DESERT SOUTHWEST REGION
10-YEAR PLAN
DRAFT PRESENTATION

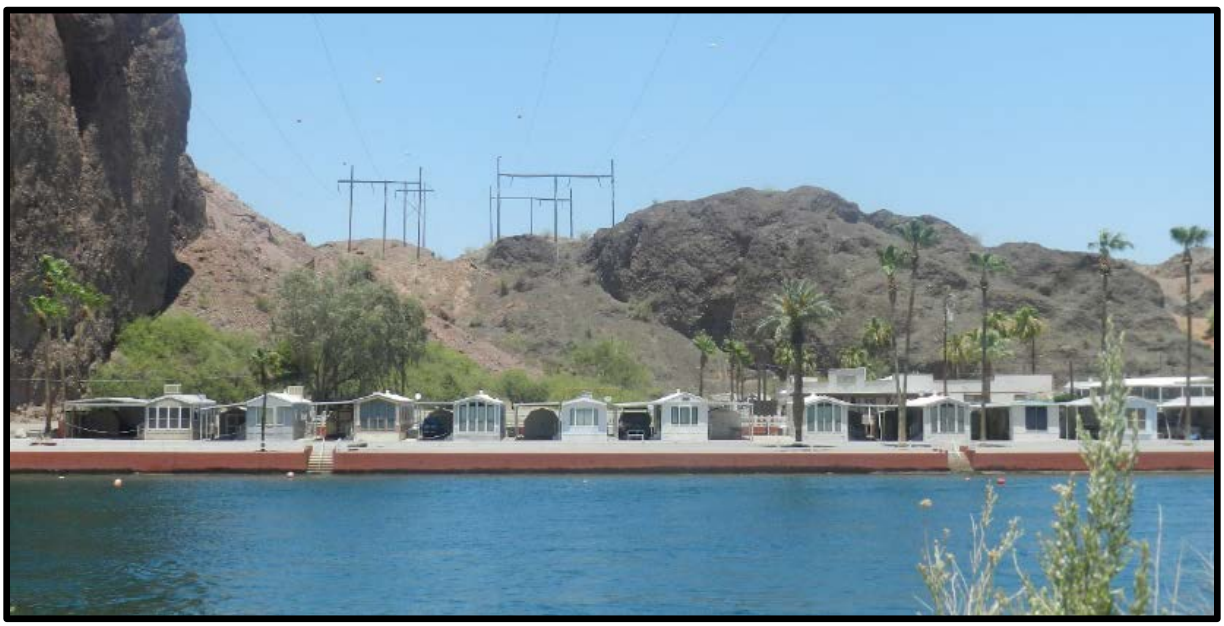

Figure 1 - Parker-Bouse & Parker-Headgate Rock transmission lines crossing Colorado River

QUARTERLY CUSTOMER MEETING: JULY 31ST, 2018
DESERT SOUTHWEST REGIONAL OFFICE
615 S. 43RD AVE
PHOENIX, AZ

Western Area Power Administration

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1. MEETING AGENDA

Tuesday, July 31, 2018
10am – 1pm (MST)

WEBEX VIDEO CONFERENCING AND CALL-IN NUMBER:

- To access the WebEx please click the below link and follow the on-screen prompts.
  https://doe.webex.com/doe/j.php?MTID=mdc83da93ceaa57f811d279673ae1ed93
  Meeting number: 901 907 369
  Meeting password: nXjrE2CA
- To join the conference call, please dial (415)-527-5035; when requested enter conference code number 901 907 369 and then enter #.

OBJECTIVES:

- Solicit customer feedback on proposed 10-Year Plan Pivot
- Review strategic capital plan
- Review draft 10-Year spend plans

AGENDA:

1. Welcome and Introduction
2. Pivot Strategy
3. FY18 Seed Projects
4. FY19 Bouse Upgrade
5. FY20 Bouse-Kofa 161-kV Rebuild
6. FY22 Parker-Blythe 161-kV Rebuild
7. Draft 10-Year Plan Spreadsheet
8. Rate Impact
9. Prepayment Vote Schedule
10. Next Steps
    a. **September TBD**, **2018**: 10-Year Plan Customer Meeting
        i. Focus: Final 10-Year Plan Presentation
    b. **December TBD, 2018:** 10-Year Plan Customer Meeting
        i. Focus: Prepayment Voting Meeting

2. TABLE OF ACRONYMS

ACSR……ALUMINUM CONDUCTOR STEEL REINFORCED
ACSS……ALUMINUM CONDUCTOR STEEL SUPPORTED
APS……ARIZONA PUBLIC SERVICE
AOA……ANALYSIS OF ALTERNATIVES
BES……BULK ELECTRIC SYSTEM
BOR……BUREAU OF RECLAMATION
BSE……BOUSE SUBSTATION
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
EVM……EARNED VALUE MANAGEMENT
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
PCB……POLYCHLORINATED BIPHENYL
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
TEP……TUCSON ELECTRIC POWER
TYP……10-YEAR PLAN
WAPA……WESTERN AREA POWER ADMINISTRATION

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4. PIVOT STRATEGY

4.1 What Is The Pivot?

A strategic onetime shift in the 10-Year Plan process that requires simultaneous approval of multiple upcoming capital improvement projects. The pivot will span two 10-Year Plan cycles (two calendar years) and incorporate simultaneous prepayment funding approvals across fiscal years 2019, 2020, 2021, and 2022. A successful pivot will conclude in December 2019 at the Prepayment Voting Meeting. Upon Completion, the 10-Year Plan will be in alignment with the Government's Budget Formulation Process such that prepayment funding will be approved two years in advance of the start of new projects.

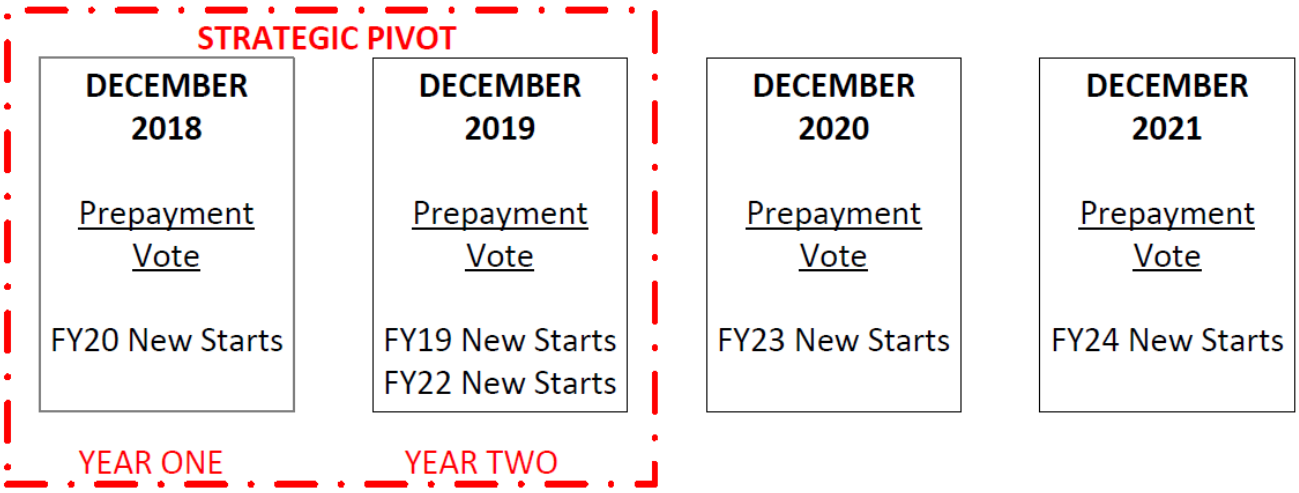


Figure 2 - Pivot strategy - Prepayment Voting Schedule

4.2 Why Do We Need to Pivot?

Federal Government Budget Formulation process begins two fiscal years prior to the execution year (current year). Historically, conducting the Prepayment funding vote in the same year as the proposed construction start, creates inconsistencies and unpredictability in the execution of DSW's annual budget, which is established two years prior. The result is modifications to resource allocations made last minute in order to compensate for budgetary swings. This is caused by deviations in projects budgeted two years prior compared to actual approved prepayment projects in the execution year. By aligning the customer prepayment vote with the Budget Formulation process, DSW can improve consistency and predictability in its Budget Formulation and Execution. Aligning capital planning with budget formulation is imperative to the success of the 10-Year Plan.

4.3 Customer Benefits

As a result of a successful pivot, the customers will gain input into Analysis of Alternatives (AOA) study prioritization, planning, and results. Previously the AOAs were being performed concurrent with Budget Formulation, such that opportunities for customer input/engagement were limited. The strategic plan to pivot will provide customers with capital planning information in advance of budget formulation. Therefore, garnishing customer support for capital improvements with time to develop diverse, viable, and economical investment alternatives.

5. FY18 SEED FUNDED PROJECTS

5.1 Overview

In August of 2017 DSW presented proposed new projects for fiscal 2018 which included the three transmission line rebuild projects listed below. These projects were selected for seed funding with a not-to-exceed allowance to start the preliminary design phase. Seed funding allows the project to move from the AOA conceptual design estimate (**RED** box below), into the preliminary design phase (**GREEN** box below). The objective of the seed funding phase is to develop 50%-75% of the design package for the purposes of developing an engineer's estimate, which is more accurate than the AOA conceptual design estimate. It is in the preliminary design phase that the project baselines are formulated as an output for customer review and consideration for full project funding with prepayments.

FY18 SEED FUNDING PLAN			
Project	**Initial Conceptual Estimate (AOA)**	**Seed Budget**	**Prepayment Total Project Cost**
Coolidge-Valley Farms 115-kV Rebuild	$4,815,696	$800,000	TBD Fall 2018
Kofa-Dome Tap 161-kV Rebuild	$5,360,022	$500,000	TBD Fall 2018
Dome Tap-Gila 161-kV Rebuild	$7,401,431	$500,000	TBD Fall 2018

**Initial Conceptual Estimate is calculated in the Analysis of Alternatives (AOA) Study*

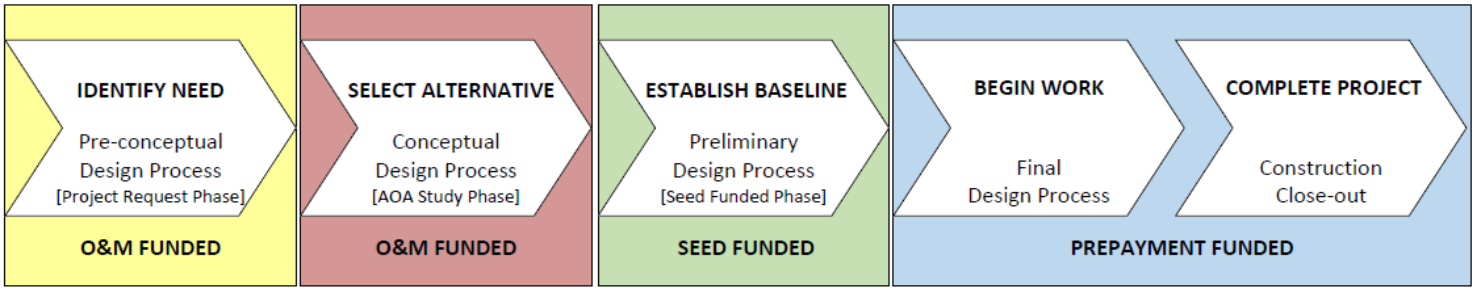


Figure 3 - Funding source for each capital planning phase

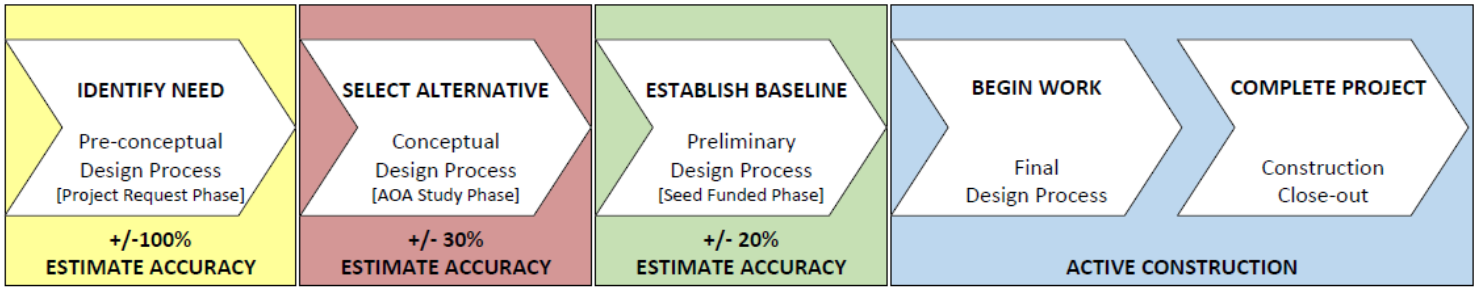


Figure 4 - Estimate accuracy for each capital planning phase

5.2 Coolidge-Valley Farms 115-kV Rebuild

Seed Budget: $800,000
Total Project Budget: TBD Fall 2018

Coolidge to Valley Farms (COL-VAF) is a single circuit, 6.1-mile, 115-kV transmission line segment of the Coolidge to Oracle (COL-ORA) 45-mile transmission line. The existing structures are mainly wood H-frame structures with a 4/0 copper conductor and two overhead ground wires. The rebuild effort will include the replacement in-kind of existing deteriorated wood pole structures. Wood pole replacements will be used except in areas where the structural design requires light-duty steel. The existing copper conductor (88 MVA) will be upgraded to a Cardinal 954 kcmil ACSR (180 MVA) conductor with the addition of a new overhead optical ground wire. The scope of work also includes possible minor substation work. Damaged H-frame wood pole structures will be demolished and removed, prior to the installation of new wood structures. Replacement of the new wood poles will be located in approximately the same location as the existing poles to avoid environmental and access concerns.

Conceptual Design/AOA study phase includes the following:

- Replace wood structures with light-duty steel structures
- Clear ROW access roads and pads as required for construction and maintenance
- Replace 6.1 miles of 4/0 copper conductor with 954 kcmil ACSR conductor
- Replace all insulators and hardware
- Correct all NESC clearance violations
- Replace one overhead ground wire with one optical-overhead-ground-wire

Preliminary design/seed funding phase (updates from the conceptual design):

- Replace wood pole structures in-kind except where final design requires light-duty steel (i.e. turning structures, NESC clearance mitigations)

5.3 Kofa-Dome Tap 161-kV Rebuild

Seed Budget: $500,000
Total Project Budget: TBD Fall 2018

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. 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.

WAPA will replace 7.3 miles of three 300 kcmil hollow core copper conductors with 336.4 kcmil ACSS conductor, replace one steel overhead ground wire with an optical overhead ground wire, and install light duty steel H-frame structures to replace the seven wood structures remaining in the line segment. Install new light duty steel H-frame steel structures as needed to correct NESC clearance issues not corrected by stringing new ACSS conductor. Access roads will be improved as needed.

Conceptual Design/AOA Study phase includes the following:

- Clear ROW access roads and pads as required for construction and maintenance
- Replace 7.3 miles of 300 kcmil copper conductor with 336.4 kcmil ACSS conductor

- Add one optical-overhead-ground-wire
- Replace all insulators and hardware
- Correct all NESC clearance violations
- Replace remaining wood pole structures will light-duty steel structures

Preliminary design/seed funding phase (updates from the conceptual design):

- Replace one steel overhead-ground-wire in-kind
- Replace both structures inside Dome-Tap substation

5.4 Dome Tap-Gila 161-kV Rebuild

Seed Budget: $500,000
Total Project Budget: TBD Fall 2018

Dome Tap (DME) to Gila (GLA) is a single circuit, 7.6 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 highway 95, the Union Pacific Railroad and the Wellton Mohawk Canal. The line traverses BLM land and a proposed critical habitat area around the Gila River. Originally constructed with wood H-frame structures, maintenance activities have replaced all but 16 of the structures with light-duty steel. Ten NESC violations have been identified along the 300 kcmil hollow core copper conductors line.

Conceptual Design/AOA Study phase includes the following:

- Clear ROW access roads and pads
- Replace 7.6 miles of 300 kcmil hollow core copper conductors with 336.4 kcmil ACSS conductors
- Add one optical-overhead-ground-wire
- Replace all insulators and hardware
- Install light duty steel H-frame structures, replacing the remaining 16 wood structures
- Light duty steel H- frame steel structures will also be installed as needed to correct NESC clearance issues not corrected by stringing new ACSS conductor

Preliminary design/seed funding phase (updates from the conceptual design):

- Replace one steel overhead-ground-wire in-kind
- Replace both structures inside Dome-Tap substation

6. ACTIVE PROJECT: PARKER-HEADGATE ROCK & PARKER BOUSE REROUTE

6.1 Project History

Approved for prepayment funding in October 2012 (FY13), 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 would 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 proposed as the new construction design for this project. The line would be configured as a double circuit shortly after departing from the Parker Substation for a proposed alignment on either the California or Arizona side of the Colorado River. To date the project alignment has remained unsecured since inception, despite several alternatives being investigated with regard to routing and reuse of existing rights-of-way in an effort to control and reduce total cost to the project.

Figure 5 - Parker-Bouse & Parker-Headgate Rock 161-kV lines crossing Colorado River

6.2 Mission Need

- Vacate transmission lines from Parker Strip and high density public areas
- Address reliability risks of end-of-life transmission structures
- Correct identified NESC clearance violations
- Vacate difficult right-of-way terrain where WAPA maintenance is currently difficult or impossible
- Alleviate current ROW encroachment issues and avoid potentially litigious land owners

Figure 6 - South of Parker Current System Alignment

6.3 Project Challenges

California Alignment

- Transmission line routing has proven to be difficult due to unique terrain constraints.
- An approved river crossing has yet to be finalized
- Unknown land acquisition costs and timelines for purchase result in inability to forecast timeline for completion
- Currently no routing solution has materialized

Parker Strip Alignment (Existing ROW)

- Strong public sentiment against remaining in the current ROW through Parker strip
- Public scoping meeting led to large outpouring of community opposition
- Potential risk of litigation or other legal delays if pursued
- Parker strip is congested and many transmission lines are difficult to access in region
- Current ROW has numerous encroachments, access constraints, along Parker strip and is currently considered not viable

CALIFORNIA ALIGNMENT

PARKER STRIP ALIGNMENT

6.4 Parker-Headgate Rock Maintenance Report

Western Area Power Administration
Geographic Information System

July 10th, 2018 PAD-HDR 161kV G5200 Maintenance Report

Maintenance Performed in 2018

	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.

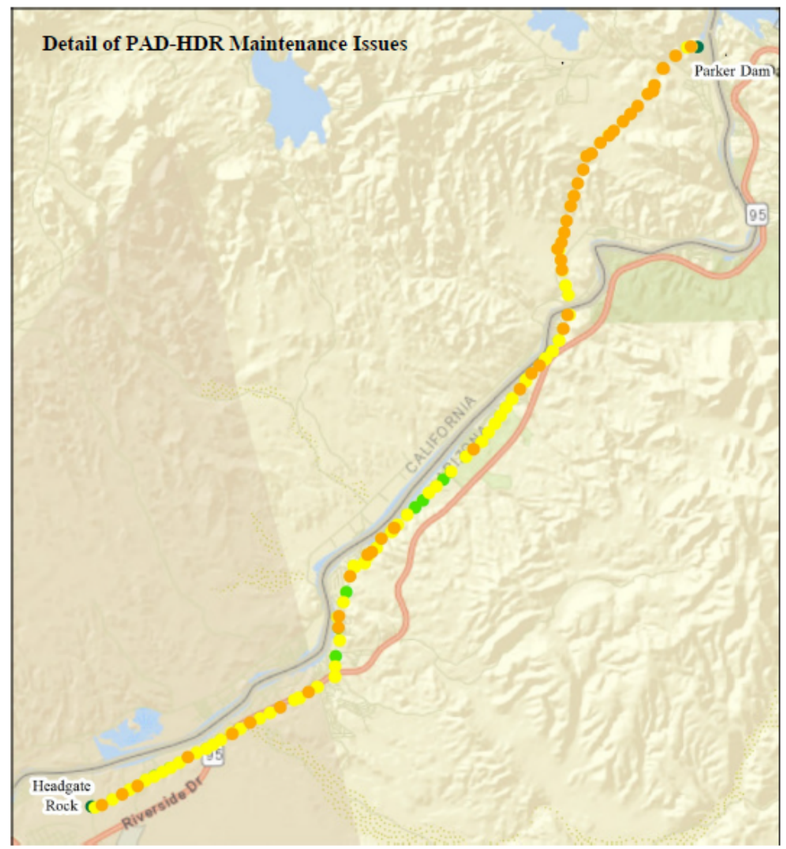
2018 Inspection Progress

	Structures
Inspected	29
Uninspected	69
Total	98

29%

Outstanding Maintenance in 2018

Row Labels	C	D	E	Grand Total
Anchor	4			4
Brace	48			48
Crossarm	22	7		29
Guy	33	2		35
Insulator	11			11
Phase/Conductor	2	1		3
Pole	69	43		112
Pole Hardware	32	2		34
Signs	6			6
Static Wire	3	1		4
Grand Total	230	56	0	286



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.

6.5 Parker-Bouse Maintenance Report

Western Area Power Administration
Geographic Information System

July 10th, 2018 PAD-BSE 161kV G5200 Maintenance Report

Maintenance Performed in 2018

	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.

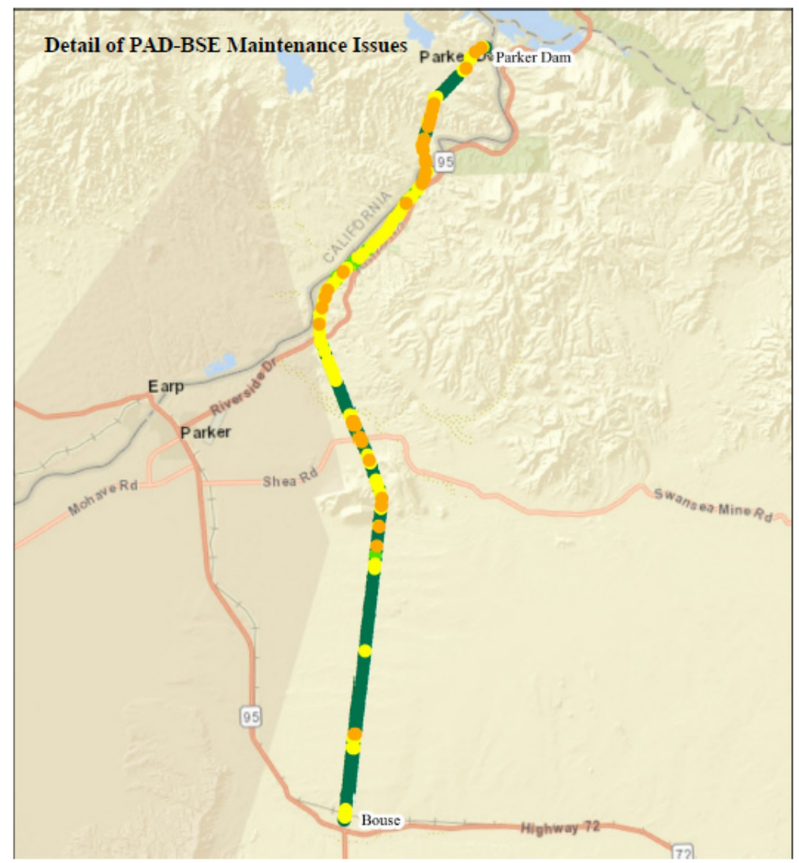
2018 Inspection Progress

	Structures
Inspected	111
Uninspected	68
Total	179

62%

Outstanding Maintenance in 2018

Row Labels	C	D	E	Grand Total
Anchor	2	1		3
Brace	48	2		50
Crossarm	29	17		46
Guy	38	2		40
Insulator	15	2		17
Pole	57	16		73
Pole Hardware	15	3		18
Signs	2			2
Static Wire	3	6		9
Grand Total	209	49	0	258



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.

6.6 Project Cancelation

- WAPA intends to cancel the Parker-Headgate Rock and Parker Bouse 161-kV Reroute Project this year. Once canceled, $17,235,000 in prepayment funds will be reprogramed to support a viable project alignment and scope of work.
- Factors supporting project cancelation:
    - Proposed routing/scoping efforts continue to lack viability despite significant efforts
    - Very little project advancement has been made since 2014
    - A number of environmental activities would have to be re-done to continue the project
    - Continuation of the project would require significant additional prepayment funding via a customer vote
    - Execution of proposed cancellation would not occur until an alternate scope is identified to meet the mission need

7. FY19 PROPOSED PROJECT: BOUSE UPGRADE PROJECT

Proposed as DSW's only FY19 new project start, the Bouse Upgrade project would kick off with appropriated seed funding estimated at $958,000. The objective would be to begin preliminary design and generate a refined total project estimate for prepayment customer review and vote in December of 2019.

EXISTING CONFIGURATION

PROPOSED CONFIGURATION

7.1 Bouse Upgrade Project Scope

STEP ONE: Build a new 230-kV transmission line

- Construct 15 miles of new double circuit 230-kV transmission line from Bouse substation to existing Parker-Liberty #2 transmission line
- Results in redirection of Parker-Liberty 230-kV line through Bouse Substation
- Approximately 60 steel monopole structures
- Proposed 1272 kcmil ACSR conductor or most economical to support load
- One overhead ground wire and one overhead optical ground wire.
- Construct across flat, unpopulated, BLM land

STEP TWO: Expand Bouse Substation

- Bouse substation rebuilt in 2012 to 230-kV standards, operated at 161-kV
- Three breaker ring-bus configuration
- Renovate into a 161-kV double-breaker-double-bus configuration
- Add two 230-kV bays in 4-breaker ring-bus configuration with two 230/161-kV transformers

STEP THREE: Connect Headgate Rock to Bouse utilizing a Jumper

- Install jumper between existing Parker-Headgate Rock 161-kV line and the existing Parker-Bouse 161-kV line
- Connect Bouse to Headgate Rock using a new Jumper
- New Headgate Rock-Bouse 161-kV line is established

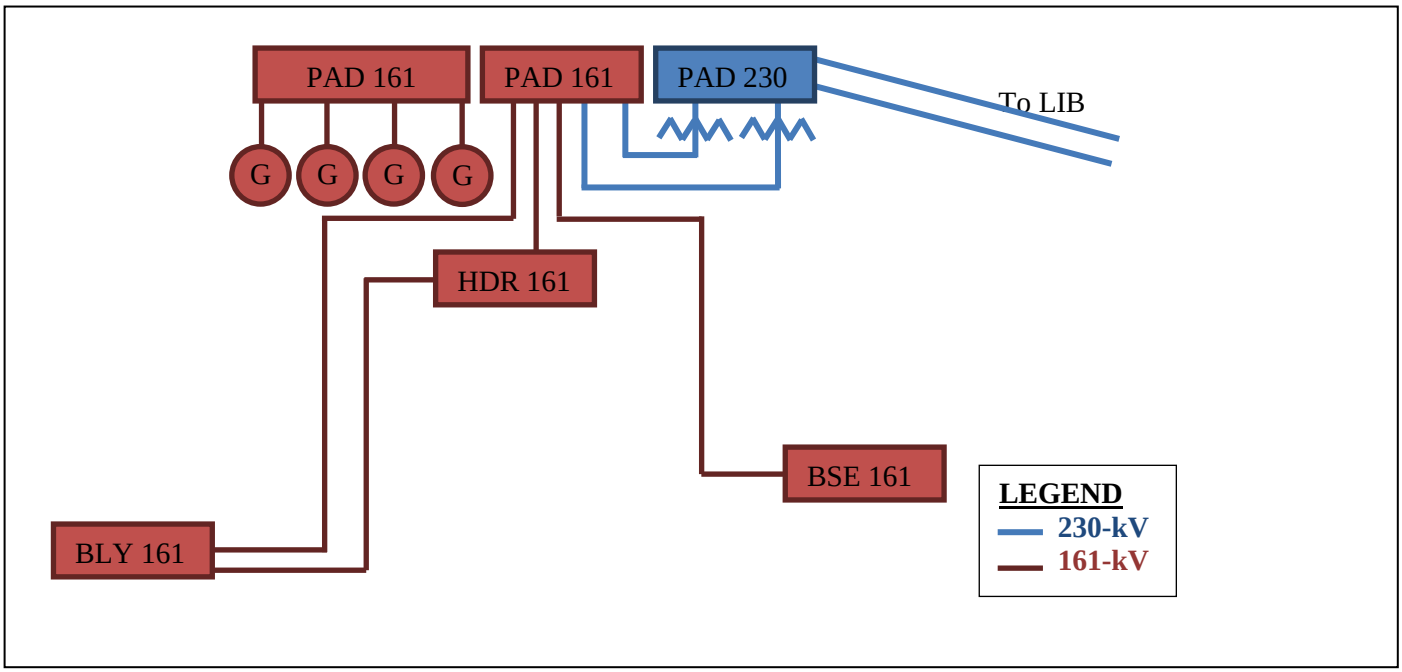
STEP FOUR: Remove 20 miles of transmission line

- Remove 10 of the 14 miles of single circuit line from Parker towards Headgate Rock.
- Remove 10 of the 22 miles of existing single circuit line from Parker towards Bouse.
- Relinquish existing ROW through Parker strip

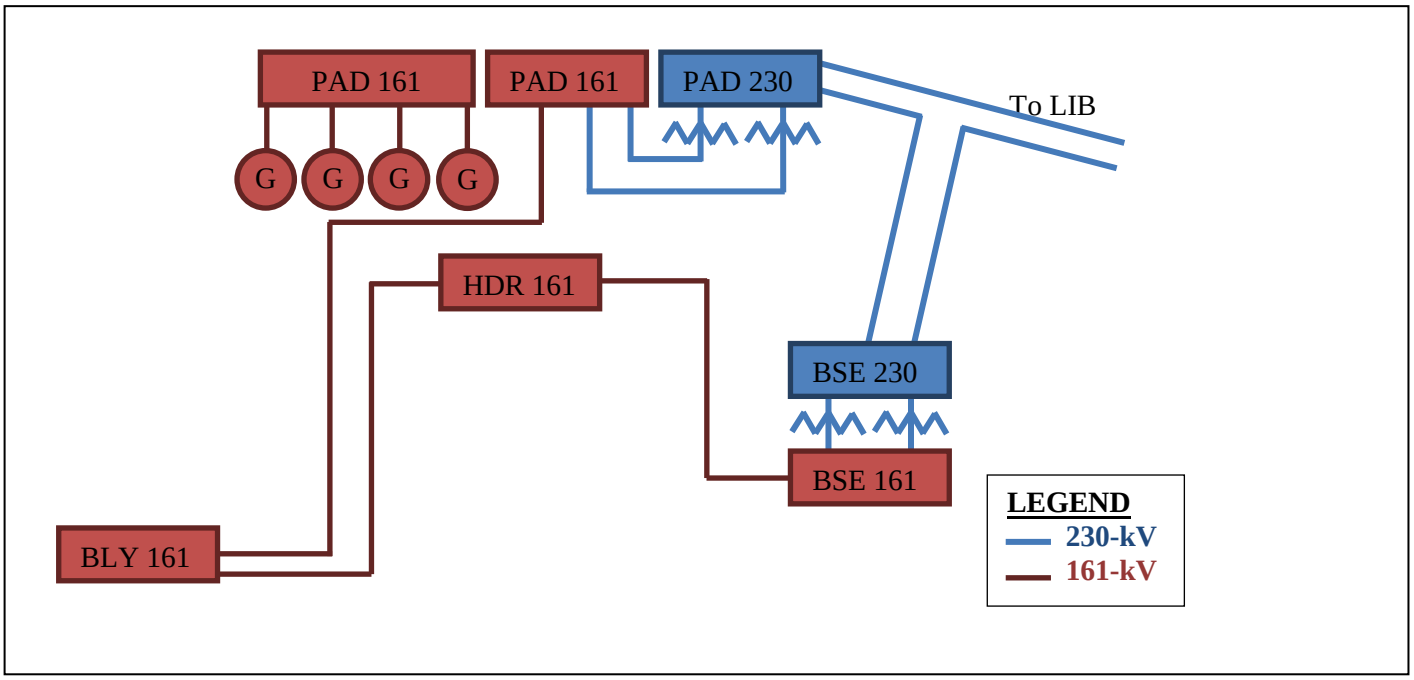
7.2 Bouse Upgrade Project Advantages

- Proposed Bouse T-Line crosses mostly flat, BLM land, away from public corridor
- Enhanced maintainability and reliability
- Viable path forward with predictable cost and schedule
- Removal of 20 miles of transmission line and 141 structures through Parker Corridor
- Optimized constructability without:
    - Potential marketing path de-ratings
    - Adding risk of meeting all existing contractual commitments
    - Impacting reliability or the operational configuration
    - Outage complexities present in the PAD-HDR/BSE project
- Loads can be met during construction with radial feed from Liberty and Parker
- System is no longer vulnerable to the impacts of either of the 230/161-kV transformers at Parker being offline (planned/unplanned), allowing for more maintenance/operational flexibility.

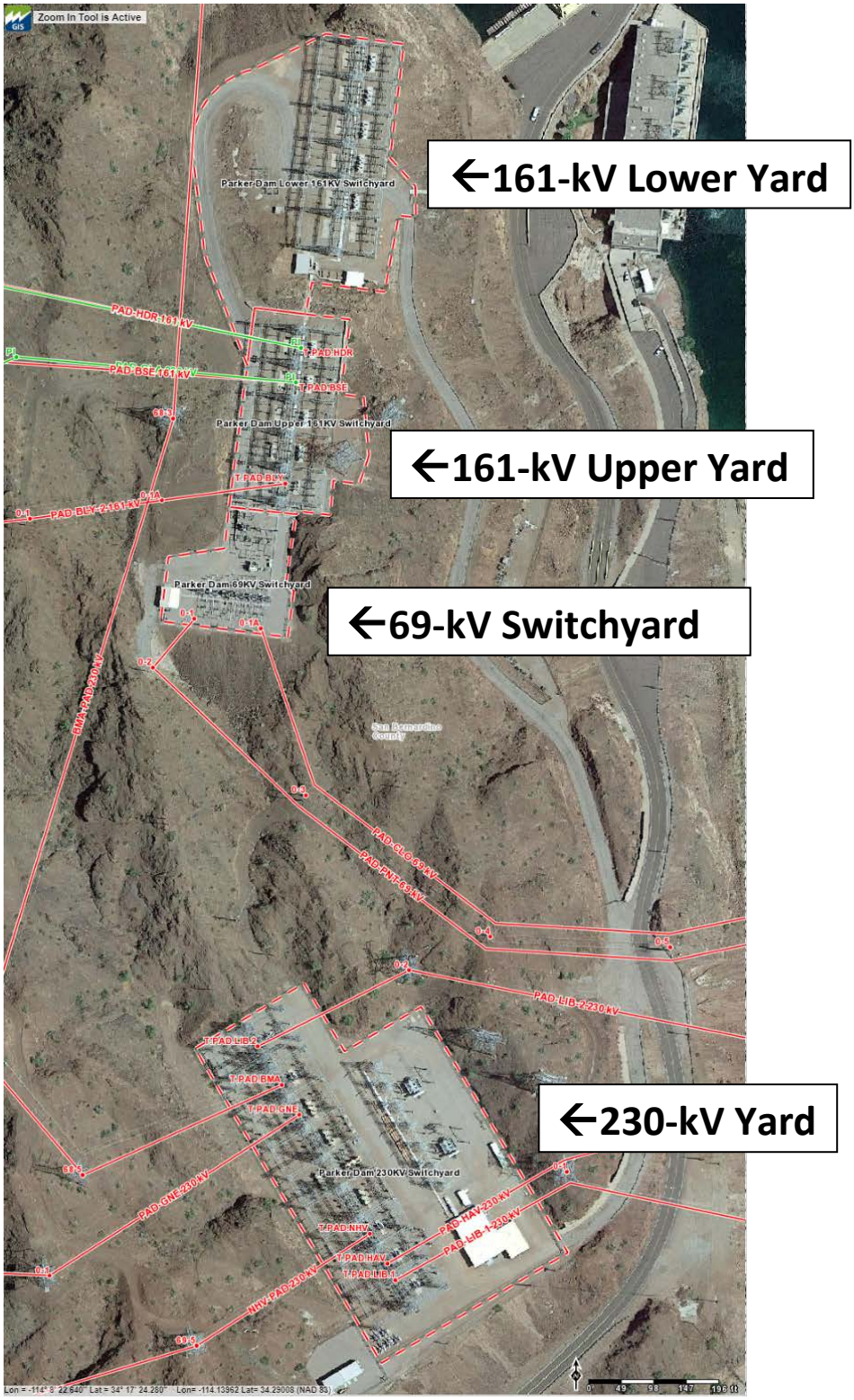
7.3 Existing Configuration



7.4 Proposed Configuration



7.5 Impacts to Parker Substation



Bouse Upgrade Project Benefits for Parker

- Removal of the Parker-Headgate Rock and the Parker-Bouse lines would:
    - Free up two bays in the upper Parker 161-kV yard
    - Avoid the need to replace two oil circuit breakers and 6 disconnect switches
    - Reduce load on the upper 161-kV yard
    - Create much needed space for future optionality
    - Reduce scope of work on Parker 161-kV rebuild effort planned for FY25
    - Allow for increased system reliability and flexibility for maintenance on any of the transformers at Parker or Bouse, extending the life of the transformers

Parker Substation Yards Historically in 10-Year Plan

- 161-kV upper and lower yards built in the late 1940's and upgraded in 1978
- Numerous options have been investigated since 2011 to mitigate reliability concerns while balancing economic viability
    - Upgrade to double-breaker-double-bus configuration
    - Rebuild main and transfer arrangement
    - Replace at risk equipment in-kind
- Two canceled projects in the last five years:
    - 161-kV Replace disconnect switches (8 tandem/14 standard)
    - 161-kV Replace 9 oil breakers
- Parker substation rebuild efforts remains in the 5+ year 10-Year Plan window
    - 161-kV Yard currently in FY24 with a $10M+ place holder
    - 230-kV yard currently in FY26 with a $5M+ place holder
- Each scope has its own unique constraints between cost, operational/maintenance flexibility, outage sequencing, etc.

Parker Substation Reliability

- The existing main and transfer bus configuration makes outage scheduling extremely difficult
- Oil circuit breakers are 35+ years old
- Most disconnect switches are 40+ year old
- Equipment failure rates are increasing
- Repairs often require custom parts and lengthy repair windows
- Status-quo maintenance is inefficient and costly
- 161-kV substation provides a radial feed to the 69-kV substation which in turn serves a variety of customers.
- Currently maintenance is bottlenecked due to outage restrictions due to current loading on 230/161-kV transformers
- If one 230/161-kV transformer goes out of service, WAPA's committed load is constricted across the remaining 230/161-kV transformer
- Outage restrictions (up to several months) impede optimal maintenance cycles which negatively affect transformer life
- 230-kV yard is showing signs of steel structure twisting
- All yards are very congested and land locked. No room for any expansion or additional redundancy for loads (aka 69-kV tie)
- Transfer bay breaker shares a bay with a 230/161-kV transformer

7.6 South of Parker – Voltage Benefits

		Existing System			Proposed Layout		
Bus	**Outage**	**Pre-Voltage**	**Post-Voltage**	**Delta Voltage**	**Pre-Voltage**	**Post-Voltage**	**Delta Voltage**
Bouse 161	PAD-BSE 161 (P1) (worst P1 for Existing System)	0.98	0.91	0.07	N/A	N/A	N/A
Bouse 161	PAD-EGL 230 (P1) (worst P1 for Proposed Layout)	N/A	N/A	N/A	0.99	0.98	0.01
Wellton-Mohawk 161	GLA-WMS + GLA-DME 161 (P2 or P6) w/ no KOF caps	0.99	Divergence	Divergence	0.99	0.78	0.22
Wellton-Mohawk 161	GLA-WMS + GLA-DME 161 (P2 or P6) w/ two 15 MVAR KOF caps	1.00	0.84	0.16	1.00	0.92	0.08

8. FY20 PROPOSED PROJECTS: BOUSE-KOFA REBUILD

8.1 Project Description

The Bouse (BSE) to Kofa (KOF) 161-kV transmission line is a single circuit, 84.3 mile line segment of the overall Parker-Gila 161-kV Transmission Line originally built in 1943.

The BSE-KOF line is located in western Arizona running south from Bouse substation to Kofa substation. Bouse substation is located just north of the junction of AZ Highways 72 and 95 in La Paz county. Kofa substation is located approximately 16 miles northeast of the city of Yuma in Yuma County. The terrain along the line is mostly low desert with multiple wash crossings and low rises. Toward the south end of the transmission line the terrain becomes more mountainous across the Castle Dome Mountains near Dome Tap.

The line was originally 78.9 miles long, constructed with three 300 kcmil hollow core copper conductors (Anaconda R178R2). Most of the wood H-Frame structures have been replaced with light duty steel H-Frame structures, and only 82 wood structures remain. In 2006 a portion of the line was rerouted around the town of Quartzsite. The reroute replaced 3.3 miles of the existing line through Quartzsite with 8.4 miles of three 954 kcmil ACSR conductors supported on single circuit steel monopoles.

Figure 7- Bouse-Kofa Existing Wood H-Frame Structure February 2018

8.2 Project Justification

An Analysis of Alternatives (AOA) Study was performed in 2017 to identify various performance gaps and deficiencies associated with this line segment and identify viable, diverse, and economical alternatives.

Experienced and/or Observed performance gaps and deficiencies:

- NERC/NESC violations have been identified and need to be corrected
- Noted deterioration and unsafe structures are significant
- Access road(s) and right-of-way availability and conditions are sub-par
- Install fiber optic ground wire to meet current and future protection, control, communication and security requirements

NERC/NESC 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 106 cases of phase-to-ground clearances and one phase-to-OGW of a crossing line clearance not meeting the minimum clearance required by the National Electrical Safety Code (NESC) and NERC.

Transmission Line Conditions:

There are 17 structures identified by maintenances forces as needing replacement with more expected when detailed ground inspection is completed.

Figure 8 - Bouse-Kofa Existing Wood H-Frame Structure February 2018

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 access roads need to be created. A lack of prompt access for appropriate resources presents reliability, safety, and cost risks.

Communications Requirements:

Installing Optical Overhead Ground Wire (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 security which is currently in the process of installing live feed video cameras and IT networks at substations; the addition of these systems will tax and soon bypass the current communications bandwidth provided by microwave.

8.3 Bouse-Kofa Maintenance Report

Western Area Power Administration
Geographic Information System

July 3rd, 2018 BSE-KOF 161kV G5200 Maintenance Report

Maintenance Performed in 2018

	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.

2018 Inspection Progress

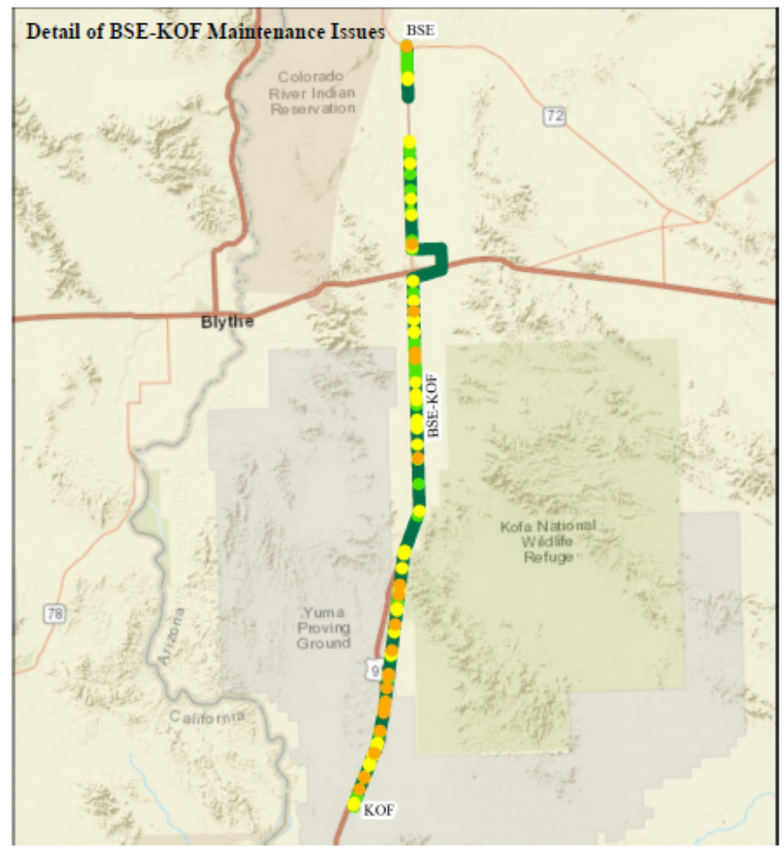
	Structures
Inspected	668
Uninspected	1
Total	669
99%	

Outstanding Maintenance in 2018

Row Labels	C	D	E	Grand Total
Anchor				0
Brace	44	6		50
Crossarm	22	7		29
Guy	8			8
Insulator	27	1		28
Phase/Conductor				0
Pole	33	10		43
Pole Hardware	6	1		7
Signs	2			2
Static Wire	4	4		8
Vibration Damper				0
Grand Total	146	29	0	175

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.



8.4 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 Economy. A detailed breakdown of each Alternative can be found below.

- Alternative 1- Status Quo (Maintenance only)
- Alternative 2- Reconductor and Replace failing wood poles in-kind
- Alternative 3- Reconductor and Replace all wood poles with light duty steel H-frame structures
- Alternative 4- Rebuild to 230-kV Standards operated at 161-kV using light duty steel H-Frame structures
- Alternative 5- Inset Structures as needed to mitigate NERC/NESC violations

Alternative #1- Status Quo (Maintenance Only)

Under the no action alternative, the BSE-KOF T-line continues in its present condition with 107 NERC/NESC violations. WAPA maintenance forces would continue to replace failed wood poles with new wood poles upon failure pending resource availability.

The status quo alternative would have no upfront construction costs, but to change out the remaining wood structures on an emergency maintenance basis could cost $5,948,000. This estimate is based on an actual pole replacements at a cost of $34,176.93. This scenario would leave 82 wood structures in the line. A detailed ground inspection which is still in progress for the current maintenance year has identified 17 structures that have rejected poles or are recommended to be replaced. More structures are expected to be recommended for replacement when the detailed ground inspection is completed.

Alternative #2- Reconductor BSE-KOF

WAPA will replace 75.6 miles of three 300 kcmil Anaconda hollow core copper conductors with three 336.4 kcmil Oriole ACSS conductors, replacing one steel OGW with OPGW, and replacing 17 wood structures deemed as requiring replacement with light duty steel H-frame structures and others as needed to correct clearance issues not corrected by the stringing new ACSS conductor. Access roads will be improved as needed.

Alternative #3- Rebuild with Light Duty Steel H-Frame Structures

WAPA will replace 75.6 miles of three 300 kcmil Anaconda hollow core copper conductors with three 336.4 kcmil Oriole ACSS conductors, replace one steel OGW with OPGW, and install light duty steel H-frame structures to replace the 82 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 to facilitate construction.

Alternative #4- Rebuild to 230-kV Standards

WAPA will remove 75.6 miles of three 300 kcmil hollow core copper conductor, two steel OGWs, 584 light duty steel H-Frame structures, and 82 wood H-Frame wood structures. WAPA will then rebuild the line segment by Installing 75.6 miles of three 954 kcmil ACSR conductor, OPGW, polymer insulators, and hardware designed for 230-kV on single circuit steel monopoles but being operated at 161-kV. Access roads will be improved as needed.

Alternative #5- Inset Structures

Description of Alternative 5 – WAPA will inset 107 light duty steel H-frame structures between existing transmission line structures as necessary to correct clearance issues. Access roads will be improved as necessary for construction.

8.5 Alternative Comparisons

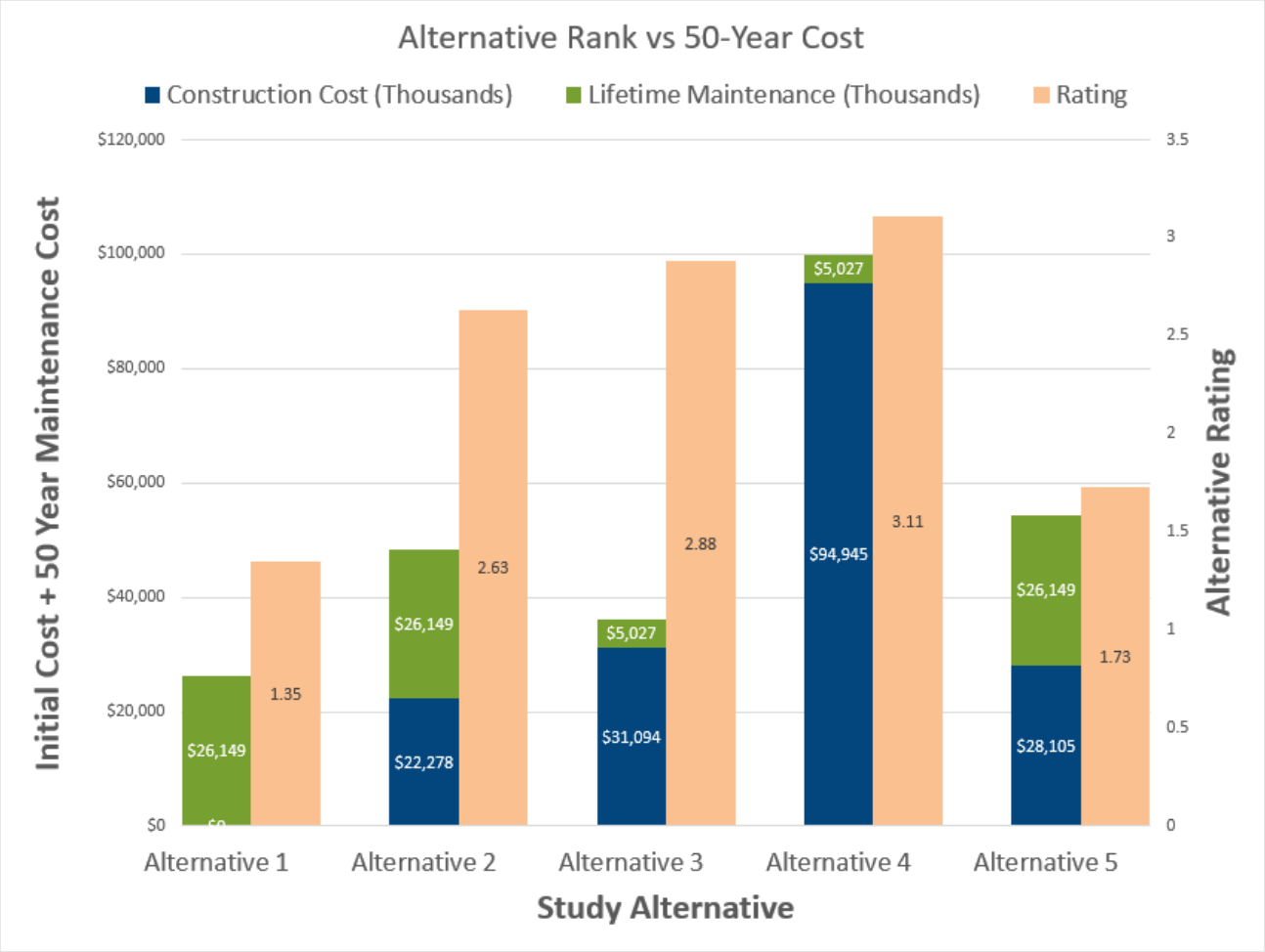


Figure 9 - Breakdown of AOA Rating and Costs for BSE-KOF

8.6 Preferred Alternative

Of these Alternatives, WAPA has concluded that Alternative 3 is preferred. Although Alternative 4 achieved a higher AOA rating, the cost required to achieve that rating is far greater than Alternative 3.

Project Predesign Estimate for Preferred Alternative (Alternative 3 Conceptual)

Preferred Alternative #3 Conceptual Estimate	
Rebuild With Light Duty Steel H-Frame Structures	
	TOTAL
Administrative (Inc. Project Management)	$986,000
EVM*	$1,736,000
Design	$201,000
Construction Contract	$11,412,000
Government Furnished Equipment (GFE)	$10,823,000
Commissioning	$134,000
Environmental	$620,000
Subtotal	$25,912,000
Contingency (20%)**	$5,182,000
Phase I & II Total Project Budget	**$31,094,000**

**Earned Value Management System (EVM) 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.*

The above estimate was developed in the AOA study phase (RED box below) and is considered a conceptual design estimate with a +/- 30% accuracy. This estimate will be updated once the preliminary design process (GREEN box below) is initiated and the project scope, schedule, and cost are elaborated through design efforts.

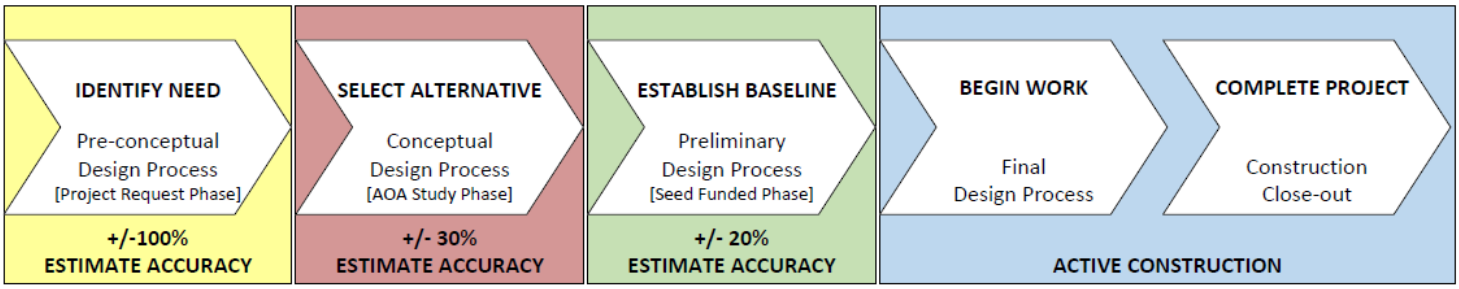


Figure 10 - Project estimate accuracy at each capital planning phase

**Currently all projects are being reevaluated to remove the 20% cost contingency as a result of improvements made through the AOA study process and seed funding mechanism. Subsequently, the project estimate provided will be reduced and performed in two phases. This will eliminate the need for EVM and as a result, the 10-Year Plan will see an overall reduction in cost. Adjustments to the 10-Year Plan and a new rate analysis will be available in advance of the September customer meeting.

8.7 Conceptual Project Phasing

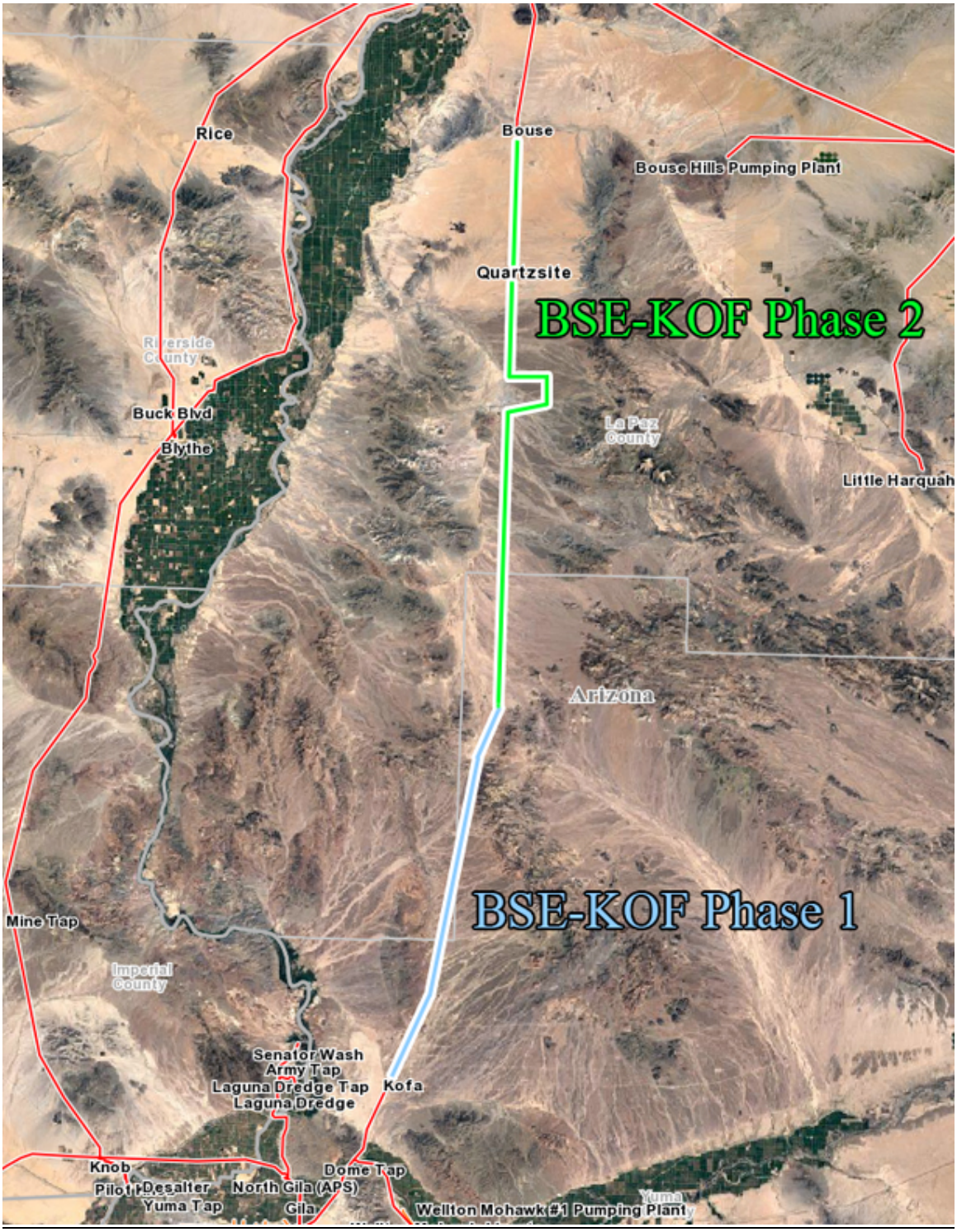


Figure 11 - Bouse-Kofa Phasing Breakdown

Phase I

Design and construct 31.25 miles of 161-kV transmission line from structure 70-2 to Kofa Substation. Design includes replacing 43 wood structures, and selecting a new conductor that can be installed on existing and new light duty steel H-Frame structures to eliminate NERC/NESC violations to the extent possible. It is anticipated some existing light duty steel H-Frame structures will be replaced with taller structures. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure.

Phase II

Design and construct 44.25 miles of 161-kV transmission line from Bouse Substation to structure 70-2. Design includes replacing 40 wood structures, and selecting a new conductor that can be installed on existing and new light duty steel H-Frame structures to eliminate NERC/NESC violations to the extent possible. It is anticipated some existing light duty steel H-Frame structures will be replaced with taller structures. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure.

Advantages:

- Each phase can be scheduled around summer outage restrictions
- Project can be completed faster with more manageable outages considering more work can be performed between outage restrictions
- The terrain on the southern end of the line is much more mountainous and difficult than the north phasing allows a multiple contractor crews to focus on terrain specific locations concurrently
- Environmental clearance for both phases can be obtained simultaneously
- All government furnished equipment for both phases can be ordered at the same time with deliveries scheduled as needed by each phase

Disadvantages:

- Two sets of specifications and drawings will be needed, a separate set for each phase
- A separate construction contract would be needed for each phase

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 retired copper wire was estimated at $1.55 per pound (market value at time of AOA)
- The project may be done in phases
- Others have expressed interest in sharing fibers and costs of OPGW. Evaluations have been done in accordance with Federal laws and regulations

9. FY22+ PROPOSED PROJECTS: PARKER-BLYTHE REBUILD

9.1 Project Description

The Parker (PAD) to Blythe (BLY) 161-kV Transmission Line was built in 1969 and runs along the Colorado River in eastern California. The transmission line is 63.9 miles long utilizing 954 kcmil ACSR conductor and two steel overhead ground wires supported on wooden H-frame structures with 3-pole wooden structures at angle points and dead-ends. The transmission line is part of the Parker-Davis Project.

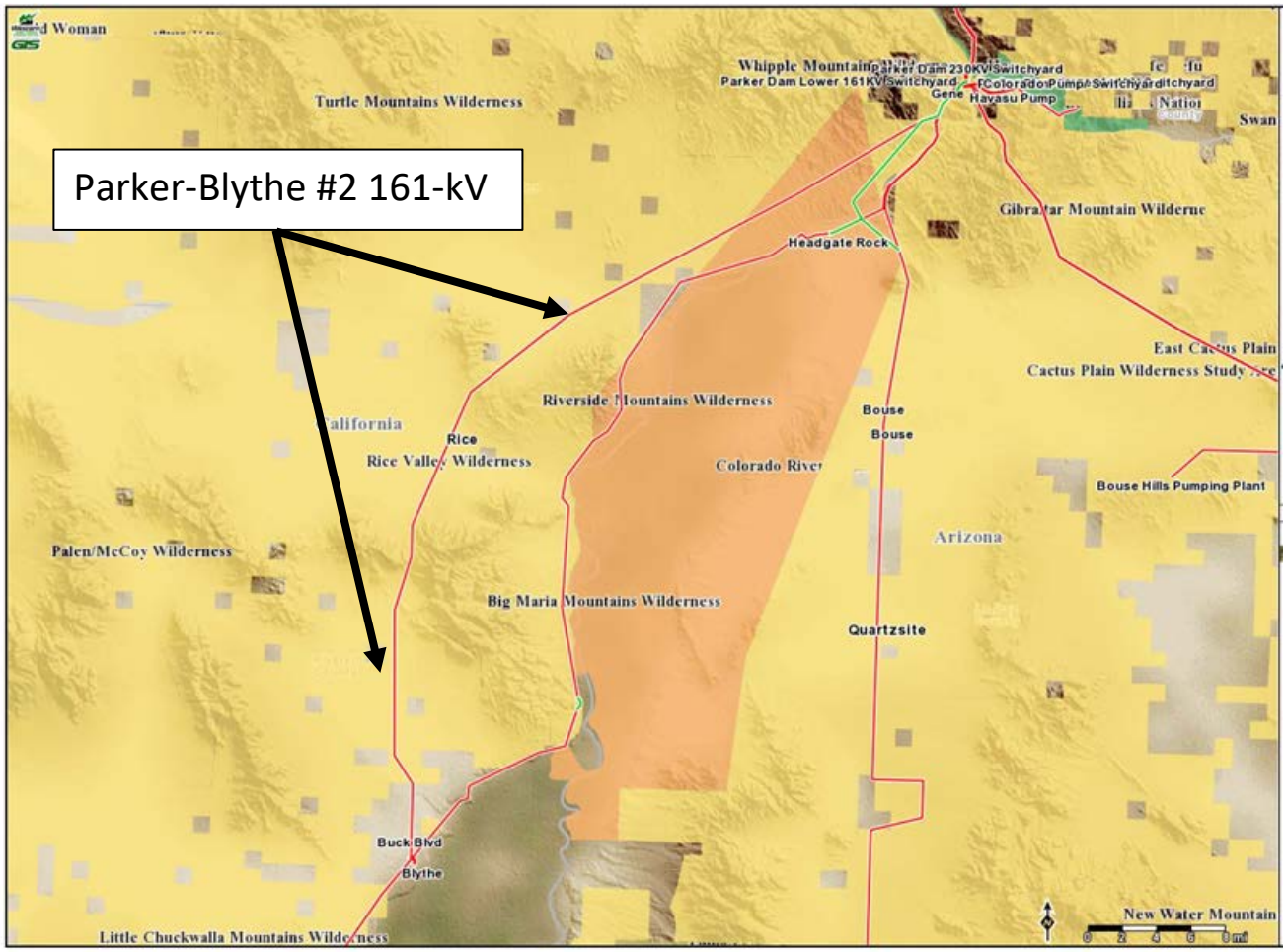


Figure 12 - Parker-Blythe #2 Area Map

9.2 Project Justification

An Analysis of Alternatives (AOA) Study was performed in 2017 to identify various performance gaps and deficiencies associated with this line segment and identify viable, diverse, and economical alternatives.

Experienced and/or observed performance gaps and deficiencies:

- Eighty percent (~881 poles) of the wood poles on the line segment require replacement
- Conductor, insulators, and hardware are 49+ years old
- NERC/NESC violations have been identified and need to be corrected
- Access road(s) and right-of-way availability and conditions are sub-par
- Install fiber optic ground wire to meet current and future protection, control, communication and security requirements

Rehabilitation of the PAD-BLY 161-kV Transmission line is needed to insure the safe, secure, reliable and affordable energy and transmission services to our customers. Rehabilitation would include:

- Replace all unsafe and deteriorated structures including those that were found to have test results with fiber strength that fell below 65% of their design strength
- Install dead-ends at intervals of less than 10 miles to prevent cascading failures
- Correct all NERC/NESC violations that have been identified
- Repair access roads as needed to construct this project
- Install fiber optic ground wire to meet current and future protection, control, communication and security requirement

NERC/NESC Violations:

There are five cases of phase-to-ground clearances not meeting the minimum clearance required by the NESC and NERC that need to be corrected.

Line Condition:

The PAD-BLY transmission line is 49 years old and has eighty percent of its supporting structures needing replacing as identified by detailed ground inspection and Polux® wood fiber strength testing.

Figure 13 - Parker-Blythe #2: Signs of Significant Pole Degradation and Heat Rot

Access Roads and ROW:

GIS data and inspection field reports shows that much of the ROW access road is so sandy, eroded or steep that construction vehicles and equipment will need to be towed in by dozer. A detailed ground inspection of the PAD-BLY transmission line conducted by DSW maintenance group identified 20% of the structures (103 out of 523) as needing a dozer tow for access to structures.

Communication Requirements:

The PAD-BLY transmission line does not have OPGW installed. OPGW has the added benefit of drastically increasing total bandwidth for data transfer over Power Line Carrier or Point to Point Microwave Systems. Security is currently in the process of installing live feed video cameras and IT networks at substations. The addition of these systems will tax or bypass the current communications bandwidth provided by the existing communication networks in place.

9.3 Parker-Blythe Maintenance Report

Western Area Power Administration
Geographic Information System

July 3rd, 2018 PAD-BLY-2 161kV G5200 Maintenance Report

Maintenance Performed in 2018

	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

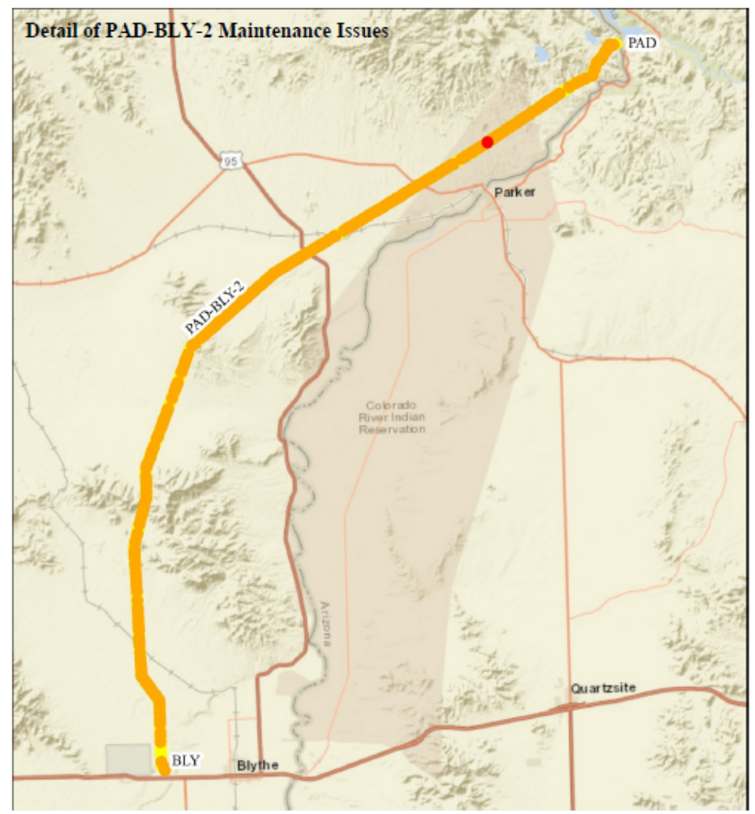
Note: Totals include RADDS projects and maintenance items.

2018 Inspection Progress

	Structures
Inspected	489
Uninspected	37
Total	526
	92%

Outstanding Maintenance in 2018

Row Labels	C	D	E	Grand Total
Anchor	18			18
Brace	183	6		189
Crossarm	81	16		97
Guy	31			31
Insulator	38	1		39
OPGW	1			1
Phase/Conductor	1			1
Pole	486	394	1	881
Pole Hardware	11	2		13
Signs	13			13
Static Wire	4	2		6
Vibration Damper	4			4
Grand Total	871	421	1	1293



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.

9.4 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 Economy. A detailed breakdown of each Alternative can be found below.

- Alternative 1 - Status Quo (Maintenance Only)
- Alternative 2 - Replace wood poles in kind and add steel structure dead-ends every <10 miles
- Alternative 3 - Rebuild with light duty steel H-Frame structures using 161-kV specifications and standards
- Alternative 3a - Rebuild with light duty steel H-Frame structures using 230-kV specifications and standards
- Alternative 4 - Rebuild with steel monopoles using 161-kV specifications and standards
- Alternative 5 - Rebuild with steel monopoles using 230-kV specifications and standards (operated at 161-kV)

Alternative #1- Status Quo (Maintenance Only)
The Parker-Blythe 161-kV Transmission Line would remain in its present condition continuing to deteriorate. The POLUX® test found only 20% of the line's supporting wood poles don't require replacement. WAPA's maintenance forces would replace individual wood poles as they fail or are deemed unfit to climb.

Alternative #2- Upgrade – Add Steel Structure Dead-ends Every <10 Miles
After receiving environmental clearances and new or amended ROW from BLM construction can begin. All failing wood H-Frame structures would be replaced with new wood structures with steel cross-arms. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. Existing 954 ACSR conductor, insulators and hardware would be used, but one OGW would be replaced with OPGW. New structures will be installed using 161-kV clearances and standards.

Alternative #3- Rebuild With Light Duty Steel H-Frame Structures Using 161-kV Specifications and Standards
After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood H-Frame structures would be replaced with new light duty steel H-Frame structures. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators and hardware would be used, one new OGW and one new OPGW would be installed. All structures will be installed using 161-kV clearances and standards.

Alternative #3a- Rebuild With Light Duty Steel H-Frame Structures Using 230-kV Specifications and Standards
After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood H-Frame structures would be replaced with new light duty steel H-Frame structures. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators and hardware would be used, one new OGW and one new OPGW would be installed. All structures will be installed using 230-kV clearances and standards. The line would be operated at 161-kV until future conversion to 230-kV.

Alternative #4- Rebuild With Steel Monopoles Using 161-kV Specifications and Standards
After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood support structures would be replaced with new steel monopoles. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators, hardware, and OPGW would be used. The new design and construction would use 161-kV clearances and standards.

Alternative #5- Rebuild With Steel Monopoles Using 230-kV Specifications and Standards (Operated at 161-kV)
After receiving environmental clearances and new or amended ROW from BLM construction can begin. All wood structures would be replaced with new steel monopoles. Steel dead-end structures would be installed at intervals of less than 10 miles to mitigate the risk of cascading failure. New conductor, insulators, hardware, and OPGW would be used. The new design and construction would use 230-kV clearances and standards.

9.5 Alternative Comparisons

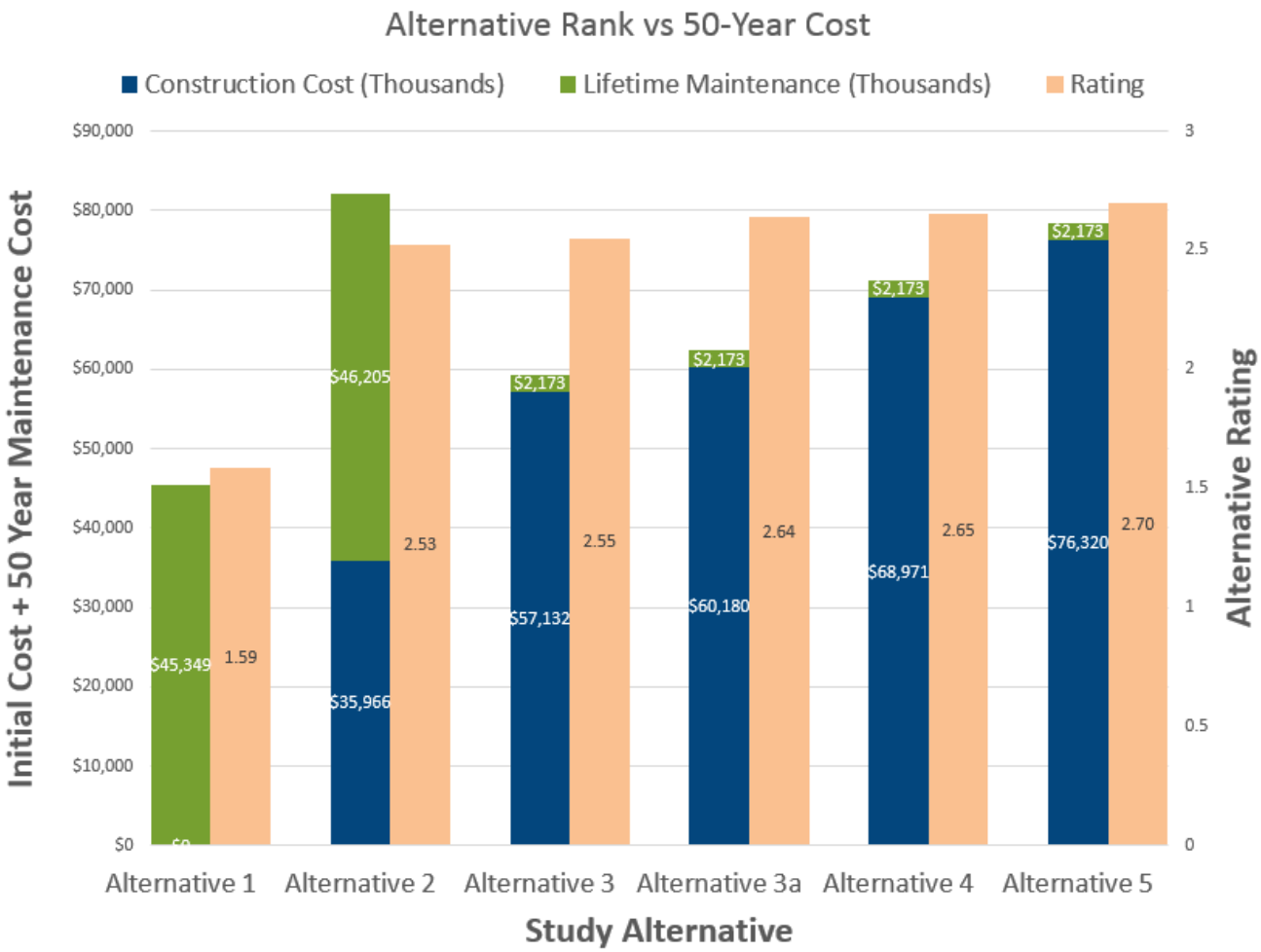


Figure 14 - Breakdown of AOA Rating and Costs for PAD-BLY #2

9.6 Preferred Alternative

Although Alternative 4 achieved a higher AOA Rating, the cost required to achieve that rating is far greater than Alternative 3a, as can be seen in the graph above.

Project Predesign Estimate for Preferred Alternative (Conceptual)

Preferred Alternative #3a Conceptual Estimate	
Rebuild With Light Duty 230-kV H-Frames	
	TOTAL
Administrative (Inc. Project Management)	$994,535
*EVM**	$1,522,000
Design	$414,975
Construction Contract	$30,462,201
Government Furnished Equipment (GFE)	$15,661,286
Commissioning	$382,532
Environmental	$596,000
Land and Land Rights	116,236
Subtotal	$50,149,765
Contingency (20%)**	$10,029,953
Phase I, II, II Total Project Budget	**$60,179,718**

**Earned Value Management System (EVM) 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.*

The above estimate was developed in the AOA study phase (RED box below) and is considered a conceptual design estimate with a +/- 30% accuracy. This estimate will be updated once the preliminary design process (GREEN box below) is initiated and the project scope, schedule, and cost are elaborated through design efforts.

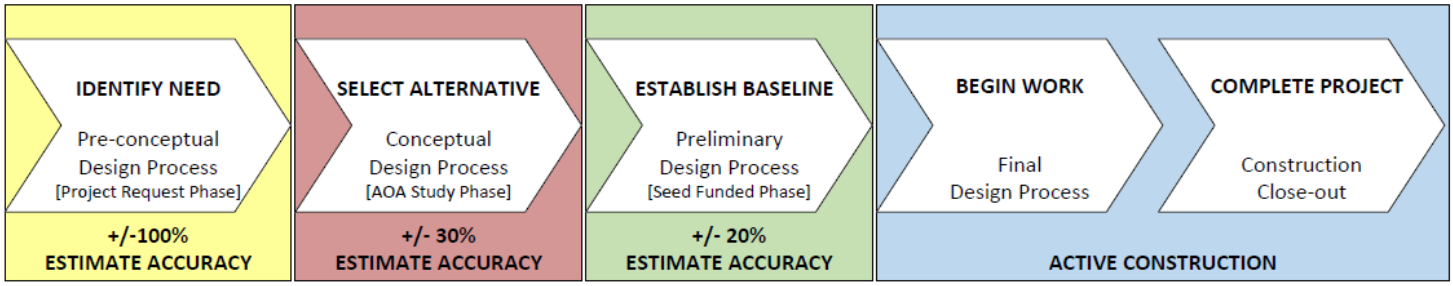


Figure 15 - Project Estimate Accuracy at each capital planning phase

**Currently all projects are being reevaluated to remove the 20% cost contingency as a result of improvements made through the AOA study process and seed funding mechanism. Subsequently, the project estimate provided will be reduced and performed in three phases. Each phase will fall below the $20M threshold at which Earned Value Management (EVM) is required. As a result, this project and the 10-Year Plan will see an overall reduction in cost. Adjustments to the 10-Year Plan and a new rate analysis will be available in advance of the September customer meeting.

9.7 Conceptual Project Phasing

Alternative 3a: Blythe-Parker 161-kV Rebuild, Phase I, Phase II, and Phase III

Figure 16 - Proposed Project Phasing Map

Phase I
Design and construct 21 miles of 161-kV transmission line from Parker Substation to structure 20-8. Design includes replacing 160 wood structures with new light duty steel H-Frame structures, and installing new conductor, one new OGW, one new OPGW, new hardware, and insulators. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure. The line will be designed to 230-kV standards and specifications but will be operated at 161-kV.

Phase II
Design and construct 21.75 miles of 161-kV transmission line from structure 20-8 to structure 41-7. Design includes replacing 181 wood structures with new light duty steel H-Frame structures, and installing new conductor, one new OGW, one new OPGW, new hardware and insulators.
Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure. The line will be designed to 230-kVstandards and specifications but will be operated at 161-kV.

Phase III
Design and construct 21.25 miles of 161-kV transmission line from structure41-7 to Blythe substation. Design includes replacing 182 wood structures with new light duty steel H-Frame structures, and installing new conductor, one new OGW, one new OPGW, new hardware and insulators. Design should include installing steel dead-end structures every 5 to 10 miles to prevent cascading failure. The line will be designed to 230-kV standards and specifications but will be operated at 161-kV.

Advantages:
- No need to have contractor demobilize and remobilize between phases
- Each phase can be scheduled around summer outage restrictions
- Environmental clearance for all three phases can be obtained simultaneously
- All government furnished equipment for all three phases can be ordered at the same time with deliveries scheduled as needed by each phase

Disadvantages:
- Three sets of specifications and drawings will be needed, a separate set for each phase
- A separate construction contract would be needed for each phase

<u>Project Assumptions and Constraints</u>
- No line outages are allowed between May 1 and September 30 in any given year
- Cost estimate is conceptual and must be revised before establishing a construction project budget
- Schedules are based on conceptual Scope of Work and must be revised as design progresses
- No new ROW is needed except for temporary construction easements
- Existing ROW and access roads are overgrown and eroded
- ROW crosses Federal Land, Tribal Land and a Desert Tortoise habitat

10. DRAFT 10-YEAR PLAN

10.1 FY19-28 SPEND PLAN

PROJECT	TOTAL PROJECT BUDGET	TOTAL PROJECT COST TO DATE	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Mesa Substation Remediation	1,970	1,950										
Tucson Substation Rebuild	9,395	9,370										
Gila-Knob 161-kV T-Line Reroute	3,595	3,531										
Black Point Mesa Reroute	2,203	2,175	28									
Parker-Davis Facility Rating Year 2	7,731	7,661	50									
Crossman Peak Microwave Facility	4,525	1,208	3,207	50								
Liberty Series Capacitor Bank Replacement	10,371	7,589	2,622	100								
Gila Substation 161-kV to 230-kV Rebuild	18,995	16,019	2,651	265								
Gila-Wellton Mohawk I-8 Crossing Rebuild	7,515	7,000	429	26								
Kofa-Dome Tap 161-kV Rebuild	5,360		4,300	550	10							
Dome Tap-Gila 161-kV Rebuild	7,401		5,921	970	10							
Coolidge-Valley Farms 115-kV Rebuild	4,816		2,673	1,138	205							
Bouse Upgrade Project	45,015		958	6,613	21,049	7,227	2,166	4,150	2,452	400		
Bouse-Kofa 161-kV Rebuild PHASE-1	15,584			500	7,792	6,236	1,056					
Bouse-Kofa 161-kV Rebuild PHASE-2	15,584			500		7,792	6,236	1,056				
Parker-Blythe 161-kV #2 Rebuild PHASE-1	20,000					500	12,779	6,385	336			
Parker-Blythe 161-kV #2 Rebuild PHASE-2	20,000					500		12,779	6,385	336		
Parker-Blythe 161-kV #2 Rebuild PHASE-3	20,000					500			12,779	6,385	336	
Parker Substation 161-kV Replacements	5,000								250	2,000	2,450	300
Blythe-Headgate Rock #1 line 161-kV Rebuil	23,900								1,195	9,560	11,711	1,434
Rogers-Coolidge 230-kV Reconductor	6,000									2,460	3,360	180
Parker Substation 230-kV Replacements	5,000									500	4,000	500
FISCAL YEAR (FY) TOTALS	**259,960**	**56,503**	**22,839**	**10,712**	**29,066**	**22,755**	**22,237**	**24,370**	**23,397**	**21,641**	**21,857**	**2,414**

Estimate Accuracy
Active Construciton
±20% Accuracy
±30% Accuracy
±100% Accuracy

NOTE: Cost in thousands of dollars. Cost to date as of 5/31/18.

11. RATE IMPACT

FY18 Rate without Future Capital $ 17.16 / kW-Year

PROJECT	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Prior Year Projects (Pending Closeout)	$ 0.04	$ 0.05	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06
RRADs	$ 0.10	$ 0.22	$ 0.31	$ 0.41	$ 0.53	$ 0.65	$ 0.77	$ 0.88	$ 0.99	$ 1.10
Mesa Substation Remediation	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03
Tucson Substation Rebuild	$ 0.16	$ 0.16	$ 0.16	$ 0.16	$ 0.16	$ 0.16	$ 0.16	$ 0.16	$ 0.16	$ 0.16
Gila-Knob 161-kV T-Line Reroute	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06	$ 0.06
Black Point Mesa Reroute		$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03	$ 0.03
Parker-Davis Facility Rating Year 2		$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Crossman Peak Microwave Facility			$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07	$ 0.07
Gila Substation 161-kV to 230-kV Rebuild			$ 0.31	$ 0.31	$ 0.31	$ 0.31	$ 0.31	$ 0.31	$ 0.31	$ 0.31
Gila-Wellton Mohawk I-8 Crossing Rebuild			$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Kofa-Dome Tap 161-kV Rebuild				$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09	$ 0.09
Dome Tap-Gila 161-kV Rebuild				$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Coolidge-Valley Farms 115-kV Rebuild				$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08	$ 0.08
Bouse Upgrade Project									$ 0.88	$ 0.88
Bouse-Kofa 161-kV Rebuild PHASE-1						$ 0.31	$ 0.31	$ 0.31	$ 0.31	$ 0.31
Bouse-Kofa 161-kV Rebuild PHASE-2							$ 0.31	$ 0.31	$ 0.31	$ 0.31
Parker-Blythe 161-kV #2 Rebuild PHASE-1								$ 0.43	$ 0.43	$ 0.43
Parker-Blythe 161-kV #2 Rebuild PHASE-2									$ 0.44	$ 0.44
Parker-Blythe 161-kV #2 Rebuild PHASE-3										$ 0.44
Parker Substation 161-kV Replacements										
Blythe-Headgate Rock #1 line 161-kV Rebu										
Rogers-Coolidge 230-kV Reconductor										
Parker Substation 230-kV Replacements										
Total	**$ 0.38**	**$ 0.68**	**$ 1.28**	**$ 1.68**	**$ 1.80**	**$ 2.22**	**$ 2.65**	**$ 3.20**	**$ 4.62**	**$ 5.17**

Estimate Accuracy
Active Construciton
±20% Accuracy
±30% Accuracy
±100% Accuracy

P-DP 5-year Rate Window

12. PREPAYMENT VOTING SCHEDULE

December 2018 (Pivot Year 1)	
Project Start	**Project Name**
FY18	Kofa-Dome Tap 161-kV Rebuild
FY18	Dome Tap-Gila 161-kV Rebuild
FY18	Coolidge-Valley Farms 115-kV Rebuild
FY20	Bouse-Kofa 161-kV Rebuild Phase 1
FY20	Bouse-Kofa 161-kV Rebuild Phase 2

December 2019 (Pivot Year 2)	
Project Start	**Project Name**
FY19	Bouse Upgrade
FY22	Parker-Blythe 161-kV Rebuild Phase 1

NOTE: No Fiscal Year (FY) 2021 Proposed New Starts

December 2020	
Project Start	**Project Name**
FY23	TBD -Customer Engagment

December 2021	
Project Start	**Project Name**
FY24	TBD - Customer Engagment

13. APPENDICES

13.1 DSW Wood Pole Data

Inspected Wood Pole Ratings

As of July of 2018, there are approximately 5,751 wood structures in DSW's Transmission service region. This includes two-pole and three-pole structure types, culminating for over 12,000+ individual wood poles. Of those approximately 50% have been inspected. Of those inspected it is estimated that 38% or 4,371 wood poles need to be replaced. Referring to the table below, all of the "D" and "E" rated structures need replacement along with an estimated 50% of the "C" rated poles.

WOOD POLE RATING						
DESCRIPTION	A	B	C	D	E	TOTAL
Structures Inspected (Wood)	733	614	850	650	2	**2849**
Uninspected						**2902**
Wood Poles Replaced 2017						
Crossarms Replaced 2017						
X-Braces Replaced 2017						
						5751

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 or system reliability.

Projected Wood Pole Ratings

The table below is the projected rating of all wood pole structures, considering the inspected poles to date as the sample group. Assuming the inspection results stated above are representative of all wood poles in DSW's Transmission System, then an estimated 38% (2,174) of all wood pole structures in the system require replacing.

PROJECTED WOOD STRUCTURE RATINGS						
DESCRIPTION	A	B	C	D	E	TOTAL
Wood Pole Structures	1480	1239	1716	1312	4	**5751**

Wood Pole Annual Replacements:

Using the GIS data, DSW replaces approximately 200-300 wood poles a year through the RRADS program.

Replacement Goals South of Parker:

- FY18: Blythe-Knob 156 structures
- FY19: Blythe-Knob 132 structures
- FY20: Blythe-Knob 136 structures
- FY21: Blythe-Knob 56 structures; Bouse-Kofa 56 structures

13.2 DSW Service Region Maintenance Report

Western Area Power Administration
Geographic Information System

October-December Fourth Quarter 2017 G5200 CartoPac Maintenance Report

4th Quarter Maintenance Performed

	Anchor	Arm/Bridge	Brace	Crossarm	Distribution Apparatus	Foundation	Guy	Insulator	Leg Member	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	0	0	0

Note: Totals include RADDS projects and maintenance items.

Key Performance Indicators	#	%
Incoming Maintenance	128	100
Maintenance Performed	0	0
Maintenance Added to Backlog	128	100

Added to Backlog | Removed from Backlog

4th Quarter Incoming Maintenance

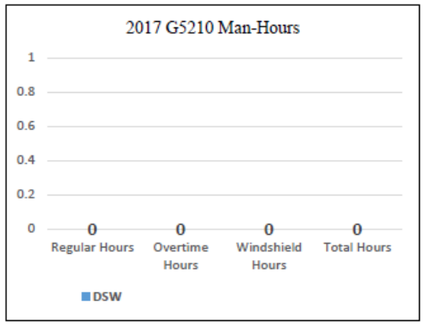
	Anchor	Arm/Bridge	Body Extension	Brace	Crossarm	Distribution Apparatus	Foundation	Guy	Insulator	K Member/Window	Leg Member	OPGW	Phase/Conductor	Pole	Pole Hardware	Signs	Static Wire	Vibration Damper	Totals
C	1			29	23			1	15				5	30		4	3		111
D	1			1	2			1	9					2			1		17
E																			0
Totals	2	0	0	30	25	0	0	2	24	0	0	0	5	32	0	4	4	0	128

DSW Total Outstanding Maintenance Backlog

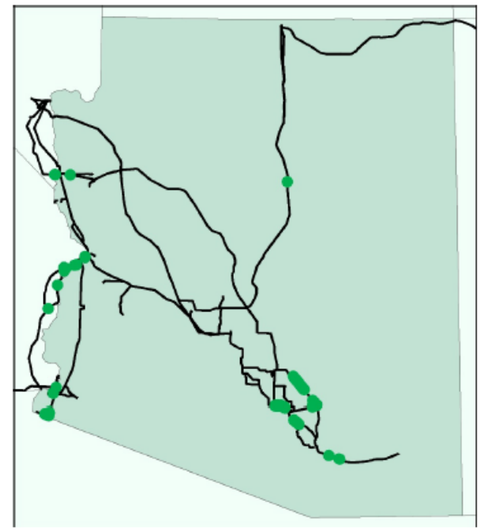
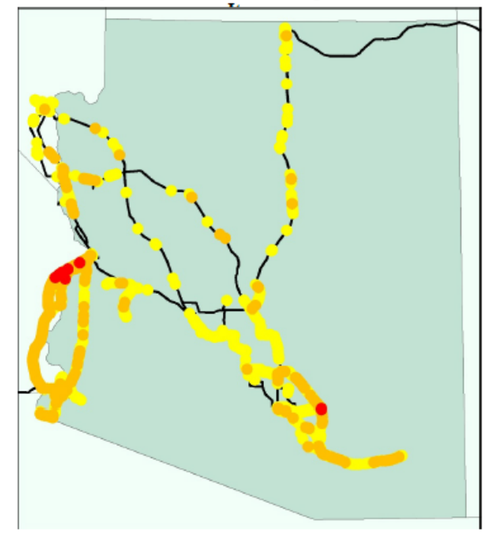
	C	D	E	Totals
Anchor	72	5		77
Arm/Bridge	26			26
Body Extension	11	11		22
Brace	1188	42	1	1231
Crossarm	852	98		950
Distribution Apparatus	17	1		18
Foundation	69	2		71
Guy	228	8		236
Insulator	766	47		813
K Member/Window	4	2		6
Leg Member	22	6		28
OPGW	9			9
Phase/Conductor	46	26		72
Pole	1692	772	7	2471
Pole Hardware	141	13		154
Signs	47	3		50
Static Wire	122	31	1	154
Vibration Damper	51			51
Totals	5363	1067	9	6439

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.



4th Quarter Maintenance Performed



Map Detail of DSW Outstanding Maintenance