulation work plan details for Construction, O&M, and RRADs.
    - Administrator's budget guidance on budget formulation year

1. **AOA Study Summaries** – Customers will find an AOA Study summary for each project proposed for the next fiscal year which includes an alternatives scorecard. The AOA scorecard is a tool that ranks various alternatives for comparison using Department of Energy (DOE) AOA best practices and methodology. Along with DOE guidance DSW has also incorporated best practices identified by the Government Accountability Office for conducting AOA studies. The following information has been provided for reference:
    - AOA Benefit Effectiveness Scorecard Template (see Section 15.1)
    - AOA Evaluation Methodology (see Section 15.2)
    - AOA Study Breakdown reports for all FY18 proposed new starts (see Section 13.2, 13.3, and 13.4)

6.2 On the Horizon

1. **Capital Planning and AOA Study Participation** – DSW is working to improve its internal Capital Planning Process to integrate customers into the development side of the program. The goal is customer participation and contribution early and often in the 10-Year Capital Planning process. DSW is working to create working customer meetings specifically to seek customer input on construction budget formulation which occurs three years ahead of the execution year. The target date is late 2017 for customer integration into the Capital Planning Program.

2. **10-Year Plan Budget Flow Chart** – DSW is working in conjunction with its customers to improve the "You Are Here" Budget Flow Chart. A new flow chart will be distributed in the fall which highlights and outlines the following:
    - Windows of opportunity to impact AOA studies
    - Window of opportunity to impact budget formulation year
    - Window of opportunity to impact new construction projects
    - Customer engagement opportunities
    - Formal 10-Year Plan Meetings
    - Congressional budget milestones
    - WAPA budget milestones

7. ASSET MANAGEMENT UPDATES

7.1 Wood Pole Maintenance Status – Whole System

Western Area Power Administration
Geographic Information System

April-June Second Quarter 2017 G5200 CartoPac Maintenance Report

2nd Quarter Maintenance Performed

	Anchor	Arm/Bridge	Brace	Crossarm	Distribution Apparatus	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	Totals
Adjusted/Modified	1	2	2	3						6		8		22
Repaired			15	6	1		1	2		40			12	77
Replaced	1		16	18	3		4	14	1	39	2			98
TOTALS	2	2	33	27	4	0	5	16	1	85	2	8	12	197

Note: Totals include RADDS projects and maintenance items.

2nd Quarter Incoming Maintenance

	Anchor	Arm/Bridge	Body Extension	Brace	Crossarm	Distribution Apparatus	Foundation	Guy	Insulator	K Member/Window	Leg Member	OPGW	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	Vibration Damper	Totals
C	32	9	8	795	634	12	4	82	317	2	4	1	11	1033	59	9	82	21	3115
D	1		7	37	56	1		4	25	1			3	584	7	3	6		735
E				2									1	8			2		13
Totals	33	9	15	834	690	13	4	86	342	3	4	1	15	1625	66	12	90	21	3863

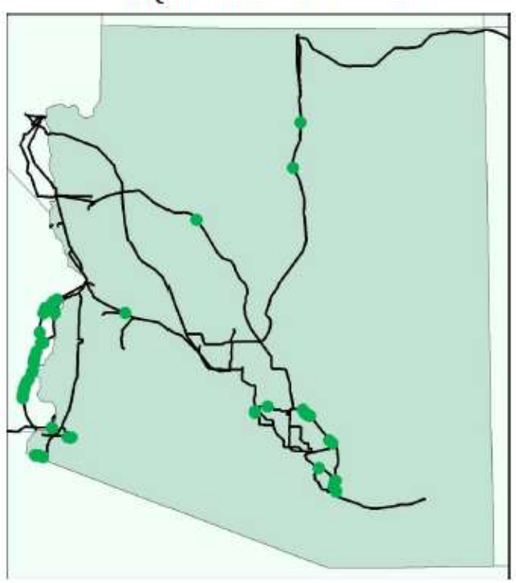
DSW Total Outstanding Maintenance Backlog

	C	D	E	Totals
Anchor	70	1	1	72
Arm/Bridge	16			16
Body Extension	9	7		16
Brace	1159	46	2	1207
Crossarm	849	81		930
Distribution Apparatus	12	1		13
Foundation	24	1		25
Guy	155	5		160
Insulator	677	38		715
K Member/Window	2	1		3
Leg Member	14			14
OPGW	4			4
Phase/Conductor	35	20	1	56
Pole	1798	680	10	2488
Pole Hardware	142	8		150
Signs	45	3		48
Static Wire	118	22	3	143
Vibration Damper	46			46
Totals	5175	914	17	6106

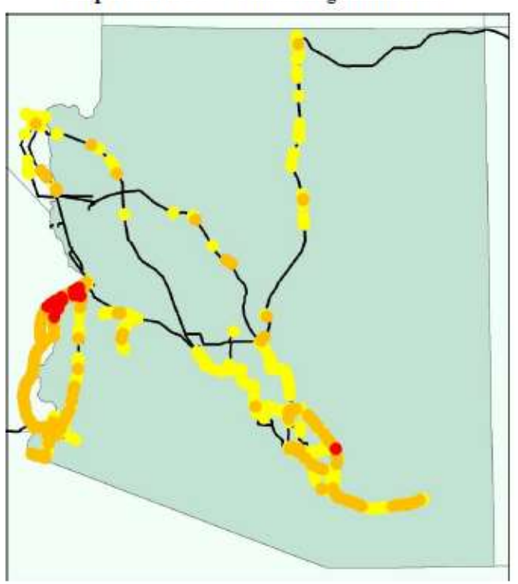
Maintenance Priority Codes

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

2nd Quarter Maintenance Performed



Map Detail of DSW Outstanding Maintenance



7.2 Wood Pole Maintenance Status - South of Parker

Western Area Power Administration
Geographic Information System

April-June Second Quarter 2017 G5200 CartoPac Maintenance Report
South of Parker

2nd Quarter Maintenance Performed

	Anchor	Arm/Bridge	Brace	Crossarm	Distribution Apparatus	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	Totals
Adjusted/Modified										4				4
Repaired			12	5	1			2		11			12	43
Replaced	1		13	15	2		4	8		35	2			80
TOTALS	1	0	25	20	3	0	4	10	0	50	2	0	12	127

Note: Totals include RADDS projects and maintenance items.

Maintenance Priority Codes

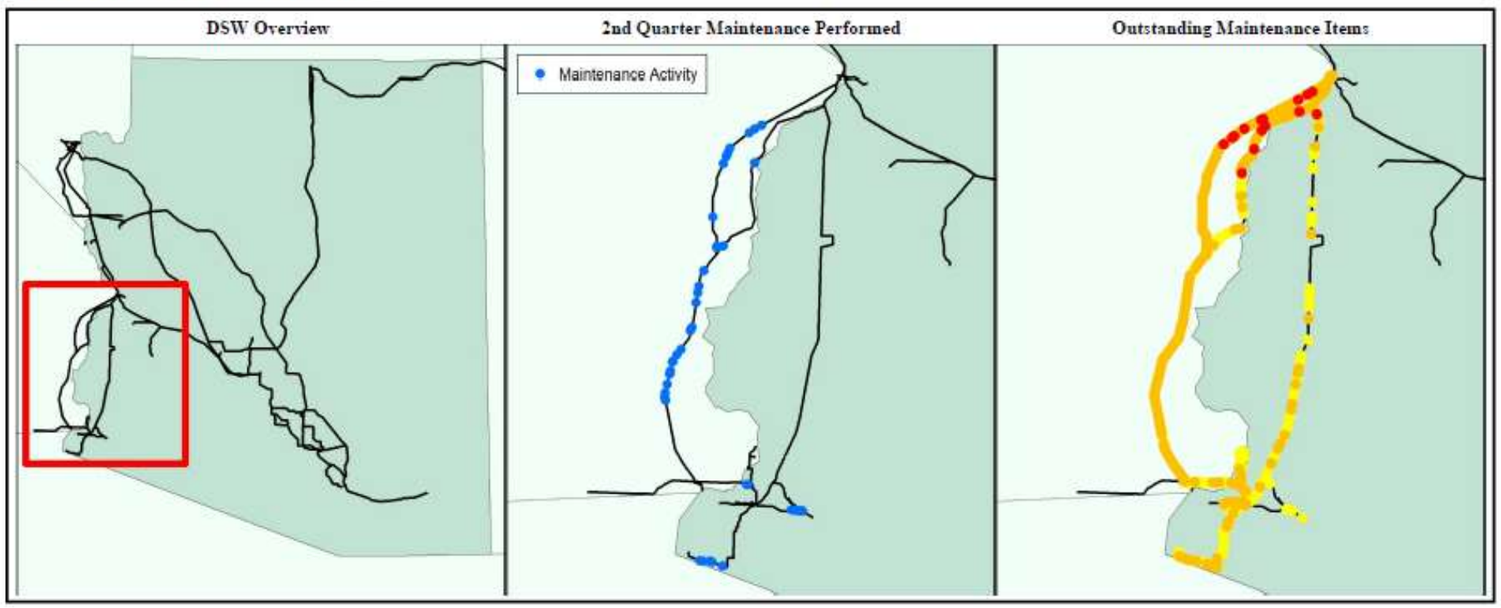
A	Good or like new. No action required.
B	Minor defect. Monitor degradation.
C	Moderate defect. Rehabilitation recommended as scheduled maintenance.
D	Serious defect. Repair, reinforce, or replace as soon as possible.
E	Risk to public safety or system reliability.

2nd Quarter Incoming Maintenance

	Anchor	Arm/Bridge	Body Extension	Brace	Crossarm	Distribution Apparatus	Foundation	Guy	Insulator	K Member/Window	Leg Member	OPGW	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	Vibration Damper	Totals
C	25	439			436	11		69	203				8	832	56	5	69	6	2159
D	1	15			39	1		4	16					567	6	3	4		656
E		2											1	8			2		13
Totals	26	456	0	0	475	12	0	73	219	0	0	0	9	1407	62	8	75	6	2828

DSW Total Outstanding Maintenance Backlog

	C	D	E	Totals
Anchor	60	2	1	63
Arm/Bridge				0
Body Extension				0
Brace	655	22	2	679
Crossarm	592	62		654
Distribution Apparatus	16	1		17
Foundation	1			1
Guy	151	7		158
Insulator	399	34		433
K Member/Window				0
Leg Member				0
OPGW				0
Phase/Conductor	19	1	1	21
Pole	1352	672	10	2034
Pole Hardware	136	7		143
Signs	34	3		37
Static Wire	86	10	2	98
Vibration Damper	9			9
Totals	3510	821	16	4347



7.3 Wood Pole Maintenance Status - South of Phoenix

Western Area Power Administration
Geographic Information System

April-June Second Quarter 2017 G5200 CartoPac Maintenance Report
South of Phoenix

2nd Quarter Maintenance Performed

	Anchor	Brace	Crossarm	Insulator	Pole	Signs	Totals
Adjusted/Modified	1	2	3		2	8	16
Repaired		1			28		29
Replaced		3	2	6	4		15
Totals	1	6	5	6	34	8	60

Note: Totals include RADDS projects and maintenance items.

Maintenance Priority Codes

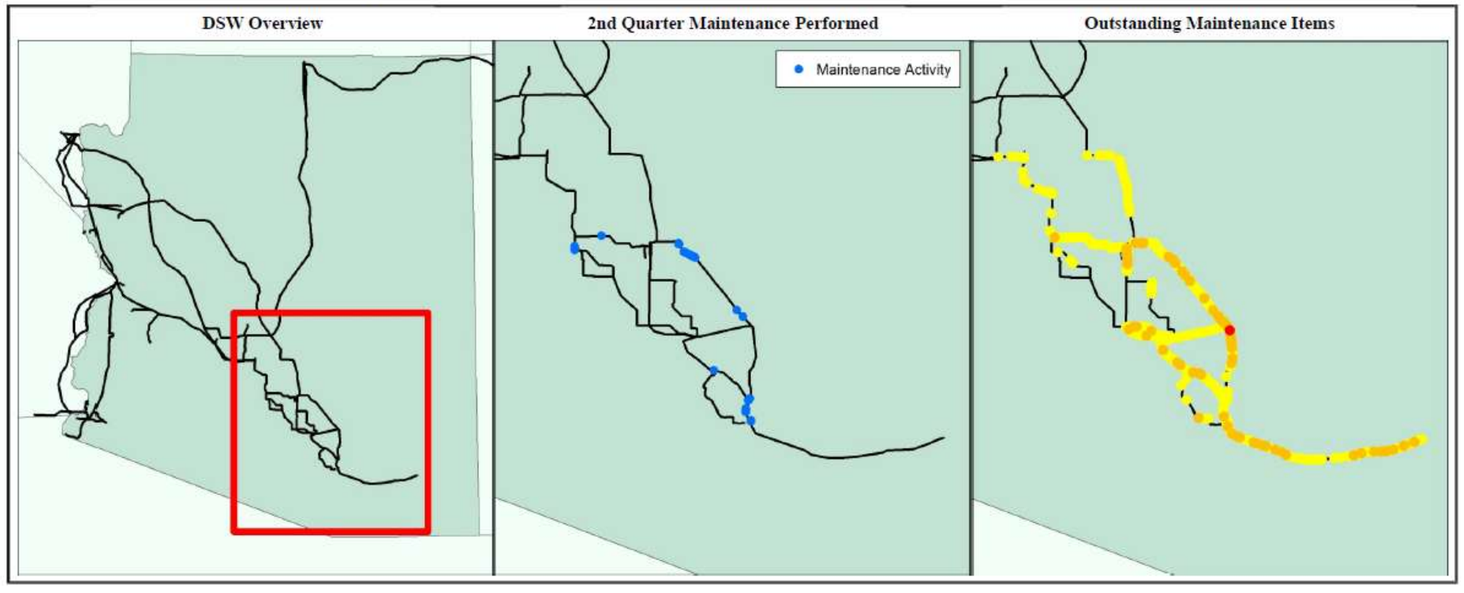
A	Good or like new. No action required.
B	Minor defect. Monitor degradation.
C	Moderate defect. Rehabilitation recommended as scheduled maintenance.
D	Serious defect. Repair, reinforce, or replace as soon as possible.
E	Risk to public safety or system reliability.

2nd Quarter Incoming Maintenance

	Anchor	Arm/Bridge	Brace	Crossarm	Foundation	Guy	Insulator	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	Vibration Damper	Totals
C	7	8	249	178	1	12	55		193	3	4	2	1	713
D			11	16			1	2	16			1		47
Totals	7	8	260	194	1	12	56	2	209	3	4	3	1	760

DSW Total Outstanding Maintenance Backlog

	C	D	E	Totals
Anchor	13			13
Arm/Bridge	8			8
Brace	409	14		423
Crossarm	263	22		285
Foundation	5			5
Guy	15			15
Insulator	158	5		163
OPGW	3			3
Phase/Conductor	7	17		24
Pole	451	34		485
Pole Hardware	10			10
Signs	7			7
Static Wire	8	8	1	17
Vibration Damper	2			2
Totals	1359	100	1	1460



8. COMPLETED CONSTRUCTION PROJECTS

8.1 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 6 -Installation of double string insulator assemblies

Completion

- March 17, 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	$5,300,000	$8,525,000	$7,830,592	$694,408
Appropriations	$0	$384,603	$384,603	$384,603	$0
Trust Funds*	$0	$336,281	$336,281	$336,281	$0
TOTAL	**$3,225,000**	**$6,020,884**	**$9,245,884**	**$8,551,476**	**$694,408**

Executions to date include expenses, obligations, and commitments through 7/31/17

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

9. ACTIVE CONSTRUCTION PROJECTS

9.1 Parker 161-kV Switch Replacement (Canceled)

The Parker Switch replacement project has been canceled and is currently in closeout. This project and others associated with the Parker 69-kV, 161-kV, and 230-kV substations were previously placed on hold, to evaluate the collective impacts on the Parker area transmission system. After further studies it has been determined that additional transmission planning analysis is needed. In an effort to incorporate the transmission needs of our customers in the Parker area, WAPA has created a South of Parker Planning Charter group. This sub-regional, transmission planning forum will identify interested parties long term transmission needs and assure a high degree of reliability in joint planning, development, and operations of the Bulk Electric System (BES).

It is with these considerations that WAPA proposed the cancellation of this project in lieu of a potentially lengthy on-hold status. Once adequate analysis of the greater Parker transmission system has concluded, WAPA will present new projects to address the known and developing maintenance issues related to Parker Substation.

Figure 7- Parker 161 -kV Yard

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$1,250,000	($1,250,000)	$0	$0	$0
Appropriations	$0	$25,685	$25,685	$25,685	$0
TOTAL	**$1,250,000**	**($1,224,315)**	**$25,685**	**$25,685**	**$0**

Executions to date include expenses, obligations, and commitments through 7/31/17

9.2 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 8- 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 ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$17,954,000	($334,176)	$17,619,824	$567,263	$17,052,561
Appropriations	$0	$792,099	$792,099	$792,099	$0
TOTAL	**$17,954,000**	**$457,923**	**$18,411,923**	**$1,359,362**	**$17,052,561**

Executions to date include expenses, obligations, and commitments through 7/31/17

9.3 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.

Figure 9 -Satellite View of Crossman Peak Future Location

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

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	$835,712	$3,689,288
Appropriations	$0	$0	$0	$0	$0
TOTAL	**$4,525,000**	**$0**	**$4,525,000**	**$835,712**	**$3,689,288**

Executions to date include expenses, obligations, and commitments through 7/31/17

9.4 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	*$0	$10,372,000	$325,280	$5,970,905
Appropriations	$0	*$4,075,815	*$4,075,815	*$4,075,815	$0
TOTAL	**$10,372,000**	***$4,075,815**	**$14,447,815**	**$4,401,095**	**$5,970,905**

Executions to date include expenses, obligations, and commitments through 7/31/17
**Appropriations became available to WAPA DSW which allowed for the procurement of the Capacitor Bank Equipment. DSW anticipates that the execution of the funding transfer will not take effect until September 2017.*

9.5 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 11 -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	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$1,025,000	$2,510,000	$3,535,000	$1,554,595	$1,980,405
Appropriations	$0	$430,012	$430,012	$430,012	$0
TOTAL	**$1,025,000**	**$2,940,012**	**$3,965,012**	**$1,984,607**	**$1,980,405**

Executions to date include expenses, obligations, and commitments through 7/31/17

9.6 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 12 -Tucson Substation Compacting Gravel Surface

Figure 13 -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	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$7,000,000	$0	$7,000,000	$6,661,693	$338,307
Appropriations	$0	$1,903,963	$1,903,963	$1,903,963	$0
TOTAL	**$7,000,000**	**$1,903,963**	**$8,903,963**	**$8,565,656**	**$338,307**

Executions to date include expenses, obligations, and commitments through 7/31/17

9.7 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 14 -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 (PCN)	$12,000,000	$5,223,587	$17,223,587	$3,203,622	$14,019,966
Appropriations	$0	$1,948,999	$1,948,999	$1,948,999	$0
TOTAL	**$12,000,000**	**$7,172,586**	**$19,172,586**	**$5,152,621**	**$14,019,966**

Executions to date include expenses, obligations, and commitments through 7/31/17

9.8 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 15 -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	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Pre-payment (PCN)	$2,000,000	$2,030,573	$4,030,573	$1,659,135	$2,371,438
Appropriations	$0	$2,132,170	$2,132,170	$2,132,170	$0
TOTAL	**$2,000,000**	**$4,162,743**	**$6,162,743**	**$3,791,305**	**$2,371,438**

Executions to date include expenses, obligations, and commitments through 7/31/17

10. ACTIVE PROJECTS (SEED FUNDING)

10.1 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.

10.2 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 16 -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.

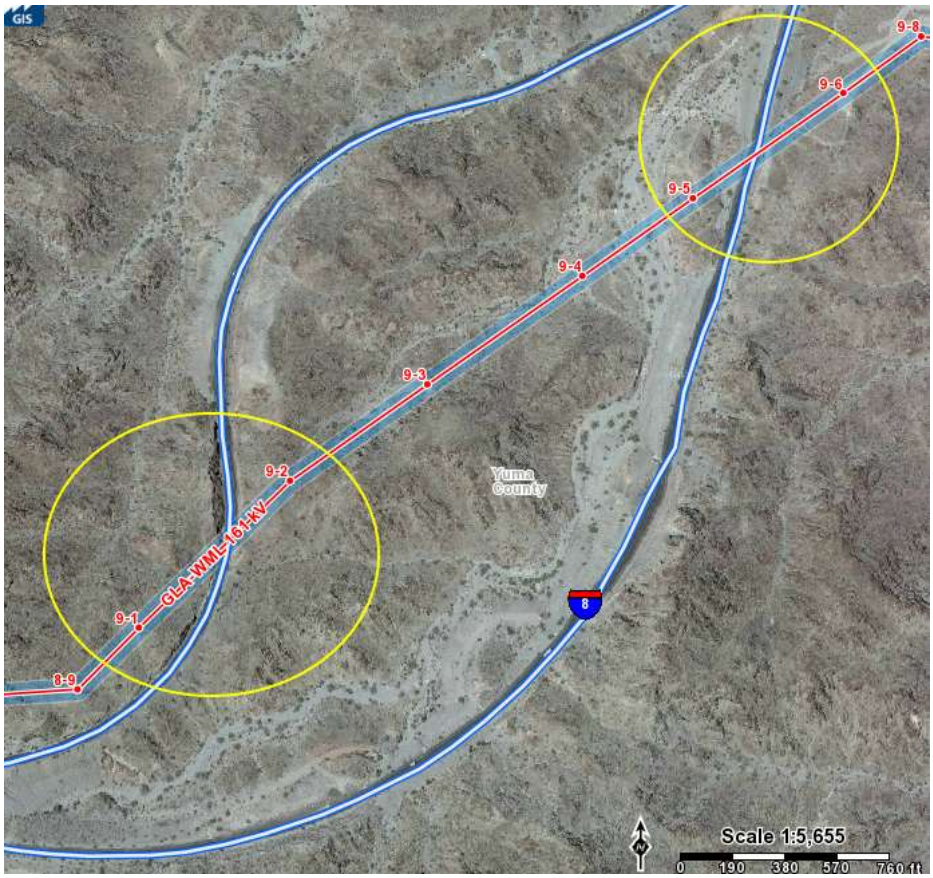


Figure 17 Locations where the GLA – WML crosses the interstate

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 7/31/17

CONCEPTUAL PROJECT FUNDING PLAN		
PHASE	**COST ESTIMATE**	**FUND TYPE**
1- Initiation, Planning, & ~50% Design Package	$500,000	Appropriations (WCF)
2- Full Design, Construction, & Closeout	$TBD	Pre-payment (PCN)
**** TOTAL PROJECT BUDGET***	***$TBD***	

**TOTAL PROJECT BUDGET will be updated upon completion of the ~50% design package which is expected in September 2017.*

11. ACTIVE PROJECTS – WORK FOR OTHERS

11.1 South Mountain Loop 202 Freeway Bypass (Trust Funded Project)

The South Mountain Freeway 202 Phoenix bypass project is an Arizona Department of Transportation (ADOT) project that is being built by Connect 202 (C202), a consortium of three contractors. The new 22-mile alignment starts south of Phoenix at I-10 and Pecos Road, runs west along the Pecos Road alignment then north following closely to existing 51st Ave roadway, where it intersects with I-10 and 59th Ave, on the west side of Phoenix. The new freeway loop crosses WAPA lines at two locations. Site #1 is at 51st Ave and Dusty Lane just north of the Gila River Indian Reservation. In order to accommodate the new highway, WAPA will remove one pole that is within the new roadway envelope and install two new structures outside of the ADOT ROW. New conductors, which are double circuit 230-kV transmission lines (Liberty to Phoenix and Liberty to Lone Butte) and OGW will be the same type and installed between the two poles. Site #2 is located at 63rd Ave and Elwood. Due to roadway elevation changes by C202, this site will only require WAPA installing line markers to ensure safe clearance distances for the equipment building the bypass.

Line marker installation at Site #2 is expected to be completed prior to October 1, 2017, and construction of Site #1 is anticipated to be begin in October 2018.

Project Milestones

- Complete design by mid-September 2017
- Award Construction Contract by March 2018
- Complete construction by mid-December 2018

Projected Energization

- Late November 2018

Project Updates

- WAPA is in negotiations with ADOT to modify the Marketing Agreement
- The DSW Service Center uninterrupted power supply system (UPS) is being investigated to ensure that when the Liberty-Phoenix line is removed from service, WAPA has adequate backup to support regional operations.

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Appropriations	$0	$0	$0	$0	$0
Trust	2,891,603	$0	$2,891,603	$308,980	$2,582,623
TOTAL	**$2,891,603**	**$0**	**$2,891,603**	**$308,980**	**$2,582,623**

Executions to date include expenses, obligations, and commitments through 7/31/17

11.2 ED2-Saguaro 115-kV Transmission Line Rebuild

(Reimbursable Maintenance Fund)

The ED2-SGR2 115-kV transmission line provides service to three Central Arizona Project pumping plants that supply water to Pima and Pinal Counties (the Brady, Picacho, and Red Rock plants). Due to a number of significant wood pole failures in a short time span (including the loss of 30 structures in 2012), CAP funded the rebuild of the 37.5 mile line to current steel monopole construction standards. Upon completion, the line will also include a 72-count fiber route through each pumping plant between the two substations. To date approximately 21 miles have been constructed and the second, final phase will start in October 2017.

Project Milestones & Schedule Updates

- ED2-Brady and Brady-Picacho segments completed June 2017
- Picacho-Red Rock segment construction to start October 2017
- Red Rock-Saguaro segment to begin in February 2018

Projected Energization/Completion

- No later than mid-June 2018

Project Updates

- Construction is ahead of schedule, approximately 4 additional miles in the first construction phase.
- Project expected to be completed $1.5M under initial budget of $18.2M.

Project Risk(s)

- Dense cultural resource sites located along Picacho-Red Rock segment.
- Multiple construction team coordination at APS' Saguaro Substation.

FUND TYPE	ORIGINAL BUDGET	FUNDING ADJUSTMENTS	CURRENT PROJECT BUDGET	EXECUTIONS TO DATE	REMAINING FUNDS
Reimbursable Maintenance Funds	$18,223,000	$0	$18,223,000	$14,775,761	$3,447,239
TOTAL	**$18,223,000**	**$0**	**$18,223,000**	**$14,775,761**	**$3,447,239**

Executions to date include expenses, obligations, and commitments through 7/31/17

11.3 Hassayampa Tap Upgrade

(Reimbursable Maintenance Funded)

The Hassayampa Switching Station (HSS) Project originated from a CAP request of WAPA to evaluate the replacement of the existing 230-kV Hassayampa Tap (HAT) with a new switching station. Following the development of multiple studies, WAPA was contracted to construct HSS as a 230-kV three-breaker ring bus configuration to upgrade the facilities that feed the Hassayampa Pumping Plant. Other key components include the 6-mile re-conductor from HSS to APS' Sun Valley Substation* (SVN) and double circuit structure installation that connects HSS to SVN and SVN to HAP. In order to account for an increased fault current between SVN and HAP, the project will also include the replacement of power transformers, instrument transformers, and motor-operated switches at HAP. A 48-count OPGW will also be installed between HSS, SVN, and HAP, an approximate distance of just over 6 miles.

**SVN is partially owned by CAP*

Project Milestones & Schedule Updates

- All major GFE has either been received or submitted for procurement.
- Construction contract has been solicited and the bid opening was held in early August 2017.
- Construction to begin in September 2017.
- Connection and energization from SVN to HAP late August 2018.
- HSS to SVN re-conductor to begin October 2018.
- Demolition of HAT complete by January 2019.

Projected Energization/Completion

- January 2019

Project Updates

- Pre-construction meeting to be held with contractor mid-August 2017.

12. FY18 PROPOSED NEW PROJECTS

12.1 Proposed Pre-payment (PCN) Funding Plan

WAPA's proposed pre-payment funding plan for FY18 is estimated at **$11,772,349. 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	***$6,342,000***	$500,000	$0	**$5,842,000
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**	****$11,772,349**

Cost estimate for preferred Alternative #3. See Coolidge-Valley Farms Section 12.2 for more details.

****Pre-Design Estimate will be updated upon completion of ~50% design package which is expected in September 2017.***

12.2 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 18: 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.

Project Justification Continued

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

<u>NESC Clearance Violations:</u>

Two phase-to-ground clearance violations exist which compromise public health and safety

<u>Line Condition:</u>

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

<u>Access Roads and ROW:</u>

Will require remedial action prior to mobilization

<u>Communication Requirements:</u>

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 Alternatives Overview and Selection

There were a total of four alternatives that were explored to provide a diverse range of viable and economically feasible design options. The feasibility/value of these alternatives was explored in regards to Compliance, Reliability and Economical. A detailed breakdown of each alternative can be found in the next section.

- **Alternative 1** – Status Quo, continue with maintenance only
- **Alternative 2** – Upgrade conductor (180 – 230MVA), replace failing wood poles in-kind, 115-kV with OPGW
- **Alternative 3 –** Upgrade conductor (180 – 230MVA), upgrade all structures to light duty steel, 115-kV with OPGW
- **Alternative 4** – Upgrade conductor (180 – 230MVA), upgrade all structures to steel monopoles, double circuit 115-kV with OPGW

Proposed Alternatives Detailed Breakdown

The following pages provide a detailed breakdown of each 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. For a better understanding of how these scores are compiled please see Section 15.1 AOA *Benefits Effectiveness Sheet* and Section 15.3 AOA *Evaluation Methodology*.

Alternative #1- Status Quo (Maintenance Only)

Pros:

- Avoids capital investment expenditures by not implementing design and construction
- Avoids environmental sensitivities present along the COL-VAF line
- WAPA resources remain available for other projects

Cons:

- WAPA and customers would absorb higher O&M expenditures negatively affecting rates
- No potential for additional interconnects or revenue generation in the area
- Aging equipment and structures would continue to degrade increasing O&M and rates
- Existing NESC clearance violations would go unresolved
- Pending issues would turn into additional NESC violations
- Failure of the line is imminent, overloading expected no later than FY 2020

Risks:

- Reliability of the COL-VAF would continue to decrease while absorbing high O&M costs
- Poses safety risks to line workers with aging infrastructure

Alternative 1 - Status Quo

Compliance Category		Score (0-4)
Does This Alternative Meet The Mission Needs?		0
Does This Alternative Meet All Regulatory Requirements?		0
How Much (negative) Environmental Impact Does This Alternative Generate?		4
How Much (negative) Land Impact Does This Alternative Generate?		4
	Average	2
	Section Weight	40%
	Weighted Compliance Score	0.8

Reliability Category		Score (0-4)
How Much Risk Does This Alternative Generate?		1
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?		2
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?		4
What Impact Would This Alternative Have On The BES If Implemented?		0
	Average	1.75
	Section Weight	35%
	Weighted Reliability Score	0.61

Economic Category		Score (0-4)
How Long Would Construction Take VS Other Alternatives?		4
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?		0
What Level Of Outages Are Required For This Alternative?		4
How Does This Alternative Affect Load Growth or Power Flow In The Area?		0
	Average	2
	Section Weight	25%
	Weighted Economic Score	0.5

Alternative 1 Final Score	1.91

Alternative 2 – Upgrade Conductor (180-230MVA), replace failing wood structures in-kind, 115-kV and OPGW

Pros:

- Mitigates needed replacement structures by utilizing current structures rated at B or better
- Reduces excavation footprint of project reducing labor hours from environmental
- Significantly improves reliability of WAPA's BES
- Reuses the 19 structures that were replaced in 2009 that remain in good health

Cons:

- Not all transmission line structures on the line will be new
- Wood structures would have a shorter lifespan (40 years) than that of steel (80 years)
- Wood structures would require more ongoing maintenance than steel

Risks:

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

Alternative 2 - Upgrade conductor, replace failing structures in-kind, 115-kV with OPGW

Compliance Category		Score (0-4)
Does This Alternative Meet The Mission Needs?		3
Does This Alternative Meet All Regulatory Requirements?		3
How Much (negative) Environmental Impact Does This Alternative Generate?		3
How Much (negative) Land Impact Does This Alternative Generate?		3
	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?		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?		3
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?		2
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 2 Final Score	3.03

Alternative 3 – 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

Alternative 3 - 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

Alternative 4 – Upgrade Conductor (180-230MVA each circuit), replace all structures with steel monopoles, double-circuit 115-kV and OPGW

Pros:

- Effectively provides two COL-VAF lines for improved reliability
- Entire COL-VAF transmission line segment would be new and built to current proper standards
- Reduced number of structures, labor and hardware required for steel monopole option
- Addresses SGR-ORA overload issues and VAF voltage issues with COL-VAF outage

Cons:

- Larger investment to bring COL-VAF transmission line to compliance
- Requires additional bays and components to construct additional 115-kV circuit
- Exceeds $11 million budget for a 6.1 mile transmission line
- Significant environmental sensitivities in the area of the transmission line

Risks:

- Potential for additional environmental clearance requirements
- Additional right-of-way may need to be acquired
- Significant increase to budget

Alternative 4 - Upgrade conductor, Steel Monopoles, double-circuit 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?		4
	Average	3.5
	Section Weight	35%
	Weighted Reliability Score	1.23

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?		4
	Average	2.75
	Section Weight	25%
	Weighted Economic Score	0.6875

Alternative 4 Final Score	3.21

Preferred Alternative:

Of these Alternatives, WAPA has concluded that Alternative 3 is preferred.

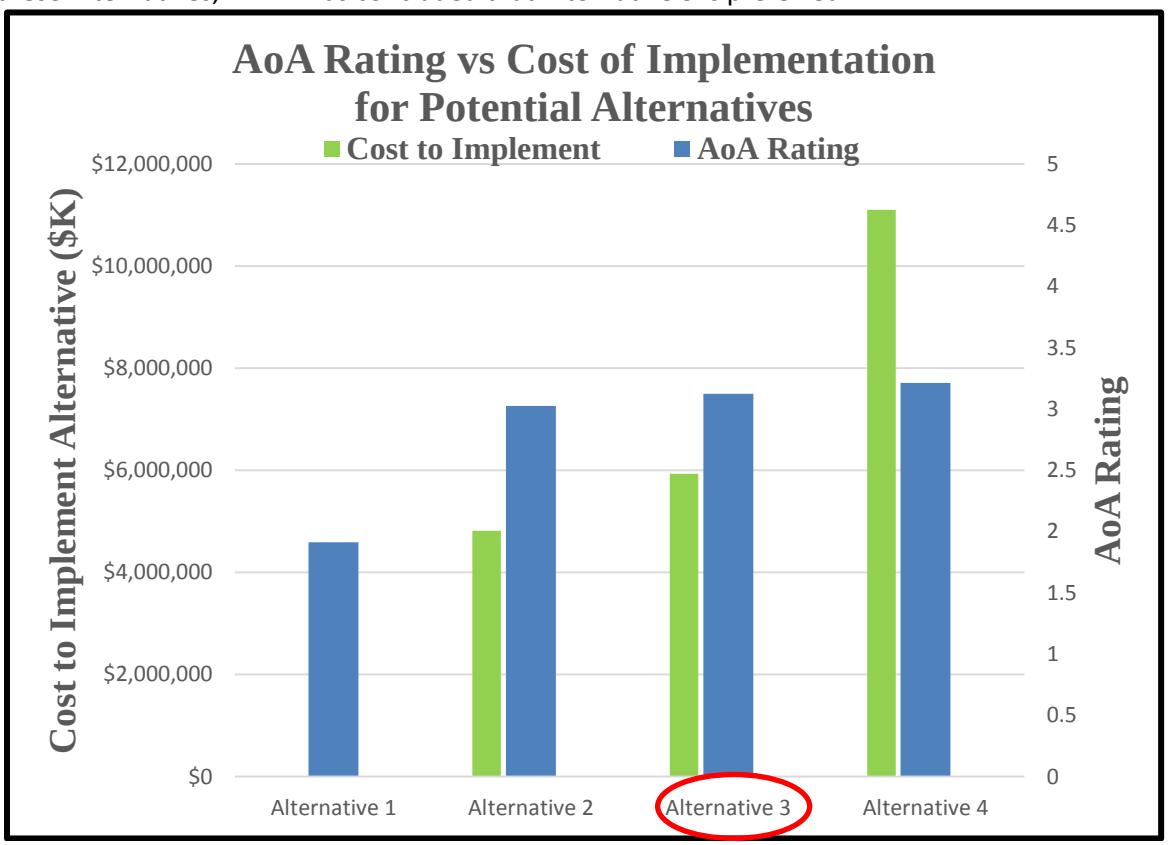


Figure 19- Breakdown of AOA for COL-VAF

Alternative Schedule Comparison

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

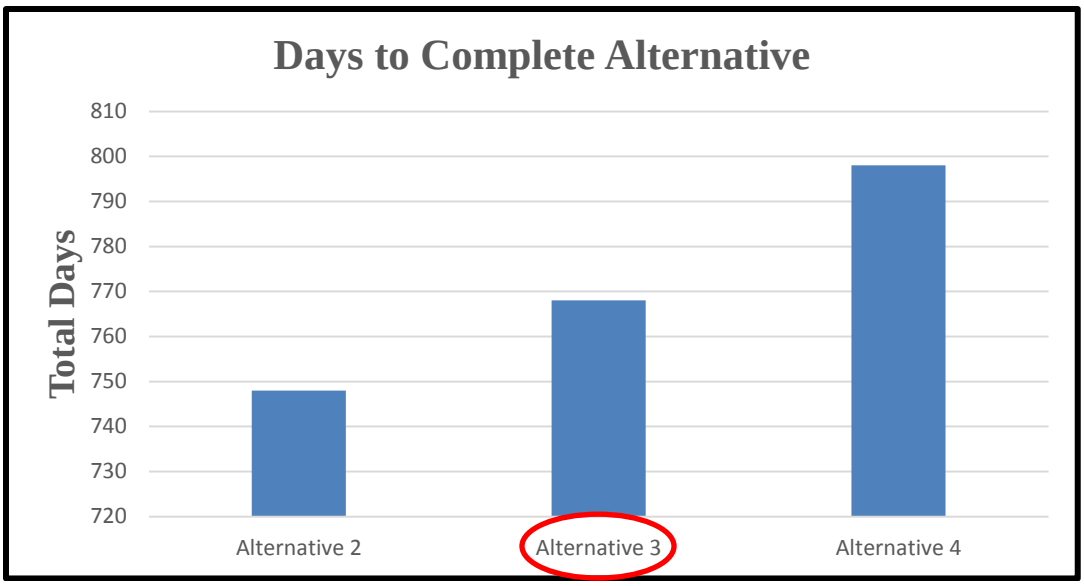


Figure 20- Days to Complete Comparison between Alternatives

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 recommended 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)

Conceptual Estimate for Preferred Alternative 3

Preferred Alternative #3 Conceptual Estimate	
Rebuild COL-VAF With Light Duty H-Frame Structures	
	TOTAL
Administrative	$1,190,328
EVMS*	$0
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%)	$988,391
Total Project Budget	**$5,930,349**

*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 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

Alternative 2

- Only replaces C and D rated structures on the line

Alternative 4

- May require additional funding for design implementation of the second circuit and clearing existing lines into the Coolidge yard
- Second circuit at Valley Farms will be connected into existing open bay on ring bus

Project Predesign Conceptual Schedule for Preferred Alternative

Projected Start: Fiscal Year Q3, 2018

Projected In-service Date: Fiscal Year Q4, 2020

See project schedule on next page 52

Another issue present on the COL-VAF line is the physical condition of the transmission structures. The structures are predominately wood H-frame and there are 57 in total, with 18 that are rated at a C or worse. The following maintenance report was executed at the end of July 2018.

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

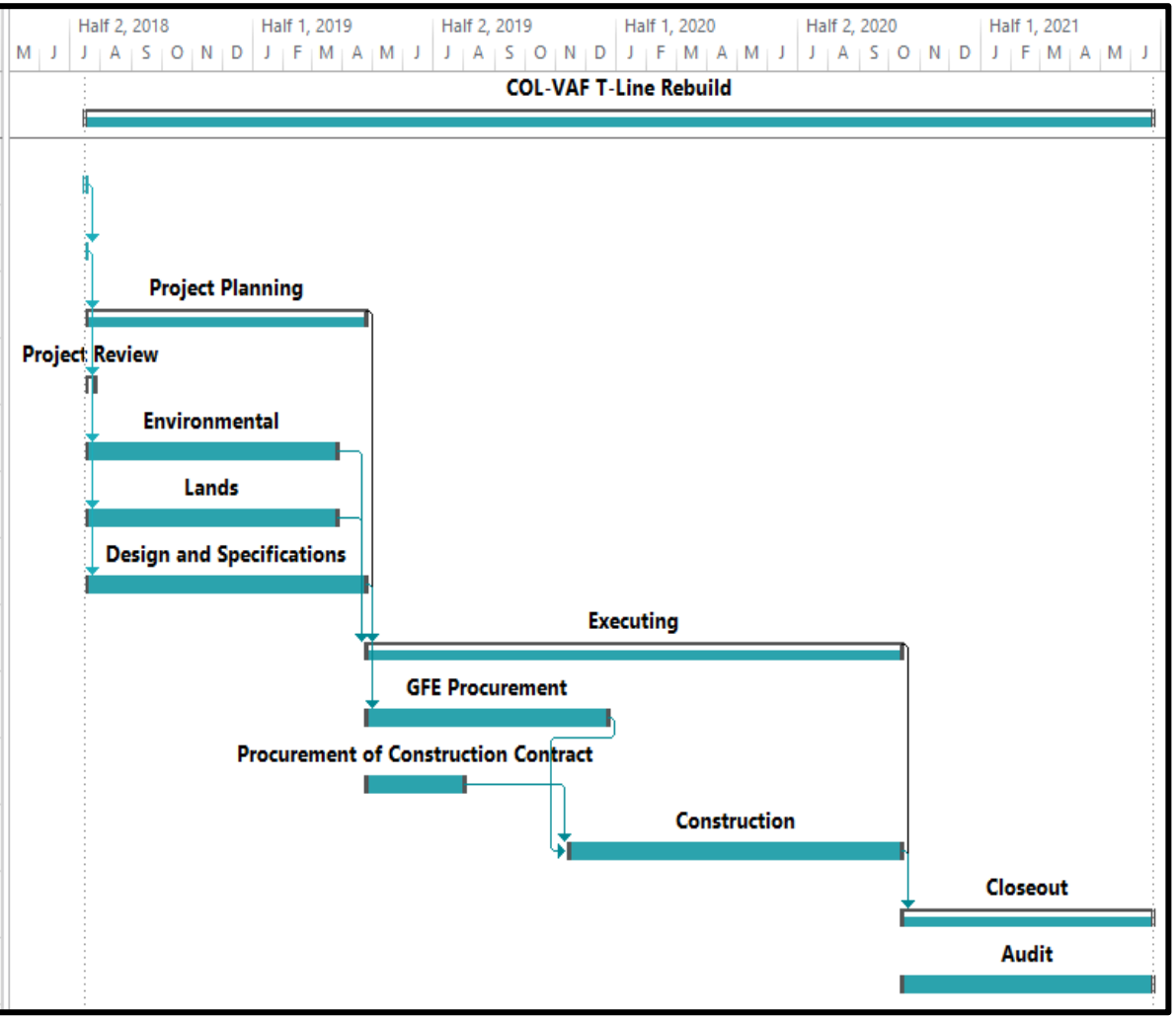
Row Labels	C	D	E	Grand Total
Anchor	1			1
Brace		1		1
Crossarm	3			3
Guy	1			1
Insulator	2			2
Phase/Conductor		1		1
Pole	15	3		18
Pole Hardware	3			3
Signs				0
Static Wire				0
Vibration Damper				0
Grand Total	25	5	0	30

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.

Conceptual Schedule for Alternative 3

Task Name	Duratio	Start	Finish
COL-VAF T-Line Rebuild	**768 days**	**Mon 7/16/18**	**Wed 6/23/21**
Assign Team	1 day	Mon 7/16/18	Mon 7/16/18
Kickoff Meeting	1 day	Tue 7/17/18	Tue 7/17/18
Project Planning	**201 days**	**Wed 7/18/18**	**Wed 4/24/19**
Project Review	**7 days**	**Wed 7/18/18**	**Thu 7/26/18**
Environmental	**180 days**	**Wed 7/18/18**	**Tue 3/26/19**
Lands	**180 days**	**Wed 7/18/18**	**Tue 3/26/19**
Design and Specifications	**201 days**	**Wed 7/18/18**	**Wed 4/24/19**
Executing	**385 days**	**Thu 4/25/19**	**Wed 10/14/20**
GFE Procurement	**174 days**	**Thu 4/25/19**	**Tue 12/24/19**
Procurement of Construction Contract	**71 days**	**Thu 4/25/19**	**Thu 8/1/19**
Construction	**239 days**	**Fri 11/15/19**	**Wed 10/14/20**
Closeout	**180 days**	**Thu 10/15/20**	**Wed 6/23/21**
Audit	**180 days**	**Thu 10/15/20**	**Wed 6/23/21**



12.3 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 21 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 22 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 Alternatives Overview and Selection
There were a total of five alternatives that were explored to provide a diverse range of viable, economically feasible design options. The feasibility/value of these Alternatives was explored in regards to Compliance, Reliability and Economical. A detailed breakdown of each Alternative can be found in the next section.

- Alternative 1- Status Quo (Routine maintenance only)
- Alternative 2- Re-conductor KOF-DME
- Alternative 3- Rebuild with Light Duty Steel H-Frame Structures
- Alternative 4- Rebuild to 230-kV Standards operated at 161-kV
- Alternative 5- Inset Structures as needed to mitigate NERC violations

Proposed Alternatives Detailed Breakdown
Below is a detailed breakdown of each 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. For a better understanding of how these scores are compiled please see Section 15.1 *AOA Benefits Effectiveness Sheet* and Section 15.3 *AOA Evaluation Methodology*.

Alternative 1- Status Quo (Maintenance Only)
Under Alternative 1 (the status quo alternative), the KOF-DME transmission line would remain in its present condition with eight NERC violations. WAPA maintenance forces would continue to replace failed wood poles with new wood poles upon failure pending resource availability.

The do nothing alternative would have no upfront construction costs, but to change out the remaining wood structures on an emergency maintenance basis could cost $550,000. This estimate is based on an actual pole replacements at a cost of $34,200. This scenario would leave seven wood structures in the line. A detailed ground inspection has identified five structures that have poles that have been rejected or are recommended to be replaced.

Pros

- Low overall cost, no design and construction costs would be incurred
- No additional right-of-way would be required
- Resources would be available for other projects

Cons

- The line would continue to be de-rated in the future
- Redundant communications path with additional bandwidth would not be established.
- There would be increased maintenance costs as wood poles continue to deteriorate
- NERC violations likely to only be addressed in a reactive, emergency maintenance situation
- Maintenance resources would not be able to tend to other parts of the power system

Risks

- Increased risk of unscheduled outage due to failed wood structures.
- Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.

Alternative 1 - Status Quo (Do Nothing)

Compliance Category	Score (0-4)
Does This Alternative Meet The Mission Needs?	0
Does This Alternative Meet All Regulatory Requirements?	0
How Much (negative) Environmental Impact Does This Alternative Generate?	3
How Much (negative) Land Impact Does This Alternative Generate?	3
Average	1.5
Section Weight	40%
Weighted Compliance Score	0.6

Reliability Category	Score (0-4)
How Much Risk Does This Alternative Generate?	0
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?	2
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?	0
Average	1.25
Section Weight	35%
Weighted Reliability Score	0.44

Economic Category	Score (0-4)
How Long Would Construction Take VS Other Alternatives?	4
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?	1
What Level Of Outages Are Required For This Alternative?	2
How Does This Alternative Affect Load Growth or Power Flow In The Area?	0
Average	1.75
Section Weight	25%
Weighted Economic Score	0.4375

Alternative 1 Final Score	1.48

Alternative #2- Reconductor KOF-DME

Under Alternative 2, WAPA would replace 7.3 miles of 300 kcmil hollow core copper conductor with 336.4 kcmil ACSS conductor and replace one steel OGW with OPGW. Seven deteriorating wood structures would be replaced with light duty steel H-frame structures and others would be replaced on a case by case basis if clearance issues were not corrected by the stringing of new ACSS conductor. Access roads will be improved as needed.

Pros

- All NERC violations would be corrected.
- Increase in line capacity.
- A redundant communications path with the needed additional bandwidth will be provided.
- Cost of construction contract could be reduced by approximately $168,500 due to scrap value of removed copper conductor.

Cons

- Some wood structures remain which would require additional maintenance and annual inspection.
- Amended or new right-of-way may have to be acquired from BLM.

Risks

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

Alternative 2 - Reconductor KOF-DME

Compliance Category	Score (0-4)
Does This Alternative Meet The Mission Needs?	3
Does This Alternative Meet All Regulatory Requirements?	3
How Much (negative) Environmental Impact Does This Alternative Generate?	2
How Much (negative) Land Impact Does This Alternative Generate?	2
Average	2.5
Section Weight	40%
Weighted Compliance Score	1

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?	1
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
Section Weight	25%
Weighted Economic Score	0.5

Alternative 2 Final Score	2.55

Alternative #3- 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

Alternative #4-Rebuild to 230-kV Standards

Under Alternative 4, WAPA would remove 7.3 miles of 300 kcmil hollow core copper conductor, two steel OGW, 50 light duty steel H-Frame structures, and seven wood H-Frame wood structures. WAPA would then rebuild the line segment by installing 7.3 miles of 954 kcmil ACSR conductor, OPGW, polymer insulators, and hardware designed for 230-kV on single circuit steel monopoles. The line would operate at 161-kV until future demands called for 230kV transmission. Access roads will be improved as needed.

Pros

- All NERC violations would be corrected.
- The transmission line would be built to 230-kV standards to meet any future increased demands.
- 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.

Cons

- Project cost is the highest of the five alternatives.
- Potential claims by landowners for damage to property.

Risks

- Outage coordination will be required among multiple entities. In addition to seasonal constraints, competing projects across the system may limit construction outage windows.

Alternative 4 - Rebuild KOF-DME to 230-kV Standards

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?		4
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?		4
	Average	3.5
	Section Weight	35%
	Weighted Reliability Score	1.23

Economic Category		Score (0-4)
How Long Would Construction Take VS Other Alternatives?		1
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?		4
	Average	2.75
	Section Weight	25%
	Weighted Economic Score	0.6875

Alternative 4 Final Score	3.11

Alternative #5- Inset Structures
Under Alternative 5, WAPA would install eight light duty steel H-frame inset structures between existing transmission line structures as necessary to correct clearance issues. Access roads would be improved as necessary for construction.

Pros:

- NERC violations would be corrected and the risk for the line de-rating is reduced.
- Alternative has the second lowest cost of all alternatives.

Cons:

- Seven wood structures would remain in deteriorated condition.
- Maintenance costs could remain high.
- Only addresses NERC violations.
- Redundant communications path with additional bandwidth would not be established.

Risks

- Increased risk of unscheduled outage due to failed wood structures.
- Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.

Alternative 5 - Inset Structures

Compliance Category	Score (0-4)
Does This Alternative Meet The Mission Needs?	1
Does This Alternative Meet All Regulatory Requirements?	3
How Much (negative) Environmental Impact Does This Alternative Generate?	2
How Much (negative) Land Impact Does This Alternative Generate?	1
Average	1.75
Section Weight	40%
Weighted Compliance Score	0.7

Reliability Category	Score (0-4)
How Much Risk Does This Alternative Generate?	2
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?	2
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?	1
What Impact Would This Alternative Have On The BET System If Implemented?	1
Average	1.5
Section Weight	35%
Weighted Reliability Score	0.53

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?	1
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
Section Weight	25%
Weighted Economic Score	0.5

Alternative 5 Final Score	1.73

Preferred Alternative:
Of the five alternatives, WAPA has concluded that Alternative 3 is the preferred option. Although Alternative 4 achieved a higher AOA Rating, the cost required to achieve that rating is far greater than Alternative 3. This fact is illustrated on Figure 23 "Breakdown of AOA Ratings and Cost for Kofa-Dome Tap Project".

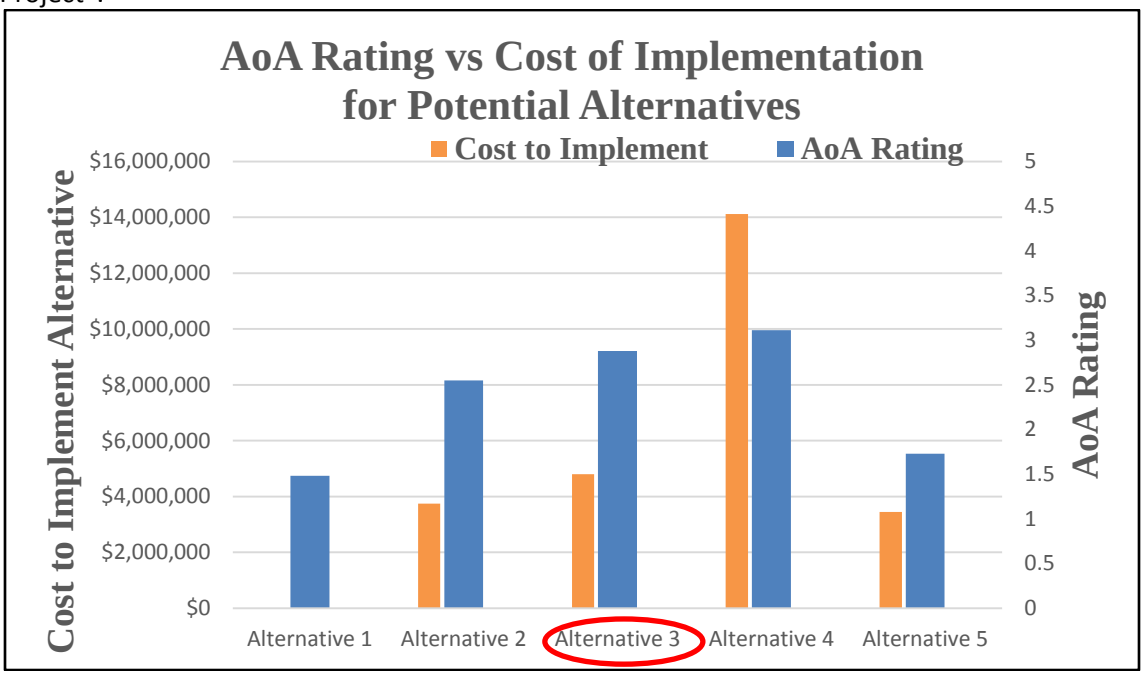


Figure 23 Breakdown of AOA Ratings and Cost for Kofa-Dome Tap Project

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

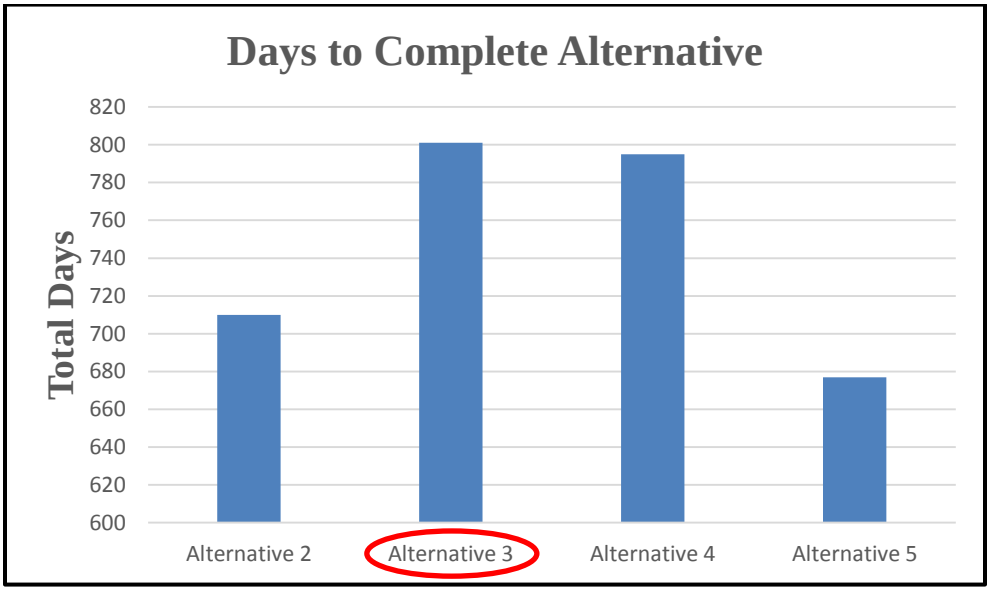


Figure 24 Days to Complete Comparison between Alternative

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	$4,016,685
Contingency (20%)	$889,337
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

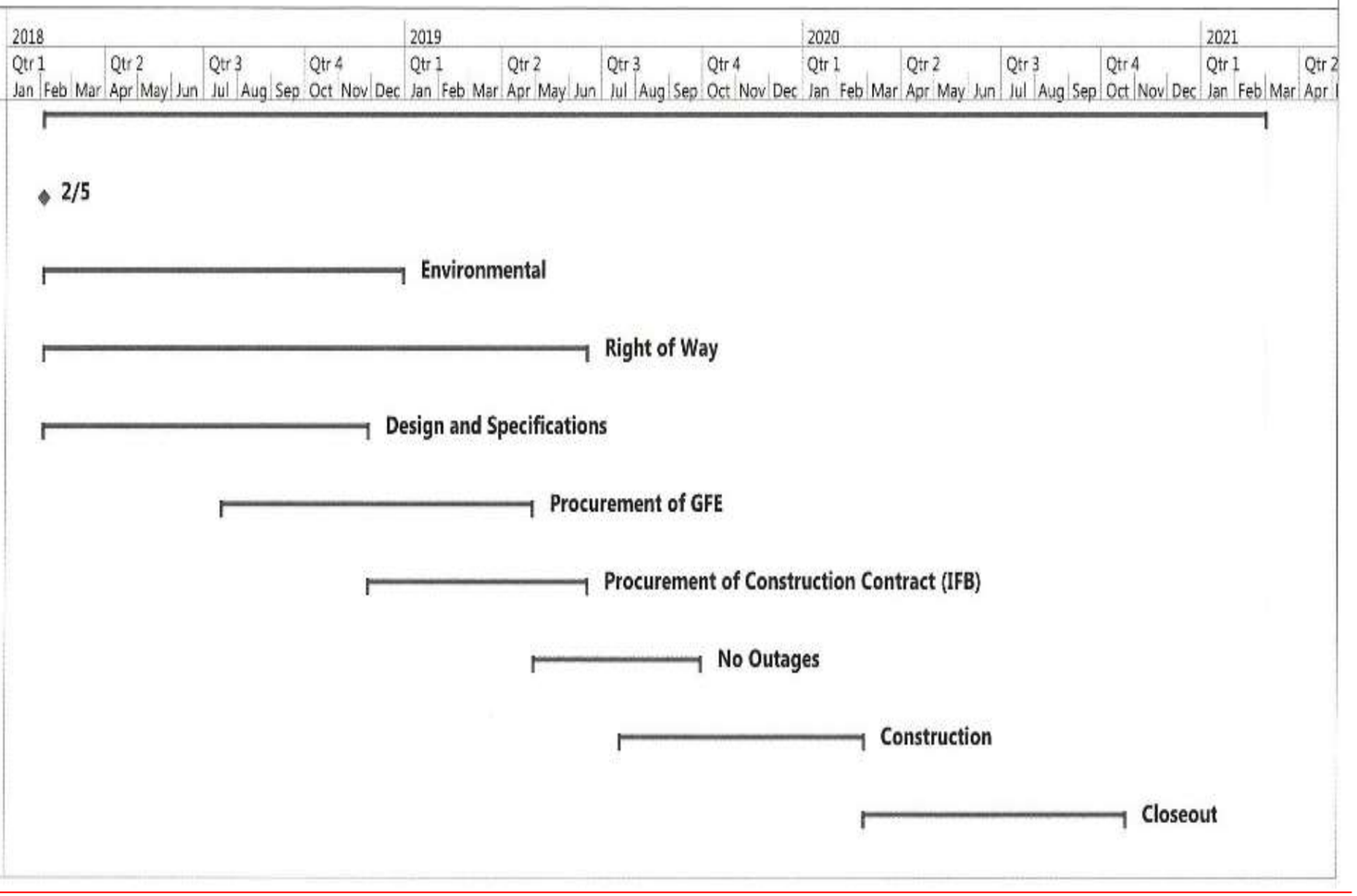
- No new ROW would be needed except for temporary construction permits.
- No line outages are allowed between May 1 and Oct 1 in any given year.
- Cost estimate is conceptual and must be revised before establishing a construction project budget.
- Salvage value of old copper wire will be $1.55 per pound.
- 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.

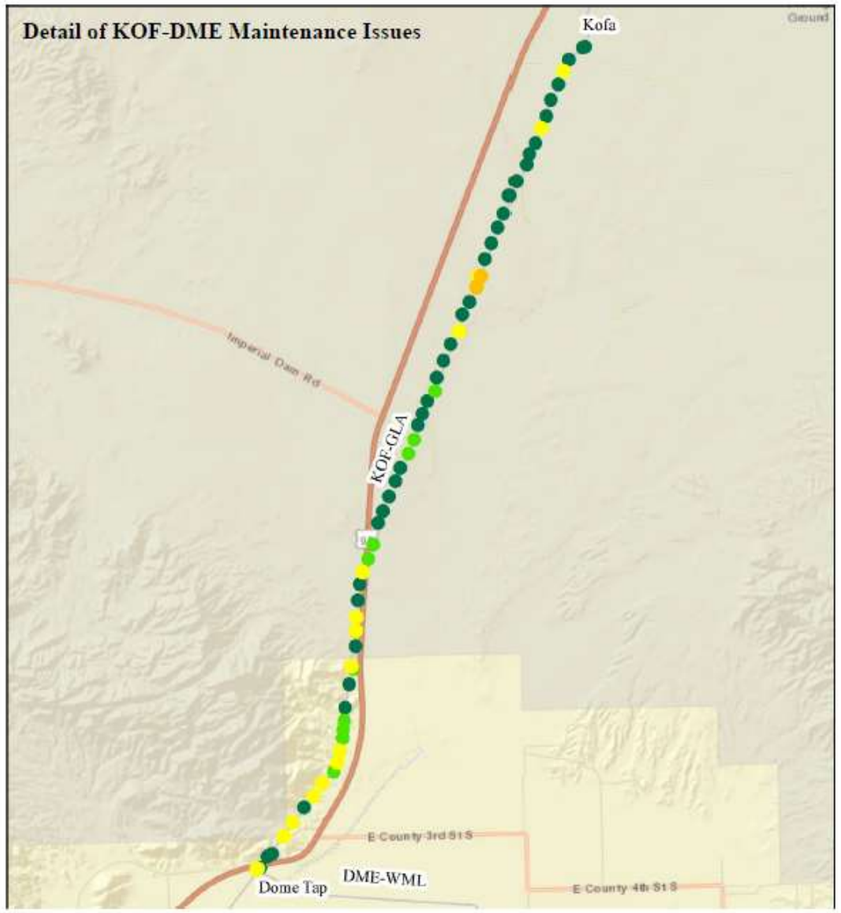
2017 Inspection Progress

	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.

12.4 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 25 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.

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:
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 26 DME-GLA wood pole checking/cracking

Proposed Alternatives Overview and Selection

There were a total of five alternatives that were explored to provide a diverse range of viable, economically feasible design options. The feasibility/value of these alternatives was explored in regards to Compliance, Reliability and Economical. A detailed breakdown of each alternative can be found in the next section.

- Alternative 1- Status Quo (Routine maintenance only)
- Alternative 2- Re-conductor DME-GLA
- Alternative 3- Rebuild with Light Duty Steel H-Frame Structures
- Alternative 4- Rebuild to 230-kV standards operated at 161-kV
- Alternative 5- Inset Structures as needed to mitigate NERC violations

Proposed Alternatives Detailed Breakdown

In the following pages you will find a more detailed breakdown of each 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. For a better understanding of how these scores are compiled please see Section 15.1 *AOA Benefits Effectiveness Sheet* and Section 15.3 *AOA Evaluation Methodology.*

Alternative 1- Status Quo (Maintenance Only)

Under the no action alternative, The DME-GLA transmission line remains in its present condition with eight NERC violations. WAPA maintenance forces would continue to replace failed wood poles with new wood poles upon failure pending resource availability.

Pros

- Low overall cost, no design and construction costs would be incurred.
- No outages would need to be taken.
- Avoids environmentally sensitive areas.
- No additional right-of-way needed.

Cons

- NERC violations likely to only be addressed in a reactive, emergency maintenance situation.
- WAPA would potentially have to de-rate the line if the NERC violations are not corrected.
- Greater risk of unplanned longer outages due to line failures.
- Increased maintenance costs and resources would not be able to tend to other parts of the system.
- Decreased system safety/reliability due to severed ground wires, fallen debris, and weathered structures.
- 161-kV transmission line load capability limits future load growth.
- There would not be a redundant communications path established.

Risks

- Increased risk of unscheduled outage due to failed wood structures.
- Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.

Alternative 1 - Status Quo

Compliance Category	Score (0-4)
Does This Alternative Meet The Mission Needs?	0
Does This Alternative Meet All Regulatory Requirements?	0
How Much (negative) Environmental Impact Does This Alternative Generate?	3
How Much (negative) Land Impact Does This Alternative Generate?	3
Average	1.5
Section Weight	40%
Weighted Compliance Score	0.6

Reliability Category	Score (0-4)
How Much Risk Does This Alternative Generate?	1
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?	1
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?	0
What Impact Would This Alternative Have On The BET System If Implemented?	1
Average	0.75
Section Weight	35%
Weighted Reliability Score	0.26

Economic Category	Score (0-4)
How Long Would Construction Take VS Other Alternatives?	4
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?	1
What Level Of Outages Are Required For This Alternative?	3
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 1 Final Score	1.49

Alternative 2- Reconductor

Under Alternative 2, WAPA would clear ROW access roads and pads, replace 7.6 miles of 300 kcmil hollow core copper conductor with 336.4 kcmil ACSS conductor, replace one steel OGW with OPGW. Ten deteriorating wood structures would be replaced with light duty H-frame structures and others would be replaced on a case by case basis if clearance issues were not corrected by the stringing of new ACSS conductor.

Pros

- All NERC violations would be corrected.
- Six existing wood structures left in place reduces Project cost.
- Inset structures may not be needed to fix NERC violations.
- New lighter conductor can be used, creating less sag and greater span lengths.
- Clean up of ROW access would be completed in a single effort and would not require a piecemeal approach.
- Increased line capacity.
- A redundant communications path with the needed additional bandwidth will be provided.
- Cost of construction contract could be reduced by approximately $175,500 due to scrap value of removed copper conductor.

Cons

- Leaving existing six wood structures will decrease system safety/reliability due to severed ground wires, fallen debris, weathered structures and increased maintenance operations.
- Environmental Assessment (EA) may be required by BLM, a process that can take approximately one year or longer.
- 161-kV transmission line load capability limits load growth.

Risks

- Increased risk of unscheduled outage due to failed wood structures.
- Outage coordination will be required among multiple entities. In addition to seasonal constraints, competing projects across the system may limit construction outage windows.
- Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.

Alternative 2 - Reconductor and Replace damaged Wood Structures

Compliance Category	Score (0-4)
Does This Alternative Meet The Mission Needs?	4
Does This Alternative Meet All Regulatory Requirements?	2
How Much (negative) Environmental Impact Does This Alternative Generate?	3
How Much (negative) Land Impact Does This Alternative Generate?	3
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?	2
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	2.75
Section Weight	35%
Weighted Reliability Score	0.96

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?	2
Average	2.25
Section Weight	25%
Weighted Economic Score	0.5625

Alternative 2 Final Score	2.73

Alternative 3- 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

Alternative 4- Rebuild to 230-kV standards

Under Alternative 4, WAPA would clear ROW access roads and pads, then remove 7.6 miles of 300 kcmil hollow core copper conductor, two steel OGWs, 50 light duty steel H-Frame structures, and 16 wood H-Frame wood structures. WAPA would then rebuild the line segment by installing 7.6 miles of 954 kcmil ACSR conductor, OPGW, polymer insulators, and hardware designed for 230-kV on single circuit steel monopoles. The line would operate at 161-kV until future demands called for 230-kV transmission.

Pros

- The crossing structures will be replaced prior to an emergency.
- No wood structures will decrease inspection costs.
- Heavy duty steel monopole structures will last longer than other structures.
- Lower environmental impacts.
- 230-kV poles have more options available for colors, finishes, and heights.
- Replacing all structures would reduce maintenance inspection frequency from every year to once every three years.
- System safety will increase.
- Inset structures will not be needed to fix NERC violations.
- New conductor can be used with less sag, increased length of span.
- This option will provide a redundant communications path and the needed additional bandwidth.
- ROW constraints will be addressed one time for entire project.
- Cost of construction contract could be reduced by approximately $175,500 due to scrap value of removed copper conductor.

Cons

- Higher material installation costs.
- Specialized, heavier equipment required for installation of 230-kV structures. WAPA does not own this equipment.
- Longer construction schedule.
- Requires more engineering to redesign lines with different structures and spans.
- WAPA DSW crews are not equipped to erect and install Heavy duty steel monopole structures.
- Environmental Assessment may be required, a process that may take up to one year or more.

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

Alternative 4 - Rebuild to 230-kV standards operate at 161kV

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?	1
How Much (negative) Land Impact Does This Alternative Generate?	1
Average	2.5
Section Weight	40%
Weighted Compliance Score	1

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?	4
What Impact Would This Alternative Have On The BET System If Implemented?	4
Average	4
Section Weight	35%
Weighted Reliability Score	1.40

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?	4
Average	3
Section Weight	25%
Weighted Economic Score	0.75

Alternative 4 Final Score	3.15

Alternative 5- Inset Structures

WAPA will construction new access ROW roadways and pads to enable the construction of inset of eight light duty steel H-frame inset structures as necessary to correct clearance issues.

Pros

- Lowest construction costs.
- Eight short scheduled outages.

Cons

- Ten wood structures would remain in deteriorated condition.
- Increased maintenance costs over time.
- Environmental Assessment may be required, a process that may take up to one year or more.
- Much of the right-of-way would not be repaired.
- Decreased system safety/reliability due to severed ground wires, fallen debris, weathered structures and increased maintenance operations.
- 161-kV transmission line load capability limits load growth.
- This alternative will only fix NERC violations
- This option will not provide a redundant communications path or the needed additional bandwidth.
- ROW constraints or the purchase of new ROW will be addressed one time for each structure only.

Risks

- Increased risk of unscheduled outage due to failed wood structures.
- Increased safety hazards due to shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.
- Outage coordination will be required among multiple entities. Numerous short outages may not be readily available, resulting in a more drawn out construction schedule and higher relative costs.

Alternative 5 - Inset structures as needed

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

Reliability Category	Score (0-4)
How Much Risk Does This Alternative Generate?	1
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?	1
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?	0
What Impact Would This Alternative Have On The BET System If Implemented?	1
Average	0.75
Section Weight	35%
Weighted Reliability Score	0.26

Economic Category	Score (0-4)
How Long Would Construction Take VS Other Alternatives?	3
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?	1
What Level Of Outages Are Required For This Alternative?	3
How Does This Alternative Affect Load Growth or Power Flow In The Area?	2
Average	2.25
Section Weight	25%
Weighted Economic Score	0.5625

Alternative 5 Final Score	2.03

Preferred Alternative:

Of these Alternatives, WAPA has concluded that Alternative 3 is preferred. Alternative 3 achieved the highest AOA Rating, the cost required to achieve that rating is much less than Alternative 4, as can be seen in *Figure 28 Breakdown of AOA for DME-GLA NERC Mitigation* below.

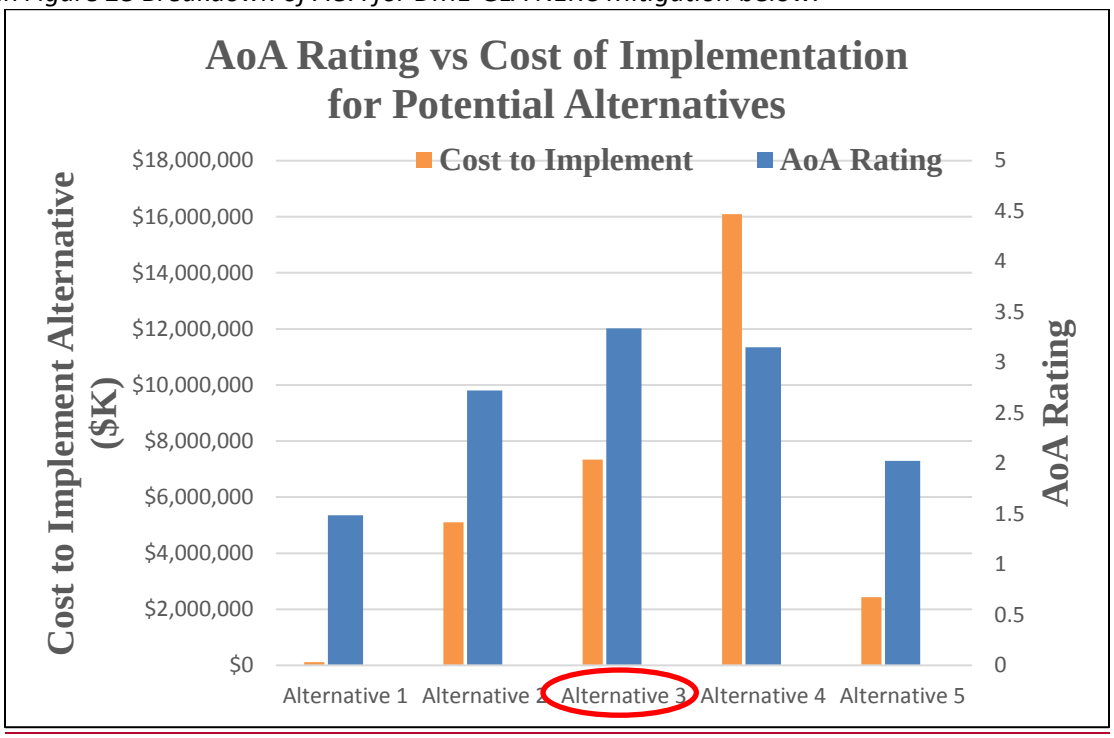


Figure 27- Breakdown of AOA for DME-GLA NERC Mitigation

Alternative Schedule Comparison

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

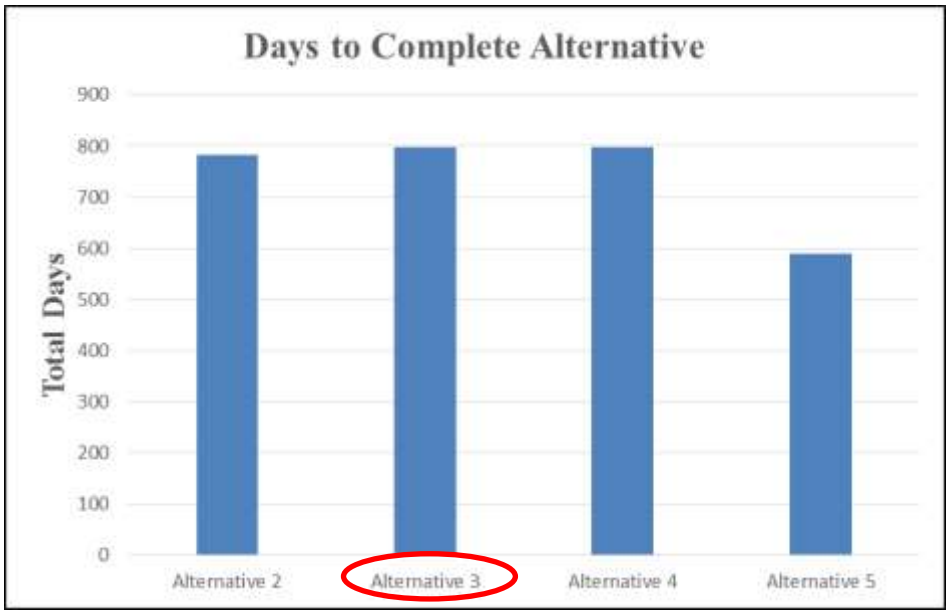


Figure 28 - Days to complete comparison between Alternatives

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.

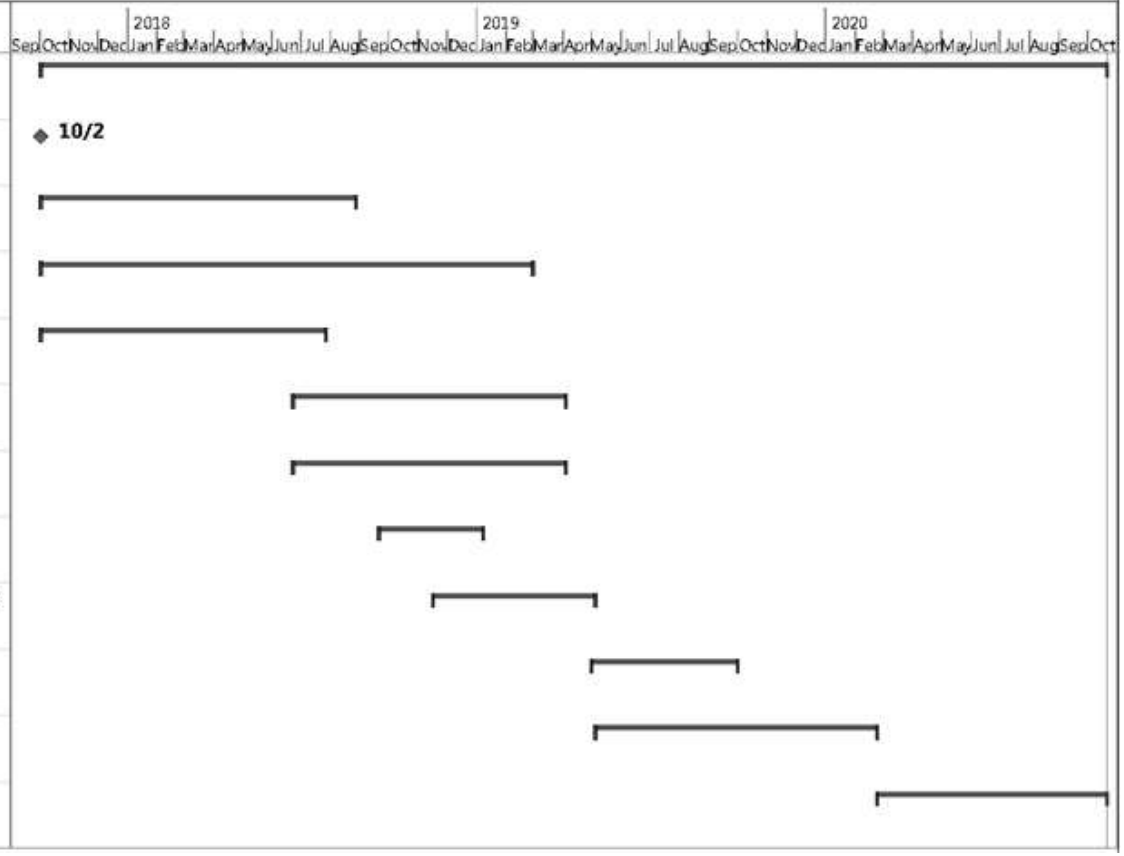
Project Predesign Conceptual Schedule for Preferred Alternative (Conceptual)

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**



Western Area Power Administration

Geographic Information System

July 25, 2017 DME-GLA 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				3	4
Replaced												0
TOTALS	0	0	0	0	0	0	1	0	0	0	3	4

Note: Totals include RADDS projects and maintenance items.

2017 Inspection Progress

	Structures
Inspected	61
Uninspected	6
Total	67

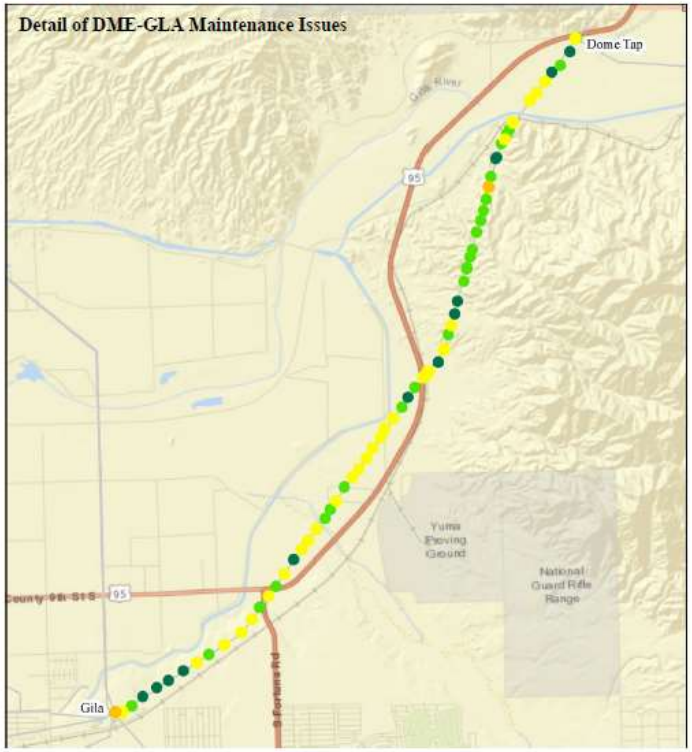
91%

Outstanding Maintenance in 2017

Row Labels	C	D	E	Grand Total
Anchor	6			6
Brace	6			6
Crossarm	8	1		9
Guy	8			8
Insulator	12			12
Phase/Conductor	1			1
Pole	32	1		33
Pole Hardware	1			1
Signs				0
Static Wire	3			3
Vibration Damper				0
Grand Total	77	2	0	79

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.



13. RETIREMENTS, REPLACEMENTS, AND ADDITIONS, (RRAD)

13.1 Overview

RRADs projects are typically completed in less than one year, and primarily rely on Federal labor to complete. Minimal design is required, and most of the material required is industry standard and easily attainable. RRAD projects are completed using existing WAPA Craft personnel and do not usually require contracted labor (Refer to the Appendices for the RRADs projects listing.). There are exceptions to this, all construction no matter the value or labor requirement in Boulder Canyon, CRSP, CAP, Levee and Salinity are accounted for in the RRAD program.

13.2 RRADs Budget Executions

Power System	Boulder Canyon	CAP	CRSP	Intertie	Parker Davis	Salinity	Levee	Grand Totals
FY17 Execution As of 8-10-17	$974,711	$10,522,578	$2,873,894	$ 1,388,846	$ 8,844,148	$ 525,947	$2,174,895	$27,305,019
FY18	$350,000	$ 6,877,500	$6,525,085	$ 3,591,808	$ 7,445,500	$1,112,483	$ 953,999	$26,856,375
FY19	$400,000	$ 800,000	$7,980,000	$ 2,440,000	$10,768,550	$ -	$ 689,000	$23,077,550
FY20	$600,000	$ 400,000	$5,535,000	$ 2,915,000	$ 9,506,024	$ -	$ -	$18,956,024
FY21	$400,000	$ 400,000	$5,185,000	$ 1,890,000	$ 8,566,347	$ -	$ -	$16,441,347

13.3 RRADs FY17 Funds Executed By Power System (>$200,000)

**Executed as of 7/31/17*

Boulder Canyon Project		
1	Hoover- Mead 1 thru 8 Jumper Replacement	$967,436
CENTRAL ARIZONA PROJECT		
2	Hassayampa Tap 230 Recon	$9,699,704
3	Transmission Line Replacement	$820,491
Colordao River Front Work and Levee System		
4	Army Tap / Senator Wash Line	$771,179
5	Gila-Gila Valley Lateral Rebuilds	$1,398,755
COLORADO RIVER STORAGE PROJECT		
6	GC Drainage Erosion	$226,697
7	Physical Security Enhancement Program	$922,385
8	Warehouse/Workspace with BOR	$382,821
9	Emergency Breaker	$546,203
10	"PPK" - Spare 345kV Breaker	$229,612
Colorado River Basin Salinity Contorl Project		
11	"WFD" - Sonora Wellfield Transformers	$458,932
Intertie Project		
12	"MED" - Mead Upgrade for Erosion Control	$382,752
13	Mead Security Building	$498,191
Parker Davis Project		
14	Moveable Property	$3,691,554
15	DSW - HVAC SCADA	$252,160
16	DSW - Roof Replacement	$486,333
17	Wood Pole Replacement Program	$2,839,212
18	Station Relay Upgrades	$277,182
19	DSW - Security Ids Perimeter	$402,132
20	Fire Alarm System Upgrade	$204,498

13.4 RRADs Projects by Power System for FY18 (>$200,000)

FY18 DESERT SOUTHWEST RRADs CAPITAL PROGRAM (>200,000)		
REF. NO.	**PROJECT DESCRIPTION**	**ALLOCATION**
Boulder Canyon Project		
1	Hoover- Mead 1 thru 8 Jumper Replacement	$250,000
Central Arizona Project		
2	Hassayampa Tap	$3,450,000
3	ED2-Saguaro #2 115kV Rebuild	$3,328,000
Coloroado River Storage Proejct		
4	Warehouse/Workspace with BOR	$2,550,000
5	Comm Tower Replacement - Microwave Site	$352,000
6	Relay Replacements - Line Relays, 69kV	$200,000
7	KV2D 24/4-kV Transformer Replacement	$500,000
8	Physical Security	$357,307
9	GC Erosion and Waterline Project	$1,350,778
Colordao River Front Work and Levee System		
10	Army Tap / Senator Wash Line	$300,000
11	Gila-Gila Valley Lateral Rebuilds	$653,999
Colorado River Basin Salinity Contorl Project		
12	Sonora Wellfield Transformers	$1,112,483
Intertie Project		
13	Relay Replacements - Transformer (KT1A)	$330,000
14	230kv Breaker & Pad Replacements for LIB 182 & 1386	$1,200,000
15	Physical Security	$306,808
16	Mead Phoenix 500kV Line	$1,500,000
Parker Davis Project		
17	SCADA Hardware/Software	$300,000
18	Front Gate Replacement for Phoenix Facility	$250,000
19	Wood Pole Program	$3,000,000
20	SF6 Gas Cart	$400,000
21	Aerial Lift(Genie or JLG)	$300,000
22	6X4 Tractor	$260,000
23	DACs Replacements	$500,000
24	UPS Project	$250,000

13.5 DSW FY18-27 Capital RRADs Program

FY18 - FY27 DESERT SOUTHWEST RRADs CAPITAL PROGRAM												
REF. NO.	PROJECT DESCRIPTION	LOCATION	FY18 BUDGET SUBMISSION	FY19 BUDGET SUBMISSION	FY20 BUDGET PLAN	FY21 BUDGET PLAN	FY22 BUDGET PLAN	FY23 BUDGET PLAN	FY24 BUDGET PLAN	FY25 BUDGET PLAN	FY26 BUDGET PLAN	FY27 BUDGET PLAN
GGBC - BOULDER CANYON												
1	Sub Equipment Replacements - General (GGBC)	TBD	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
	G5200 TOTALS		$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
2	Relay Replacements - Line & Transfer Breaker	MED B	$0	$200,000	$200,000	$0	$0	$0	$0	$0	$0	$0
3	Transformer Relay Replacements	MED B	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	Misc. Communications Facilities Replacement (GGBC)	TBD	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
	G5300 TOTALS		$100,000	$200,000	$400,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
5	Hoover- Mead 1 thru 8 Jumper Replacement	HVRMED	$250,000	$200,000	$0	$0	$0	$0	$0	$0	$0	$0
	G5600 TOTALS		$250,000	$200,000	$0	$0	$0	$0	$0	$0	$0	$0
	BOULDER CANYON TOTALS		$350,000	$400,000	$600,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000
GGCA - CENTRAL ARIZONA PROJECT												
1	Sub Equipment Replacements - General (GGCA)	TBD	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
2	"SPH" - HVAC Unit Replacement	SPH	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	G5200 TOTALS		$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
3	Fiber Optic - Cisco Equipment - BDP0002B-R-12421	BDP	$33,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	Fiber Optic - Cisco Equipment - PCO0002B-R-12421	PCO	$33,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	Fiber Optic - Cisco Equipment - RRK0002B-R-12421	RRK	$33,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
6	Outyear projects -TBD	TBD	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
	G5300 TOTALS		$99,000	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
7	Hassayampa Tap	HAT/HAP	$3,450,000	$300,000	$0	$0	$0	$0	$0	$0	$0	$0
8	Transmission Line Replacement	ED2SGR2	$3,328,500	$500,000	$0	$0	$0	$0	$0	$0	$0	$0
	G5600 TOTALS		$6,778,500	$800,000	$0	$0	$0	$0	$0	$0	$0	$0
	CAP TOTALS		$6,877,500	$800,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000
GGCR - COLORADO RIVER STORAGE PROJECT												
1	Warehouse/Workspace with BOR	GC	$2,550,000	$1,000,000	$0	$0	$0	$0	$0	$0	$0	$0
2	Replacement of 6 Bypass Breakers (FLG 194 & 594, KAY 1086 & 1386, and PPK 2192 & 2299)	FLG/PPK/KAY	$0	$1,360,000	$0	$2,050,000	$0	$0	$0	$0	$0	$0
3	Replacement of GC 345kV Breakers (1292, 3492, 5596, 5682)	GC	$0	$0	$1,100,000	$0	$1,600,000	$0	$0	$0	$0	$0
4	Replacement of PPK 345kV Breakers (2199, 2292, 1196, 1492)	PPK	$0	$0	$1,100,000	$0	$1,600,000	$0	$0	$0	$0	$0
5	Replacement of GC 230kV Breakers (7482, 7282, 8082)	GC	$0	$0	$0	$600,000	$0	$900,000	$0	$0	$0	$0
6	Replacement of PPK 345kV Breakers (1596 & 1692)	PPK	$0	$0	$0	$550,000	$0	$800,000	$0	$0	$0	$0
7	Replacement of GC 345kV Breakers (194 & 594)	GC	$0	$0	$0	$0	$0	$550,000	$0	$800,000	$0	$0
8	Replacement of GC 345kV Breakers (1092, 1196, 3292)	GC	$0	$0	$0	$0	$0	$0	$825,000	$0	$1,200,000	$1,200,000
9	Replacement of GC 230kV Breakers (7682, 7982)	GC	$0	$0	$0	$0	$0	$0	$400,000	$0	$600,000	$600,000
	G5000 TOTALS		$2,550,000	$2,360,000	$2,200,000	$3,200,000	$3,200,000	$2,250,000	$1,225,000	$800,000	$1,800,000	$1,800,000
10	Test Equipment	MOVP	$120,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
	G5200 TOTALS		$120,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
	G53 - Communication Projects											
11	Comm Site Building Replacement With Environmental	TOW	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
12	Comm Tower Replacement - Microwave Site	GC	$352,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
13	Microwave Upgrades With Environmental	GCM/JPK	$85,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
14	Microwave Upgrades With Environmental	JPK/GCM	$85,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
15	Microwave Upgrades With Environmental	JPK/PSM	$30,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
16	Microwave Upgrades With Environmental	PSM/JPK	$30,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
17	Microwave Upgrades With Environmental	GCM/ZIL	$35,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
18	Microwave Upgrades With Environmental	ZIL/GCM	$35,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
19	Microwave Upgrades With Environmental	ZIL/LOL	$70,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
20	Microwave Upgrades With Environmental	LOL/ZIL	$70,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
21	Comm Site Building Replacement With Environmental	MGS	$0	$72,963	$800,000	$0	$0	$0	$0	$0	$0	$0
22	Remote Terminal Unit (RTU) Replacement	FLG	$0	$147,037	$0	$0	$0	$0	$0	$0	$0	$0
23	RTU Replacements (Communication Sites)	ELD/CAN	$0	$85,000	$0	$0	$0	$0	$0	$0	$0	$0
24	Glen Canyon Microwave Tower Replacement	GCM	$0	$0	$50,000	$50,000	$0	$0	$0	$0	$0	$0
25	RTU Replacements (Communication Sites)	PSM/GCS	$0	$0	$85,000	$0	$0	$0	$0	$0	$0	$0
26	Power System Replacement	TBD	$0	$0	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
27	RTU Replacement (RTAC)	LHV	$0	$0	$0	$150,000	$0	$0	$0	$0	$0	$0
28	RTU Replacements (Communication Sites)	TBD	$0	$0	$0	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000	$85,000

GGCR - COLORADO RIVER STORAGE PROJECT												
	G53 - Protection Projects											
29	WIN/CIP 7 Security Relay Encryption	MULTI-SITES	$20,000	$20,000	$20,000	$0	$0	$0	$0	$0	$0	$0
30	Meter Replacement - Revenue & Panel	GCS/PWL	$150,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
31	PRC-002-2 Digital Monitoring Equipment Upgrades & Team Additions	PPK	$175,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
32	Remedial Action Scheme (GCS0022B)	GCS	$90,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
33	Remedial Action Scheme (FLG0019B)	FLG	$20,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
34	Remedial Action Scheme (PPK0064B)	PPK	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
35	Relay Replacements - Transfer Breaker & Bus Diff	PPK	$90,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
36	Relay Replacements - XFMR (PPK0075B)	PPK	$200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
37	Meter Replacement - Revenue & Panel	PPK	$0	$175,000	$0	$0	$0	$0	$0	$0	$0	$0
38	Relay Replacements - Line Relays, 69kV	GCS	$0	$250,000	$0	$0	$0	$0	$0	$0	$0	$0
39	Relay Replacements - Transfer Breaker & Bus Diff	PPK	$0	$210,000	$0	$0	$0	$0	$0	$0	$0	$0
40	PRC-002-2 Digital Monitoring Equipment Upgrades & Team Additions	TBD	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
41	Meter Replacement - Revenue & Panel	LHV	$0	$0	$50,000	$0	$0	$0	$0	$0	$0	$0
42	Relay Replacements - Line & RTU (RTAC)	KAY	$0	$0	$300,000	$0	$0	$0	$0	$0	$0	$0
43	Relay Replacements - Line/Transformer	TBD	$0	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
44	Meter Replacement - Revenue & Panel	TBD	$0	$0	$0	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
	G5300 TOTALS		$1,647,000	$1,160,000	$1,755,000	$785,000	$585,000	$585,000	$585,000	$585,000	$585,000	$585,000
45	GC Erosion and Waterline Project	GC	$1,350,778	$100,000	$0	$0	$0	$0	$0	$0	$0	$0
46	KV2D 24/4-kV Transformer Replacement	GC	$500,000	$225,244	$0	$0	$0	$0	$0	$0	$0	$0
47	Physical Security Enhancement Program	FLG/PPK/GC	$357,307	$300,000	$0	$0	$0	$0	$0	$0	$0	$0
48	Pinnacle Peak-Replace Shunt Cap Bank	PPK	$0	$3,774,756	$1,520,000	$1,140,000	$380,000	$0	$0	$0	$0	$0
	G5600 TOTALS		$2,208,085	$4,400,000	$1,520,000	$1,140,000	$380,000	$0	$0	$0	$0	$0
	CRSP TOTALS		$6,525,085	$7,980,000	$5,535,000	$5,185,000	$4,225,000	$2,895,000	$1,870,000	$1,445,000	$2,445,000	$2,445,000
GGCL - LEVEE												
1	Army Tap / Senator Wash Line	ATP/SEW	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
	G5200 TOTALS		$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	Gila-Gila Valley Lateral Rebuilds	GLA/GIV	$653,999	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	Gila-North Gila 69kV Rebuild	GLA/NGA	$0	$689,000	$0	$0	$0	$0	$0	$0	$0	$0
	G5600 TOTALS		$653,999	$689,000	$0	$0	$0	$0	$0	$0	$0	$0
	LEVEE TOTALS		$953,999	$689,000	$0	$0	$0	$0	$0	$0	$0	$0
GGCS - SALINITY												
1	Sonora Wellfield Transformers	SON	$1,112,483	$0	$0	$0	$0	$0	$0	$0	$0	$0
	G5600 TOTALS		$1,112,483	$0	$0	$0	$0	$0	$0	$0	$0	$0
	SALINITY TOTALS		$1,112,483	$0	$0	$0	$0	$0	$0	$0	$0	$0
GGIN - INTERTIE												
1	Test Equipment	MOVP	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
	G5200 TOTALS		$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
	G53 - Communication Projects											
2	WIN/CIP 7 Security Relay Encryption	MED/LIB/PPK	$20,000	$30,000	$0	$0	$0	$0	$0	$0	$0	$0
3	Power System Replacement - LIB0057B	LIB	$25,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
	G53 - Protection Projects											
4	Relay Replacements - Transformer (KT1A)	MED	$330,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	Relay Replacements - Basler and Transformer (KU2A)	PCK	$70,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
6	PRC-002-2 DME Upgrades & Team Additions	MED	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
7	Meter Replacement - Revenue & Panel	TBD	$0	$55,072	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
8	Relay Replacements - Line/Transformer	TBD	$0	$194,928	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
	G5300 TOTALS		$545,000	$380,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000
9	Physical Security Upgrade	PCK	$306,808	$520,000	$0	$0	$0	$0	$0	$0	$0	$0
10	230kv Breaker & Pad Replacements for LIB 182 & 1386 (TAM)	LIB	$1,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
11	Mead Substation Domestic Water Main Replacement	LIB	$0	$0	$1,025,000	$0	$0	$0	$0	$0	$0	$0
	G5600 TOTALS		$1,506,808	$520,000	$1,025,000	$0	$0	$0	$0	$0	$0	$0
12	Mead Phoenix 500kV Line	MED/PHX	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000
	G6100 TOTALS		$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000
	INTERTIE TOTALS		$3,591,808	$2,440,000	$2,915,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000

GGPD - PARKER DAVIS												
1	A2000 - OCIO	MOVP	$60,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	A2100 - Cyber Security	MOVP	$0	$0	$0	$153,000	$0	$0	$0	$0	$0	$0
3	A2200 - Network	MOVP	$189,000	$382,000	$454,000	$140,000	$45,000	$0	$0	$146,000	$382,000	$382,000
4	A2600 - Infrastructure	MOVP	$0	$242,050	$0	$0	$35,000	$41,000	$211,420	$0	$0	$0
5	A2700 - SCADA (OSIsoft)	PHS	$300,000	$877,500	$355,350	$133,333	$545,000	$300,000	$775,000	$300,000	$270,000	$270,000
6	A2900 - Power Mngt & Mrkt	MOVP	$0	$0	$1,501,674	$1,420,014	$340,029	$1,085,007	$85,007	$765,065	$680,057	$680,057
7	A2A00 - O&M Tech	MOVP	$0	$0	$550,000	$0	$75,000	$0	$3,000,000	$100,000	$425,000	$425,000
	A2XXX TOTALS		$549,000	$1,501,550	$2,861,024	$1,846,347	$1,040,029	$1,426,007	$4,071,427	$1,311,065	$1,757,057	$1,757,057
8	DSW - Restroom Upgrades	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
9	DSW - Fire Alarms	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
10	HVAC Replacements (Electrician's Bldg)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
11	Security Entryway (Design only in FY17)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
12	Conference Rooms Rebuild (Design only in FY17)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
13	Admin Suite Rebuild (Design only in FY17)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
14	Break Rooms Rebuild (Design only in FY17)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
15	Gate/Guard House (Design only in FY17)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
16	Wash Bay (Design only in FY17)	PHS	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
17	Replace HVAC Units for Warehouse	PHS	$140,500	$0	$0	$0	$0	$0	$0	$0	$0	$0
18	Covered Parking Lighting	PHS	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
19	Front Gate Replacement for Phoenix Facility	PHS	$250,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
20	Roof Upgrade - Phoenix Main Facility Building	PHS	$0	$600,000	$0	$0	$0	$0	$0	$0	$0	$0
21	Facility Project TBD	PHS	$0	$0	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000
	G1000 TOTALS		$490,500	$600,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000
22	Replace PRS 230kV Breakers (286,382)	PRS	$0	$0	$370,000	$0	$550,000	$0	$0	$0	$0	$0
23	Replace ED2 115kV Breakers (1162, 1262, 1362,1462)	ED2	$0	$0	$500,000	$800,000	$0	$0	$0	$0	$0	$0
24	Replace PAD 230kV Breakers (586, 982)	PAD	$0	$0	$0	$320,000	$0	$400,000	$0	$0	$0	$0
25	Replace RGS 230kV Breakers (1086, 682, 786)	RGS	$0	$0	$0	$0	$0	$555,000	$0	$825,000	$0	$0
26	Replace RGS 230kV Breakers (882, 982)	RGS	$0	$0	$0	$0	$0	$0	$370,000	$0	$550,000	$550,000
	G5000 TOTALS		$0	$0	$870,000	$1,120,000	$550,000	$955,000	$370,000	$825,000	$550,000	$550,000
	ELECTRICIANS											
27	Test Equipment	MOVP	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
28	Wood Pole Program	GLAWMS	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000
29	230kV Oil Breaker Replacement PAD 482 (TAM), purchase 2018, install 2019 (contingent upon construction PAD Rebuild project)	PAD	$0	$175,000	$200,000	$0	$0	$0	$0	$0	$0	$0
30	230kV Oil Breaker Replacement PAD 782 (TAM), purchase 2018, install 2019 (contingent upon construction PAD Rebuild project) - Omitted from Oct 2015 sheet	PAD	$0	$175,000	$200,000	$0	$0	$0	$0	$0	$0	$0
	LINEMEN											
31	SF6 Gas Cart	PHS	$400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
32	Dilo Dolly (2)	PHS	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
33	LowBoy Trailer	PHS	$150,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
34	Aerial Lift(Genie or JLG)	PHS	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
35	6X4 Tractor	PHS	$260,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
36	Oil filtration Trailer	PHS	$120,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
37	UTV (2-each)	PHS	$30,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
38	Bucket Truck 40 ft (2-each)	PHS	$0	$150,000	$0	$0	$0	$0	$0	$0	$0	$0
39	Bare Hand Bucket Truck 125ft	PHS	$0	$800,000	$0	$0	$0	$0	$0	$0	$0	$0
40	Bull Dozer	PHS	$0	$380,000	$0	$0	$0	$0	$0	$0	$0	$0
41	MOVP - TBD	PHS	$0	$0	$750,000	$1,000,000	$1,000,000	$950,000	$900,000	$900,000	$900,000	$900,000
	G5200 TOTALS		$4,480,000	$4,800,000	$4,270,000	$4,120,000	$4,120,000	$4,070,000	$4,020,000	$4,020,000	$4,020,000	$4,020,000

	G53 - Communication Projects											
42	Test Equipment	MOVP	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
43	DACs Replacements	WTK/MTM	$79,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
44	DACs Replacements	CTP/MED	$421,000	$237,524	$0	$0	$0	$0	$0	$0	$0	$0
45	Power System Replacement (Microwave Bldg Batteries)	PHS	$140,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
46	Optical Mux Replacements (FOP)	FOP	$50,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
47	RTU Replacements	TBD	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
48	WIN/CIP 7 Security Relay Encryption	MULTI-SITES	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
49	Fiber Optic Installation LADLAT0001B - should be IMD	LAD/LAT	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
50	Cisco Sonet Replacement - GPK0006B	GPK	$25,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
51	Power System Replacement - PHS0191B - Comm Ctr	PHS	$35,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
52	Comm Site Replacements - MTL0008B (CISCO)	MTL	$60,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
53	Microwave Replacements - MTM_CTP0006B (JUS)	MTM	$40,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
54	New Microwave HOP - (BLA_CUNxxxxB)(JUS)	BLA/CUN	$40,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
55	New Microwave HOP - (CUN_BLAxxxxB)(JUS)	BLA/CUN	$40,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
56	Optical Mux Replacements (CUN0003B)(JUS)	CUN	$26,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
57	Comm Site Building Replacement	PSP	$0	$83,537	$100,000	$75,000	$1,000,000	$0	$0	$0	$0	$0
58	Power System Replacement (Comm Center Batteries)	PHS	$0	$38,938	$0	$0	$0	$0	$0	$0	$0	$0
59	Power System Replacement	TBD	$0	$0	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000
60	OPGW - Installation (In Study Phase)	LAD-IMPERIAL	$0	$0	$0	$0	$0	$880,000	$880,000	$880,000	$880,000	$880,000
61	Radio Replacements (JUS)	JUS	$0	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
	G53 - Protection Projects											
62	DMS Upgrades	NHV/TOP	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
63	Relay Replacements - Underfrequency	WMS/BLY	$0	$124,363	$0	$0	$0	$0	$0	$0	$0	$0
64	Relay Replacements - Line/Transformer	AMR	$0	$422,000	$0	$0	$0	$0	$0	$0	$0	$0
65	Relay Replacements - Line	HEN/MED	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
66	Relay Replacements - Line	PHX/LIB	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
67	Meter Program	TBD	$45,000	$110,637	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
68	PRC-002-2 DME Upgrades & Team Additions	TBD	$25,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
69	Relay Replacements - Line/Transformer	TBD	$0	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
	G5300 TOTALS		$1,676,000	$1,787,000	$1,005,000	$980,000	$1,905,000	$1,785,000	$1,785,000	$1,785,000	$1,785,000	$1,785,000
70	Physical Security Upgrade	PCK/GLA/TUC/ TTT	$0	$2,080,000	$0	$0	$0	$0	$0	$0	$0	$0
71	UPS Project	PHX	$250,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
	G5600 TOALS		$250,000	$2,080,000	$0	$0	$0	$0	$0	$0	$0	$0
	PARKER DAVIS TOTALS		$7,445,500	$10,768,550	$9,506,024	$8,566,347	$8,115,029	$8,736,007	$10,746,427	$8,441,065	$8,612,057	$8,612,057
	GRAND TOTALS		$26,856,375	$23,077,550	$18,956,024	$16,441,347	$15,030,029	$14,321,007	$15,306,427	$12,576,065	$13,747,057	$13,747,057

TABLE OF DISTRIBUTION BY ORG		**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**
		$549,000	$1,501,550	$2,861,024	$1,846,347	$1,040,029	$1,426,007	$4,071,427	$1,311,065	$1,757,057	$1,757,057
		$490,500	$600,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000	$500,000
		$2,550,000	$2,360,000	$3,070,000	$4,320,000	$3,750,000	$3,205,000	$1,595,000	$1,625,000	$2,350,000	$2,350,000
		$4,940,000	$4,900,000	$4,770,000	$4,620,000	$4,620,000	$4,570,000	$4,520,000	$4,520,000	$4,520,000	$4,520,000
		$4,067,000	$3,527,000	$3,710,000	$2,515,000	$3,240,000	$3,120,000	$3,120,000	$3,120,000	$3,120,000	$3,120,000
		$12,759,875	$8,689,000	$2,545,000	$1,140,000	$380,000	$0	$0	$0	$0	$0
		$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000	$1,500,000
		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		$ 26,856,375	$ 23,077,550	$ 18,956,024	$ 16,441,347	$ 15,030,029	$ 14,321,007	$ 15,306,427	$ 12,576,065	$ 13,747,057	$ 13,747,057

TABLE OF DISTRIBUTION BY POWER SYSTEM		**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**
		$350,000	$400,000	$600,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000
		$6,877,500	$800,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000
		$953,999	$689,000	$0	$0	$0	$0	$0	$0	$0	$0
		$6,525,085	$7,980,000	$5,535,000	$5,185,000	$4,225,000	$2,895,000	$1,870,000	$1,445,000	$2,445,000	$2,445,000
		$1,112,483	$0	$0	$0	$0	$0	$0	$0	$0	$0
		$3,591,808	$2,440,000	$2,915,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000	$1,890,000
		$7,445,500	$10,768,550	$9,506,024	$8,566,347	$8,115,029	$8,736,007	$10,746,427	$8,441,065	$8,612,057	$8,612,057
		$ 26,856,375	$ 23,077,550	$ 18,956,024	$ 16,441,347	$ 15,030,029	$ 14,321,007	$ 15,306,427	$ 12,576,065	$ 13,747,057	$ 13,747,057

14. 10-YEAR PLAN SPREADSHEET

14.1 DSW FY18-27 10-Year Plan Capital Program

DSW Ten Year Plan - Projects FY18-27 ***All figures are in 1,000s***

REF #	PROJECT	Fund	Notes	PCN Budget [6]	Non-PCN Executed to Date	Total Project Budget [6]	Estimate FY18-27 [6]	Executions (July 2017)	PROJECTED TOTAL [6]	18TOT	19TOT	20TOT	21TOT	22TOT	23TOT	24TOT	25TOT	26TOT	27TOT
1	Parker Substation 161-kV Switch Replacement	PCN	Canceled	1,250	26	1,250		26	26										
2	Facility Rating Mitigation Year 2 (Medium Priority)	PCN	Completed - Closeout	8,525	721	9,246	56	8,551	8,607	56									
3	Parker-Headgate Rock/Bouse 161-kV Rebuild	PCN	Active - On Hold Pending Design	17,620	792	18,412	605	1,359	1,964	605									
4	Mesa Substation Remediation	PCN	Active	3,535	430	3,965	1,533	1,980	3,513	1533									
5	Gila-Knob 161-kV T-Line Reroute	PCN	Active	4,031	2,132	6,163	699	3,791	4,490	699									
6	Tucson Substation Rebuild	PCN	Active	7,000	1,903	8,903	150	8,565	8,715	150									
7	Liberty Series Capacitor Bank Replacement	PCN	Active	10,372	4,076	14,448	6,392	4,401	10,793	3,196	3,196								
8	Crossman Peak Microwave Facility	PCN	Active	4,525	-	4,525	3,689	836	4,525	3,000	639	50							
9	Gila Substation 161-kV Rebuild	PCN	Active	17,224	1,949	19,173	14,020	5,153	19,173	11,896	1,523	601							
10	Gila-Wellton Mohawk Interstate-8 Crossing Rebuild	WCF	Active - Seed Funding Phase	-	220	6,341	6,121	220	6,341	2,853	3,171	97							
11	Kofa-Dome Tap 161-kV Analysis	WCF	Projected FY18 Start - Study Complete			5,360	5,360		5,360	822	4415	123							
12	Coolidge-Valley Farms 115-kV Analysis	WCF	Projected FY18 Start - Study Complete			5,930	5,930		5,930	738	3822	1147	223						
13	Dome Tap-Gila 161-kV Analysis	WCF	Projected FY18 Start - Study Complete			7,401	7,401		7,401	3226	1874	1769	532						
14	Bouse-Kofa 161-kV Analysis	WCF	Projected FY19 Start - Study Complete			31,100	31,100		31,100		1787	4288	21568	2002	1455				
15	Parker-Blythe 161-kV #2 Analysis	WCF	Projected FY20 Start - Study Inprogress			*45,000*	45,000		45,000			2250	18450	21150	2250	900			
16	Blythe-Headgate Rock #1 line 161-kV Analysis	WCF	Projected FY21 Start			*23,900*	23,900		23,900				1195	9799	11233	1195	478		
17	Parker Substation 161-kV Analysis	WCF	Projected FY22 Start			*10,500*	10,500		10,500					525	4095	5040	630	210	
18	Rogers-Coolidge 230-kV Reconductor Analysis	WCF	Projected FY23 Start			*6,000*	6,180		6,180						120	2700	2880	360	120
19	Tucson-Oracle 115-kV Reconducotor Analysis	WCF	Projected FY24 Start			*15,600*	15,600		15,600							312	7020	7800	468
20	Mead Substation Replace Transformer (KU2A)	WCF	Projected FY24 Start			5,200	5,200		5,200							200	4200	750	50
									SUB TOTAL	**28,774**	**20,427**	**10,325**	**41,968**	**33,476**	**19,153**	**10,347**	**15,208**	**9,120**	**638**
	PROJECT(S) SENT TO RRADs PROGRAM (>$1M)																		
21	Gold Mine Tap -Knob 161-kV Rebuild (~22 miles)	WMF	Transfer CONST to RRADS FY18				3,000		3,000	3,000									
22	Blythe-Gold Mine Tap 161-kV Rebuild (~43 miles)	WMF	Transfer CONST to RRADS FY19,20,21				9,000		9,000		3,000	3,000	3,000						
									SUB TOTAL	**3,000**	**3,000**	**3,000**	**3,000**						

Planning Assumptions for Projects That Have Not Completed AOA Study Phase:

1. Project start dates are scheduled based on urgency derived from MDCC priority ranking and projected available funding and resources.
2. AOA Studies are conducted under O&M. Until Studies Are completed.
3. Total Project Cost Are Strictly High Level Conceptual.
4. Prior to AOA Studies, Proposed Project Fiscal Year Spend-Plans are Calculated Using A 5-Year Profile (See chart on right)

SUBS **Planning Spend-Plan Profile (% of Total Project Cost)**

Program (PD)		Non-Program (NPD)		TOTAL
Year 1	5%	Year 1		5%
Year 2	10%	Year 2	29%	39%
Year 3	13%	Year 3	35%	48%
Year 4	5%	Year 4	1%	6%
Year 5	2%	Year 5		2%

T-LINES <$20M **Planning Spend-Plan Profile (% of Total Project Cost)**

Program (PD)		Non-Program (NPD)		TOTAL
Year 1	2%	Year 1		2%
Year 2	6%	Year 2	39%	45%
Year 3	5%	Year 3	45%	50%
Year 4	2%	Year 4	1%	3%

T-LINES >$20M **Planning Spend-Plan Profile (% of Total Project Cost)**

Program (PD)		Non-Program (NPD)		TOTAL
Year 1	3%	Year 1		5%
Year 2	6%	Year 2	35%	41%
Year 3	6%	Year 3	43%	47%
Year 4	3%	Year 4	2%	5%
Year 5	2%	Year 5		2%

14.2 DSW Pre-payment Project Funding Status

	Project	Status	Year Approved	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	Revised Prepayment Budget	Prepayment Executed to Date	Available Prepayment Funds	Appropriations Executed to Date	TOTAL Executed to Date
1	Thornton Road - Empire - ED5 Transmission Line Rebuild	Complete	FY10	28,500,000		(3,118,252)	(11,555,836)			(688,494)			13,137,418	13,137,418	-	-	13,137,418
2	ED4-ED5 Transmission Line Rebuild	Complete	FY11		14,982,000		(7,000,000)			(900,879)			7,081,121	7,081,121	-	-	7,081,121
3	Rebuild Davis 230-kV Switchyard (Davis Stage 06)	Complete	FY11		-								-	-	-	-	-
4	Coolidge Substation 230/69-kV Transformer	Complete	FY12			6,110,000	79,277	(495,841)	(332,966)	119,039			5,479,509	5,479,509	-	4,416,592	9,896,101
5	Bouse Substation 161-kV Rebuild	Complete	FY12			4,970,000	1,027,919	(3,618,770)		(44,002)			2,335,147	2,335,147	-	7,804,142	10,139,289
6	ED4-ED2 115-kV Transmission Line Rebuild	Complete	FY12			11,100,000				(8,312,920)	(500,000)	(133,640)	2,153,440	2,153,440	-	4,666,010	6,819,450
7	Pinnacle Peak-Rogers Right-of-Way	Complete	FY13				6,200,000				(198,174)		6,001,826	6,001,826	-	106,778	6,108,603
8	Parker-Headgate Rock	Under Review	FY13				17,954,000			(334,176)			17,619,824	539,175	17,080,650	718,906	1,258,081
9	Parker-Davis Facility Rating Mitigation Year 2	Active	FY14/15					3,225,000	5,300,000				8,525,000	7,715,955	809,045	417,807	8,133,762
10	Parker-Davis Facility Rating Mitigation Year 3	Cancelled	FY15						16,000,000		(16,000,000)		-	97,939	(97,939)	-	97,939
11	Black Point-Mesa Transmission Line Reroute	Close-Out	FY14					1,855,500		(529,916)		133,640	1,459,224	1,226,463	232,761	930,148	2,156,611
12	Mesa Substation Remediation	Active	FY14/16					1,025,000		2,510,000			3,535,000	1,548,337	1,986,663	388,713	1,937,051
13	Gila-Knob 161-kV Double Circuit Upgrade	Active	FY14					2,000,000			2,030,573		4,030,573	1,615,151	2,415,422	2,050,028	3,665,179
14	Parker Substation 161-kV Switch Replacement	Cancelled	FY14					1,250,000			(1,250,000)		-	23,899	(23,899)	-	23,899
15	Mead CCVT Support Structure Replacement	Close-Out	FY14					975,000					975,000	877,801	97,199	-	877,801
16	Gila Substation 161-kV Rebuild	Active	FY14					12,000,000		(1,075,597)	6,299,184		17,223,587	3,152,507	14,071,080	1,882,109	5,034,616
17	Del Bac-Nogales Right-of-Way Renewal	Complete	FY15						3,550,000		(49,854)		3,500,146	3,500,146	-	-	3,500,146
18	Tucson Substation Rebuild	Active	FY15						7,000,000				7,000,000	6,560,757	439,243	1,759,333	8,320,090
19	Crossman Peak Microwave Facility	Active	FY16							4,525,000			4,525,000	863,941	3,661,059	-	863,941
20	Liberty Series Capacitor Bank	Active	FY16							10,372,000			10,372,000	4,306,696	6,065,304	4,074,959	8,381,656
	PROJECT TOTALS			28,500,000	14,982,000	19,061,748	6,705,360	18,215,889	31,517,034	5,640,056	(9,668,271)	-	114,953,815	68,217,229	46,736,586	29,215,525	97,432,754

* Executed to date amounts include commitments, outstanding obligations and expenses as of 6/30/2017

THANK YOU

15. APPENDICES

15.1 AOA Benefits Effectiveness Scorecard

Alternative 1 - Enter Name of Alternative Here

Compliance Section Weight = 40.00%

Compliance Criteria #1	Score Awarded
Does This Alternative Meet The Mission Needs?	

Score Definitions	
0	Meets none of the Needs
1	Meets some of the Needs
2	Meets half of the Needs
3	Meets most of the Needs
4	Meets all of the Needs

Justification for the Given Score

Justifications should include whether or not the totality of the mission need is addressed with this Alternative. If it does not explicitly meet all needs then identify which needs it fails to meet, and why it fails.

Additional Comments

Compliance Criteria #2	Score
Does This Alternative Meet All Regulatory Requirements?	

Score Definitions	
0	Meets No Requirements
1	Meets Few Requirements
2	Meets Some Requirements
3	Meets Most Requirements
4	Meets All Requirements

Justification for the Given Score

State whether or not it meets NEPA, NERC, NITS, etc.

Additional Comments

Compliance Criteria #3	Score
How Much (negative) Environmental Impact Does This Alternative Generate?	

Score Definitions	
0	Very High Impact
1	A large Impact
2	A medium Impact
3	A small Impact
4	No Impact

Justification for the Given Score

If the Alternative will require Environmental work to be performed indicate the scale of work required and the amount of additional effort needed to meet those requirements.

Additional Comments

Compliance Criteria #4	Score
How Much (negative) Land Impact Does This Alternative Generate?	

Score Definitions	
0	Very High Impact
1	A large Impact
2	A medium Impact
3	A small Impact
4	No Impact

Justification for the Given Score

If the Alternative will require Lands work/purchases to be performed indicate the scale of work/purchases required and the amount of additional effort needed to meet those requirements.

Additional Comments

Alternative 1 - Enter Name of Alternative Here

Reliability Section Weight = 35.00%

Reliability Criteria #1	Score
How Much Risk Does This Alternative Generate?	

Score Definitions	
0	Very High Risk
1	A large amount of Risk
2	A fair amount of Risk
3	A small amount of Risk
4	No Risk/ Removes Risk

Justification for the Given Score

Explain what risks are associated with the Alternative in regards to cost, schedule and system reliability. If the project removes risk then indicate how it does so.

Additional Comments

Reliability Criteria #2	Score
How Safe Is The Implementation Of This Alternative For Workers and Infrastructure?	

Score Definitions	
0	Not Safe at All
1	Excessive Danger
2	Some Danger
3	Little Danger
4	Completely Safe

Justification for the Given Score

Discuss any risks that will be encountered by workers implementing or having conintuing effort on this Alternative. Discuss any adverse impacts on the system as a whole physically from this Alternative.

Additional Comments

Reliability Criteria #3	Score
How Abundant Are Replacement Parts For Any Hardware Required For This Alternative?	

Score Definitions	
0	Must Be Manufactured
1	Difficult to Find
2	Not Applicable
3	Can Be Found
4	Abundant and Cheap

Justification for the Given Score

Discuss any issues with long term maintenance for any hardware required to implement this Alternative.

Additional Comments

Reliability Criteria #4	Score
What Impact Would This Alternative Have On The BET System If Implemented?	

Score Definitions	
0	Large Negative Impact
1	Negative Impact
2	No Impact
3	Positive Impact
4	Large Positive Impact

Justification for the Given Score

Discuss how this Alternative modifies the overall architecture of the Bulk Electric Transmission System

Additional Comments

Alternative 1 - Enter Name of Alternative Here

Economic Section Weight = 25.00%

Economic Criteria #1	Score
How Long Would Construction Take VS Other Alternatives?	

Score Definitions	
0	Much More Time
1	More Time
2	The Same Amount of Time
3	Less Time
4	No Time

Justification for the Given Score

Look at the total time for construciton weighed against other alternatives. Status Quo is likely the only Alternative that will have a perfect Score here.

Additional Comments

Economic Criteria #2	Score
What Level Of Effort Is Required Long Term For This Alternative VS Other Alternatives?	

Score Definitions	
0	Much More Effort
1	More Effort
2	The Same Amount of Effort
3	Less Effort
4	No Effort

Justification for the Given Score

Look at the total lifecycle effort (maintenance, monitoring, etc) weighed against other alternatives. This should offset Status Quo Negatively.

Additional Comments

Economic Criteria #3	Score
What Level Of Outages Are Required For This Alternative?	

Score Definitions	
0	Excessive Outages
1	Many or Extended Outages
2	Several or Long Outages
3	Few or Short Outages
4	No Outages

Justification for the Given Score

Note number and length of required outages here.

Additional Comments

Economic Criteria #4	Score
How Does This Alternative Affect Load Growth or Power Flow In The Area?	

Score Definitions	
0	Large Negative Impact
1	Negative Impact
2	No Impact
3	Positive Impact
4	Large Positive Impact

Justification for the Given Score

Note a quantifiable scale of impact here in regards to loading or flow. Score should be based comparatively against other Alternatives.

Additional Comments

15.2 AOA Evaluation Methodology

During the Alternative Selection process of the Analysis of Alternatives (AOA), a ratings system consisting of three categories is used. Those categories are Compliance, Reliability, and Economics. WAPA has established a standard weighting for each category as follows: 40% Compliance, 35% Reliability and 25% Economics. This standard rating is the cornerstone in providing safe, secure, reliable and affordable transmission services. However, each of these three criteria can be weighted independently during the development of the Mission Need and the Alternatives when appropriate.

The methods utilized for WAPA's AOA Selection Process were created based on criteria derived from the Department of Energy (DOE)[1] and the Government Accountability Office (GAO)[2]. The DOE and GAO have provided guidance and best practices on the execution of an AOA study. DSW is following all relevant suggestions and incorporating guidance into the 10-Year Planning Program with a focus to meeting best practices outlined on behalf of the Federal Government for the benefit of its customers and stakeholders.

[1] *"DOE 413.3B - Program and Project Management for the Acquisition of Capital Assets"*

[2] *"GAO-15-37 - DOE and NNSA Project Management - Analysis of Alternatives Could Be Improved by Incorporating Best Practices"*

1. General Principals

1.1. The customer(s)/stakeholder(s) define the mission need and functional requirements without a predetermined solution.
1.2. The customer(s)/stakeholder(s) provide the team conducting the AOA with enough time to complete the AOA process to ensure a robust and complete analysis.
1.3. The team includes members with diverse areas of expertise including, at a minimum, subject matter expertise, project management, cost estimating, and risk management.
1.4. The team creates a plan, including proposed methodologies, for identifying, analyzing, and selecting alternatives, before beginning the AOA process.
1.5. The team documents all steps taken to identify, analyze and select alternatives in a single document.
1.6. The team documents and justifies all assumptions and constraints used in the analysis.
1.7. The team conducts the analysis without a predetermined solution.

2. Identifying Alternatives
The team:
2.1. Identifies study alternatives that are sufficient, diverse, viable, and economically feasible; representing a suitable range of design alternatives.
2.2. Describes alternatives in sufficient detail to allow for robust analysis.
2.3. Includes one alternative representing the status quo to provide a basis of comparison among alternatives.
2.4. Screens the list of alternatives before proceeding, eliminates those that are not viable, and documents the reasons for eliminating any alternatives.

3. Analyzing Alternatives

The team:

3.1. Develops a life-cycle cost estimate for each alternative, including all costs from inception of the project through design, development, deployment, operation, maintenance, and retirement.

3.2. Presents the life-cycle cost estimate for each alternative as a range or with a confidence interval, and not solely as a point estimate.

3.3. Expresses the life-cycle cost estimate in present value terms

3.4. Uses a standard process to quantify the benefits/effectiveness of each alternative and documents this process.

3.5. Quantifies the benefits/effectiveness resulting from each alternative over that alternative's full life cycle, if possible.

3.6. Explains how each measure of benefit/effectiveness supports the mission need.

3.7. Identifies and documents the significant risks and mitigation strategies for each alternative.

3.8. Tests and documents the sensitivity of both the cost and benefit/effectiveness estimates for each alternative to risks and changes in key assumptions.

4. Selecting a Preferred Alternative

4.1. The team or the decision maker defines selection criteria based on the mission need.

4.2. The team or the decision maker weights the selection criteria to reflect the relative importance of each criterion.

4.3. An entity independent of the AOA process reviews the extent to which all best practices have been followed (for certain projects, additional independent reviews may be necessary at earlier stages of the process such as for reviewing the study plan or for reviewing the identification of viable alternatives).

15.3 WAPA's Ranking Process – Maintenance, Design, and Construction Council (MDCC)

Criteria for Evaluating Capital Projects and Ranking Them for Comparison

Project Ranking:

Each Project will be ranked based on **Compliance**, **Reliability**, and **Economics** to determine the overall order these projects should be implemented. Each of these categories is comprised of specific criteria that will be evaluated and assigned a ranking based on importance/impact to the proposed project.

The **Compliance** category includes the following criteria:

- Meets Environmental regulatory requirements (not including projects that are solely to enhance the environment, IE. Basic Substation cleanup).
- Meets North American Electric Reliability Corporation (NERC) reliability standards.
- The equipment or facility currently is or in the near future will constrain the transmission system
- Meets Health and Safety requirements.
- Each criterion has equal weight within the category.

The **Reliability** category includes the following criteria:

- Condition of the equipment or facility
- Availability of replacement parts or repair services
- Impact to the power system if the project is not completed
- Number of outages that have occurred and the frequency of outages
- Facility loading and encroachment on maximum ratings
- Risk score(s) from the AM Risk Register Spreadsheet of various equipment that may be included in a project.

Each criterion has equal weight within the category.

The **Economic (WAPA and its customers)** category includes the following criteria:

- The economic impacts of not completing the project is determined to be significant to the regional transmission system.
- There is a contractual need for the project such as a power marketing agreement stating the need.
- An obligation for a path that meets a contractual requirement.
- Loss of revenue to WAPA, including additional revenue that would become available as a direct result of the project.
- Customer(s) incur increased costs if they need to purchase alternate path or power.

Each criterion has equal weight within the category.

The ranking levels are as follows:

0 - Minor: There is negligible impact in regards to the issue and why the project is needed
1 - Moderate: There is limited impact in regards to the issue and why the project is needed
2 - Major: There is significant impact in regards to the issue and why the project is needed
3 - Severe: There is high impact in regards to the issue and why the project is needed
4 - Catastrophic: Failure to complete the project will result in extended outages, severe system degradation and/or significant economic repercussions.

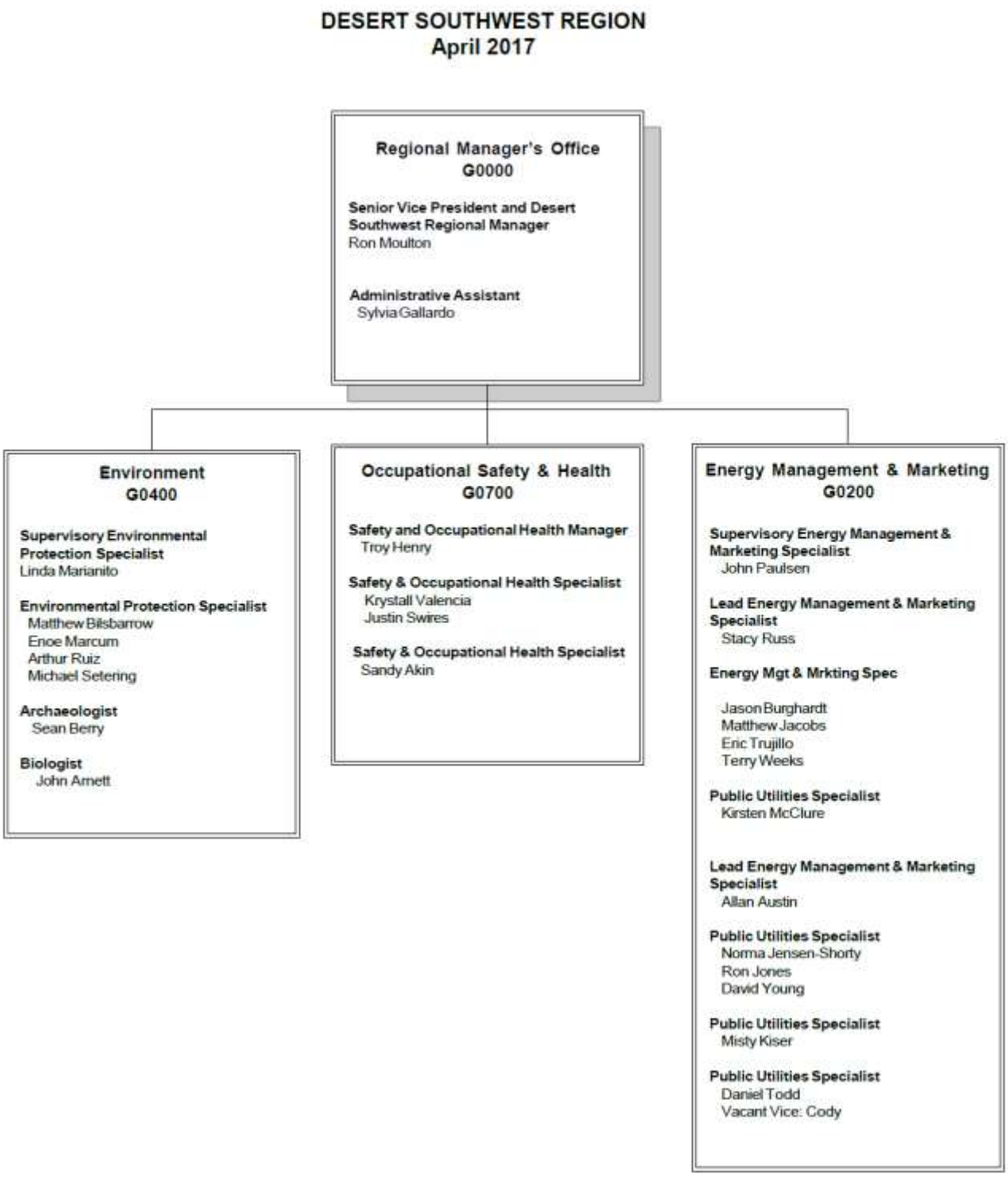
After each of the proposed projects is rated for each of the categories, the following weighting factor is applied:

- Compliance will have a weighting factor of 0.40 because of the need of the project and possible impact to life or limb, heavy fines could be imposed, and the requirement by law or regulation.
- Reliability will have a weighting factor of 0.35 because of its impact to the system and WAPA's credibility and reputation if there is a failure or outage.
- Economical will also have a weighting of 0.25 due to the monetary impact and direct impact to our customers if the project is not completed.

Other Considerations:

- If a capital project has had a prior year start, meaning that the project had a construction award or a major equipment purchase in the prior fiscal year, it will be given a priority in funding consideration in order to avoid increased costs resulting from equipment delivery issues, contract modifications, interest during construction (IDC), and personnel scheduling. If there is a funding conflict, a further comparison of risk will be performed.
- If the project has joint participation (i.e. Partial funding from customer trust project and partial WAPA funding) it will be given priority in funding consideration similar to prior year start projects.
- A NERC compliance violation, or other system emergency need, which may require a new project start, might be more costly than increased costs from delays to an on-going capital project, and may be given priority. In other words, cost impacts from delaying any prior starts will be weighed against the impact of not complying with NERC Standards or not correcting the system need.
- Interconnection requests that are not funded by the requestor will be included in this process for ranking.
- Upon completion of the ranking consensus, each region will review their qualifying projects to verify and confirm that they can execute the appropriated funds by fiscal year end.

15.4 DSW Organizational Charts



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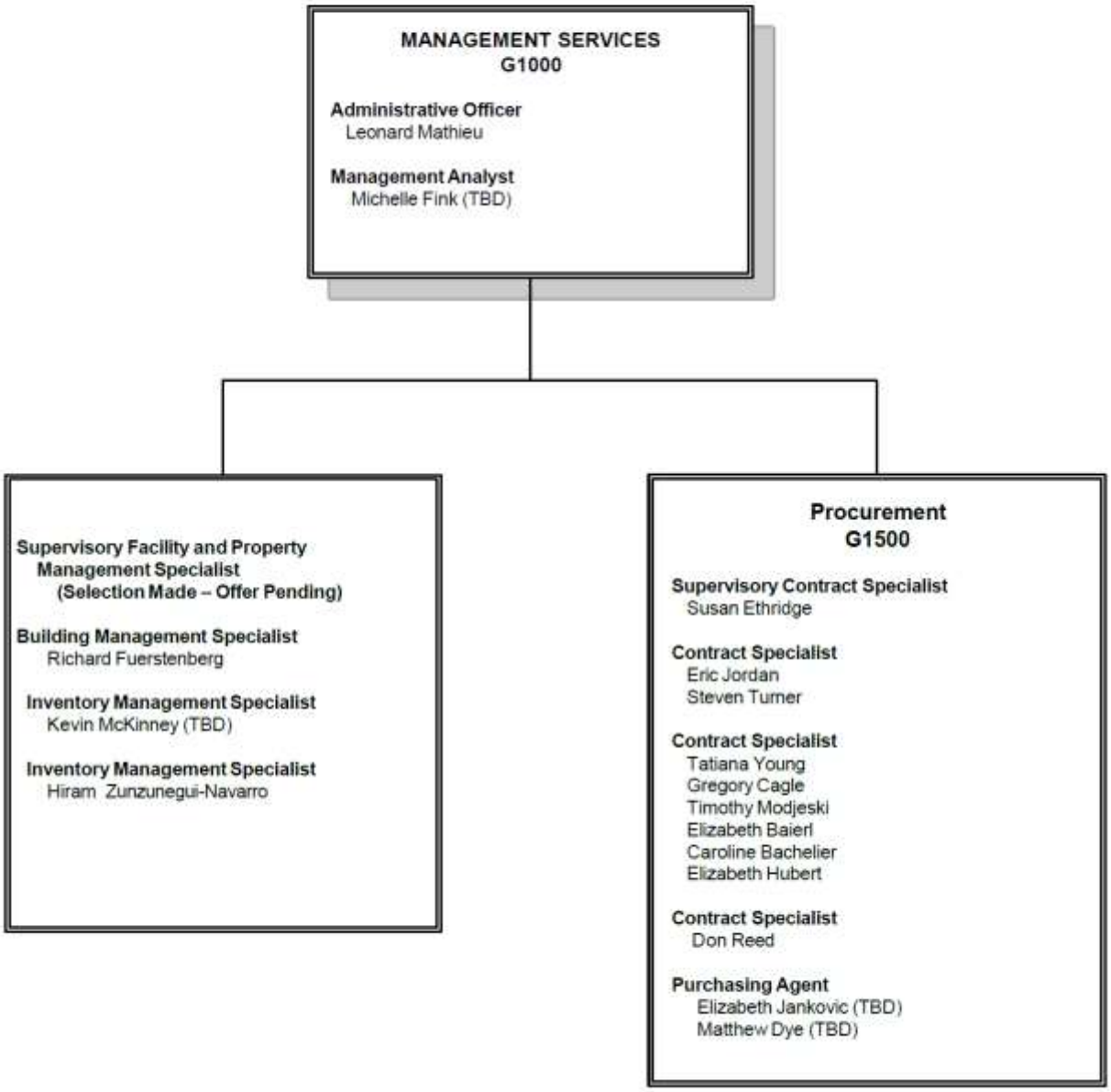
April 2017



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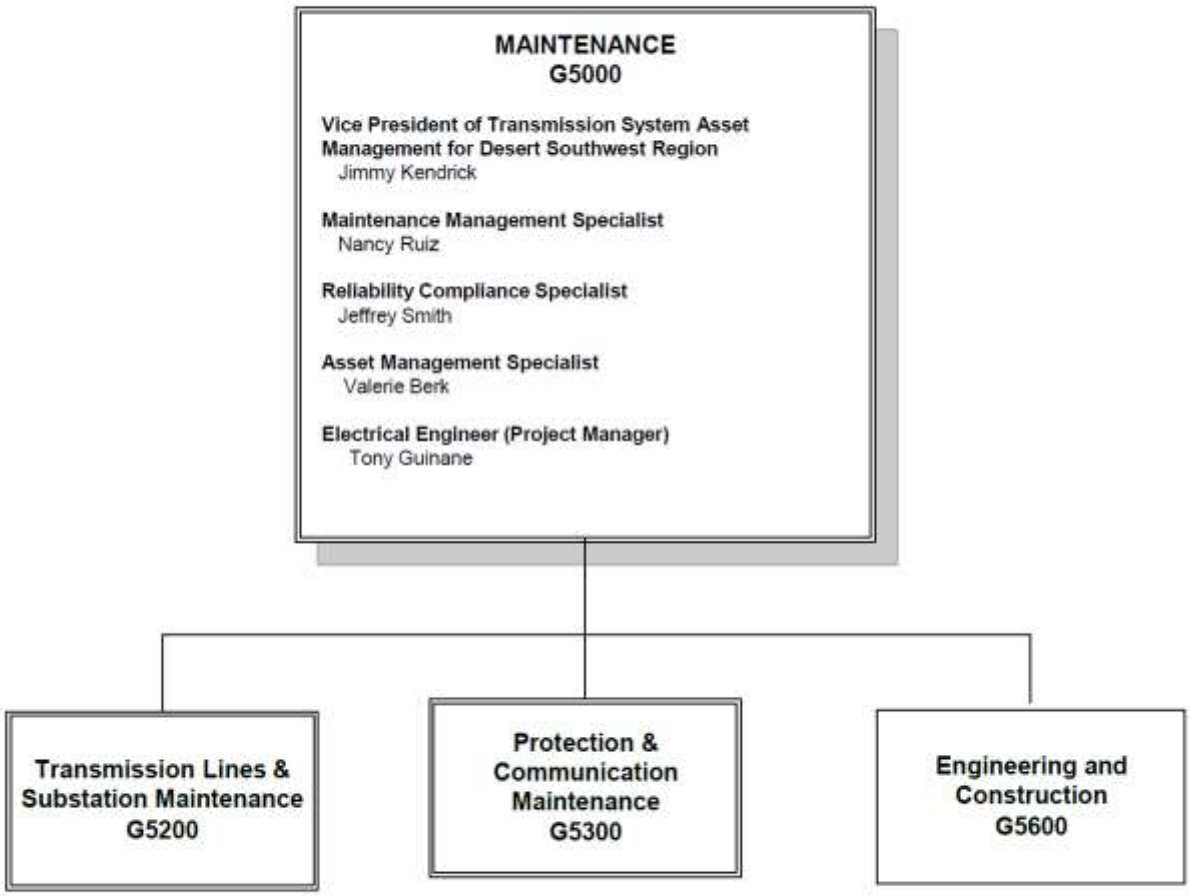

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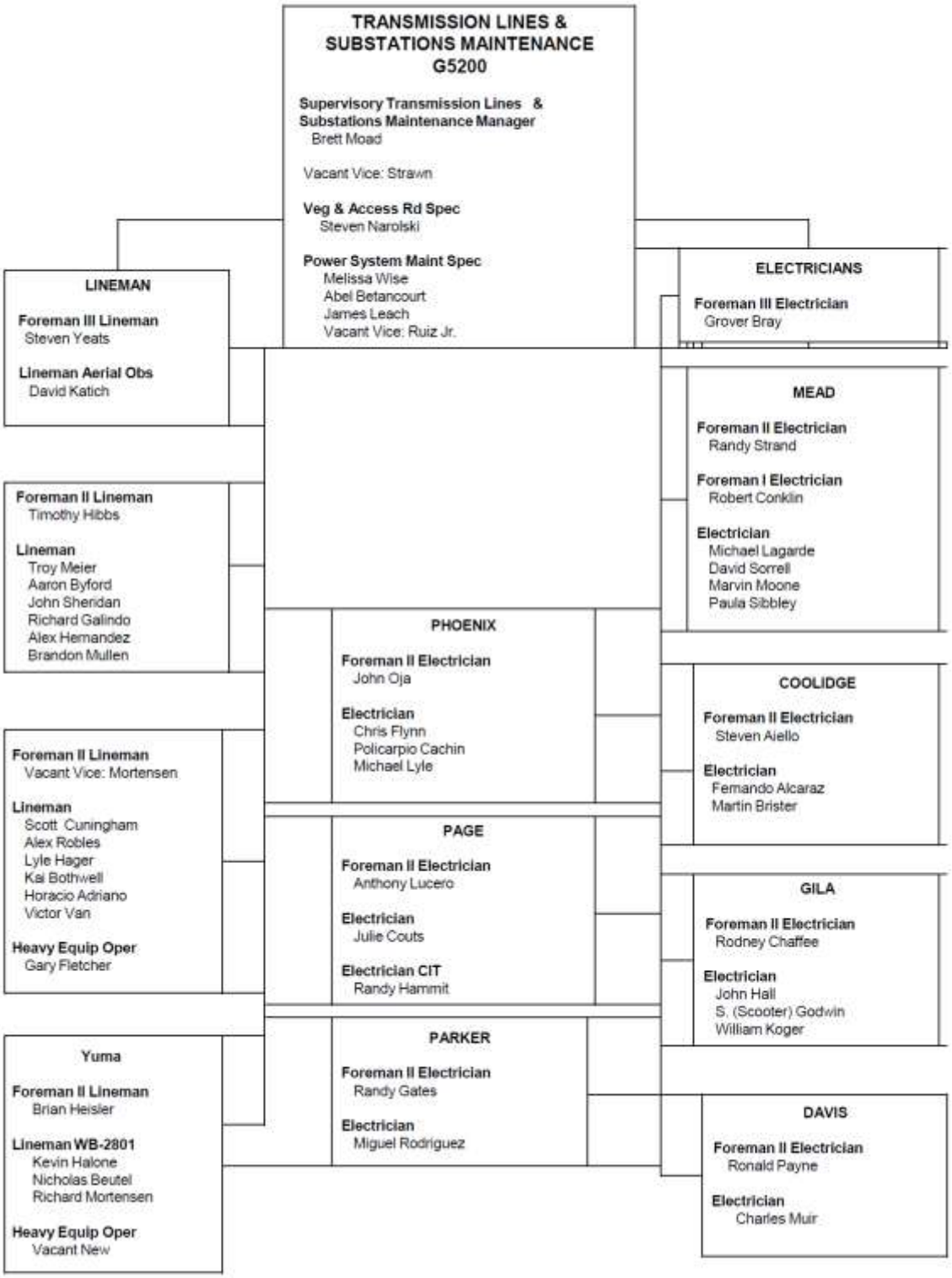

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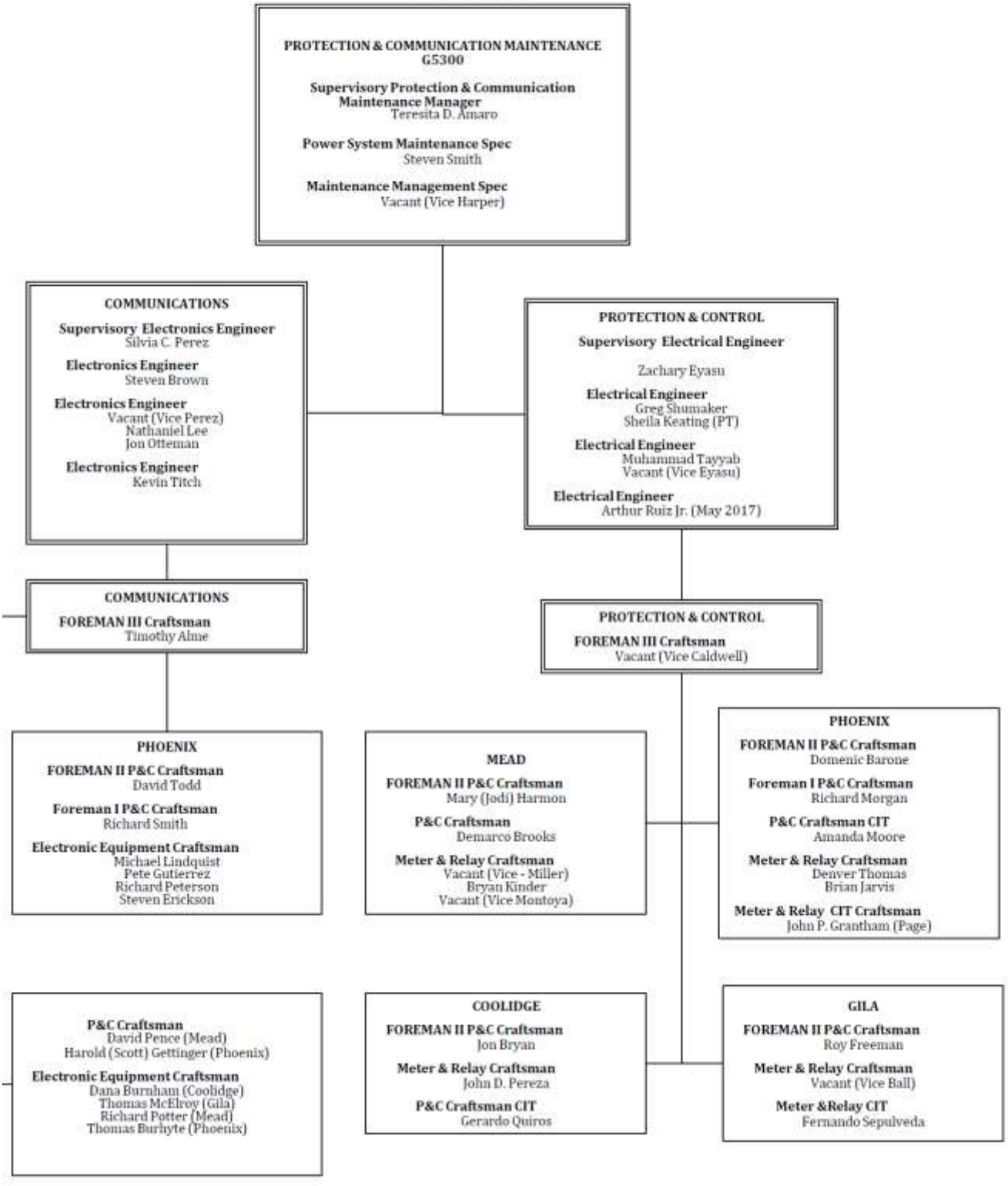
PROTECTION & COMMUNICATIONS MAINTENANCE
May 1, 2017



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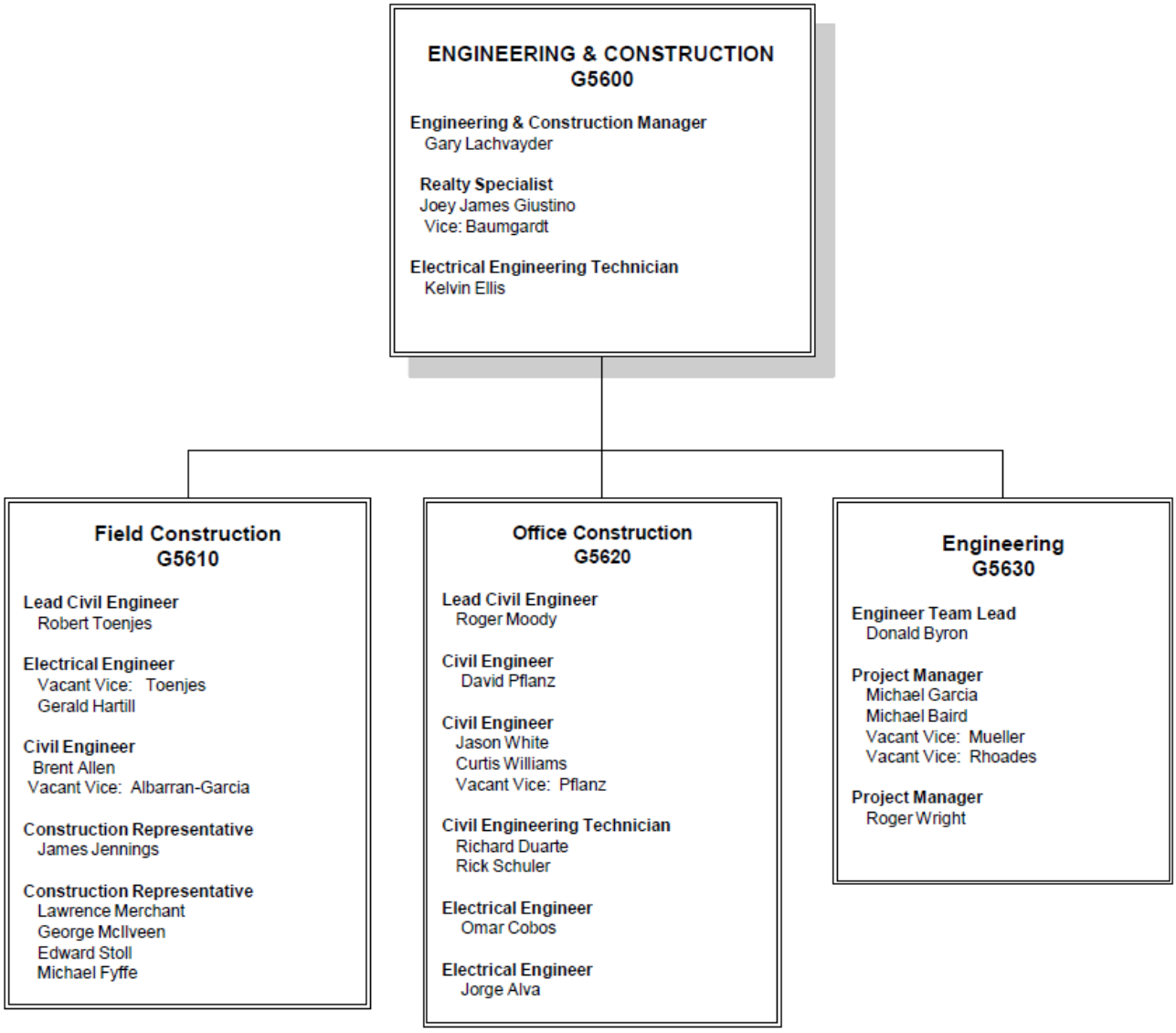

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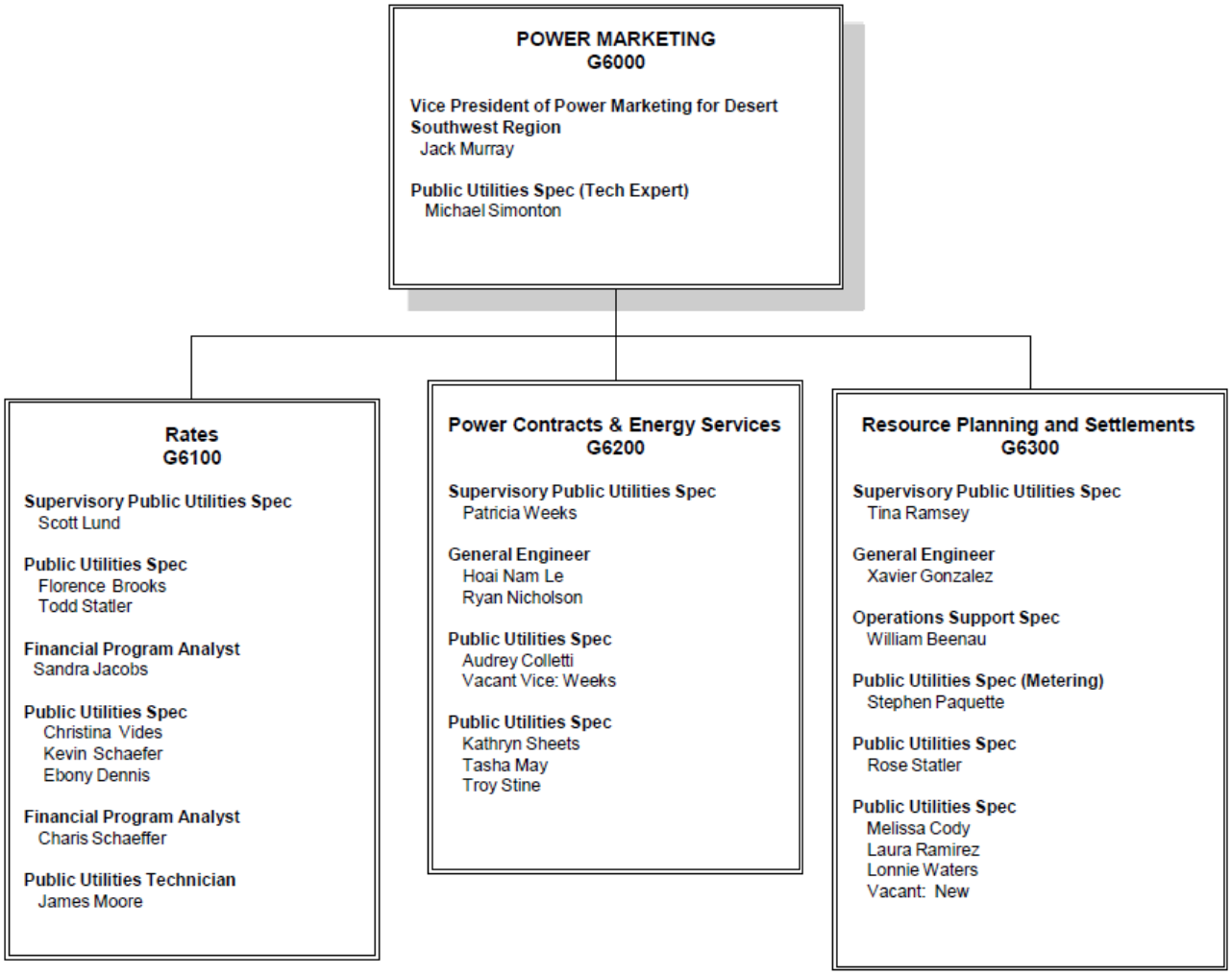

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April 2017