

# FY12 Ten-Year Capital Program



*Davis Substation 230/69-kV Transformer*

**Western Area Power Administration's  
Desert Southwest Regional Office  
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## Appendices

- DSW FY12 – FY21 Construction Program
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## 1.0 INTRODUCTION

Western Area Power Administration (Western) 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. Western 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. Western'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.

Western is committed to maintaining and operating a reliable transmission system. The Capital Program provides both a capital investment plan, as well as a funding plan, that will maintain reliable power delivery to Western's customers.

The purpose of the Capital Program presentation for the Western's Desert Southwest Region (DSW) is to clearly describe challenges, goals, 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.
- Changes in project priority.
- Unforeseen problems with the transmission system.
- Mandates or regulatory requirements.
- New contractual requirements.

The Capital Program is divided into the following major areas by power projects:

- Construction
- Pre-payment Projects
- Repairs, Replacements, Additions, and Deletions (RRAD's)
  - Communication System, Control, Protection, and Metering Improvements and Replacements
  - Substation Improvements and Replacements
  - Transmission Line Improvements and Replacements
  - Purchase of Maintenance Equipment, Test Equipment, and Building Improvements/Repairs

## 2.0 POWER SYSTEM OVERVIEW

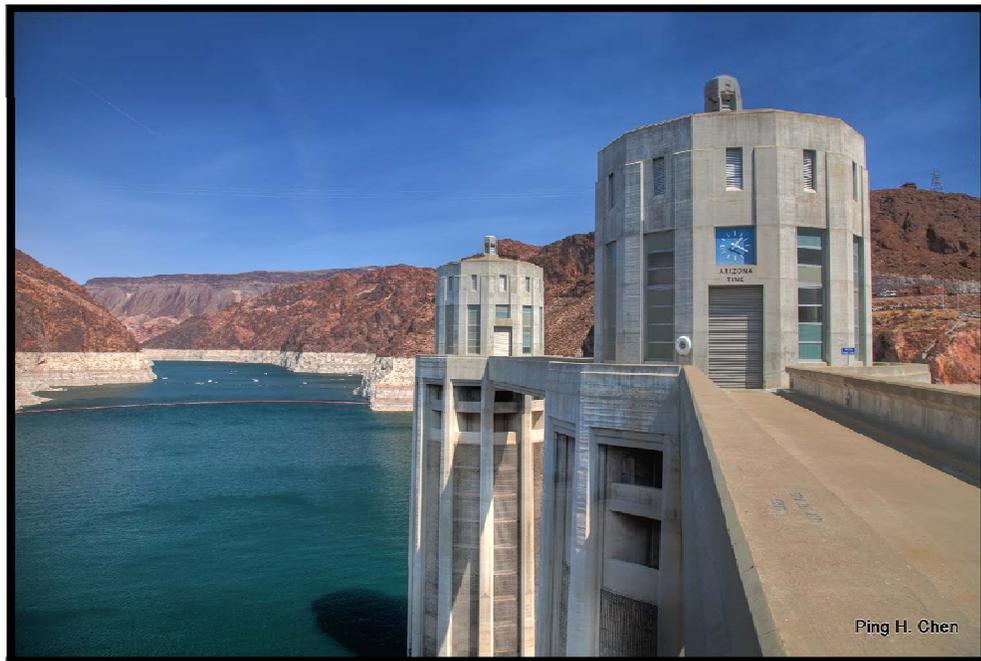
Western's DSW Region provides O&M and construction services for five major power system projects:

- Boulder Canyon Project (BC)
- Central Arizona Project / Central Arizona Water Conservation District (CAP / CAWCD)
- Colorado River Front Work and Levee System (Levee)
- Colorado River Storage Project (CRSP)
- Pacific Northwest/Southwest Intertie Project (Intertie)
- Parker-Davis Project (Parker-Davis)

Each of the power system projects has its own unique source of funding and funding requirements; therefore, they are handled separately with regard to project studies and execution. Parker-Davis provides the majority of DSW's regional power facilities.

### 2.1 BOULDER CANYON FACILITIES

Hoover Dam, the highest and third largest concrete dam in the United States, sits on the Colorado River just outside of Las Vegas, Nevada, and is the backbone of the Boulder Canyon Project (BC). Lake Mead, the reservoir formed behind the Hoover Dam, is the nation's largest man-made reservoir. It can hold a two-year supply of the average flow of the Colorado River with its storage capacity of 27.38 million acre-feet.



*Hoover Dam and Lake Mead*

This project began in 1928 with legislation approving construction of the Boulder Canyon Project. Hoover Power Plant has 19 generating units, with the installed capacity of 2,079 megawatts (MW). Yearly average generation of 4.3 billion kilowatts can serve the annual electrical needs of nearly 1.3 million people. Power from this project is marketed as long-term contingent capacity with associated firm energy. This contingent capacity and associated firm energy are available as long as there are sufficient water releases to generate the power required to allow Western to meet its power delivery obligations. If sufficient power to support the customer capacity entitlements is not available, each customer's capacity entitlement is temporarily reduced. Customers receive 4.527 billion kilowatts (kWh) of firm energy each year. If generation at Hoover Powerplant is insufficient, Western can purchase energy to make up the shortfall at individual customer's request on a pass-through cost basis. The majority of Western's facilities for Boulder Canyon are numerous 230-kV transmission lines extending approximately 12 miles from Hoover Dam to the Mead Substation.

## **2.2 CENTRAL ARIZONA PROJECT / CENTRAL ARIZONA WATER CONSERVATION DISTRICT FACILITIES**

The Central Arizona Project (CAP) is one of three related water development projects that make up the Colorado River Basin Project. The others are the Dixie and the Upper Basin Projects. The CAP was developed for Arizona and New Mexico.



*CAP Canal*

In 1968, Congress authorized CAP to improve water resources in the Colorado River Basin. Segments of the 1968 authorization allowed Federal participation in the Navajo Generating Station, which has three coal-fired steam electric generating units for a combined capacity of 2.25 million kWh. The Federal share of 24.3 percent (547 MW), is used to power the pumps that move the Colorado River water through CAP canals. Power that is surplus to CAP pumping requirements, and needed for desalting and protecting pumping facilities, is currently marketed under the Navajo Power Marketing Plan. Approximately 350,000 kWh are currently marketed as surplus. Western's DSW Region markets Navajo power on behalf of the Bureau of Reclamation's CAP. These facilities include the 115-kV wood pole system south of Phoenix near Tucson, the 230-kV steel pole system from the Mead area south to Parker, and other various locations in order to support pumping activities for the canal system.



*Harcuvar Substation to support pumping activities.*

### **2.3 COLORADO RIVER FRONT WORK AND LEVEE SYSTEM**

The Colorado River Front Work and Levee System extends from Lees Ferry, Arizona, the division point between the Upper and Lower Colorado River Basins, to the Southerly International Boundary between the United States and Mexico, a distance of about 700 river miles. Its purpose is to control floods, improve navigation, and regulate the flows of the Colorado River. This multiple-purpose program includes control of sediment movement, protection of communities and transportation facilities, maintenance of agricultural land by controlling the bed and banks of the river, and preservation and enhancement of the fish, wildlife, and recreation facilities. Western'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.

### **2.4 COLORADO RIVER STORAGE PROJECT FACILITIES**

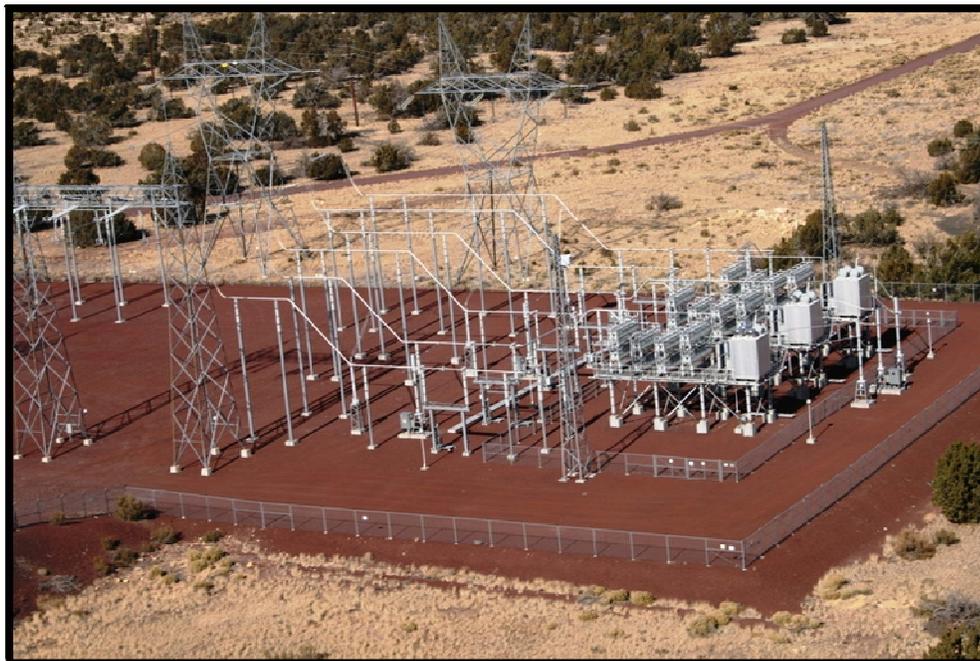
The Colorado River Storage Project (CRSP) was authorized by the Colorado River Storage Project Act of 1956. It consists of four major storage units: Glen Canyon, Flaming Gorge, Navajo, and Wayne N. Aspinall. CRSP has a combined storage capacity that exceeds 31.9 million acre-feet. The project provides water-use developments in the upper Colorado River Basin and to the lower Colorado River, as required by the Colorado River Compact. Five Federal power plants are associated with the project. Operating capacity of CRSP's 16 generating units is 1,727 megawatts.

With an average of 6 million megawatts of net generation for the past five years, CRSP provides for the electrical needs of more than one million people spread throughout Colorado, Utah, New Mexico, and Arizona. Portions of southern California, Nevada, and Wyoming are also served by CRSP power. Westerns's CRSP Management Center in Salt Lake City markets and delivers CRSP power. Operations, maintenance, and other support activities are provided by DSW in the south and RMR in the north. More than 2,323 miles of high-voltage transmission lines are strung throughout these states to deliver power to customers. CRSP facilities for DSW include Glen Canyon, Shiprock, Flagstaff, Longhouse Valley, Kayenta, and Pinnacle Peak Substations, as well as approximately 710 miles of 345-kV and 230-kV transmission lines that connect these substations.



*Glen Canyon Dam*

Inflow at Lake Powell was 72 percent of the average in FY2010. CRSP hydro-generation produced 4.8 million MW in FY2010. The inflow for FY2011 was approximately 170 percent of the average, due to the significant snow pack in the watershed.



*Flagstaff Switchyard*

## 2.5 PACIFIC NORTHWEST / SOUTHWEST INTERTIE FACILITIES

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 was to be a co-operative construction venture between Federal and non-Federal entities. However, due to delays in construction funding, interest among the potential users waned. These events resulted in the indefinite post-ponement of DC line construction. Consequently, the facilities constructed provide only AC transmission service.

Western's portion of Intertie consists of two parts: a northern portion and a southern portion. The northern portion is administered by Western's Sierra Nevada Region (SNR), and the southern portion by Western's DSW Region. 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 to Perkins Substation, a 230-kV line from Perkins to Pinnacle Peak Substation, and two 500-kV segments from Mead Substation to Phoenix Substation and Mead Substation to Adelanto Substation.



*Mead Substation*

## 2.6 PARKER-DAVIS PROJECT FACILITIES

Parker-Davis makes up the majority of the DSW regional power facilities, and was formed by consolidating two projects, Parker Dam and Davis Dam, in 1954. Parker Dam and Powerplant, which created Lake Havasu 155 miles below Hoover Dam on the Colorado River, were authorized by the Rivers and Harbors Act. Davis Dam, located on the Colorado River 67 miles below Hoover Dam, created Lake Mohave. Davis Dam has storage capacity of 1.8 million acre-feet. The Bureau of Reclamation increased the five generation units' operating capacity from 232 megawatts to 266 megawatts by rewinding Generator Unit No. 1. The water demands in the Lower Colorado Basin, and releases from Hoover Dam, determine the operation of the Parker-Davis Project.

Power generated from the Parker-Davis Project is marketed to customers in southern Nevada, Arizona, and southern California. Excluding project use, the total marketable energy is 316 megawatts (winter season) and 835 megawatts (summer season). Parker-Davis is operationally integrated with Hoover Powerplant. In the event that Parker-Davis generation is insufficient to meet firm contractual obligations, Hoover generation may be used. Alternatively, Western may purchase power from other resources.



*Davis Dam*



*Davis Substation*

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 majority of DSW's facilities are part of the Parker-Davis project, and 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. All of the wood pole replacement projects identified in this Capital Program belong to Parker-Davis.

### 3.0 PROGRAM COST SUMMARIES

#### 3.1 CONSTRUCTION PROJECTS

APPROPRIATED CONSTRUCTION FUNDING	
FY11 Funds Received	\$23,000,000 (Executed \$21,000,000)*
FY12	\$7,500,000**

\*Continuing Resolution delayed the receipt of funds until April (seven month delay). Major construction projects could not be awarded.

\*\*This amount is currently undetermined until the budget is finalized, and is significantly less than the requested budget amount.

Construction projects, in comparison to RRAD's, are typically more complex in nature, and require the use of an outside construction contractor in lieu of Federal labor (force account). These projects are multi-year funded and the majority will cross fiscal years and take extended periods of time to complete. Federal labor will be used to complete the project design and specifications, environmental requirements, procurement of equipment and contracts, project tracking, financial management, commissioning, construction management, 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, and conductors. All projects currently scheduled for FY12 execution are dependent on the receipt of adequate appropriated funding in a timely manner. The construction project listing (refer to the Appendices) may be adjusted in order to accommodate any changes in the amount of funding received and the time of year the funding is provided. Appropriated funding cannot be carried over from year to year; therefore, a Continuing Resolution (or any other delay in funding) dramatically impacts DSW's ability to execute funds in a timely manner.

If there is a prolonged Continuing Resolution in a given fiscal year, equipment purchases and construction contracts will be delayed.

In FY2011, numerous Continuing Resolutions delayed the receipt of appropriated funds until April 2011. DSW was able to procure large equipment purchases in the remaining five months, but the award of large construction contracts cannot be achieved with a Continuing Resolution that lasts well into the affected fiscal year.

A Continuing Resolution 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.

### **3.1.1 Construction Projects Accomplished in FY11**

- Completed the rebuild of the Buckskin-Planet Tap 69-kV Transmission Line.
- Completed the Davis Substation 69-kV Rebuild (Davis Substation, Stage 05). The new control building is now functional. All 69-kV controls have been moved out of the Bureau of Reclamation facilities. All three 69-kV transmission lines were rerouted around the mountain top south of Davis Dam and into the newly constructed 69-kV yard. The old 69-kV yard has been demolished. The new 69-kV yard and two 230/69-kV transformers are operational and carrying load.
- Awarded the Davis Substation 230-kV yard reconfiguration (Davis Substation, Stage 06) construction contract. All existing 230-kV oil circuit breakers will be removed and replaced with SF6 circuit breakers. Nine new switches will be installed, as well as new metering packages, to transform the yard into a double-breaker double-bus configuration. All of the Government-furnished equipment was ordered and has been delivered.
- Coolidge Substation 230/69-kV transformer was designed, and the contract to build the unit was awarded. This supports the new bay addition that must be completed by FY2014, in order to maintain the right-of-way agreement with the Gila River Indian Community.
- Construction on the Gila-Yuma Tap 34.5-kV Transmission Line rebuild is nearing completion. All work in the outlying areas has been completed up to the Gila Substation. The portion of the existing transmission line in the urban areas of 24<sup>th</sup> Street is still in progress.
- Liberty Substation 345/230-kV transformer was designed, and the contract to build the unit was awarded. The existing unit is well beyond its useful life span, and is in need of replacement. Numerous oil leaks, the inability to acquire replacement parts, and equipment testing are all indicators that replacement is necessary. An unexpected failure of this 600 MVA transformer would severely cripple Western's capacity at the Liberty Substation location.
- The transmission line structures were ordered for the Davis-Kingman Tap 69-kV Transmission Line. The existing 27-mile wood pole transmission line is being rebuilt on steel monopole structures.
- Five 230-kV SF6 power circuit breakers were ordered for the Parker Substation Oil Breaker Replacement project. Existing oil breakers are beyond their useful life span, and pose an environmental risk at the riverside substation. The 230-kV units were ordered to replace the existing 161-kV units in anticipation of future substation upgrades and additional fault duty requirements.



*New Davis 69-kV Substation (Davis Substation, Stage 05)*



*Old 69-kV Demolished (Davis Substation, Stage 05)*



*New Davis 69-kV Controls (Davis Substation, Stage 05)*



*New Breaker and Switch Foundations (Davis Substation, Stage 06)*



*Gila-Yuma Tap 34.5/69-kV Rebuild*



*Buckskin to Planet Tap 69-kV Transmission Line Rebuild*



*Installation of 230-kV Transformer feed at Davis Dam  
(Davis Substation, Stage 05)*



*345/230-kV 600 MVA Transformer similar to the unit  
on order for Liberty Substation.*

### **3.1.2 Construction Projects Planned for Execution in FY12**

- Davis Substation 69-kV Rebuild (Davis Substation, Stage 05) will be finalized, and major construction activities closed out. The new 69-kV yard and control house are fully-functional. Disposal of the old 69-kV electrical equipment is in the final stages. Operations and maintenance agreements are being finalized.
- Davis Substation 230-kV Switchyard Rebuild (Davis Substation, Stage 06) will continue throughout FY12, with a scheduled completion in mid-FY13. The existing oil power circuit breakers are being replaced with new SF6 gas units. The new 230-kV controls are being installed to replace the original control cabinets, and the existing maintenance facility will be demolished. All of the new 230-kV breakers, switches, and metering will be installed on the north bus first. As the north bus becomes fully-functional, all of the transmission and generation lines will be transferred to the north bus. The 230-kV control equipment, currently in the Bureau of Reclamation facilities, will be removed as the new 230-kV controls being installed in Western's control house take over the relay and protection functions of the new 230-kV systems.
- Gila-Yuma Tap 34.5/69-kV Transmission Line Rebuild is scheduled to complete in mid-FY12. The transmission line was originally built on wood structures, and has been operating at 34.5-kV. The line is being rebuilt on steel monopoles, to 69-kV construction standards, but will still operate at 34.5-kV. Approximately two-thirds of the line has been rebuilt in the suburban areas; the remaining section in the urban areas of Yuma, paralleling 24<sup>th</sup> Street, will be rebuilt in FY12.
- Davis-Kingman Tap 69-kV Transmission Line project will completely rebuild 27.3 miles of existing wood pole transmission line. The project is scheduled to have a construction contract awarded in FY12. Monopole steel structures were purchased in previous years; therefore, the majority of the appropriated funds needed for FY12 are for Federal labor and contract field work.
- Liberty Substation 345/230-kV Transformer Replacement project replaces the 1964 model transformer that is currently in place at Liberty Substation. The replacement 345/230-kV 600 MVA unit was purchased in FY11, and is scheduled for installation in FY13. Funds will be executed in FY12 to support the procurement of the remaining yard equipment, and the preliminary design of the associated facilities.



*Existing Davis-Kingman Tap 69-kV Transmission Line*

- Parker 161-kV Breaker Replacement project replaces five existing 161-kV oil power circuit breakers with new SF6 units. The breakers were ordered in FY11; therefore, the design and installation will take place in FY12.



*Parker Substation 161-kV Oil Breakers*

### **3.2 PRE-PAYMENT PROJECTS**

In the past, the majority of DSW's construction projects have previously been funded solely through appropriated funds. These funds tend to fluctuate annually, creating a negative effect on the execution of large scale construction projects. As previously identified, appropriated funds available for construction have been minimal in the last few years, thus limiting Western's ability to adequately maintain the existing electrical infrastructure.

#### **Pre-Payment Project Selection Process:**

In FY10, Western and its customers decided that the best way to address this on-going struggle was the use of a pre-payment funding source for selected construction projects. Projects that are proposed for the use of pre-payments funds are first submitted for funding through the typical appropriated funding process.

If adequate appropriations are not received, then the approved pre-payment project(s) are executed using pre-payment funding (refer to the Appendices for the Pre-Payment Project List).

The annual list of construction projects (refer to Appendix: DSW FY12-FY21 Construction Program) is reviewed by Western's management team annually in September. Potential projects suitable for pre-payment funding are selected from the list of projects previously submitted to Congress for the receipt of appropriate funding. Proposed pre-payment projects selected by Western are then presented to Western's customers for review and consideration in the Ten-Year Capital Program booklet, published annually. A customer meeting is typically held in late November, providing a forum for Western and its customers to have an open dialog about the projects, answering any questions or concerns that the customers may have. An official vote on the proposed pre-payment projects is conducted in December of each year, to ensure that only projects that receive customer support for funding through this mechanism are pursued. (Note: Prior to customers participating in this voting process, a Memorandum of Understanding must be signed.) Once the project(s) are approved, pre-payment funding is released for the specific project, and execution of that project can begin.

### **3.2.1 Pre-payment Projects Selected for Funding in FY10**

#### ***Thornton Road-Empire Substation Transmission Line Rebuild***

##### **Project Scope:**

The principal components of this project include the demolition of 13.2 miles of the existing Casa Grande-Empire 115-kV Transmission Line, including wood H-frame support structures, 336.4 kmil ACSR phase conductors, 3/8-inch steel overhead groundwires, and associated hardware. A new replacement transmission line will be constructed on steel monopole support structures using 1272 kmil ACSS phase conductors, one ½-inch steel overhead groundwire, and one fiber optic overhead groundwire, new high-temperature hardware, and new porcelain insulators. This new line will be built to 230-kV standards using a double-circuit design. The phase conductors for only one circuit will be installed, and these will be operated at 115-kV. The existing insulators will be reinstalled on the arms of the empty circuit to eliminate the vibration risk to these arms. The fiber optic will be terminated at the take-off structure located outside of Empire Substation.

**Work Accomplished To-Date:**

- NEPA compliance has been completed (Categorical Exclusion).
- Design has been completed.
- All Government-furnished equipment has been purchased, including conductor, overhead groundwire, overhead optical groundwire, line hardware, insulators, and poles.
- Some Government-furnished equipment has been received, including conductor, insulators, anchor bolt cages, most line hardware, and overhead groundwire.
- The laydown yard has been secured, and a fencing contractor has erected a temporary fence for security purposes.

**Project Issues and/or Risks:**

- The laydown has soft ground, making equipment delivery difficult.
- Culturally sensitive areas are present within the transmission line alignment and have the potential to impact construction/project schedule.
- Outage restrictions are limited to October – January. If this project is delayed, it will impact successive projects, such as Empire-ED5 Transmission Line Rebuild and ED4-ED5 Transmission Line Rebuild projects.
- Delays in Government-furnished equipment delivery could result in delay claims from the contractor, as Western is providing the equipment needed for construction.

**Estimated Cost:**

- \$16,000,000

**Actual Cost To-Date:**

- \$9,300,000 (Nov. 16, 2011)

**Major Project Milestone Schedule:**

- Award Construction Contract on September 2011
- Complete Construction by January 2012
- Project Close-out completed by July 2012

***Empire Substation-ED5 Substation Transmission Line Rebuild***

**Project Scope:**

The principal components of this project include the demolition of 9.2 miles of the existing Empire-ED5 115-kV Transmission Line, including wood H-frame support structures, 336.4 kcmil ACSR phase conductors, 3/8-inch steel overhead groundwires, and associated hardware.

A new replacement transmission line will be constructed on steel monopole support structures using 1272 kcmil ACSS phase conductors, one ½-inch steel overhead groundwire, and one fiber optic overhead groundwire, new high-temperature hardware, and new porcelain insulators. This new line will be built to 230-kV standards using a double-circuit design.

The phase conductors for only one circuit will be installed and these will be operated at 115-kV. The existing insulators will be reinstalled on the arms of the empty circuit to eliminate the vibration risk to these arms. The fiber optic will be terminated at the take-off structures outside of Empire and ED5 Substations.

**Work Accomplished To-Date:**

- NEPA compliance has been completed (Categorical Exclusion).
- Design has been completed.
- All Government-furnished equipment has been purchased, including conductor, overhead groundwire, overhead optical groundwire, line hardware, insulators, and poles.
- Some Government-furnished equipment has been received, including conductor, insulators, anchor bolt cages, most line hardware, and overhead groundwire.
- The laydown yard has been secured, and a fencing contractor has erected a temporary fence for security purposes.

**Project Issues, Risks:**

- The laydown has soft ground, making equipment delivery impossible without ground compaction.
- Outage restrictions are limited to January – April. If this project is delayed, it will impact successive projects, such as ED4-ED5 Transmission Line Rebuild and ED5 Substation Rebuild projects.
- Delays in Government-furnished equipment delivery could result in delay claims from the contractor, as Western is providing the equipment needed for construction.

**Estimated Cost:**

- \$12,500,000

**Actual Cost To-Date:**

- \$6,100,000 (Nov. 16, 2011)

**Major Project Milestone Schedule:**

- Awarded Construction Contract in November 2011
- Complete Construction by June 2012
- Project Close-out completed by November 2012

### **3.2.2 Pre-payment Projects Selected for Funding in FY11**

#### ***ED4 -ED5 Transmission Line Rebuild***

##### **Project Scope:**

The principal components of this work include the demolition of 9.1 miles of the existing Electrical District No. 4 (ED4) to Electrical District No. 5 (ED5) 115-kV Transmission Line, including wood H-frame support structures, 795 kcmil ACSR phase conductors, 3/8-inch steel overhead groundwires, and associated hardware. A new replacement transmission line will be constructed on direct-embedded steel monopole support structures using 1272 kcmil ACSS phase conductors, one 1/2-inch steel overhead groundwire, and one fiber optic overhead groundwire, new high-temperature hardware, and new porcelain insulators. This new line will be built to 230-kV standards using a double-circuit design. The phase conductors for only one circuit will be installed, and these will be operated at 115-kV. The existing insulators will be reinstalled on the arms of the empty circuit to eliminate the vibration risk to these arms. The fiber optic will be terminated at the take-off structures outside of ED4 and ED5 Substations.

##### **Work Accomplished To-Date:**

- Biological surveying has been completed.
- An Environmental Consultant, procured using DSW's Blanket Purchase Agreement, has completed Class I and Class III cultural survey reports,
- Geological boring has been completed.
- Western's construction specification review has been completed.
- The laydown yard has been secured, and a fencing contractor has erected a temporary fence for security purposes. (The laydown yard from the Empire-ED5 project will be re-utilized for this project.)
- Steel poles purchased as Government Furnished Equipment (GFE) using appropriated funds.

##### **Project Issues and/or Risks:**

- The laydown has soft ground, making equipment delivery impossible without ground compaction.
- Encroachments located within the transmission line alignment need to be resolved prior to construction.
- Outage restrictions are limited to October – January. If this project is delayed, it will impact successive projects, such as the ED5 Substation Rebuild project.
- Delays in Government-furnished equipment delivery could result in delay claims from the contractor, as Western is providing the equipment needed for construction.
- Culturally sensitive areas may be present within the transmission line alignment, and could impact the construction/project schedule.

**Estimated Cost:**

- \$14,980,000

**Actual Cost To-Date:**

- \$3,900,000 (Nov. 16, 2011)

**Major Project Milestone Schedule:**

- Categorical Exclusion completed September 30, 2011
- Government-furnished Equipment ordered during FY12
- Finalized Construction Specifications forwarded to Procurement in November 2011
- Award Construction Contract by June 2012
- Complete Construction by January 2013
- Project Close-out completed by July 2013

***Davis Substation 230-kV Rebuild (Davis Substation, Stage 06)***

The Davis Substation 230-kV Rebuild to a double-breaker double-bus configuration was approved as a pre-payment project for FY11, in the amount of \$4.6 million. This approval was requested by Western's customers and granted prior to the conclusion of Continuing Resolution, in order to ensure that the project could be executed as scheduled. However, Continuing Resolution ended in April 2011, thus allowing the project to be funded with Western's appropriated funds, rather than utilizing pre-payment funds.

**3.2.3 Pre-payment Projects Approved for Funding in FY12**

1. Coolidge Substation 230/69-kV Transformer Addition (\$6,110,000)
2. Bouse Substation 161-kV Rebuild (\$4,970,000)
3. ED4-ED2 115-kV Transmission Line Rebuild (\$11,100,000)

Total Cost of Pre-Payment Projects Proposed for FY12 = \$22,180,000

***Coolidge Substation 230/69-kV Transformer Addition***

**Project Background:**

The facility serves as a feed to several Coolidge area power suppliers, including Electrical District No. 2 (ED2), Arizona Public Service, Salt River Project, and the Bureau of Indian Affairs. The purpose of this project is to accommodate a contractual agreement to provide 80 MW to the Gila River Indian Community utility at Coolidge Substation.

Coolidge Substation is a 230/115/12.47-kV facility, originally built in the 1950's, and upgraded in the 1990's. It is located in the town of Coolidge, in an agricultural region of central Arizona. Western is requesting a 50-year transmission line easement on its Coolidge-Rogers 230-kV Transmission Line, across approximately six miles of GRIC land. The objective of these additions is to grant to the Gila River Indian Community 80 megawatts of transformer capacity, at no cost to GRIC, in return for GRIC granting Western an easement for a right-of-way traversing a portion of the GRIC land.

**Project Scope:**

A facility study resulted in the decision to add a 230-kV bay on the east side of the existing 230-kV yard. This bay includes a 230-kV breaker, disconnect switches, protection and control equipment, bus work, and support structures. The new bay will connect to a new 230/69/12.47-kV 150 MVA transformer. The low side of the transformer will connect to a new 69-kV bay, with accompanying 69-kV breaker, disconnect switches, protection and control equipment, bus work, and support structures. A new control house will be built to house the protection, control, and communications panels for the new 69-kV bay, as well as other associated equipment. An additional bay on the west side of the existing 230-kV yard will be required. This bay will include a 45 MVAR capacitor bank, a reactor, disconnect switches, protection and control equipment, bus work, and support structures.

**Estimate Cost:**

- Total Project Cost = \$7,710,000
- Transformer Purchase (Complete) = \$1,600,000
- Remaining Project Cost (Pre-Payment) = \$6,110,000

**Major Project Milestone Schedule:**

- Transformer Purchase completed in May 2011
- Complete Design by February 2012
- Award Construction Contract by September 2012
- Energize by January 2014

***Bouse Substation 161-kV Rebuild***

**Project Background:**

Bouse Tap is a 161-kV switchyard built in the early 1950's, and is located in a bare desert region of western Arizona. Bouse Tap is 18.7 circuit miles from Parker Substation on the Parker-Kofa 161-kV Transmission Line, and serves the adjacent Arizona Public Service Black Peak Substation. The facility consists of motor-operated disconnect switches mounted on a lattice box structure, metering, and communications equipment located in a small service building on-site.

Bouse was originally constructed as a Tap, but is being rebuilt as a ring bus, which is more reliable. Replacing the Tap with a reliable configuration will provide more flexibility in Western's 161-kV system south of Parker Dam.



**Project Scope:**

This project involves building a new yard with modern equipment rated to 230-kV, and a bus arrangement better suited to providing reliability in an area with old transmission lines that are prone to outages. The new arrangement will be a three breaker ring bus that is capable of expansion to the double-breaker double-bus configuration. A control building with new DC power, relays, controls, and communications will be constructed to house these functions, as well as a new microwave tower to maintain the existing microwave communications. The design has been approximately 95% complete for almost a year, but the lack of appropriations has delayed the construction of this project. The new Bouse Switchyard (formerly named Bouse Tap) will start with the construction of a shoofly using wood poles, polymer insulators, and aluminum conductors to temporarily connect the Parker and Kofa transmission lines, as well as maintain the existing APS feed. Relocation of an APS 69/12.5-kV line will be required.

Construction of the new yard can begin once site preparation has been completed. The new yard equipment, including 230-kV circuit breakers, disconnect switches, instrument transformers, and the microwave tower will be installed while the control building is being built. Control boards, relaying, and battery systems will be installed once the floor is put in the new control building. When the new facilities have been commissioned, a temporary line from the new yard will be utilized to feed APS' Black Peak radially from Parker, while the old yard demolition takes place.

**Estimated Cost:**

- Total Project Cost = \$7,832,000
- Project Cost to Date = \$2,862,000
- Remaining Project Cost (Pre-Payment) = \$4,970,000

**Major Project Milestone Schedule:**

- Complete Design by February 2012
- Award Construction Contract by October 2012
- Complete Construction by November 2013
- Energize by Spring of 2014

***ED2- ED4 115-kV Transmission Line Rebuild***

**Project Background:**

The Electrical District No. 2 (ED2) to Electrical District No. 4 (ED4) Transmission Line is a 9.3 mile 115-kV transmission line that was built in 1948, and runs through central Arizona. The alignment runs through both agricultural and urban areas. The line is a single circuit, with 795 kcmil ACSR phase conductors supported by wood H-frame structures. The line has two overhead groundwires, and ED2 and ED4 utilities are fed from this line. The wood poles display symptoms of advanced external shell rot, along with weathering and large cracks. The shell rot introduces reliability and safety concerns because of the reduction of the amount of wood available to bear the load of the conductors and hardware. Damage to the outer layer can allow the ingress of fungus and insects that cause internal decay, further weakening the poles. These issues increase the chance that the structure will fail. Weathering and decay have also had a significant effect on the structure support wood, which could lead to crossarm or knee brace failure. Shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance.



**Project Scope:**

The rebuild of the ED2-ED4 115-kV Transmission Line is very similar to the previously approved pre-payment projects and will consist of completely removing conductors, insulators, hardware, and all wood structures. The new line will be built on double-circuit 230-kV steel monopoles. One circuit will be installed utilizing a 1272 kcmil ACSS conductor, polymer/porcelain insulators, and share one new optical groundwire and one new overhead groundwire. The new line will be designed to accommodate growth in the area by providing additional clearances from encroachments. Rebuilding this segment of transmission line, in conjunction with the previously approved pre-payment projects, will complete the lower portion of Western’s 115-kV/230-kV loop from Test Track Substation to ED2 Substation. Completing this portion of the loop provides for additional reliability and will enable Western to more easily connect to the greater bulk electric system in the Phoenix area.

**Estimated Cost:**

- Total Project Cost = \$11,100,000

**Major Project Milestone Schedule:**

- Complete Design by August 2012
- Award Construction Contract by April 2013
- Complete Construction and Energize by Spring of 2014

**3.3 RRAD’s PROJECTS**

RRAD’s 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’s projects are completed using existing Western Craft personnel, and do not usually require the outsourcing of labor for the work that needs to be accomplished. (Refer to the Appendices for the RRAD’s projects listing.)

	<b>Boulder Canyon</b>	<b>CAP</b>	<b>CRSP</b>	<b>Intertie</b>	<b>Parker-Davis</b>
FY11 Received/Accomplished	\$403,808	\$104,869	\$5,659,502	\$1,732,102	\$5,398,118
FY12 Planned	\$865,000	\$416,000	\$4,048,100	\$2,080,000	\$6,820,000

### 3.3.1 RRAD's Projects Accomplished in FY11 (> \$100,000)

#### Substations:

- Completed the installation of 345/230-kV KU3A transformer at Pinnacle Peak Substation.
- Replaced four oil 345-kV power circuit breakers at Flagstaff Substation with new SF6 units.
- Re-gasketed the 345/230-kV KU2A transformer at Pinnacle Peak Substation.
- Replaced breaker 442 at Gila Substation.
- Replaced 115-kV disconnect switch at Saguaro Substation.
- Initiated 230/138-kV transformer installation at Glen Canyon Substation to provide a second source to Garkane Energy Cooperative, Inc.'s load.



*Removal of 345-kV Oil Power  
Circuit Breaker at Flagstaff  
Substation*

*New 345-kV SF6 Power Circuit  
Breaker at Flagstaff Substation*



### **Protection & Communications:**

- Replaced approximately 50% of the aging microwave communication systems from Phoenix to Mexican Hat communication sites.
- Replaced aging remote terminal units at five CRSP substations.
- Replaced relays on 345/230-kV transformer differential, breaker failure relays, and relays for synchronization check upgrade.
- Replaced remote terminal units on the 230-kV system at Mead Substation.
- Replaced 345-kV line relays on the Liberty-Peacock Transmission Line.
- Installed digital fault recorders at Peacock Substation.
- Upgraded joint use system fiber communication at fifteen Parker-Davis sites.
- Upgraded joint use system microwave communication at seven Parker-Davis sites.
- Replaced microwave communication radios at eight Parker-Davis sites.
- Replaced line relays for Hoover-Mead Nos. 4 and 7 Transmission Lines.



*Digital Relay Installation*

### **Transmission Lines:**

- Continued environmental work in support of clear cutting activities on Pinnacle Peak-Glen Canyon 345-kV Transmission Lines.
- Replaced hardware on Casa Grande-Saguaro Transmission Lines.
- Replaced “red tagged” wood poles on 115-kV transmission line system in proximity to Casa Grande, ED2, and Saguaro Substations that were identified during the wood pole inspection program as potential points of failure.
- Awarded construction contract to make erosion repairs on Tucson-Apache 115-kV Transmission Line.



*Wood Pole Replacement*

*Right: Deadend Wood Pole Replacement on Coolidge-Saguaro Transmission Line*



*Tucson-Apache Transmission Line Erosion*

**Facilities:**

- Upgraded SCADA Hardware/Software/Map Board at Phoenix Dispatch.
- Repaired the roof of the DSW Phoenix Office caused by hail damage.
- Upgraded network equipment in the Phoenix SCADA room.

**3.3.2 RRAD's Projects Planned for Execution in FY12 (> \$100,000)****Substations:**

- Re-gasket and replace bushings on 230/115-kV transformer at Harcuvar Substation.
- Complete 345-kV power circuit breaker installation at Flagstaff Substation.
- Complete 230/138-kV transformer installation at Glen Canyon Substation.
- Replace main batteries and add new battery room at Pinnacle Peak Substation.
- Replace air conditioning unit at the Mead Substation facility.
- Refurbish the exterior of power transformer at Coolidge Substation.
- Replace disconnect switch at Saguaro Substation.
- Replace 115-kV circuit breaker at Tucson Substation.

**Protection & Communications:**

- Replace line relays on the Hoover-Mead No. 4 Transmission Line.
- Continue microwave radio communication upgrades on the Phoenix to Mexican Hat communication path.
- Replace remote terminal units at Glen Canyon Substation.
- Replace communication buildings at Zilner and Lolamai Point.
- Design and install a unit dropping scheme for Pinnacle Peak, Glen Canyon, and Flagstaff Substations.
- Continue replacement of relays on 345/230-kV transformer differential, breaker failure relays, and relays for synchronization check upgrade at Glen Canyon Substation.
- Replace aging microwave radios at various substations on the Parker-Davis system.
- Upgrade the joint use system on the Parker-Davis system.
- Purchase test equipment for commissioning, relay, and communication crews.
- Replace telephone system at DSW Phoenix office.
- Complete building repairs at Black Point communication site.
- Replace line relays at two Parker-Davis substations.

**Transmission Lines:**

- Repair erosion problems on Hoover-Mead transmission lines.
- Continue environmental clearance and clear cutting on Pinnacle Peak to Glen Canyon 345-kV transmission lines.
- Replace "red tag" wood poles that have deteriorated beyond the point of repair or salvage.
- Purchase replacement bulldozer, hotstick trailers, and bucket truck.
- Complete repairs on the Tucson-Apache Transmission Line Erosion project.

**Facilities:**

- Continue SCADA Hardware/Software upgrades in the Phoenix Dispatch center.
- Replace air conditioning unit in downstairs computer room.
- Install metal fence fabric at the Phoenix warehouse.
- Replace computer network equipment.

## 4.0 STRATEGIC PLANNING

Construction projects are prioritized for execution based on the most critical needs of the electrical system and available appropriated funding. Projects with the potential for funding outside of the typical appropriated funding process are moved to a lower priority status, since their potential for alternative funding is greater. Other projects that may not be funded by alternative funding sources remain as a priority for appropriated funding.

Pre-payment funded projects are those submitted by Western to its customers as potential projects. These projects are selected and prioritized based on the replacement needs of the system in conjunction with customer input. Pre-payment projects are submitted to the customer, and, if approved, added to the active project list and executed in the same manner as a typical construction project with regard to design, procurement, construction, and closeout.

Western's Transmission Planning Department conducts system studies on the existing transmission system. The studies will evaluate potential load growth over a pre-determined period of time, real time system operations, and past system performance to determine where upgrades, enhancements, or repairs may be needed and when. The results of these studies are considered when scheduling projects within the Ten-Year Capital Program.

Project selection also considers the upgrades that are being proposed by proponents as they make application to Western through the tariff process. Western manages interconnection requests through the Open Access Transmission Service Tariff (OATT). Under OATT, there are three classifications of interconnections: Large Generation Interconnection (LGI), Small Generation Interconnection (SGI), and Transmission Line Interconnection. Additional information regarding Western's OATT and interconnection processes, including DSW's LGI/SGI queue, can be found at [www.oatioasis.com/walc](http://www.oatioasis.com/walc).

Other activities that may also be associated with the interconnection requests include construction of new switchyards, communications systems, upgrade and expansion of existing switchyards, and/or re-conductoring and upgrade of transmission lines. The interconnection and associated construction projects may result in enhanced system operational capability, improved system reliability, and expansion and/or increased utilization of transmission service capacity.

## **5.0 RATES FORECAST**

In general, all of DSW's power systems are beginning to experience upward pressure on their transmission rates.

The Central Arizona Project has experienced increases in revenue requirements due to O&M and replacement costs. The FY11 rates have increased by approximately 2.5%, and a preliminary estimate for FY12 indicates a similar increase will be necessary.

The Intertie Project, while not experiencing significant increases in revenue requirements, is not meeting the 500-kV sales projections that were included in the last rate process. Without these sales, a rate adjustment will be initiated to ensure the project fully recovers its costs.

The Parker-Davis Project transmission rates remain unchanged for FY12; however, estimates for FY13 and subsequent years indicate that rate increases will be necessary. The pressure on the rates is due a decreasing carryover balance, as well as increases in capital costs that support a reliable transmission system.

## **6.0 ASSETS**

DSW operates and maintains a complex system of interconnected substations, transmission lines, and communication sites. DSW owns and operates substations in the states of Arizona, Nevada, California, and New Mexico. The 48 substations comprise the majority of the installed equipment in the region, including 477 high voltage circuit breakers, and 78 power transformers.

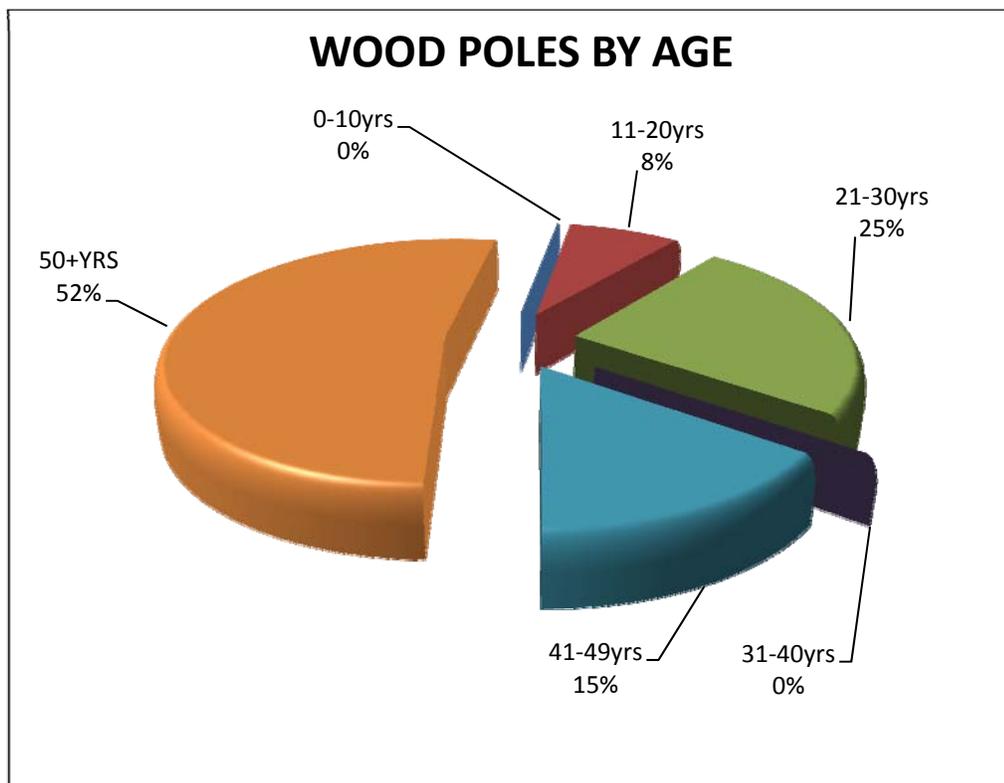
The substations are interconnected by 2,666 miles of transmission lines, operating at voltages between 34,500 and 500,000 volts. The majority of the transmission lines (2,023 miles) were built using steel structures, with the remainder using wood pole (635 miles) or concrete pole (eight miles) construction.

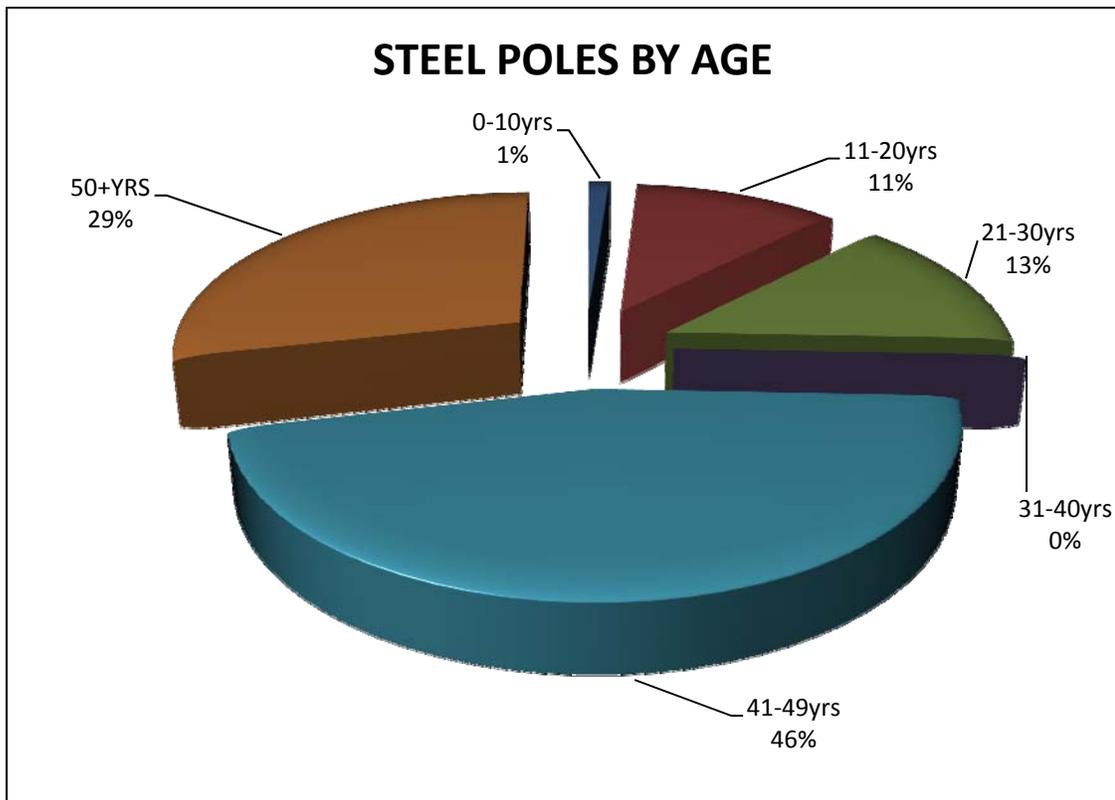
The electrical system is operated from the Phoenix Control Center by means of an extensive communications network consisting of microwave, radio, and fiber optic links. The links are connected through 74 Western-owned communication sites, and 128 other points that DSW receives and/or sends information to and from.

## 6.1 TRANSMISSION LINES

Voltage	Miles of Wood	Miles of Steel	Miles of Concrete	Total Mileage
500,000 Volts	0	256	0	256
345,000 Volts	0	714	0	714
230,000 Volts	1	904	0	905
161,000 Volts	242	117	0	359
115,000 Volts	281	25	0	306
69,000 Volts	79	7	0	86
<69,000 Volts	32	0	8	40
Total	635	2,023	8	2,666

DSW has 635 miles of wood pole transmission lines. Generally, age alone is not sufficient justification for rebuilding a transmission line. However, DSW's experience with the Parker-Planet Tap 69-kV Transmission Line (built in 1943), the Davis-Kingman Tap 69-kV Transmission Line (built in 1947), the Coolidge-Oracle 115-kV Transmission Line (built in 1943), and the Gila-Knob 161-kV Transmission Line (built in 1943), has shown that wood poles constructed in the Desert Southwest environment need to be replaced at 60 to 65 years of age or sooner.



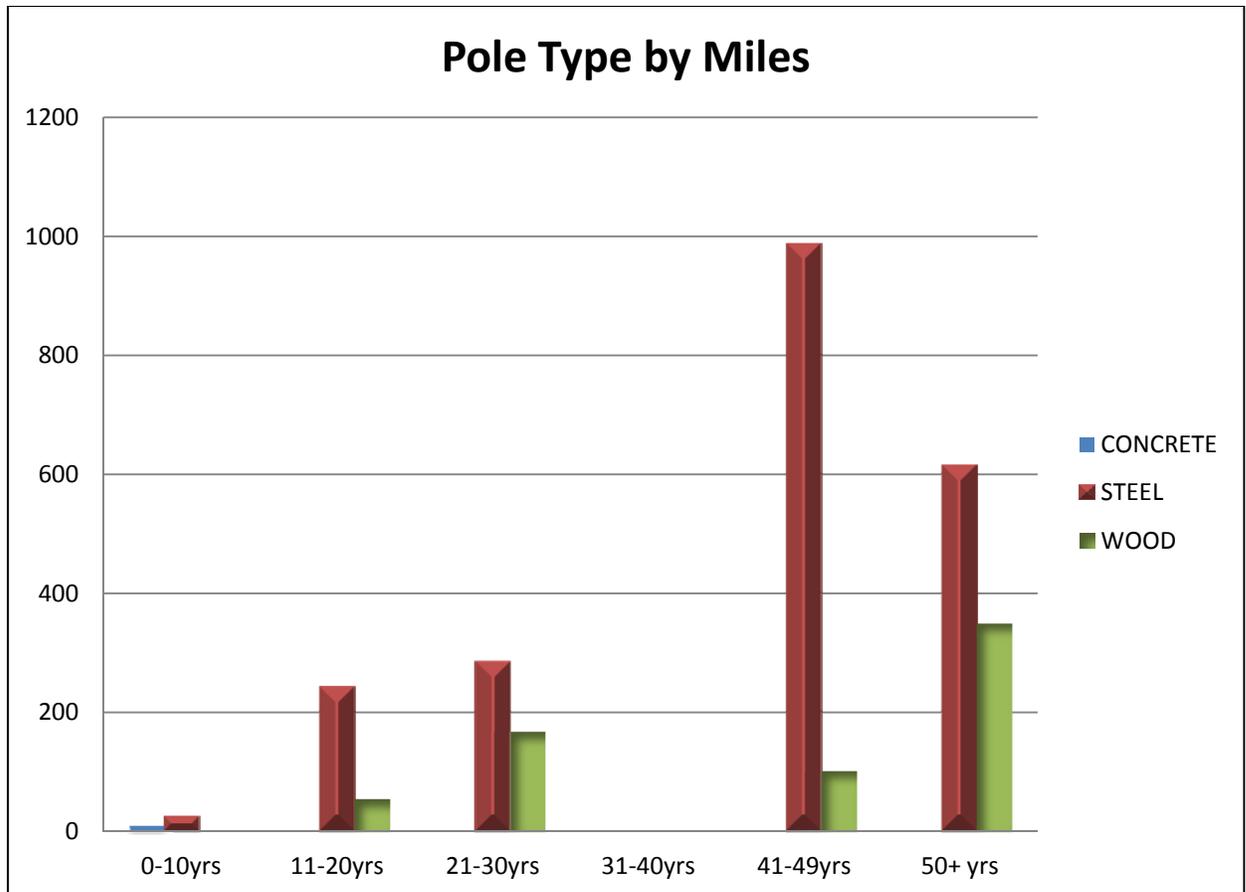


The bulk of the wood H-frame structures are in service long past their engineered lifespan of 50 years, and are exhibiting condition-related deterioration consistent with their age and the low desert environment.

The wood poles display symptoms of advanced external shell rot, weathering, and large cracks. These conditions introduce reliability and safety concerns because of the reduction of the amount of wood available to bear the load of the conductors and hardware. Damage to the outer layer allows the ingress of fungus and insects that cause internal decay, further weakening the poles. These issues increase the probability of the structure collapsing. Weathering and decay have a significant effect on the structure support wood, which could lead to crossarm or X-brace failures.

Additional issues affecting the H-frame structures in this region that lead to structure failure problems are: raked, bowed, or leaning poles, vehicle strikes, lightning and fire damage, and water damage from irrigation. Other scenarios encountered include broken insulators, insulators showing damage due to flashover, and loose, worn out, or missing hardware.

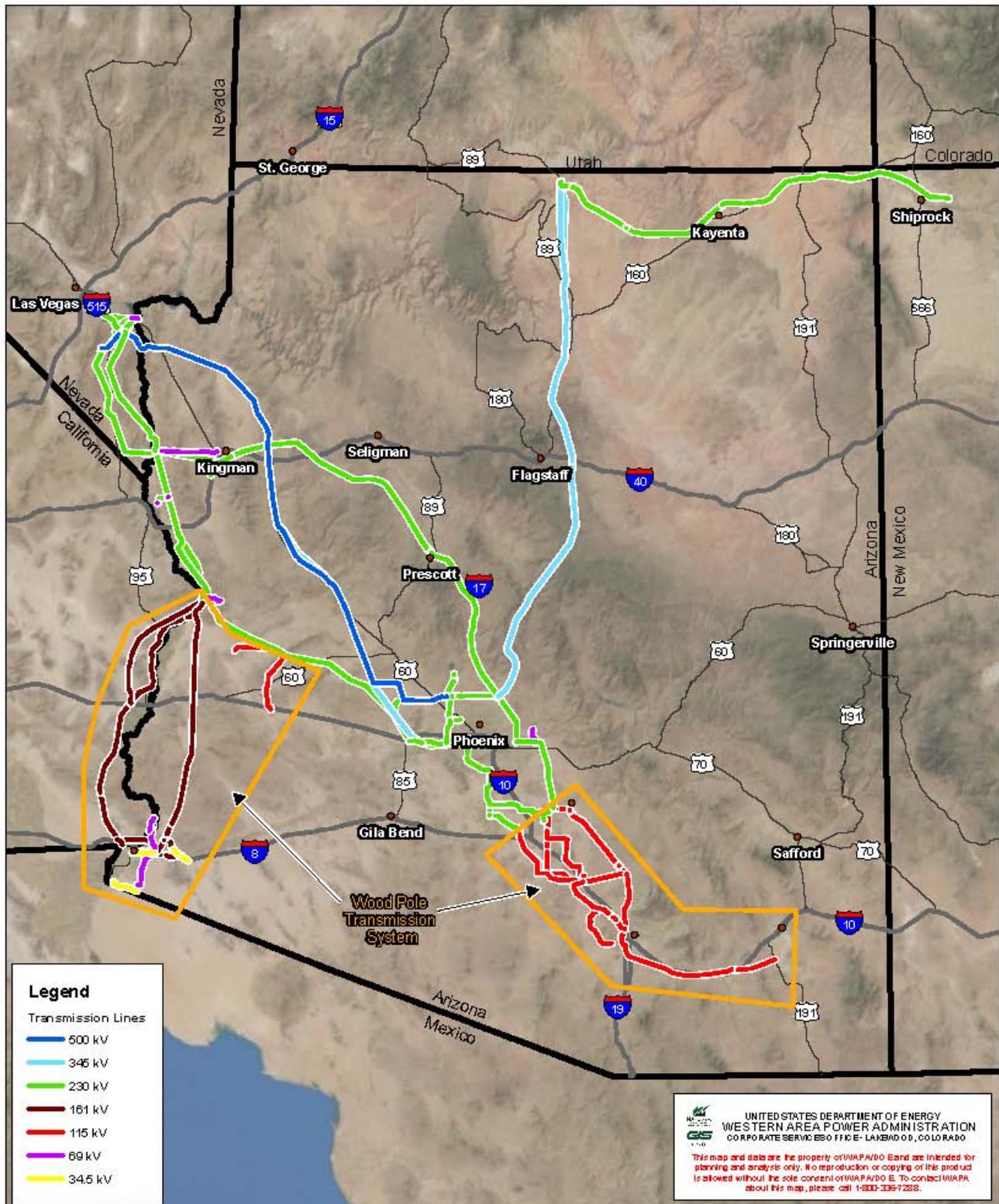
Shell rot, weathering, and cracks on the outer layer make it unsafe for line personnel to climb the poles and perform maintenance; therefore, maintenance personnel are forced to use bucket trucks to access pole tops. A large portion of these structures are located in remote desert areas and rough terrain; therefore, it can be difficult to access with heavy equipment.



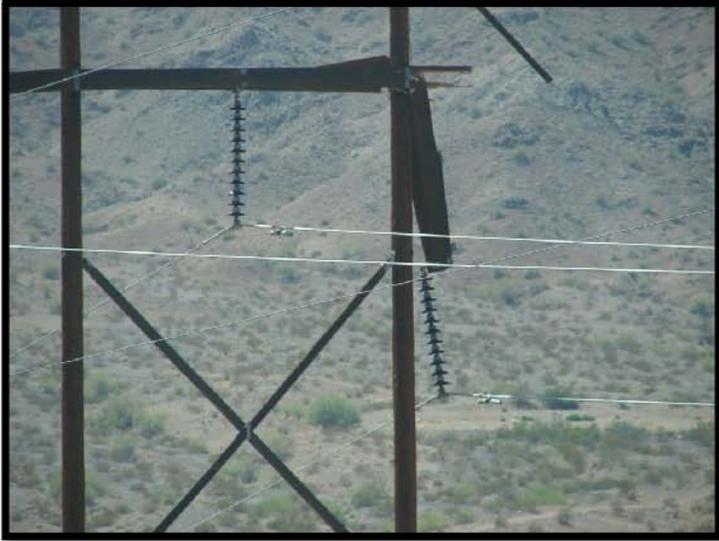


*Valley Farms-Oracle 115-kV Transmission Line depicts  
severely weathered wood pole*

# Desert Southwest Wood Pole Transmission System



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*Parker-Blythe #1 161-kV  
Transmission Line*



*161-kV Wood Pole  
Failure/Collapse*



*161-kV H-Frame  
Disintegration*

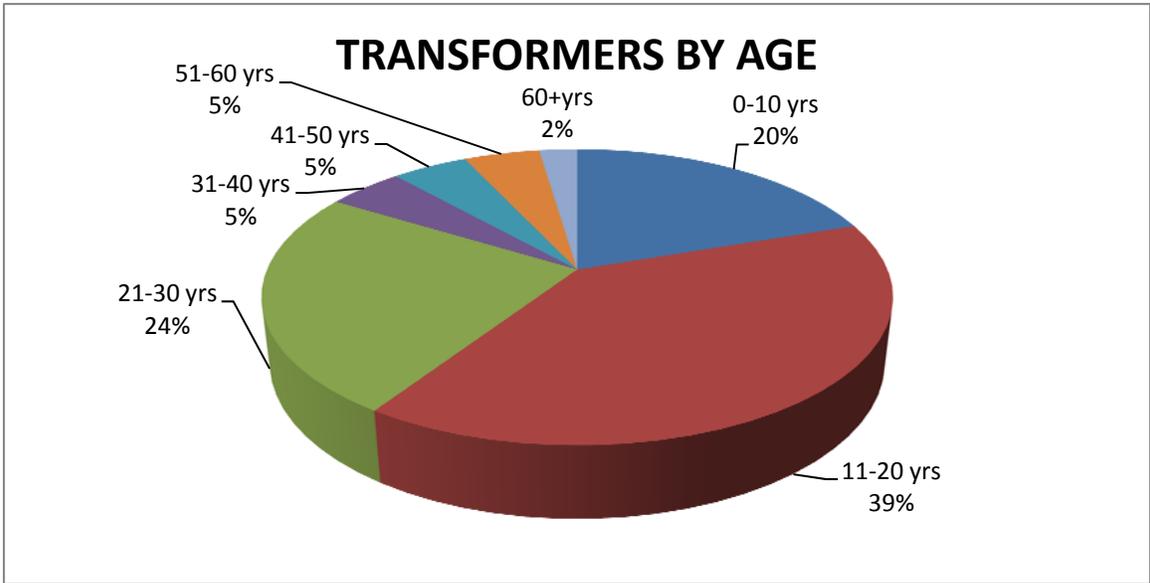
## 6.2 TRANSFORMERS

DSW has 78 power transformers; six of which are over 40 years old. Another five will be 40 years old in the next 10 years. The average service life of a power transformer is 40 years.

Due to the long lead time to procure critical transformers, it is not practical to maintain these units to the point of failure. The loss in revenue for an outage on a 500-kV transformer, power circuit breaker, or transmission line can exceed \$1 million a day, in addition to the potential loss of load to Western's customers.

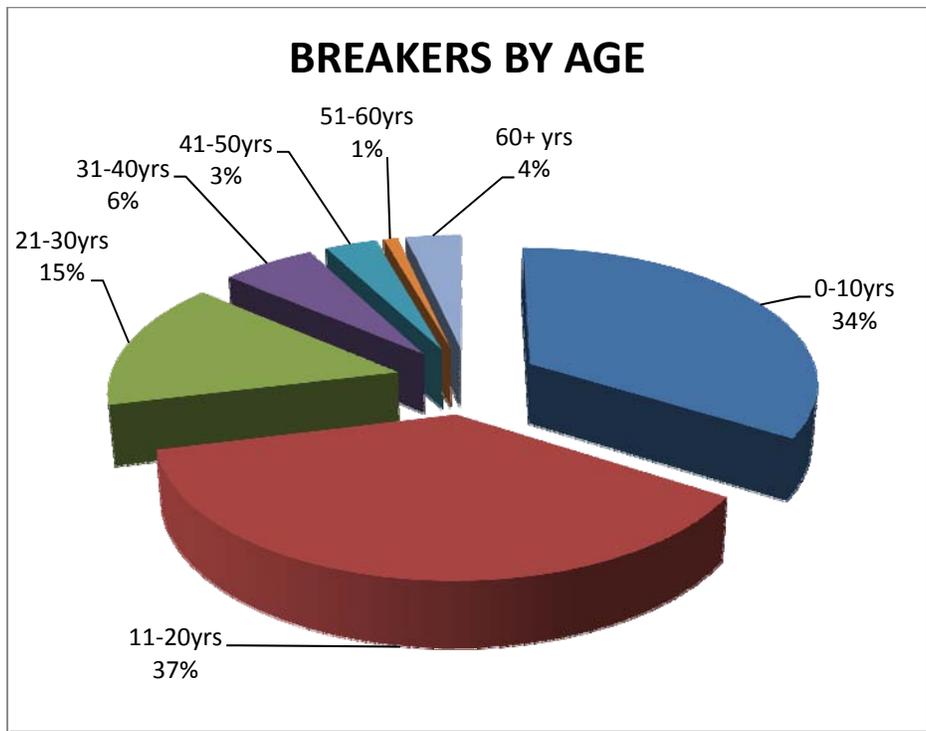


*345/230-kV Transformer Repairs*



### 6.3 POWER CIRCUIT BREAKERS

DSW has 477 power circuit breakers; 47 of which are over 40 years old. Another 32 will become 40 years old in the next 10 years. The average service life of a power circuit breaker is 40 years.





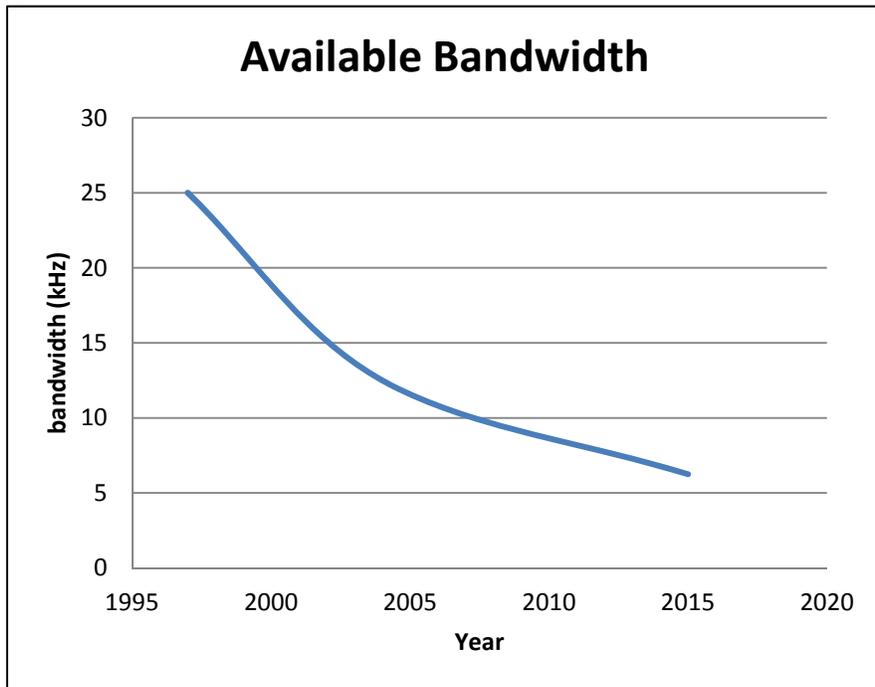
*Replacement of 345-kV Power Circuit Breaker  
at Flagstaff Substation*

#### **6.4 COMMUNICATION TERMINALS**

Western uses communication terminals to allow substations to communicate with one another, which are required for the basic operation and reliability of the individual substation. Without reliable or adequate communication, the substations reliability and overall operation are compromised. The recommended life expectancy of a microwave radio is 10 years. Beyond this timeframe, replacement parts are no longer readily available, and the hardware begins to break down and become less and less reliable. Western has 133 microwave radios in total, and 60 of these are in excess of 10 years old (45%).



*Microwave Communication Tower*



Decreasing available bandwidth from the FCC is requiring the use of newer type radios to accomplish the same task. To make “room” for other commercial radio uses, the FCC has cut the available bandwidth from 12.5 kHz to 6.25 kHz.

The existing radios are no longer suitable because the band width is too wide for the new FCC regulations. Western must purchase new radios to meet the future band width requirements. (Similar to the transition from analog TV signals to digital in 2009, when all analog TV’s had to be converted to script the new regulations.) Western radios must be replaced to accept the new requirements.

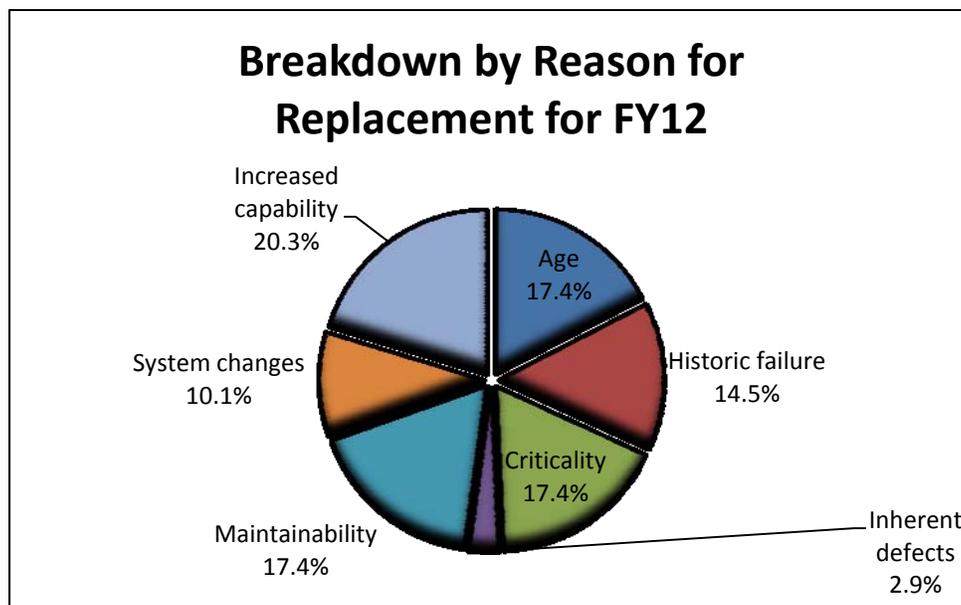
## 6.5 LINE RELAYS

DSW has 1,759 line relays; 771 of which are 15 years or older and represent 44% of the relay inventory. The average service life of a line relay is 15 years. The percentage of relays in excess of 15 years old will increase to 60% in the next five years.



*New 230-kV Line Relays at Davis Substation*

One of the major reasons that Western replaces a relay is age. Over time, vendor support for relays diminishes, as does the ability to find replacement parts. The parts that are available tend to be more costly making it economically unfeasible to keep the relay in service. Lastly, the older relays become out-dated with the advent of newer, microprocessor-based relays.



To ensure system stability, Western analyzes the elements that are protecting the higher priority assets. The extra high voltage lines often receive more upgrades because of this added visibility. Under NERC requirement PRC-005-2, electromechanical and solid state relays require complete functionality tests every six years. This number doubles to every 12 years between tests if the relay is a microprocessor. Also, the newer microprocessors bring increased redundancy to the system, can perform multiple functions that previously required separate relays, and can record fault data for analysis. Western must also keep in compliance with North American Electric Reliability Corporation standards, and potential requirements from the Environmental Protection Agency, over PCB contamination. Relays are replaced to ensure compliance with these requirements.

## **APPENDICES**

- DSW FY12 – FY21 Construction Program
- DSW FY12 – FY16 RRAD's Program



FY12 - FY16 DSW RRADs PROGRAM									20-Oct-11
REF. NO.	PROJECT DESCRIPTION	LOC	ORG	FY12 APPROVED	FY13 BUDGET	FY14 BUDGET	FY15 BUDGET	FY16 BUDGET	
				BUDGET	SUBMISSION	PLAN	PLAN	PLAN	
<b>BOULDER CANYON</b>									
1	Basler Relays	VAR	G53	\$ 105,000	\$ 105,000	\$ -	\$ -	\$ -	
2	MOI Equipment Transfer	HVRMED	G53	\$ 30,000	\$ -	\$ -	\$ -	\$ -	
3	Remove and Replace Line Relays	HVRMED4	G53	\$ 100,000	\$ -	\$ -	\$ -	\$ -	
4	Channel Banks	CWG	G53	\$ 30,000	\$ -	\$ -	\$ -	\$ -	
5	Hoover-Mead Transmission Line Erosion	HVRMED	G53	\$ 600,000	\$ 510,970	\$ -	\$ -	\$ -	
6	Digital Fault Recorders	HVRMED	G53	\$ -	\$ 110,000	\$ -	\$ -	\$ -	
7	Outyear projects -TBD	TBD	G53	\$ -	\$ -	\$ 400,000	\$ 400,000	\$ 400,000	
<b>TOTAL BOULDER CANYON</b>				<b>\$ 865,000</b>	<b>\$ 725,970</b>	<b>\$ 400,000</b>	<b>\$ 400,000</b>	<b>\$ 400,000</b>	
<b>CENTRAL ARIZONA PROJECT</b>									
1	Main Battery Replacement	SPH	G52	\$ 8,000	\$ -	\$ -	\$ -	\$ -	
2	Main Battery Replacement	RSK	G52	\$ 45,000	\$ 5,000	\$ -	\$ -	\$ -	
3	Main Battery Replacement	HCR	G52	\$ 8,000	\$ -	\$ -	\$ -	\$ -	
4	Transformer and Bushing Replacement	HCR	G52	\$ 300,000	\$ 300,000	\$ 300,000	\$ -	\$ -	
5	Outyear projects -TBD	TBD	G52	\$ -	\$ -	\$ -	\$ 400,000	\$ 400,000	
<b>G52 TOTALS</b>				<b>\$ 361,000</b>	<b>\$ 305,000</b>	<b>\$ 300,000</b>	<b>\$ 400,000</b>	<b>\$ 400,000</b>	
6	Meter Replacement	RSK	G53	\$ 55,000	\$ -	\$ -	\$ -	\$ -	
<b>G53 TOTALS</b>				<b>\$ 55,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	
7	Transmission Line Replacement	ED2SGR2	G56	\$ -	\$ 10,000,000	\$ 7,500,000	\$ -	\$ -	
8	Transmission Line Replacement	RSKDLB	G56	\$ -	\$ 10,000,000	\$ 5,500,000	\$ -	\$ -	
<b>G56 TOTALS</b>				<b>\$ -</b>	<b>\$ 20,000,000</b>	<b>\$ 13,000,000</b>	<b>\$ -</b>	<b>\$ -</b>	
<b>TOTAL CAP</b>				<b>\$ 416,000</b>	<b>\$ 20,305,000</b>	<b>\$ 13,300,000</b>	<b>\$ 400,000</b>	<b>\$ 400,000</b>	
<b>COLORADO RIVER STORAGE PROJECT (CRSP)</b>									
1	Physical Security Upgrades Flagstaff	FLG	G07	\$ 45,000	\$ -	\$ -	\$ -	\$ -	
2	Security Camera Upgrades	GC	G07	\$ -	\$ -	\$ 45,000	\$ -	\$ -	
<b>G07 TOTALS</b>				<b>\$ 45,000</b>	<b>\$ -</b>	<b>\$ 45,000</b>	<b>\$ -</b>	<b>\$ -</b>	
3	Flagstaff 345kV Circuit Breaker Replacement	FLG	G52	\$ 150,000	\$ -	\$ -	\$ -	\$ -	
4	Test Equipment	MOVVP	G52	\$ 40,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	
5	Lidar Closeout		G52	\$ 30,000	\$ -	\$ -	\$ -	\$ -	
6	Main Battery Replacement and Main Battery Room Replacement	PPK	G52	\$ 130,000	\$ 6,000	\$ -	\$ -	\$ -	
7	Main Battery Replacement	GC	G52	\$ 65,000	\$ 6,000	\$ -	\$ -	\$ -	
8	Completion of Environmental Documentation	FLG/PPK	G52	\$ 110,000					
9	Pinnacle Peak-Rogers ROW Agreement (50%)	PPK/RGS	G52	\$ -	\$ 6,000,000				
10	Replacement of FX Capacitor Maintenance Breakers	FLG/PPK/KAY	G52	\$ -	\$ 200,000	\$ 200,000	\$ 200,000	\$ 200,000	
<b>G52 TOTALS</b>				<b>\$ 525,000</b>	<b>\$ 6,272,000</b>	<b>\$ 260,000</b>	<b>\$ 260,000</b>	<b>\$ 260,000</b>	
11	Microwave Upgrades Phoenix to Mexican Hat	MEXHAT	G53	\$ 1,024,000	\$ -	\$ -	\$ -	\$ -	
12	Replace Communication Power Systems (Various Locations)	PSM/TOW FOR FY12	G53	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 35,000	

REF. NO.	PROJECT DESCRIPTION	LOC	ORG	FY12 APPROVED	FY13 BUDGET	FY14 BUDGET	FY15 BUDGET	FY16 BUDGET
				BUDGET	SUBMISSION	PLAN	PLAN	PLAN
13	WIN/CIP	FLG/PPK/GC	G53	\$ 30,100	\$ 15,000	\$ -	\$ -	\$ -
14	RTU Upgrades	FLG/PPK/GC/N AV	G53	\$ 320,000	\$ 320,000	\$ -	\$ -	\$ -
15	Remove and Replace Relays	GC	G53	\$ 140,000	\$ -	\$ -	\$ -	\$ -
16	Multiple Relay Replacements - GCS 345/230/25kV transformer differential relays, 50BF relays and sync check upgrade	PSM/TOW FOR FY12	G53	\$ 192,000	\$ 220,000	\$ 110,000	\$ 110,000	\$ 110,000
17	Radio Towers/Grounding	PSM/TOW FOR FY12	G53	\$ 75,000	\$ -	\$ -	\$ -	\$ -
18	Phase Shift Bus Differential Relay Replacement	GC	G53	\$ 96,000	\$ -	\$ -	\$ -	\$ -
19	Unit Dropping Scheme	GC,PPK,FLG	G53	\$ 100,000	\$ -	\$ -	\$ -	\$ -
20	Communication Buildings - Zilner and Lolamai	ZIL & LOL	G53	\$ 501,000	\$ 15,000	\$ -	\$ -	\$ -
<b>G53 TOTALS</b>				<b>\$ 2,513,100</b>	<b>\$ 605,000</b>	<b>\$ 145,000</b>	<b>\$ 145,000</b>	<b>\$ 145,000</b>
21	230/130-kV Transformer Addition	GAR	G56	\$ 950,000	\$ -	\$ -	\$ -	\$ -
21	Reconfigure 69kV Yard GC Substation	GC	G56	\$ -	\$ 1,500,000	\$ 1,900,000	\$ 1,900,000	\$ -
22	PPK-RGS LiDAR Closeout (ROW Agreement)	PPK/RGS	G56	\$ 15,000	\$ -	\$ -	\$ -	\$ -
<b>G56 TOTALS</b>				<b>\$ 965,000</b>	<b>\$ 1,500,000</b>	<b>\$ 1,900,000</b>	<b>\$ 1,900,000</b>	<b>\$ -</b>
<b>TOTAL CRSP</b>				<b>\$ 4,048,100</b>	<b>\$ 8,377,000</b>	<b>\$ 2,350,000</b>	<b>\$ 2,305,000</b>	<b>\$ 405,000</b>
<b>INTERTIE</b>								
1	Security Equipment - TBD by G07 in FY of Execution	TBD	G07	\$ -	\$ -	\$ 45,000	\$ 45,000	\$ 45,000
<b>G07 TOTALS</b>				<b>\$ -</b>	<b>\$ -</b>	<b>\$ 45,000</b>	<b>\$ 45,000</b>	<b>\$ 45,000</b>
2	Mead Facility Complex Air Conditioning for Maintenance Bldg	MED	G52	\$ 180,000	\$ -	\$ -	\$ -	\$ -
3	Instrument Transformers	MED	G52	\$ 80,000	\$ 80,000	\$ 80,000	\$ 80,000	\$ 80,000
4	Main Battery Replacement	MED	G52	\$ 70,000	\$ 6,000	\$ -	\$ -	\$ -
5	Test Equipment	MOVP	G52	\$ 30,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000
6	Breaker Replacement 1582	LIB	G52	\$ -	\$ 155,000	\$ 155,000	\$ 5,000	\$ -
<b>G52 TOTALS</b>				<b>\$ 360,000</b>	<b>\$ 281,000</b>	<b>\$ 275,000</b>	<b>\$ 125,000</b>	<b>\$ 120,000</b>
7	Mead 230kV RTUs	MED	G53	\$ -	\$ 280,000	\$ 280,000	\$ 280,000	\$ 280,000
8	Completion of RTU Upgrades at 230 kV	MED	G53	\$ 30,000	\$ -	\$ -	\$ -	\$ -
9	345kV Line Relay Replacement	MED	G53	\$ 100,000	\$ -	\$ -	\$ -	\$ -
10	Radio Tower/Grounding	MED	G53	\$ 90,000	\$ -	\$ 60,000	\$ 60,000	\$ 60,000
<b>G53 TOTALS</b>				<b>\$ 220,000</b>	<b>\$ 280,000</b>	<b>\$ 340,000</b>	<b>\$ 340,000</b>	<b>\$ 340,000</b>
11	Mead Phoenix 500kV Line	MED	G61	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000
<b>G61 TOTALS</b>				<b>\$ 1,500,000</b>				
<b>TOTAL INTERTIE</b>				<b>\$ 2,080,000</b>	<b>\$ 2,061,000</b>	<b>\$ 2,160,000</b>	<b>\$ 2,010,000</b>	<b>\$ 2,005,000</b>
<b>PARKER DAVIS</b>								
1	Dispatch Map Board	PHS	J26/40	\$ -	\$ 650,000	\$ 250,000	\$ -	\$ -
2	SCADA Hardware/Software	PHS	J26	\$ 793,900	\$ 650,000	\$ 850,000	\$ 850,000	\$ 850,000

REF. NO.	PROJECT DESCRIPTION	LOC	ORG	FY12 APPROVED	FY13 BUDGET	FY14 BUDGET	FY15 BUDGET	FY16 BUDGET
				BUDGET	SUBMISSION	PLAN	PLAN	PLAN
	<b>G61 TOTALS</b>			\$ 793,900	\$ 1,300,000	\$ 1,100,000	\$ 850,000	\$ 850,000
3	Physical Security Upgrades Coolidge Sub	COL	G07	\$ 45,000	\$ -	\$ -	\$ -	\$ -
4	Portable Surveillance System/and Card Readers	PHX	G07	\$ 40,000	\$ -	\$ -	\$ -	\$ -
5	Portable Surveillance System/Comm Sites	GLA	G07	\$ 45,000	\$ -	\$ -	\$ -	\$ -
6	Physical Security Upgrades Gila	TOP	G07	\$ 45,000	\$ -	\$ -	\$ -	\$ -
7	Security Cameras	PHX	G07	\$ -	\$ 80,000	\$ -	\$ -	\$ -
8	G07 Various TBD by FY	PHX	G07	\$ -	\$ -	\$ 100,000	\$ 100,000	\$ 100,000
	<b>G07 TOTALS</b>			\$ 175,000	\$ 80,000	\$ 100,000	\$ 100,000	\$ 100,000
9	Metal Fence Fabric for Warehouse	PHX	G10	\$ 150,000	\$ -	\$ -	\$ -	\$ -
10	Computer Room and MmM Room Air Handler	PHX	G10	\$ 120,000	\$ -	\$ -	\$ -	\$ -
11	G1000 Various Projects TBD by Fiscal Year of Execution	PHX	G10	\$ -	\$ -	\$ 500,000	\$ 500,000	\$ 500,000
12	Main Breaker Replacement Phoenix Substation	PHX	G10	\$ 80,000	\$ -	\$ -	\$ -	\$ -
13	Warehouse Insulator Racks	PHX	G10	\$ 20,500	\$ -	\$ -	\$ -	\$ -
14	Warehouse Golf Carts	PHX	G10	\$ 19,800	\$ -	\$ -	\$ -	\$ -
15	Warehouse Forklift	PHX	G10	\$ 17,000	\$ -	\$ -	\$ -	\$ -
16	Stucco Repair & Painting	PHX	G10	\$ -	\$ 170,000	\$ -	\$ -	\$ -
17	Erosion Control & Retention	PHX	G10	\$ -	\$ 100,000	\$ -	\$ -	\$ -
18	Modify Fire Supression System	PHX	G10	\$ -	\$ 100,000	\$ -	\$ -	\$ -
	<b>G10 TOTALS</b>			\$ 407,300	\$ 370,000	\$ 500,000	\$ 500,000	\$ 500,000
19	End of Life Equipment	PHX	G20	\$ 185,000	\$ 185,000	\$ -	\$ -	\$ -
20	Completion of Computer Room Upgrade	PHX	G20	\$ 75,000	\$ -	\$ -	\$ -	\$ -
	<b>G20 TOTALS</b>			\$ 260,000	\$ 185,000	\$ -	\$ -	\$ -
21	Test Equipment	MOVP	G52	\$ 120,000	\$ 120,000	\$ 120,000	\$ 120,000	\$ 120,000
22	Wood Pole Program - Lines in Location Field is for FY12 Program - Outyears will be determined as funds and Section of lines are identified	CAG-EMP-ED5, SGR, COLED2#1, ED2SGR#1, TUCAPE, ED2SGR#2, COLED2#2	G52	\$ 1,400,000	\$ 2,300,000	\$ 2,460,000	\$ 2,460,000	\$ 2,460,000
23	Main Battery Replacement	HEN	G52	\$ 5,000	\$ -	\$ -	\$ -	\$ -
24	Battery Replacement	CAG	G52	\$ 45,000	\$ 5,000	\$ -	\$ -	\$ -
25	Battery Replacement	PRS	G52	\$ 45,000	\$ -	\$ -	\$ -	\$ -
26	Disconnect Replacement	SGR	G52	\$ 200,000	\$ 100,000	\$ 100,000	\$ -	\$ -
27	Boulder City Tap Disconnect Replacement 181 & 281	BTP	G52	\$ 100,000	\$ -	\$ 280,000	\$ -	\$ -
28	Refurbish Exterior of Transformer	COL	G52	\$ 120,000	\$ -	\$ -	\$ -	\$ -
29	Instrument Transformer & Arrester Replacement Program	VAR	G52	\$ -	\$ 80,000	\$ 80,000	\$ 80,000	\$ -
30	Complete Air Conditioning	COL	G52	\$ 60,000	\$ -	\$ -	\$ -	\$ -
31	Tucson Substation 115kV Circuit Breaker Replacement	TUC	G52	\$ 160,000	\$ 160,000	\$ 200,000	\$ 200,000	\$ -
32	Breaker Replacement - 352 Installation	GLA	G52	\$ -	\$ 75,000	\$ 5,000	\$ -	\$ -

REF. NO.	PROJECT DESCRIPTION	LOC	ORG	FY12 APPROVED	FY13 BUDGET	FY14 BUDGET	FY15 BUDGET	FY16 BUDGET
				BUDGET	SUBMISSION	PLAN	PLAN	PLAN
33	Breaker Replacement - 352 Installation	PAD	G52	\$ 120,000	\$ 100,000	\$ 5,000	\$ -	\$ -
34	Main Station Battery Replacement	KOF	G52	\$ -	\$ -	\$ 45,000	\$ 5,000	\$ -
35	Tucson, Pinnacle Peak, and Kayenta Breaker Replacement	TUC	G52	\$ -	\$ 165,000	\$ 165,000	\$ -	\$ -
36	Main Station Battery Replacement	SIG	G52	\$ -	\$ -	\$ 45,000	\$ 5,000	\$ -
37	Station Service Transformer (KZ2A_	TUC	G52	\$ -	\$ -	\$ -	\$ -	\$ 1,500,000
38	Breaker Replacement - 152	GLA	G52	\$ -	\$ -	\$ -	\$ -	\$ 75,000
39	Hot Stick Trailers/Semis	MOVVP	G52	\$ 420,000	\$ -	\$ -	\$ -	\$ -
40	Bull Dozer	MOVVP	G52	\$ 500,000	\$ -	\$ -	\$ -	\$ -
41	Replace Bucket Truck, JLG Replacement and 2 - RTVs	MOVVP	G52	\$ 245,000	\$ -	\$ -	\$ -	\$ -
42	Telehandler Forklift	MOVVP	G52	\$ -	\$ 78,000	\$ -	\$ -	\$ -
43	Line Truck	MOVVP	G52	\$ -	\$ 430,000	\$ -	\$ -	\$ -
44	Digger Truck	MOVVP	G52	\$ -	\$ -	\$ 550,000	\$ -	\$ -
45	Manlift	MOVVP	G52	\$ -	\$ -	\$ 165,000	\$ -	\$ -
46	Bucket Trucks - 2 each	MOVVP	G52	\$ -	\$ -	\$ -	\$ 750,000	\$ -
47	155ft Manlift	MOVVP	G52					\$ 800,000
48	Forklift	MOVVP	G52	\$ -	\$ -	\$ -	\$ -	\$ 50,000
	<b>G52 TOTALS</b>			<b>\$ 3,540,000</b>	<b>\$ 3,613,000</b>	<b>\$ 4,220,000</b>	<b>\$ 3,620,000</b>	<b>\$ 5,005,000</b>
49	JUS Fiber (oc 48 Upgrades)	VAR	G53	\$ -	\$ 240,000	\$ -	\$ -	\$ -
50	Station Relay Replacement	VAR	G53	\$ -	\$ 330,000	\$ 330,000	\$ 330,000	\$ 330,000
51	Line Relay Replacement	VAR	G53	\$ 280,000	\$ 220,000	\$ 220,000	\$ 220,000	\$ 220,000
52	VOIP PBX Upgrade	PHX	G53	\$ 300,000	\$ -	\$ -	\$ -	\$ -
53	Complete Repairs at Black Point Building	BLM MTM	G53	\$ 150,000	\$ -	\$ -	\$ -	\$ -
54	Radio Towers/Grounding		G53	\$ -	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000
55	WIN/CIP	COL/PHS	G53	\$ 100,000	\$ 75,000	\$ 125,000	\$ 125,000	\$ 125,000
56	JUS Microwave	VAR	G53	\$ 240,000	\$ -	\$ -	\$ -	\$ -
57	Test Equipment	G53	G53	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000
58	Unit Dropping Scheme	GC,PPK,FLG	G53	\$ -	\$ -	\$ -	\$ -	\$ -
59	Microwave Replacements	VAR	G53	\$ 243,800	\$ 243,963	\$ 243,963	\$ 243,963	\$ 243,963
60	Replace Communication Bldgs	VAR	G53	\$ -	\$ 73,037	\$ 60,000	\$ 60,000	\$ 60,000
61	Communication Equipment/Support OCI	VAR	G53	\$ -	\$ 140,000	\$ -	\$ -	\$ -
	<b>G53 TOTALS</b>			<b>\$ 1,493,800</b>	<b>\$ 1,562,000</b>	<b>\$ 1,218,963</b>	<b>\$ 1,218,963</b>	<b>\$ 1,218,963</b>
62	Tucson Apache Restructure Reinforcement	TUC APE	G56	\$ 150,000	\$ -	\$ -	\$ -	\$ -
	<b>G56 TOTALS</b>			<b>\$ 150,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
	<b>TOTAL PARKER DAVIS</b>			<b>\$ 6,820,000</b>	<b>\$ 7,110,000</b>	<b>\$ 7,138,963</b>	<b>\$ 6,288,963</b>	<b>\$ 7,673,963</b>
	<b>LEVEE</b>							
1	Gila-Gila Valley Transmission Line Upgrade	PHS	J26	\$ -	\$ 2,300,000	\$ -	\$ -	\$ -
	<b>G61 TOTALS</b>			<b>\$ -</b>	<b>\$ 2,300,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
	<b>DSW RRADS PROGRAM FY TOTALS</b>			<b>\$ 14,229,100</b>	<b>\$ 40,878,970</b>	<b>\$ 25,348,963</b>	<b>\$ 11,403,963</b>	<b>\$ 10,883,963</b>