CHAPTER 3.0
DESCRIPTION OF THE PROPOSED PROJECT

3.1 PROJECT DEVELOPMENT PROCESS

3.1.1 Overview

This section describes the steps taken by SCE and the status of permitting actions previously taken by state and federal regulatory agencies in the development of the DPV2 transmission line project. Additional permits or actions required prior to construction of the proposed DPV2 project are listed in Section 3.1.4.

The proposed route for the Devers-Harquahala 500kV transmission line is located generally parallel to SCE's existing DPV1 500kV transmission line route (see Chapter 1, Map 1-1; and Maps 3-2a-c, end of Chapter 3). Electrical systems and siting studies were conducted prior to construction of the DPV1 line. A regional siting study was conducted by SCE in 1976-1977 to identify alternative routes between Devers Substation and PVNGS within a 6,000-square-mile area. Subalternate routes were evaluated in the DPV1 Draft Environmental Impact Statement (DEIS) prepared by the USDOI-BLM and NRC (BLM and NRC, July 1978). These agencies selected the preferred route for the DPV1 transmission line that was constructed in 1982 following state approvals by the CPUC and the Arizona Corporation Commission (ACC).

After construction of the DPV1 line, applications to construct the DPV2 500kV transmission line using the proposed route between Devers Substation and PVNGS were submitted by SCE in 1985. The CPCN application and PEA included the proposed route and four subalternates from the DPV1 studies that were completed in 1978. Agency approvals and other actions pertaining to the DPV2 project are described as follows, and listed in Table 3-1.

TABLE 3-1 DPV2 AGENCY APPROVALS AND OTHER ACTIONS			
Document	**Date**	**Agency**	**Action**
CPCN Application including PEA	12/85	CPUC	Initial filing
Draft Environmental Impact Report	03/87	CPUC	State of California public and agency review
Supplemental Draft Environmental Impact Statement	05/87	USDOI/BLM	Review in compliance with NEPA
Final EIR	08/05/87	CPUC	Compliance with California Environmental Quality Act
Arizona Certificate of Environmental Compatibility Application filed (Case No. 76)	11/16/87	ACC	Filed application for state of Arizona review (withdrawn)
Amended CPCN Application/PEA filed (No. 85-12-012)	08/88	CPUC	Incorporated SCE/Division of Ratepayer Advocates cost/benefit study
Addendum to FEIR	09/88	CPUC	Review required for amended PEA
Final SEIS	10/88	USDOI/BLM	Proposed project and route adjacent to DPV1 approved
Interim Opinion (Decision No. 88-12-030)	12/09/88	CPUC	Interim Order Granting conditional approval for CPCN and route
Record of Decision	02/21/89	BLM	Approved project and preferred route in compliance with NEPA
Certificate of Right-of-Way Compatibility	03/01/89	USFWS	Certified compatibility of 500kV transmission line on KOFA NWR land
Right-of-Way Grant (CA-17905/AZ-23805)	08/11/89	BLM	Right-of-way permitted across federal land
SCE Ten-Year Plan filed	02/28/94	ACC	Notice of SCE's plan to construct in Arizona

SCE applied to the CPUC for a CPCN for DPV2 in 1985. Following reviews of SCE's PEA (1985) and the CPUC EIR (1987) and subsequent filing and review of SCE's 1988 Amended Application and PEA (SCE 1988), the CPUC issued a decision approving the then proposed route for DPV2. The Interim Order issued in December 1988 granted a CPCN to SCE that allowed construction of the project, conditioned upon compliance with an environmental mitigation program and other conditions as specified in the CPUC Final EIR (1987).

The USDOI – BLM approved the DPV2 project and the proposed route following completion of a FSEIS (BLM 1988) in compliance with NEPA, and issued a ROD in 1989. Later that year, the BLM issued a Right-of-Way Grant to SCE for the construction, operation, and maintenance of DPV2 across federal land, pursuant to Title V of the Federal Land Policy and Management Act of 1976. In 1989, USFWS issued a CRC for the portion of the DPV2 route that crosses the KOFA NWR in Arizona.

The route that was proposed in the 1985 Application and PEA, and 1988 Amended Application and PEA, followed the existing DPV1 line and terminated at PVNGS. The termination point of the 500kV transmission line route that is proposed in the current application is the Harquahala Generating Station Switchyard, located approximately 16 miles directly northwest of PVNGS (see Map 1-1). The distance of the proposed route between Devers Substation and the Harquahala Generating Station is approximately 230 miles and follows the existing DPV1 line for a distance of 225 miles, approximately 8 miles shorter than the route proposed in the previous DPV2 applications.

The majority of the proposed Devers-Harquahala 500kV transmission line would be constructed within the 130-foot-wide right-of-way on public land granted in perpetuity to SCE for the DPV2 project by the BLM in 1989. The right-of-way was granted for a total of 149.9 linear miles of public land between Devers and PVNGS, 57.2 miles in California and 92.7 miles in Arizona, including land managed by the BLM, USFWS, U.S. Department of Defense (DOD), and U.S. Bureau of Reclamation (USBR). The proposed Devers-Harquahala 500kV transmission line route would require a total of 136.6 miles of public land, as shown in Table 3-2. The Devers-Harquahala 500kV route also is within utility corridors as designated in the BLM RMPs for each of the respective BLM planning areas in Arizona and California. Construction would proceed as authorized by the BLM, incorporating the mitigation measures identified in the final versions of the FEIR, FSEIS, ROD, Right-of-Way Grant, CEC, and CRC.

TABLE 3-2 DPV2 RIGHT-OF-WAY GRANT AND PROPOSED DEVERS-HARQUAHALA 500kV TRANSMISSION LINE RIGHT-OF-WAY		
Land Management Agency	**Total Miles of Right-of-Way**	
	DPV2 Right-of-Way Grant (BLM 1989)	**Proposed Devers-Harquahala 500kV Transmission Line**
BLM	123.8	110.5
USFWS	26.1	26.1
Total	**149.9**	**136.6**
Note: BLM land withdrawals include DOD, Yuma Proving Ground (0.1 mile); USBR, CAP Canal (0.1.mile). USFWS land includes the KOFA NWR (23.8 miles) and Coachella Valley NWR (2.3 miles).		

Additional right-of-way requirements include Arizona State Trust Land (10.8 miles), California State Land (0.6 mile), Agua Caliente Indian Reservation (0.1 mile), and private land (81.6 miles). Some portions of the right-of-way were previously acquired from private owners by SCE. The Devers-Harquahala 500kV right-of-way acquired on private land, adjacent to the DPV1 right-of-way, will be a minimum of 130 feet wide.

Reinforcement of the 230kV system west of Devers was planned for the proposed 1985 DPV2 project. The proposed DPV2 project, for which SCE is now requesting CPUC approval, also includes upgrades to SCE’s 230kV system west of Devers. The proposed improvements would be constructed within SCE’s existing right-of-way that consists of one set of double-circuit towers and two separate sets of single-circuit structures between Devers and San Bernardino Junction (40 miles). San Bernardino Junction is the intersection of 230kV transmission line corridors located 3.4 miles south of the San Bernardino Substation. The proposed 230kV system upgrade west of Devers would require the removal of an existing single-circuit 230kV transmission line on wood H-frame structures, and the removal of an existing single-circuit 230kV transmission line on lattice steel structures between Devers and San Bernardino Junction; replacement with a new double-circuit 230kV line; and reconductoring and modification of the existing double-circuit 230kV line. Also, the upgrade would require reconductoring both circuits on an existing double-circuit 230kV tower line between Vista Substation and San Bernardino Junction. In addition, one circuit on each of the two existing double-circuit 230kV tower lines between the San Bernardino Junction and San Bernardino Substation (3.4 miles) would be reconductored.

The upgrade will result in four 230kV circuits, each with new 1033.5 thousand circular mil (kcmil) ACSR bundled (two) conductors.

3.1.2 Alternatives – Devers-Harquahala 500kV Segment

3.1.2.1 Alternative Routes

Alternative routes described in this chapter include subalternates considered and eliminated in the DPV1 EIS; the 1985 DPV2 PEA (amended in 1988); as well as alternatives considered in this PEA. Following is a description of the subalternate routes considered in the 1985 DPV2 PEA as amended in 1988, and a review conducted in 2002-2003 to update the subalternate route conditions. Alternatives to be considered in this PEA also are described in this chapter, with resource analysis following in Chapters 4 and 5.

Alternative Routes Considered and Eliminated

Studies were conducted to evaluate both electrical system alternatives and routing alternatives to the proposed DPV2 project. The electrical system alternatives are described in Chapter 2, Purpose and Need, of this document. Four subalternate routes for the portion of the line proposed between Devers and PVNGS were evaluated to address potential sensitivities in the Blythe and KOFA NWR areas. The subalternate route evaluation was documented at successive stages of project development for the 1985 PEA and amended 1988 PEA.

Following are summary descriptions of the subalternate routes considered in the 1988 amended PEA (SCE 1988) and impacts related to specific resources that potentially would result from the construction and operation of the DPV2 project for each of the subalternate routes. (See Appendix D, Chapter 10, page references noted below are from the 1988 PEA.)

A comparison of the proposed and subalternate routes is provided in Table 3-3. The subalternate route segments range from 82.3 to 90.6 miles long, and include links that comprise the route segments between common points, as listed in the table and shown on Map 3-1. (Links 1 and 13 are common segments at the eastern and western ends of the network of subalternate routes.)

TABLE 3-3
DEVERS-HARQUAHALA 500KV TRANSMISSION LINE
PROPOSED AND SUBALTERNATE ROUTE COMPARISON

			Length of Route Segment		**Ground Disturbance**	
Description of Proposed and Subalternate Routes	**Link Numbers**	**New 500kV Towers** (number in segment)	**Route** (miles)	**New Access and Spur Roads** (miles)	**Temporary Construction Areas** (laydown areas, tensioning and pulling sites, in acres)	**Permanent Area** (access and structure footings, in acres)
Proposed Route	2, 6, 8, 10, 12	258	79.0	5.4	275	9
Subalternate 1	3, 4a, 4b, 4c, 6, 8, 10, 12	271	82.4	48.3	288	82
Subalternate 2	3, 5, 11,12	282	82.3	79.7	298	135
Subalternate 3	2, 6, 7, 9	296	90.6	36.7	314	62
Subalternate 4	3, 4a, 17, 4c, 6, 8, 10, 12	277	84.1	50.1	294	85

Subalternate Route 1 (Links 3, 4a, 4b, 4c, 6, 8, 10, and 12). This route was originally part of a subalternate route in Arizona that was evaluated in the BLM's EIS (1978) for the DPV1 transmission line. Subalternate Route 1 was selected for further evaluation for the 1985 DPV2 project at the time of the previous studies in response to potential concerns regarding impacts to the KOFA NWR and protection of the desert bighorn sheep. This route would cross BLM land located north of the KOFA NWR boundaries (as delineated at the time of the previous studies).

Map 3-1

Subalternate Routes Considered in the 1988 PEA

Devers-Palo Verde No. 2

11 x 17

color

However, the route would have crossed the New Water Mountains Wilderness Study Area (WSA), on BLM land, as well as a contemplated expansion area of the KOFA NWR along the southern side of I-10. This subalternate route would be 3.4 miles longer than the proposed route (Link 2) and result in 82 acres of permanent ground disturbance, compared to 9 acres for the proposed route (see Table 3-2).

SCE's 1988 amended PEA concluded that the following impacts would result from Subalternate 1:

- Movement of wildlife species – The need for new construction access in a separate corridor would result in potentially greater adverse impact to bighorn sheep than the preferred route (1988 PEA, p. 10-75); potentially significant impact to an area of major sensitivity (within proposed KOFA NWR expansion area) (1988 PEA, p. 10-60); and impacts to Tyson Wash (Link 4c).

- Recreation use – Significant impacts to the BLM La Posa Recreation Site and Long-Term Visitor Center – (Link 4b-4c) and views from the site (1988 PEA, pp. 10-56 – 10-84).

- Visual resources – Significant impact from construction of the project in a new corridor in areas of Class A and Class B scenic quality (Link 4b); significant impact to scenic value of views from I-10, parallel to the transmission line in a new corridor with strong visual contrasts (Link 4a-4b), and crossing Highway 95 in the La Posa Plains (Link 4c); significant impact to views from residences (Link 4c) (1988 PEA, pp. 10-78 – 10-81).

Subalternate Route 2 (Links 3, 5, 11, and 12) – Subalternate 2 is a portion of Subalternate Route "P," that was evaluated in the DPV1 DEIS, in response to concerns regarding agricultural impacts in the Palo Verde Valley for the proposed route. Subalternate Route 2 would cross agricultural land on the Colorado River Indian Tribe (CRIT) Reservation, and would be 3.3 miles longer than the proposed route (Link 2). This route would result in approximately 135 acres of permanent ground disturbance compared to 9 acres for the proposed route.

The CRIT Tribal Council previously denied SCE a right-of-way for the DPV1 line in 1977, indicating that it would adversely impact the tribes. At the time of SCE's 1988 amended PEA, the CRIT indicated that a right-of-way would not be approved for the proposed DPV2 project.

Resource impacts that would occur if Subalternate Route 2 was selected include the following:

- Agricultural land – potentially significant impacts to prime farmland (Links 7 and 11) (1988 PEA p. 10-58).

- Visual resources – Significant impact from construction of the project in a new corridor in areas of Class A and Class B scenic quality in the northern portion of the Plomosa and Dome Rock mountains (Link 5), in the Colorado River riparian area (Link 5), and through agricultural land in the Palo Verde Valley of California (Link 11). Significant impact to scenic values for views from I-10 with strong contrasts south of Bear Hill and west of Blythe Airport (Link 11); State Route (SR) 95 in the La Posa Plains; US 60 west of Brenda, Poston Road, and Midland Road (Link 5); and US 95 north of Blythe (Link 11). Significant impact to residential views near Brenda (Link 5) and along the Colorado River (Link 11) (1988 PEA, p. 10-78 – 10-84).

- Movement of wildlife species – Significant impact to high-quality bighorn sheep habitat (Link 5) including a major movement corridor between Ibex Peak/Haystack Peak and Lazarus Tanks mountain block and nearby lambing areas in the north Plomosa Mountains.

Subalternate Route 3 (Links 2, 6, 7 and 9) - This subalternate route was not evaluated in studies conducted initially for the DPV1 line, but was considered in the studies for the 1985 DPV2 project (1985 PEA) in response to concerns regarding agricultural impacts in the Blythe area. This subalternate route crossed the Palo Verde Valley in California, about 10 miles south of the DPV1 crossing through a portion of Imperial County. Subalternate Route 3 would be 11.5 miles longer than the proposed route. The subalternate route would cross 3.8 miles of farmland (Links

7 and 9), which would be less than the 9.8 miles of farmland on the proposed route (Links 8, 10, 12). Because Subalternate Route 3 is 11.6 miles longer than the proposed Devers-Harquahala 500kV transmission line, the resultant area of permanent ground disturbance would be 62 acres, or 53 acres greater than the proposed route (see Table 3-3). Even though impact to agricultural land would be less, the overall impact to ground disturbance would be greater.

Construction on Subalternate Route 3 would result in significant impacts, as follows:

- Visual impacts – Significant impacts to scenic values and residences at the Colorado River crossing and riparian area, and Palo Verde Mesa (Links 7 and 9); significant impacts at CA 78 highway crossing (Link 9); significant impacts to the BLM Oxbow Recreation Site (Link 7) and Imperial County Palo Verde Park (Link 9) (1988 PEA, pp. 10-78 – 10-84).

- Cultural resources – Impact to significant archaeological sites including the Ripley Intaglio and two other major intaglio groups; potentially significant impacts to sensitive areas in the Colorado River terraces, Mule Mountain, and the Palo Verde Mesa would result from construction of new access (Links 7 and 9) (1988 PEA, pp. 10-60 – 10-62).

<u>*Subalternate Route 4 (Links 3, 4a, 17, 4c, 6, 8, 10, and 12)*</u> – Subalternate Route 4 is the same as Subalternate Route 1, except that Subalternate Route 4 would follow a portion of the All American Pipeline corridor north of I-10 in Arizona (Link 17 instead of Link 4b), crossing I-10 twice and U.S. Highway 60 once. Impacts would be comparable to Subalternate Route 1, with the addition of the following:

- Wildlife species – Potentially significant impact to the area north of I-10, between Ranges 16 and 18 West (Link 17), identified in the BLM's Lower Gila South RMP as bighorn sheep lambing grounds, unsuitable for overhead transmission lines (1988 PEA, pp. 10-55). Although Subalternate 4 would avoid crossing the KOFA NWR, it would have potentially greater adverse impact to bighorn sheep than would the preferred route (1988 PEA, pp. 10-75).

- Visual impacts – Significant impacts to viewers of the line that would be constructed parallel to I-10 in a new corridor, at the two highway crossings east and west of the Plomosa Mountains (Link 17), and crossing US 60 southwest of Brenda (Link 17); significant impacts to residential viewers near Brenda and the BLM La Posa Recreation Site (Link 17) (1988 PEA, pp.10-80 – 10-84).

Construction of Subalternate Route 4 would disturb approximately 85 acres, or 76 more acres of permanent ground disturbance than the proposed route (see Table 3-3).

The USFWS agreed that the preferred DPV2 route through the KOFA NWR had less impact than Subalternate Route 1. As stated in the CRC issued by the USFWS for KOFA NWR, "the preferred alternative route [for the Devers-Palo Verde #2 500kV Transmission Line depicted in the SEIS]…is compatible with the purpose for which the land was acquired, subject to established mitigation measures and the stipulation that no further above-ground utility development of this corridor be permitted after construction of this [DPV2] transmission line" (USFWS 1989).

Results of the 2003 Review of Subalternate Routes and Proposed Route

In conjunction with the environmental studies conducted for this PEA in 2002-2004, SCE and Environmental Planning Group (EPG) conducted a review of the current conditions within the proposed and four subalternate corridors for the Devers-Harquahala segment in order to document changes that may have occurred during the period since the 1988 FEIR/Final SEIS. Reviews of agency land management plans and updates, aerial imagery, and ground and aerial field reconnaissance also were conducted. Results of the current review indicated that no significant changes had occurred that would alter the selection of the proposed route for the DPV2 transmission line that received conditional approval in 1988.

The overriding factor in this evaluation is that existing access for construction and maintenance of the Devers-Harquahala 500kV line would be available along the DPV1 corridor. In general, consolidating transmission lines within common utility corridors is desirable because it minimizes: land disturbance, barriers to wildlife movement, and additional visual impacts that typically result from separate transmission line corridors. Constructing the project within a corridor separate from the designated utility corridor that includes DPV1 would be inconsistent with the BLM RMPs. Plan amendments would be needed in order for the BLM to grant alternative rights-of-way. The 3-mile portion of the DPV1 line through Copper Bottom Pass was constructed on double-circuit structures, including installation of conductor wires for the DPV2 circuit. Consequently, there is no need to build additional structures or acquire additional right-of-way, and no new impact would occur for this segment.

None of the subalternate routes that were evaluated in the studies would be preferable to the proposed route based on environmental, technical, or economic factors. The environmentally preferred route, approved in 1988 by the CPUC and in 1989 by the BLM, for the 1985 DPV2 500kV transmission line would therefore remain as the proposed route for the currently proposed Devers-Harquahala 500kV line, except that the Devers-Harquahala line would terminate at Harquahala and not the PVNGS switchyard.

The review of the proposed and subalternate routes identified no additional areas of significant impact. Also, specific areas of significant or potentially significant impact that were identified in the previous studies for the 1985 DPV2 and 1988 amended PEA were unchanged. In conclusion, the proposed route for the 1985 DPV2 500kV transmission line remains the environmentally preferred route for the proposed Devers-Harquahala 500kV transmission line.

The proposed Devers-Harquahala 500kV transmission line route would terminate at the Harquahala Switchyard instead of the PVNGS Switchyard, which was the original termination point in the 1988 amended PEA and 1988 FSEIS.

Alternative Routes Considered and Evaluated

Alternatives to the proposed action considered and evaluated in this PEA for the Devers-Harquahala transmission line route include two subalternate routes for the portion of the 500kV transmission line in Arizona—the Harquahala-West Subalternate Route and the Palo Verde Subalternate Route. The subalternate routes are described below, and are shown on Map 3-2a.

Harquahala-West Subalternate Route

This subalternate route would exit the Harquahala Switchyard directly to the west for 12 miles, then follow the El Paso Natural Gas pipeline corridor northwest for 9 miles to its intersection with the proposed Devers-Harquahala 500kV route. The route would be located in a designated BLM Utility Corridor. New right-of-way would need to be acquired across private, state, and BLM land. The Harquahala-West Subalternate Route would be 14 miles shorter than the proposed route (a total distance of 216 miles), and would require about 48 fewer 500kV towers than the proposed route.

Steel lattice towers would be used for the portion of the route across desert land west of Centennial Wash to the intersection with DPV1 at the Wendon Pump Station. The Harquahala-West Subalternate Route would be constructed using tubular steel pole structures from the Harquahala Generating Station to the Centennial Wash to reduce the affected ground area across farmland. Spur roads would be built from the existing access road along the pipeline for construction of towers, and a new access road would be required along the section lines between the Harquahala Switchyard and the pipeline road. A minimum of 160-foot-wide right-of-way would need to be acquired on BLM land, and a minimum of 200-foot-wide right-of-way would need to be acquired on state and private land.

Construction of the Harquahala-West Subalternate Route would result in a greater amount of adverse environmental impact than the proposed route, as indicated in Section 5.3.1. Because this subalternate route would not be parallel to an existing transmission line, visual impacts to residential viewers would occur. Also, construction of a new access road for a portion of the subalternate route would be required, causing about 10 acres more ground disturbance than the proposed Devers-Harquahala route.

Currently, Arizona Public Service Company (APS) is planning for the Palo Verde Hub to TS-5 500kV transmission line that may parallel DPV1 between the PVNGS interconnection area and the Central Arizona Project (CAP) Canal. If the Palo Verde Hub to TS-5 line is constructed in a manner that would preclude SCE from entering Harquahala switchyard from the east, then the Harquahala-West subalternate may become SCE's preferred route.

Palo Verde Subalternate Route

The proposed route for the Devers-Harquahala 500kV transmission line is generally parallel to SCE's existing 500kV DPV1, as shown on Map 1-1. Unlike the DPV2 route described in the 1988 PEA, the proposed project involves building a new 500kV transmission line from Devers to the Harquahala Generating Station switchyard terminus, and acquiring the existing Harquahala-Hassayampa 500kV transmission line.

As an alternative to the termination of DPV2 at Harquahala, and SCE's acquisition of the existing Harquahala-Hassayampa 500kV transmission line, the DPV2 line would terminate at the PVNGS Switchyard. This would require the construction of the Palo Verde Subalternate Route, a new 500kV transmission line parallel to the DPV1 transmission line for an additional 10 miles to the PVNGS switchyard. A diagram of the proposed and subalternate route construction configurations is shown on Map 3-3 (end of Chapter 3). Although environmental impacts of construction and operation of the Palo Verde Subalternate Route would not be substantially more adverse than the environmental impacts resulting from the proposed Devers-Harquahala route, SCE's preference is to construct the proposed Devers-Harquahala route.

3.1.2.2 Midpoint Substation Alternatives – Joint DPV2 and Desert Southwest Transmission Project

In addition to the routing alternatives for the proposed 500kV line, the Midpoint Substation is considered as an alternative component that could be constructed in conjunction with the proposed DPV2 Project. This PEA includes the evaluation of one preferred site and two alternative sites for the substation that would be located south and west of Blythe, California, as shown on Maps 3-2a and 3-2b. Descriptions of the Midpoint Substation preferred site and alternative sites also are provided in Section 3.2.2.4.

The proponents of the California DSWTP are proposing to construct a 500kV transmission line from Blythe to Devers adjacent to the proposed Devers-Harquahala 500kV transmission line. Under a joint project proposal, only one instead of two 500kV transmission lines would be constructed since the parties would share a single 500kV transmission line. The joint project would include the construction of a 500kV substation. Initially, the Midpoint Substation would be equipped only with switching facilities to provide interconnections for the DPV1, Devers-Harquahala, and DSWTP 500kV lines. In the future, 500/230/161/66kV substation equipment would be installed. The Midpoint Substation would be completed in March 2009.

The preferred location for the Midpoint Substation, as shown in Map 3-2a, is about 10 miles southwest of Blythe, California, adjacent to SCE's DPV1 right-of-way. The preferred site is located on BLM land immediately west of IID's Blythe-Niland 161kV transmission line and Western's Blythe-Knob 161kV transmission line. A preliminary block diagram for the Midpoint

Substation is presented in Figure 3-1. The Midpoint Substation would be constructed within a rectangular area approximately 1,000 feet by 1,900 feet, or 44 acres. The switching facilities would be constructed within the Midpoint Substation property.

The 500kV switching station would include buses, circuit breakers, and disconnect switches. The switchyard would be equipped with 108-foot-high dead-end structures.

A new telecommunications facility would be installed on site to provide microwave and fiber optic communications for protective relaying and special protection scheme requirements. Three new microwave paths and two fiber optic systems would be installed at the Midpoint Substation site. The proposed fiber optic systems are Midpoint-Buck Boulevard Substation and Midpoint-Devers-Harquahala. The telecommunications facilities are described in Section 3.4.2.4.

A 45-foot by 70-foot mechanical-electrical equipment room would be installed on site to house all controls and protective equipment and a telecommunications room. A microwave tower also would be installed at the substation site.

A review of several potential siting areas for the Midpoint Substation was conducted by SCE in February 2004. The review considered engineering, environmental, and land availability criteria. Based on this review, a preferred site and two alternative sites were identified that would be feasible for construction and operation of the substation. These sites are described in Section 3.2.2.4 and indicated on Maps 3-2a and b.

3.1.3 Alternatives – West of Devers 230kV Transmission System

Reinforcement of the 230kV system west of Devers was planned for the 1985 DPV2 project, and evaluated in the 1987 EIR. That proposal called for reconductoring and rearranging 230kV circuits, including replacement of some of the towers subject to final engineering. The proposed

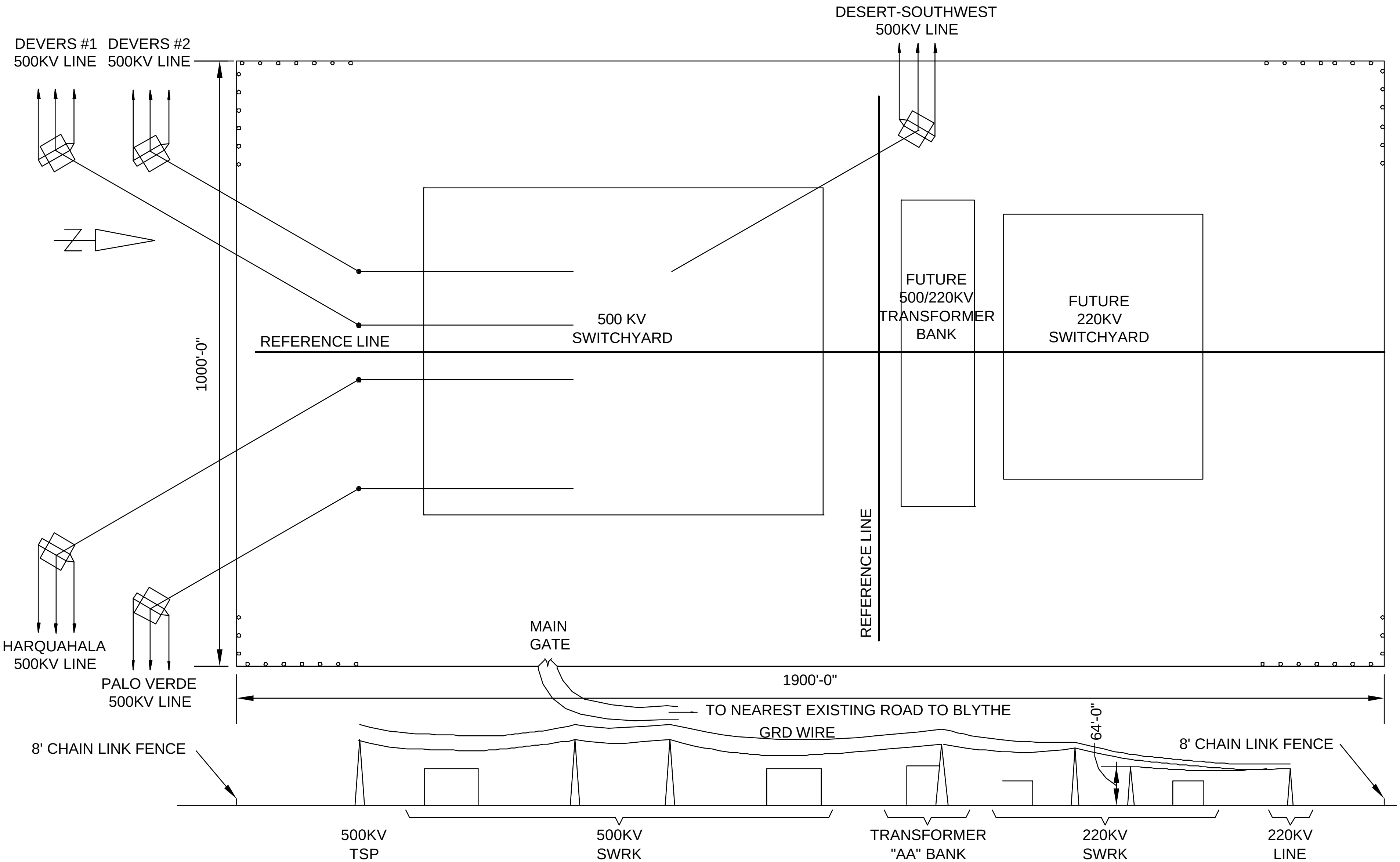
DPV2 project now includes modifications to four existing 230kV circuits for the entire route between Devers and Vista substations, and into the San Bernardino Substation.

The proposed improvements would be constructed within SCE's existing utility right-of-way that now contains four 230kV circuits on three sets of structures. Portions of the right-of-way also contain one or more 115kV lines that would remain in place. A detailed description of the proposed 230kV upgrade is provided in Section 3.3.2.

System alternatives have been considered and, as described in Chapter 2, the results of those studies indicate that construction of a new 230kV transmission line in a separate location would not meet the project objectives. The proposed upgrade would consolidate the existing lines on new double-circuit structures within the existing utility corridor. Rearrangement of the existing lines within the existing right-of-way would provide additional space for other transmission lines within the right-of-way, if any were needed in the future. The existing easements comprising portions of the corridor will require some upgrades to accommodate the proposed transmission line structures.

3.1.4 Permits or Other Actions Required Prior to Construction

The list of permits or approvals likely to be required to allow construction of the proposed DPV2 transmission line project is provided in Table 3-4. This list is not all-inclusive.



Note: Not to Scale

Figure 3-1
Midpoint Substation Block Diagram

TABLE 3-4
PERMITS OR OTHER ACTIONS REQUIRED PRIOR TO CONSTRUCTION OF THE DPV2 IN ARIZONA AND CALIFORNIA

FEDERAL

Bureau of Land Management
- Amended Right-of-Way Grant
- Notice to Proceed and Temporary Use Permits

U.S. Department of Defense - Army
- Right-of-Way Grant on Yuma Proving Ground-BLM land withdrawal

U.S. Fish and Wildlife Service
- Certificate of Environmental Compatibility for the KOFA NWR
- Right-of-Way Grant - crossing KOFA NWR and Coachella Valley NWR
- Consultation for Section 7 of the Endangered Species Act

U.S. Army Corps of Engineers
- Section 10 Permit – crossing Colorado River
- Section 401/404 Permit – streambed alteration/crossing

Federal Aviation Administration
- 7460(1) Permit
- Notice to Airmen

U.S. Bureau of Reclamation
- Right-of-Way Grant – crossing CAP Canal

Federal Communications Commission
- Licenses/permits related to Federal Communications Commission frequencies and paths

TRIBAL LAND/BUREAU OF INDIAN AFFAIRS

Agua Caliente Indian Reservation – Right-of-way/Easement
Morongo Band of Mission Indians – Right-of-way document

ARIZONA

State
- **Arizona Corporation Commission** – Certificate of Environmental Compatibility
- **Arizona Department of Transportation** – Encroachment/Crossing Permits
- **State Historic Preservation Office –** Consultation for Section 106 of the National and Arizona State Historic Preservation Act
- **Arizona State Land Department –** Right-of-Way Easement

Local and Regional

Maricopa County
- Road/Highway Encroachment/Crossing Permit
- Flood Control/Drainage Channel Encroachment/Crossing Permit

Harquahala Irrigation District
- Encroachment/Crossing Permit

La Paz County
- Road/Highway Encroachment/Crossing Permit
- Flood Control/Drainage Channel Encroachment/Crossing Permit

TABLE 3-4 PERMITS OR OTHER ACTIONS REQUIRED PRIOR TO CONSTRUCTION OF THE DPV2 IN ARIZONA AND CALIFORNIA
CALIFORNIA **State** **California Public Utilities Commission –** Certificate of Public Convenience and Necessity **State Lands Commission** - Right-of-Way Easement **California Department of Transportation** - Road/Highway Encroachment/Crossing Permit **Department of Water Resources** – Colorado Aqueduct Encroachment/Crossing Permit **State Historic Preservation Office –** Consultation for Section 106 of the National Historic Preservation Act
Local and Regional **Riverside County** Road/Highway Encroachment/Crossing Permit Flood Control/Drainage Channel Encroachment/Crossing Permit **Palo Verde Irrigation District** Encroachment/Crossing Permit **San Bernardino County** Road/Highway Encroachment/Crossing Permit Flood Control/Drainage Channel Encroachment/Crossing Permit **Cities** Road/Highway Encroachment/Crossing Permit Flood Control Channel Encroachment/Crossing Permit Temporary Use/Occupancy Permit - Material and Storage Yards Regional Water Quality Control Board - Storm Water Pollution Prevention Plan
OTHER UTILITIES **El Paso Natural Gas** – Pipeline Encroachment/Crossing Permit **Southern California Gas –** Pipeline Encroachment/Crossing Permit **AT&SF Railroad** – Encroachment/Crossing Permit

3.2 LOCATION

The proposed project would consist of the construction of a 500kV transmission line, approximately 230 miles long, from the high-voltage switchyard adjacent to the Harquahala Generating Station, west of Phoenix, Arizona, to SCE's Devers Substation near Palm Springs, California. Upgrades to SCE's existing 230kV transmission system west of Devers also would be required.

The proposed route between Harquahala and Devers, as shown on Maps 3-2a and 3-2b (end of Chapter 3), would generally parallel SCE's existing DPV1 500kV transmission line, of which approximately 102 miles are located in Arizona and approximately 128 miles are located in California. The proposed 230kV modifications west of Devers would be located within SCE's existing rights-of-way between SCE's Devers and Vista substations, a distance of approximately 45 miles, and interconnecting with the San Bernardino Substation within an existing 3.4-mile-long right-of-way, as shown on Map 3-2c.

3.2.1 Termination Points

The Arizona segment of the proposed 500kV transmission line would terminate at the Harquahala Generation Station Switchyard, located in Maricopa County approximately 17 miles northwest of the PVNGS and 60 miles west of Phoenix. The Harquahala Switchyard is in Section 31, Township 2 North, Range 8 West; Gila and Salt River Base and Meridian.

While the proposed transmission line would physically terminate at the Harquahala Switchyard, SCE would utilize the existing Harquahala-Hassayampa 500kV transmission line and the existing Hassayampa to PVNGS 500kV interconnection to provide a path to the PVNGS Switchyard (see Map 3-2a).

An alternative termination point in Arizona would be the PVNGS Switchyard, which would be a direct Devers to PVNGS connection. This route is described in Section 3.1.2 as the Palo Verde subalternate route.

The California segment of the proposed Devers-Harquahala 500kV line would terminate at Devers Substation in Riverside County, north of Palm Springs, California. Devers Substation occupies portions of Sections 4 and 5 in Township 3 South, Range 4 East, San Bernardino Base and Meridian.

The 230kV system upgrade west of Devers would terminate where the existing 230kV lines currently terminate at Vista and San Bernardino substations. Vista Substation is located in the city of Grand Terrace, San Bernardino County, California in Section 32, Township 1 South, Range 4 West. San Bernardino Substation is located in the city of Redlands in Section 18, Township 1 South, Range 3 West.

3.2.2 Description of the Proposed and Alternative Routes and Substation Sites

3.2.2.1 Proposed Devers-Harquahala 500kV Transmission Line Route

The total length of the proposed Devers-Harquahala 500kV transmission line route is approximately 230 miles. The proposed route parallels SCE's existing DPV1 single-circuit 500kV line for approximately 225 miles, and the existing Harquahala-Hassayampa 500kV line for approximately 5 miles. The proposed line would depart the Harquahala Switchyard and proceed in an easterly direction parallel to the Harquahala-Hassayampa 500kV line to a point where it would meet and parallel the existing DPV1 line. The route then turns north and proceeds approximately 2.7 miles to I-10, where it crosses I-10 and proceeds to a point 1 mile northwest of Burnt Mountain. The route then turns westerly and generally follows I-10 and the CAP Canal for approximately 20 miles through the Big Horn Mountains and across the Harquahala Plain to a point ½ mile north of I-10. From this point, the route turns southwest, crosses I-10, and proceeds approximately 5 miles where it meets the El Paso Natural Gas Company's existing pipeline just north of its Wenden Pump Station north of the Eagletail Mountains.

At this point, the route generally parallels the El Paso Natural Gas pipeline and DPV1 line for approximately 56 miles, crossing the Ranegras Plain, KOFA NWR, La Posa Plain, and Arizona State Highway 95, through the Dome Rock Mountains to the summit of Copper Bottom Pass. The route then turns southwesterly away from the pipeline, descends the western slope of the Dome Rock Mountains, and proceeds approximately 9 miles to a crossing of the Colorado River.

Upon crossing the Colorado River, the route leaves Arizona and passes into the Palo Verde Valley, 5 miles south of Blythe, California. The route proceeds westerly for approximately 10 miles to the top of the Palo Verde Mesa, then proceeds northwesterly approximately 4 miles to a point 2 miles south of I-10 and 5 miles southwest of the Blythe Airport.

At this point, the route proceeds westerly and generally parallel to I-10 and the DPV1 line for approximately 63 miles to a point in Shavers Valley where it turns northerly and crosses I-10 approximately 2 miles east of the Cactus City rest stop. After crossing I-10, the route parallels SCE's existing DPV1 and other transmission lines for the remaining 46 miles to Devers Substation.

3.2.2.2 Harquahala-West Subalternate Route

The Harquahala-West Subalternate Route would begin at the Harquahala Switchyard. Rather than departing the Harquahala Switchyard to the east paralleling the existing Harquahala-Hassayampa right-of-way, as described above for the proposed route, the Harquahala-West Subalternate Route departs the Harquahala Switchyard to the west and follows section lines due west for approximately 12 miles through private and state land to the El Paso Natural Gas pipeline corridor. This portion of the route parallels Courthouse Road approximately 1 mile to the north along section lines to the pipeline corridor. At the pipeline corridor, the transmission line would proceed northwesterly along the pipeline corridor for approximately 9 miles to the intersection with the DPV1 transmission line, immediately north of the El Paso Wendon Pump Station. From this point, the proposed transmission line parallels the southern side of the existing DPV1 transmission line to the west as described in Section 3.1.2. The length of the Harquahala-West segment between the Harquahala Switchyard and the junction with the DPV1 line and the proposed route is 21 miles. The Harquahala-West Subalternate Route would be approximately 14 miles shorter than the proposed route.

3.2.2.3 Palo Verde Subalternate Route

The Palo Verde Subalternate Route would be considered if the proposed 500kV transmission line were to terminate at the PVNGS Switchyard, rather than terminate at the preferred Harquahala Switchyard (see Map 3-2a and Map 3-3). Rather than leave the existing DPV1 transmission corridor and follow the existing Harquahala-Hassayampa 500kV transmission line west to the Harquahala Switchyard, this subalternate route would cross from the western side of the DPV1 transmission line to the east, and continue south, parallel to the DPV1 and Harquahala-Hassayampa 500kV lines. The alternative crosses predominantly BLM land southeasterly past Saddle Mountain, and follows the DPV1 transmission line to the PVNGS Switchyard. The total length of this subalternate route is approximately 240 miles, which is 10 miles longer than the proposed Devers-Harquahala transmission line route.

3.2.2.4 Midpoint Substation Preferred and Alternative Sites

The preferred and alternative sites for the Midpoint Substation are located west of the Palo Verde Valley and Blythe, California. The locations of the substation sites are described below and shown on Map 3-2b.

Preferred Site – This site is located approximately 5 miles south of I-10 and the Blythe Municipal Airport on BLM land in the northwest ¼ of Section 26, Township 2 North, Range 21 East, near the eastern bluff of the Palo Verde Mesa at Gravel Pit Road. The substation site would be directly north of and adjacent to the DPV1 right-of–way, in the northwestern quadrant of the junction of the DPV1 and Devers-Harquahala 500kV lines, IID's Blythe-Nyland 161kV line, and WAPA's Blythe-Knob 161kV line.

Alternative Site 1, Mesa Verde – This site is located approximately 4.5 miles northwest of the preferred site, also north of and adjacent to the DPV1 right-of-way on private land in the northwest ¼ of Section 8, Township 3 North, Range 21 East, about 1.5 miles south of I-10.

Alternative Site 2, Wiley Well – This site is approximately 5 miles due west of the Mesa Verde site, also north of and adjacent to the DPV1 right-of-way, about 17 miles west of Blythe. The site would be constructed in Section 5, Township 3 North, Range 20 East, about ½ mile east of Wiley Well Road on BLM land.

3.2.2.5 West of Devers 230kV Upgrade

This segment of the proposed project is located within existing SCE transmission line rights-of-way between Devers Substation, San Bernardino Substation, and Vista Substation. The right-of-way contains four existing 230kV circuits. The route between Devers and Vista substations is approximately 45 miles long. An additional 3.4 miles of right-of-way exists between San Bernardino Junction and the San Bernardino Substation.

The route departs from Devers Substation, located at the northern boundary of the city of Palm Springs, and proceeds westerly, parallel to the northern side of I-10 through the San Gorgonio Pass. It crosses portions of the Morongo Indian Reservation and the cities of Banning and Beaumont. Approximately 26 miles west of Devers, the proposed line crosses to the southern side of I-10 and proceeds west about 3 miles, across the southern portion of the city of Calimesa and into San Timoteo Canyon. The route proceeds through the San Timoteo Canyon in a northwesterly direction for approximately 7 miles, at which point it enters San Bernardino County, crossing the southwestern corner of the city of Redlands.

Exiting San Timoteo Canyon, the route enters the city of Loma Linda at San Bernardino Junction. It then proceeds north for 3.4 miles, across I-10 through a portion of the city of Redlands, and connects to the San Bernardino Substation, located in an unincorporated portion of San Bernardino County. From San Bernardino Junction, the route continues west for 5 miles through the city of Grand Terrace crossing I-215 and terminating at Vista Substation.

3.3 PROPOSED TRANSMISSION LINE FACILITIES

The proposed 500kV transmission line and upgraded 230kV transmission lines would consist of overhead wires (conductors), which form three electrical phases. The conductors would be supported by steel structures and steel poles and would be electrically isolated from the structures by insulators. In addition to the conductors, structures, and insulators, the proposed transmission lines would contain hardware and overhead optical fiber groundwires for telecommunications.

3.3.1 500kV Transmission Line Facilities (Devers-Harquahala)

The proposed 500kV transmission line is designed to operate at a nominal voltage of 525kV phase to phase and a maximum voltage of 550kV phase to phase. The transmission line capacity rating is limited to 2,700 amps under normal conditions and 3600 amps under emergency conditions.

A summary of the quantities for the proposed Devers-Harquahala 500kV transmission line is presented in Table 3-5.

TABLE 3-5
PROPOSED DEVERS-HARQUAHALA 500kV TRANSMISSION LINE SUMMARY

Dimensions	
Length of line (miles, rounded to 1 mile)	230
Total right-of-way area (acres, rounded to 10 acres)	3,910
New Permanent Area Occupied (acres)	
Tower footings	7.4
Access roads	None (existing)
Spur roads	32.8
Substation	None (existing)
Series compensation	4.0
Telecommunications	0.2
Total	42.4
New Temporary Area Occupied (acres)	
Transmission line structures	694.0
Access roads	8.1
Construction yards, pulling/splicing and batch plant areas	129.2
Substation/switchyard (Harquahala and shunt reactor)	3.0
Series capacitor banks(2 sites)	6.0
Telecommunications (optical repeater)	1.2
Total	841.5
Number of Structures (approximate)	
New single-circuit lattice steel towers	709
Existing double-circuit lattice steel towers	13
New single-circuit H-frame structures	39
New single-circuit, tubular steel poles	23
Land Ownership (miles)	
State, California	0.6
State, Arizona	10.8
Federal (BLM, USFWS, USDOD, USBR)	136.5
Private	81.6
Indian Reservation (Agua Caliente)	0.1
Existing Utility Corridors (miles)	
Parallel to existing DPV1 500kV right-of-way	225
Parallel to existing Harquahala-Hassayampa 500kV right-of-way	5.0
Number of Crossings	
Primary highways	4
Secondary highways	15
Rivers and streams	1
Railroads	2

Notes: Affected area estimates are based on the following factors:

- 0.010 acre per lattice steel tower – permanent
- 0.005 acre per H-frame structure – permanent
- 0.002 acre per tubular steel pole – permanent
- 0.9 acre per tower pad – temporary
- 0.9 acre per pulling station, one every 3 miles – temporary
- 0.2 acre per splicing station, one every 3 miles – temporary
- 5.0 acres per construction yard, one every 40 miles – temporary
- 2.0 acres per batch plant, one every 30 miles – temporary

Areas occupied by facilities installed within existing substation and communications site properties are not included in estimates.

3.3.1.1 Structures

The proposed 500kV transmission line would utilize four types of structures:

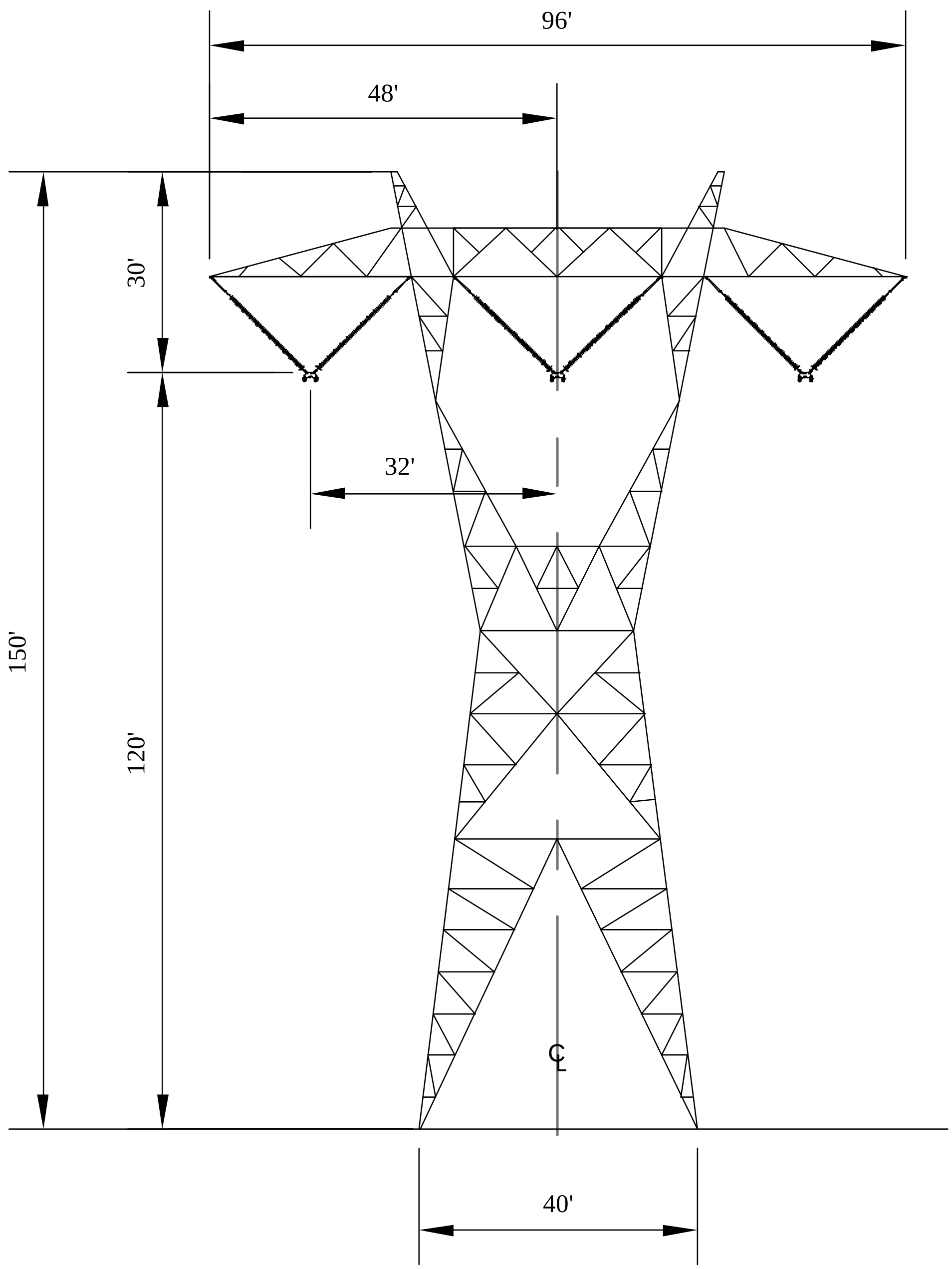
- four-legged single-circuit lattice steel towers
- four-legged double-circuit lattice steel towers (existing structures)
- two-legged (H-frame) single-circuit towers
- single-pole, tubular steel towers

The 709 new four-legged single-circuit lattice steel towers would be constructed of galvanized lattice steel angle members connected together by bolts. These towers would support one circuit consisting of three phases of conductors arranged in a horizontal (flat) configuration; the tower diagram is shown in Figure 3-2.

The 13 four-legged double-circuit towers are existing lattice steel towers which were constructed for the DPV1 line. They are located in the Copper Bottom Pass in the Dome Rock Mountains just east of the Colorado River in Arizona. These towers support two circuits, each consisting of three phases of conductors arranged in a vertical configuration. The DPV1 line is located in the first space and the proposed line would utilize the second space. The tower diagram is shown in Figure 3-3.

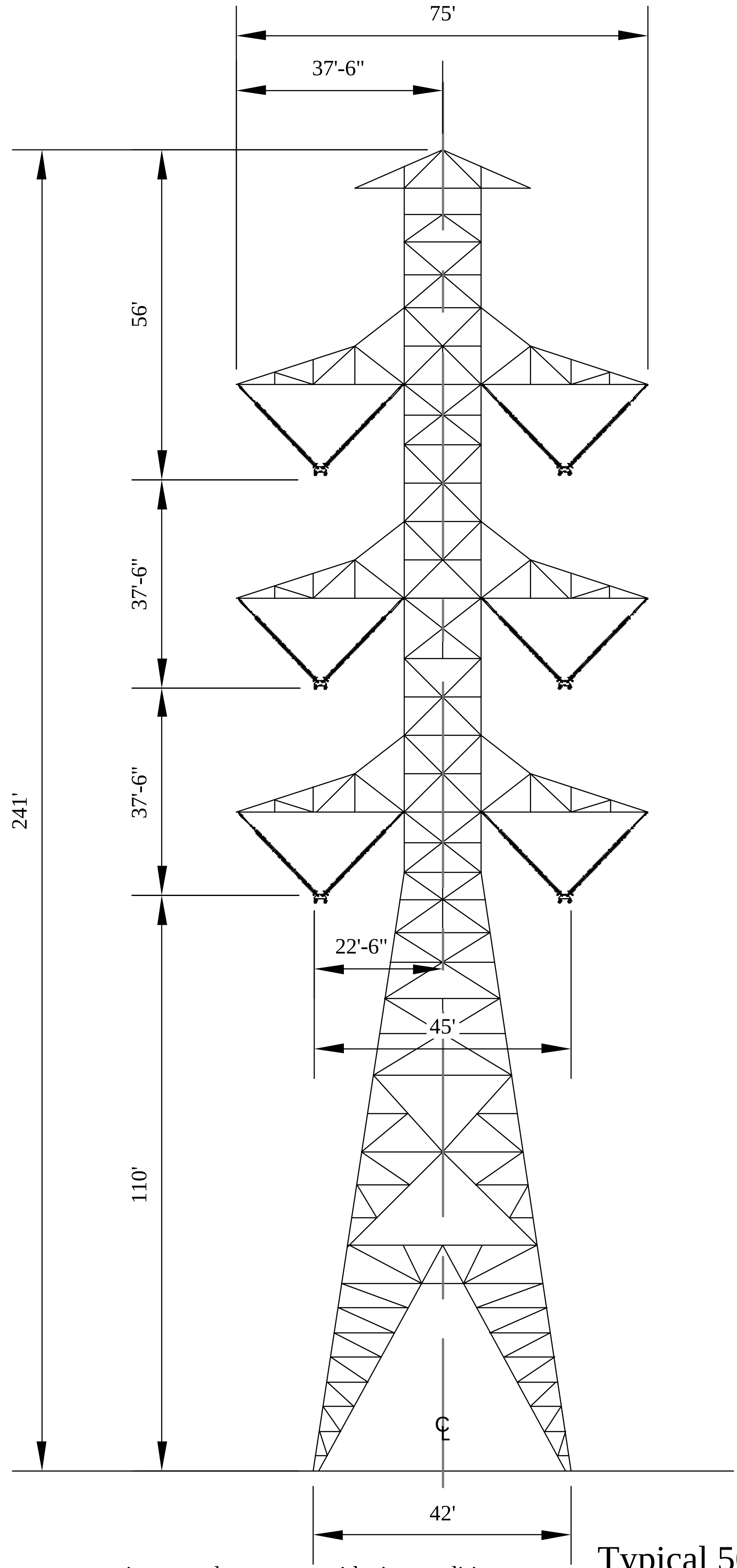
The 39 new two-legged single-circuit towers, also referred to as H-frames, would be used to cross farmland in the Palo Verde Valley to minimize impacts to farming operations. The towers would be constructed of galvanized lattice steel angle members connected together by bolts. These towers would support one circuit consisting of three phases of conductors arranged in a horizontal (flat) configuration. The tower diagram is shown in Figure 3-4.

The 23 new single-circuit tubular steel pole would be used to match the structure type along the 5-mile segment of the existing Harquahala-Hassayampa 500kV line. The pole diagram is illustrated in Figure 3-5.



Note:
Dimensions are approximate and may vary with site conditions.

Figure 3-2
Typical 500kV Single-Circuit
Lattice Steel Tower



Note:
Dimensions are approximate and may vary with site conditions.

Figure 3-3
Typical 500kV Double-Circuit
Lattice Steel Tower

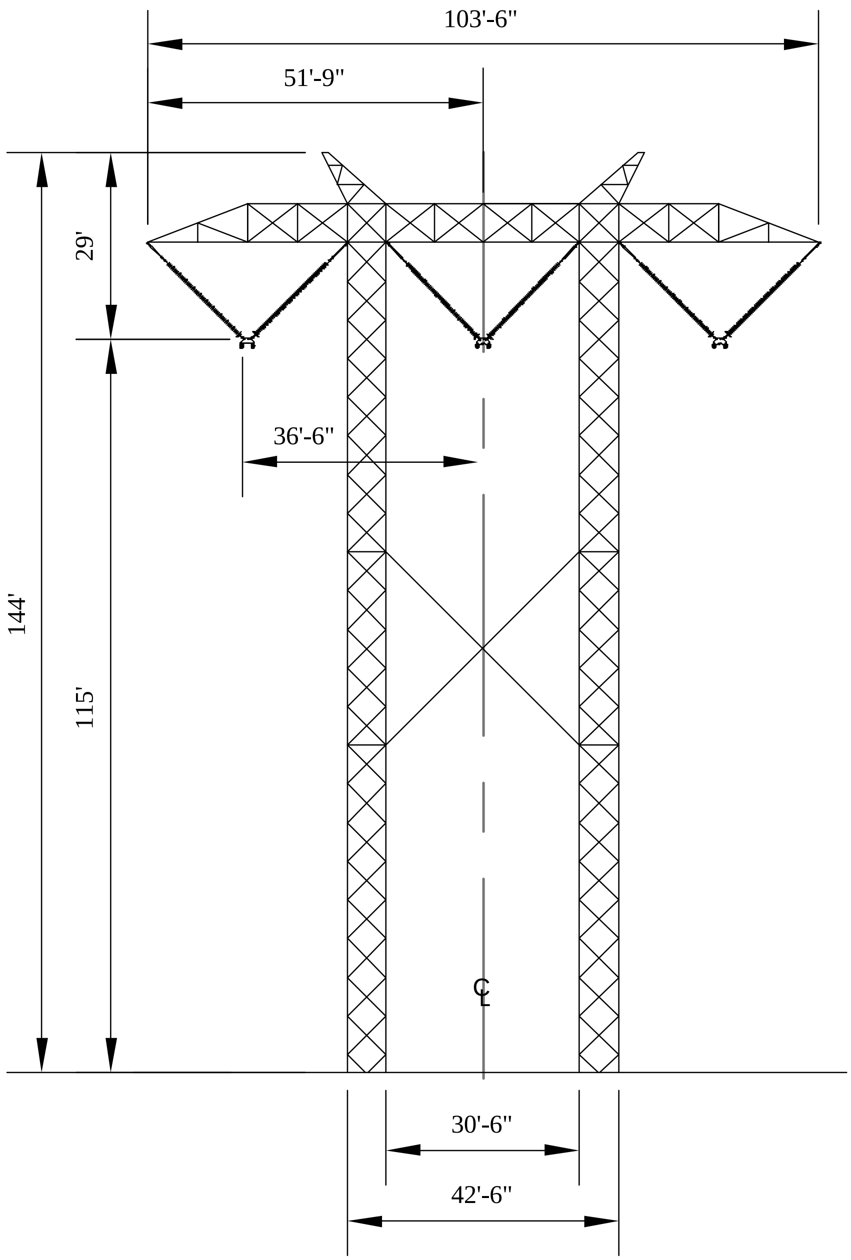


Figure 3-4
Typical 500kV Single-Circuit
"H - Frame" Tower

Note:
Dimensions are approximate and may vary with site conditions.

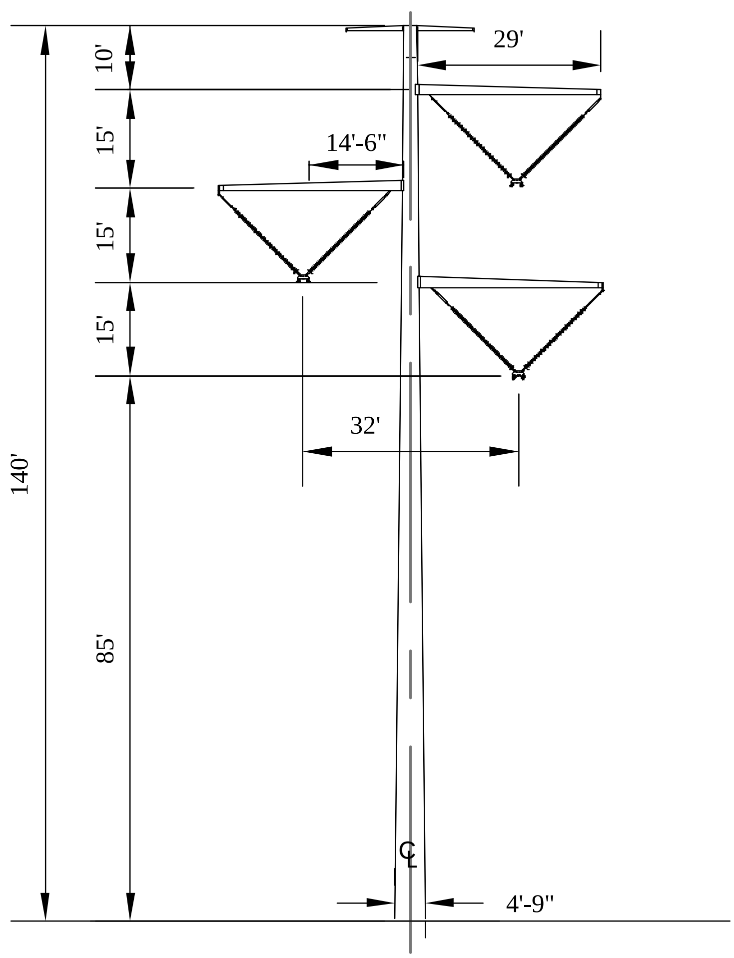


Figure 3-5
Typical 500kV Single-Circuit
Tubular Steel Pole

Note:
Dimensions are approximate and may vary with site conditions.

The transmission line would be composed primarily of tangent (suspension) type structures where the conductors approach and depart the structures in a straight line. The remaining towers would be heavier structures, which are either angle structures that suspend the conductor and allow a limited change in line direction, or dead-end structures, which are utilized for major changes in line direction. Although structure weights vary with height and specific load carrying capabilities, the approximate weight of each type of structure is as follows:

Structure Type	Weight (pounds)
Four-legged single-circuit tangent	32,000
Four-legged single-circuit angle	50,000
Four-legged single-circuit dead-end	80,000
Four-legged double-circuit tangent	125,000
Four-legged double-circuit dead-end	200,000
Two-legged single-circuit tangent	55,000
Tubular steel pole	38,000

The strength requirements for each structure location will be determined in final design with respect to projected weather data for various areas. Operational experience with the DPV1 line will be utilized to determine tower design parameters. Towers with higher wind resistance ability are anticipated to be utilized in Arizona.

The heights of the structures would vary depending upon the terrain, span length, and the presence of other facilities or features that the transmission line may cross such as rivers, roads, highways, railroads, telephone lines, and other power transmission and distribution lines. The typical overall structure height would be approximately 150 feet for the proposed four-legged, single-circuit lattice steel towers and approximately 144 feet for the proposed two-legged, H-frame towers. The existing four-legged double-circuit towers are approximately 241 feet in height.

Where feasible, the new Devers-Harquahala 500kV towers would be installed to match the overall height of the existing DPV1 towers, and new towers would be aligned horizontally with the existing DPV1 towers. However, the Independent System Operator has specified that the capacity of the line be 2700 amps under normal conditions and 3600 amps under emergency conditions, an increase from the 1988 DPV2 capacity rating. This capacity rating necessitates that the heights of some of the proposed Devers-Harquahala towers be slightly taller than the adjacent DPV1 structures. In some locations, tower spacing may not correspond to the DPV1 structures, in order to provide adequate conductor ground clearance.

The conductor height also would vary, depending upon the same factors described above for the structures. The minimum conductor height above ground would be 35 feet between towers.

The typical structure foundations would require four to eight augured, cast-in-place concrete piles. The size and number of piles required would vary with the type of structure and soil conditions encountered at each tower site.

The average tower-to-tower spacing (span length) would be approximately 1,550 feet, or about 3.4 towers per mile of line for steel lattice towers. Span lengths generally range from a minimum of 400 feet to a maximum of 2,200 feet. The typical span length for tubular steel poles would be 1,320 feet, or four towers per mile. The exact quantity and placement of the structures is determined by the final detailed design of the transmission line, which is influenced by terrain, land use, environmental resource concerns, and economics.

Some tower locations and site installation conditions may require special tower placement according to government agency requirements. Special tower placements in these cases would be coordinated with the appropriate agency.

3.3.1.2 Conductors

Each 500kV phase would be a two-conductor bundle with a spacing of 18 inches between conductor centers. The typical conductor phase spacing for four-legged single-circuit towers is 32 feet as shown in Figure 3-2; for four-legged double-circuit towers it is 37.5 feet vertically and 45 feet horizontally as shown in Figure 3-3; for two-legged single-circuit towers it is 36.5 feet as shown in Figure 3-4; and for tubular steel poles it is 15 feet vertically and 32 feet horizontally as shown in Figure 3-5. Each conductor is 1.762 inches in diameter, 2,156 kcmil, ACSR. With this type of conductor, the load current flows through the aluminum strands that are formed in a helix around the core of steel strands. The steel strands provide the mechanical strength to support the aluminum strands.

3.3.1.3 Insulators

The tangent and angle 500kV insulator assemblies would consist of two strings of insulators in the form of a "V." These strings are used to suspend each conductor bundle (phase) from the structure while maintaining the electrical clearance between these conductors, the ground, and the structure. The "V" string also restrains the conductor from swinging into the structure during winds. Each leg of the "V" assembly would contain one or two one-piece gray polymer insulators, depending on the conductor loads. On dead-end structures, the insulators are arranged in a barrel configuration consisting of four polymer insulators. The polymer insulators are visually similar to the porcelain type insulators used on the DPV1 line, but require less effort to install and less maintenance.

3.3.1.4 Hardware

Hardware required for the 500kV transmission line would include suspension clamps, dead-end assemblies, spacers, armor rods, vibration dampers, and other miscellaneous parts. All of the hardware used on the proposed line would be designed for corona-free operation throughout the maximum design voltages.

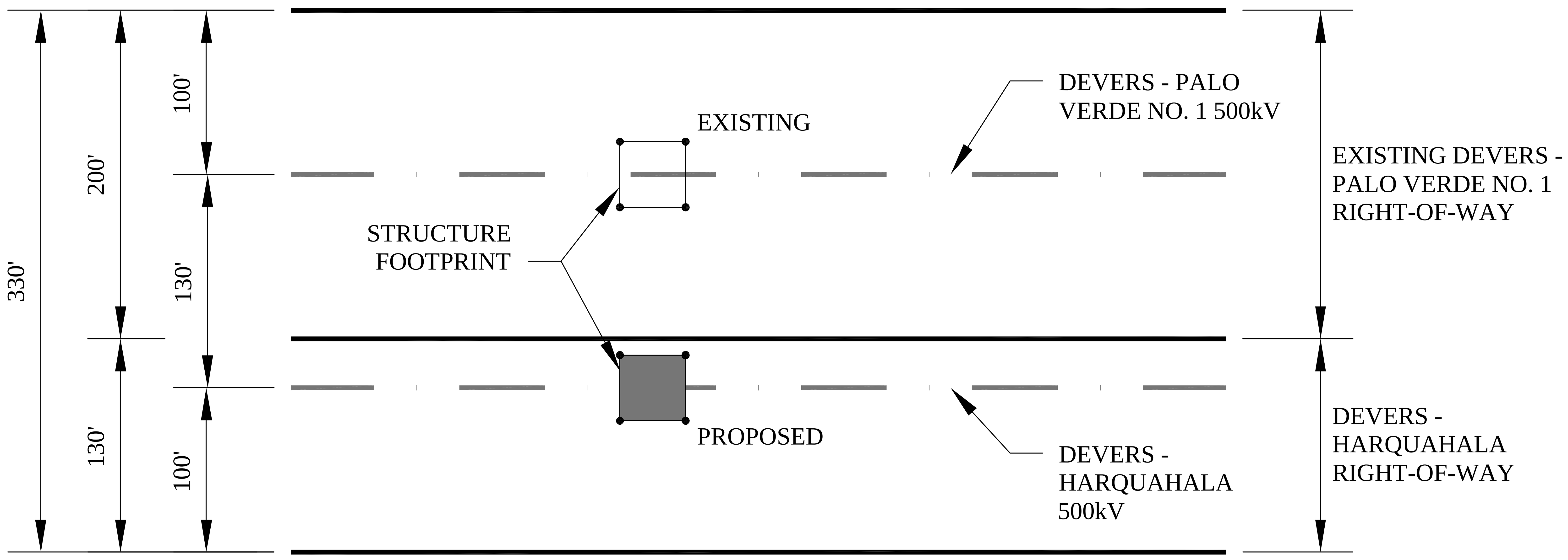
Conductor spacers would be installed along the lines to keep the two-phase subconductors from contacting each other. This avoids conductor damage due to impacts that would occur without these spacers. Armor rods would be installed at the points where the suspension clamps support the conductors. Armor rods increase the safety and reliability of the lines by minimizing the possibility of conductor damage resulting from flashovers of the insulator string and by protecting the conductor mechanically at the support point. Vibration dampers would be located on the conductor. This helps to prevent metal fatigue of the conductor strands by reducing the vibration caused by the wind.

3.3.1.5 Overhead Groundwires

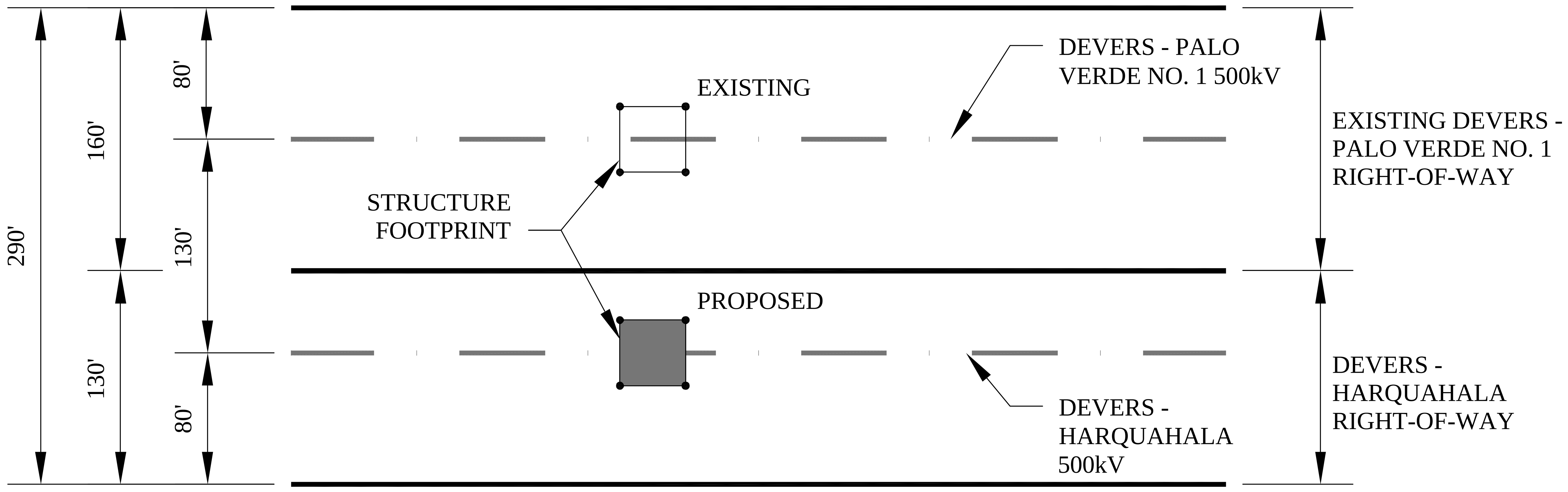
The overhead groundwires, located on the peaks of the transmission line structures, are used to intercept lightning that would otherwise strike the conductors. The 500kV structures would have two overhead groundwires, approximately 0.5 inch in diameter, supported on each of the two structure peaks. Any electric current from a lightning strike would be transferred to the ground through the groundwires and the structure. One of the overhead ground wires would contain optical fibers for communication and line protection purposes.

3.3.1.6 Right-of-Way

The majority of the right-of-way for the proposed Devers-Harquahala line is located adjacent to existing 500kV transmission line rights-of-way, including the DPV1 right-of-way for a distance of approximately 225 miles, and the Harquahala-Hassayampa 500kV transmission line right-of-way for a distance of 5 miles. The proposed 500kV transmission line would be constructed within a 130-foot-wide right-of-way on federal and state land, and within a minimum of 130-foot-wide right-of-way on private land and Indian Reservation land, where located adjacent to the existing DPV1 right-of-way (Figure 3-6). In 1989, the BLM granted a right-of-way to SCE for the DPV2 transmission line, which includes land managed by the BLM and USFWS as shown in Table 3-2. The proposed Devers-Harquahala 500kV line would be constructed within that right-of-way previously granted by the BLM.



TYPICAL RIGHT-OF-WAY ADJACENT TO DPV1 ON PRIVATE LAND, INDIAN RESERVATION, AND CALIFORNIA STATE LAND



TYPICAL RIGHT-OF-WAY ADJACENT TO DPV1 ON BLM AND ARIZONA STATE LAND

Figure 3-6
Typical Devers-Harquahala 500kV
Transmission Line Right-of-Way

The presence of utility or canal structures would require that the Devers-Harquahala 500kV right-of-way be separated from DPV1 or widened to accommodate those structures. In those locations where a separate right-of-way is required, the width would be 160 feet on federal or state land, and a minimum of 200 feet on private land. As shown on Figure 3-6, the centerline of the structures for the proposed Devers-Harquahala 500kV line would be separated by a minimum of 130 feet from the centerline of existing 500kV transmission line structures.

Exceptions to this configuration would be at the following locations:

- The edge of the DPV2 right-of-way would need to be expanded 75 feet by 320 feet for the construction of the series capacitor banks adjacent to the existing series capacitor banks in Arizona and California.

- The proposed Devers-Harquahala 500kV transmission line would be installed within the DPV1 right-of-way on existing double-circuit structures located in Copper Bottom Pass, a distance of approximately 3 miles, wherein no additional right-of-way would be required.

3.3.1.7 Access Roads

Construction of a new transmission line requires roads for construction crew, material, and equipment access to each tower site. After construction, these access roads are required to allow maintenance crews and repair vehicles access to each tower to inspect, maintain, and if necessary, repair or replace damaged towers, conductors, or insulators.

Existing streets and access roads would be used for construction access whenever possible. Existing access roads would be improved as required. No new main access roads are expected to be needed for the proposed route. Spur roads would be needed from the existing access roads to the new tower sites. Some existing access roads deviate from the right-of-way in order to avoid environmentally sensitive areas or rough land terrain features, such as steep hillside slopes.

Access and spur roads are generally 14-foot-wide unimproved roads. The main access road follows the transmission line right-of-way with spur roads branching off to each tower site. Spur roads usually have turnabout areas near the tower sites. All access road and spur road improvements, whether on or off the right-of-way, would satisfy all applicable permits and regulations.

3.3.2 West of Devers 230kV Transmission System Facilities

The proposed DPV2 project would require upgrades to SCE's existing 230kV transmission system west of Devers. The existing 230kV system west of Devers includes two 230kV circuits connecting Devers and Vista substations and two circuits connecting Devers with the San Bernardino Substation located at the San Bernardino Generating Station (Figure 3-7a). San Bernardino Junction is the term used to identify the intersection of the 230kV transmission line corridors that meet 3.4 miles south of the San Bernardino Substation.

The existing 230kV transmission system upgrade segment from Devers to San Bernardino Junction is approximately 40 miles. The segment from Vista Substation to San Bernardino Junction is approximately 4.8 miles. The segment from San Bernardino Substation to San Bernardino Junction is approximately 3.4 miles. The upgrades required for the 230kV system include the following, as shown on Figure 3-7a:

- Removal of an existing 40-mile, single-circuit wood H-frame 230kV line between Devers and San Bernardino Junction.
- Removal of an existing 40-mile, single-circuit lattice steel 230kV line between Devers and San Bernardino Junction.

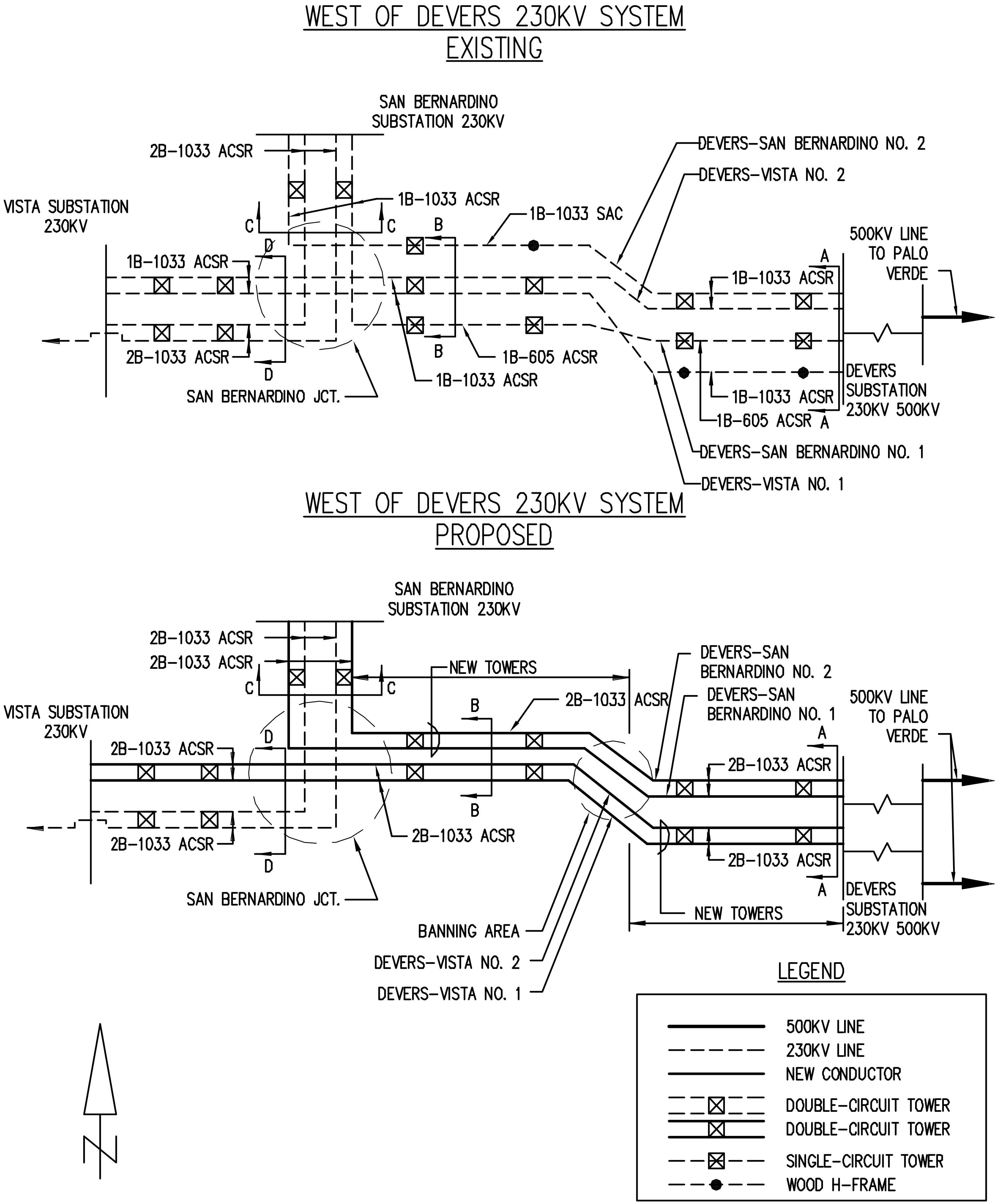


Figure 3-7a
West of Devers 230kV System, Existing and Proposed

- Construction of a new 40-mile, double-circuit 230kV line between Devers and San Bernardino Junction within the existing right-of-way.
- Reconductoring of and modification to the existing 40-mile, double-circuit 230kV lattice steel tower line between the Devers Substation and San Bernardino Junction.
- Reconductoring both circuits on an existing 4.8-mile, double-circuit 230kV lattice steel tower line between Vista Substation and San Bernardino Junction.
- Reconductoring one circuit on each of the two existing 3.4-mile, double-circuit 230kV lattice steel tower lines between San Bernardino Substation and San Bernardino Junction.

Each of the 230kV transmission lines is designed to operate at a nominal voltage of 230kV phase to phase. When the upgrades are completed, each 230kV circuit would be capable of transferring nominally 988 MW of power on a continual basis and 1,335 MW under emergency conditions.

A summary of the proposed west of Devers 230kV transmission facilities is provided in Table 3-6.

TABLE 3-6
PROPOSED WEST OF DEVERS 230kV UPGRADE SUMMARY

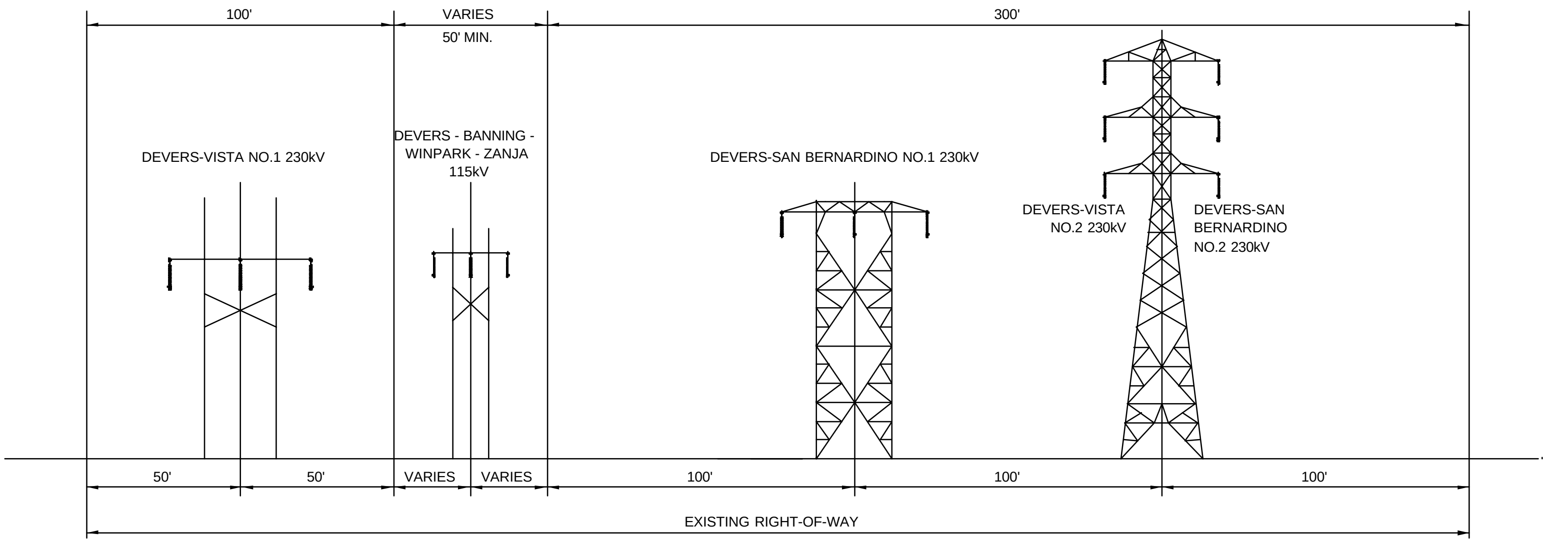
Length of segment from Devers Substation to San Bernardino Junction	40 miles
Length of segment from Vista Substation to San Bernardino Junction	4.8 miles
Length of segment from San Bernardino Substation to San Bernardino Junction	3.4 miles
Span length (spacing between towers)	1,400 to 1,500 feet 3.5 to 3.8 structures/mile (average)
Number of existing structures removed	398
Total number of new structures to be installed	161
Number of existing structures to be raised	23
Number of existing structures to be reinforced	37
Area affected by structure removal	9.7 acres
Area affected by new structure installation	46.7 acres
Area affected by pulling/splicing sites	27.5 acres
Affected area estimates based on the following factors: 0.06 acre per each structure removed - temporary 0.29 acre per new structure installed - permanent 14-foot-wide by 200 feet long spur roads at 25 percent of new tower sites - permanent 0.6 acre/mile pulling/splicing sites - temporary	

3.3.2.1 Structures

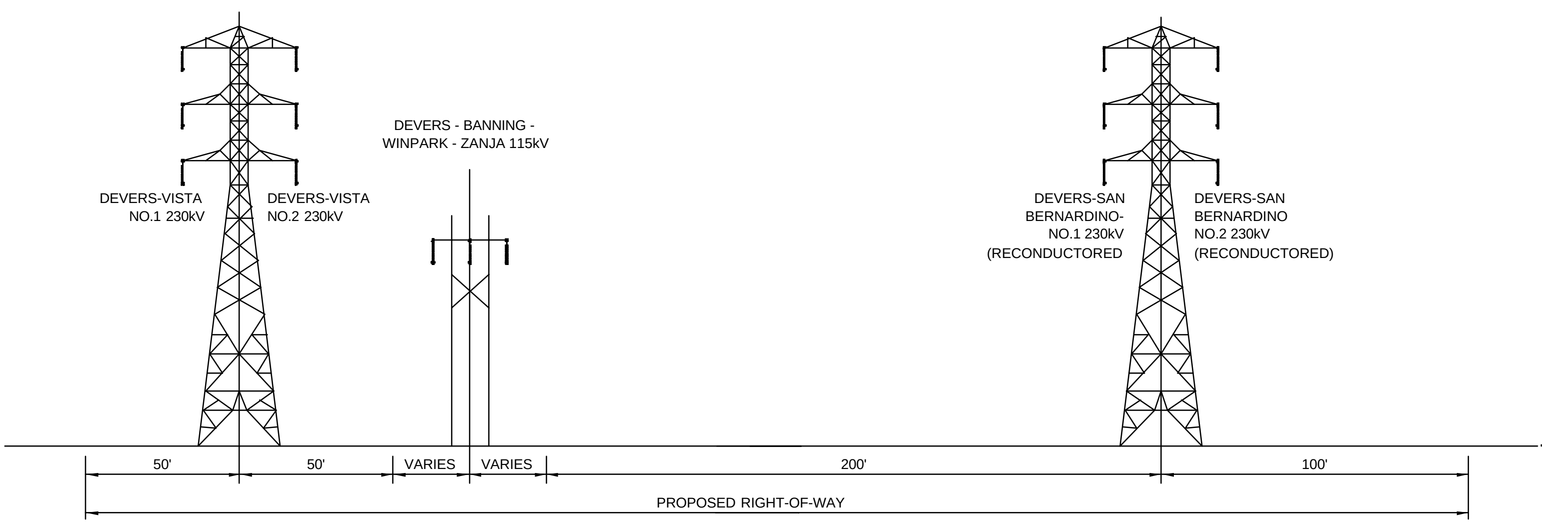
The proposed 230kV transmission system modifications include utilization of the existing double-circuit lattice steel towers between Devers and Vista substations, and between the San Bernardino Substation and San Bernardino Junction. The new double-circuit line between Devers and San Bernardino Junction would be constructed on lattice steel structures similar in size and appearance to the existing structures. It is estimated that 23 existing lattice steel towers may be raised with the use of a lattice steel extension set under the existing structures using new concrete foundations. Some new structures may be inter-set between existing towers, as required, to support new conductors.

The existing and proposed structure configuration and placements are shown on Figures 3-7b through 3-7e. Lattice towers, shown in Figure 3-8, would be constructed of galvanized steel angle members connected with bolts. Each tower would support two circuits consisting of three phases of conductors arranged in a vertical configuration.

The new double-circuit transmission line would be constructed using primarily tangent (suspension) type structures where the conductors approach and depart the structures in the same straight line. The remaining towers are heavier structures, which are either angle structures which permit limited changes in line direction, or deadend structures which are utilized for major changes in line direction. Although structure weights vary with their height and specific load carrying capabilities, the approximate weight of each type of structure is as follows:

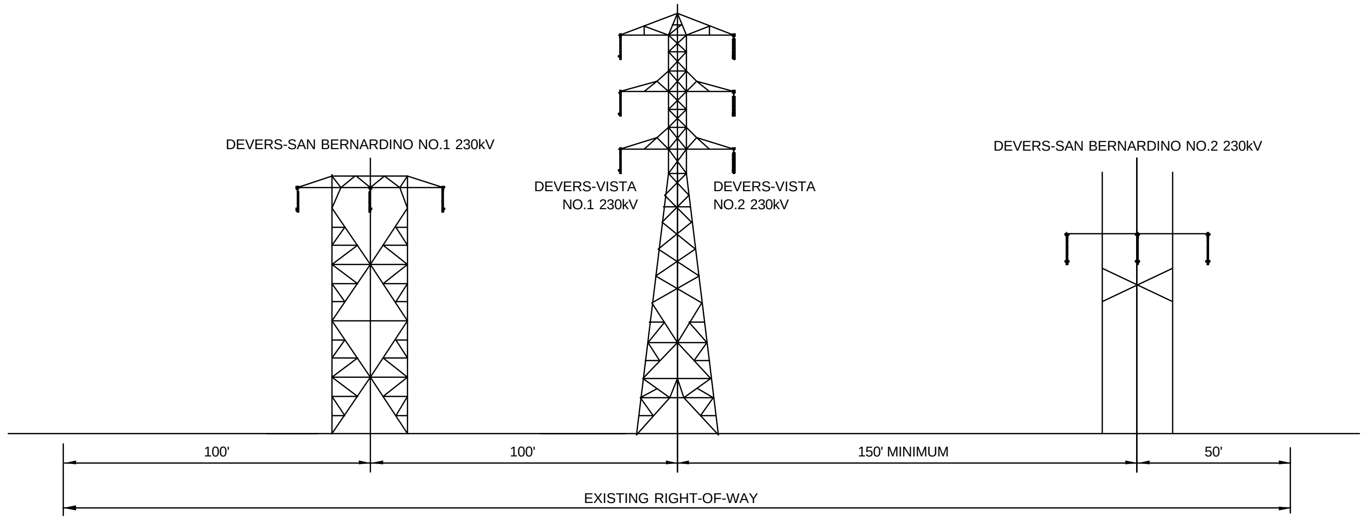


SECTION A-A
EXISTING RIGHT-OF-WAY LOOKING WEST
(Refer to Figure 3-7a)

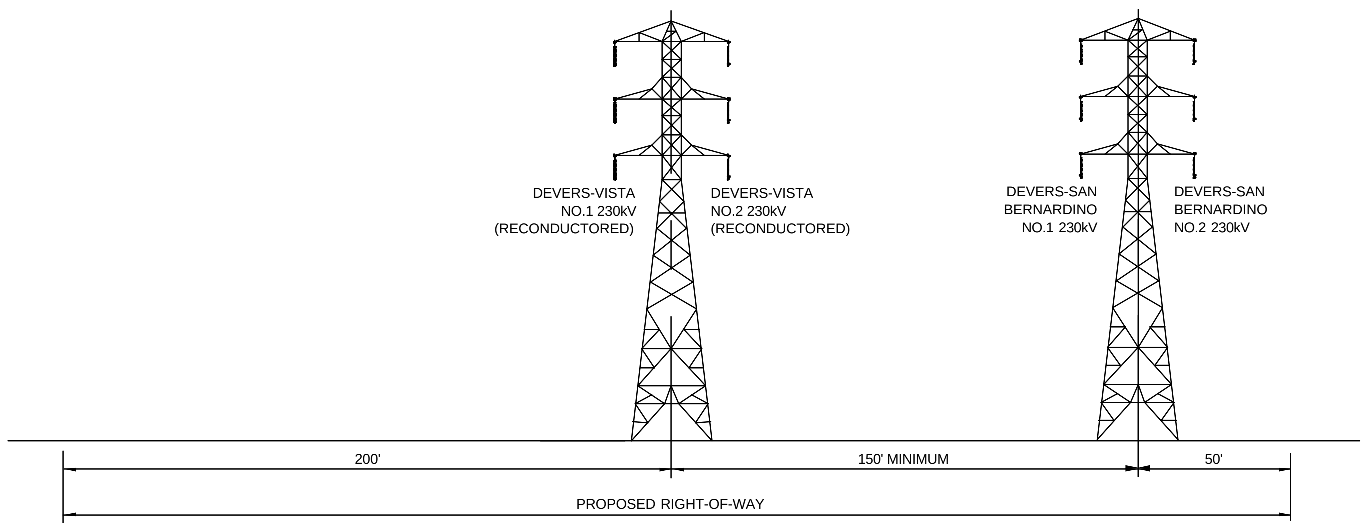


SECTION A-A
PROPOSED RIGHT-OF-WAY LOOKING WEST
(Refer to Figure 3-7a)

Figure 3-7b
Typical Sections

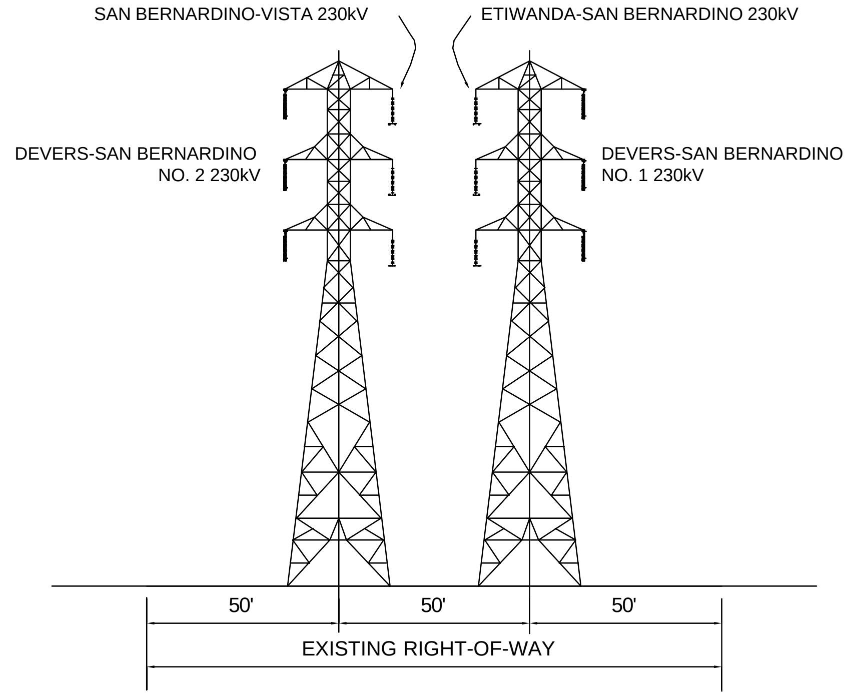


SECTION B-B
EXISTING RIGHT-OF-WAY LOOKING WEST
(Refer to Figure 3-7a)



SECTION B-B
PROPOSED RIGHT-OF-WAY LOOKING WEST
(Refer to Figure 3-7a)

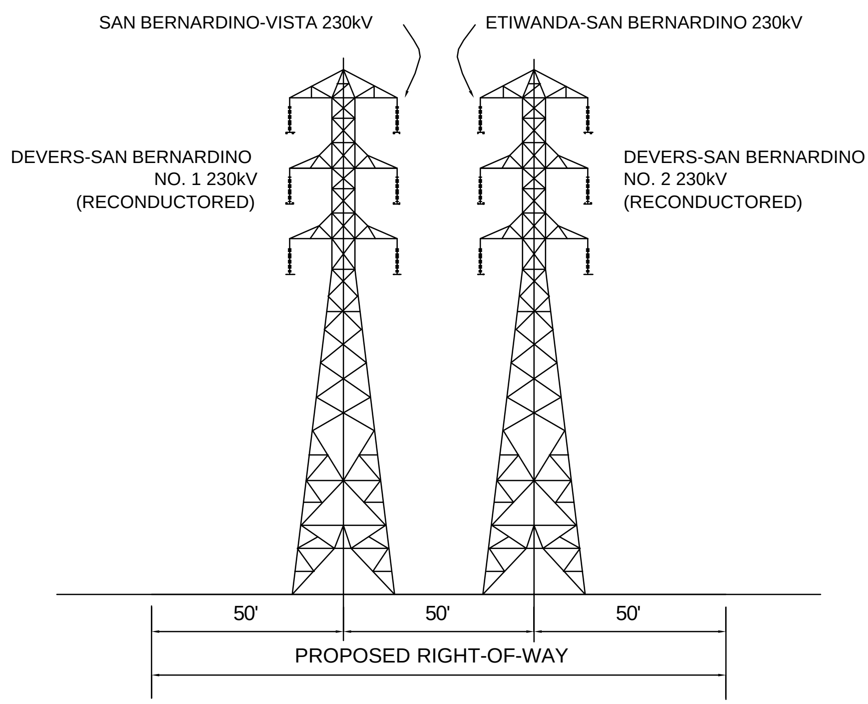
Figure 3-7c
Typical Sections



SECTION C-C

EXISTING RIGHT-OF-WAY LOOKING NORTH

(Refer to Figure 3-7a)



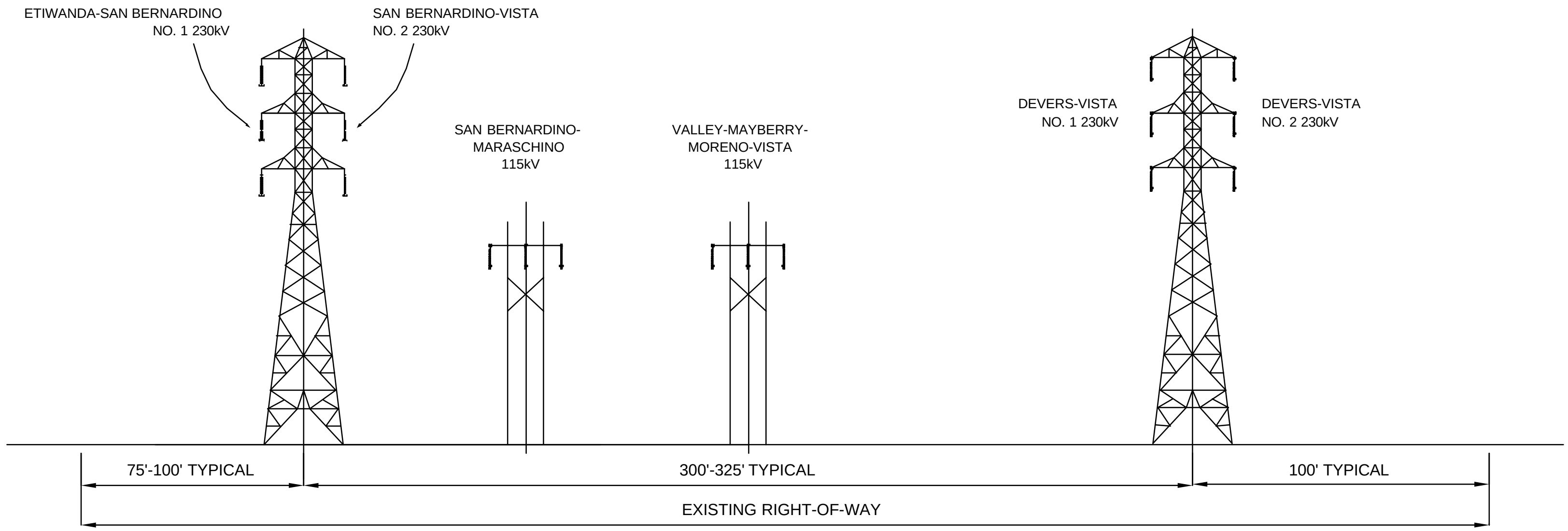
SECTION C-C

PROPOSED RIGHT-OF-WAY LOOKING NORTH

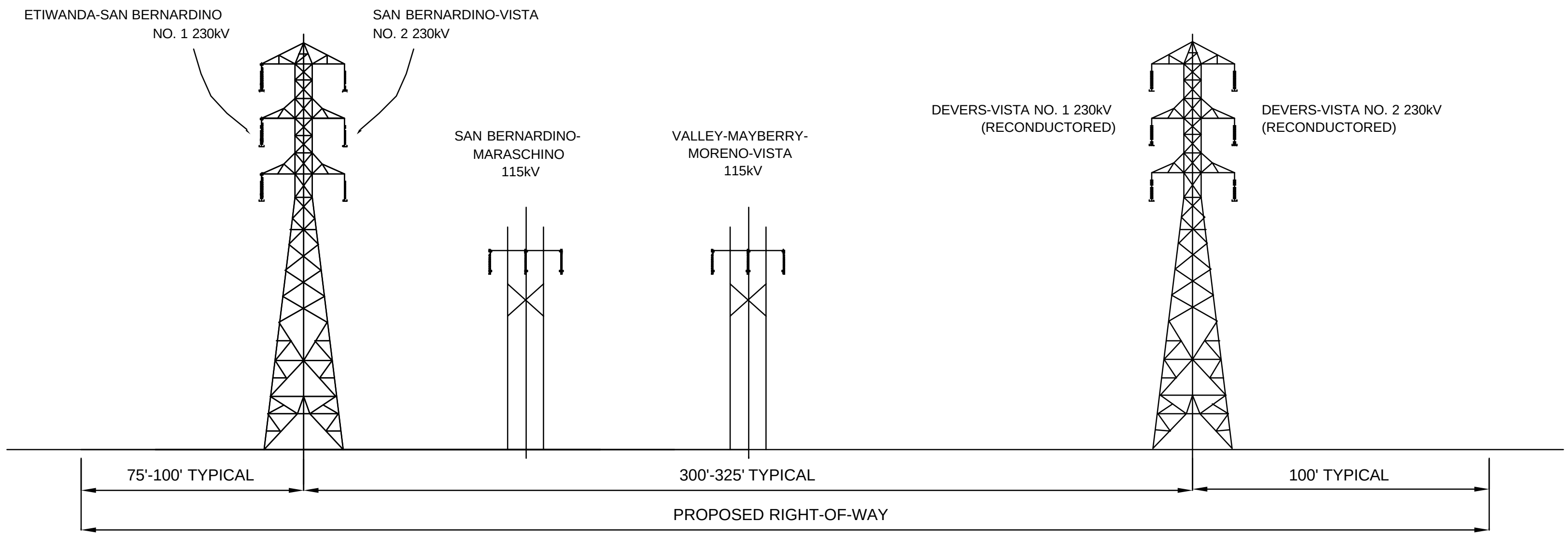
(Refer to Figure 3-7a)

Figure 3-7d

Typical Sections

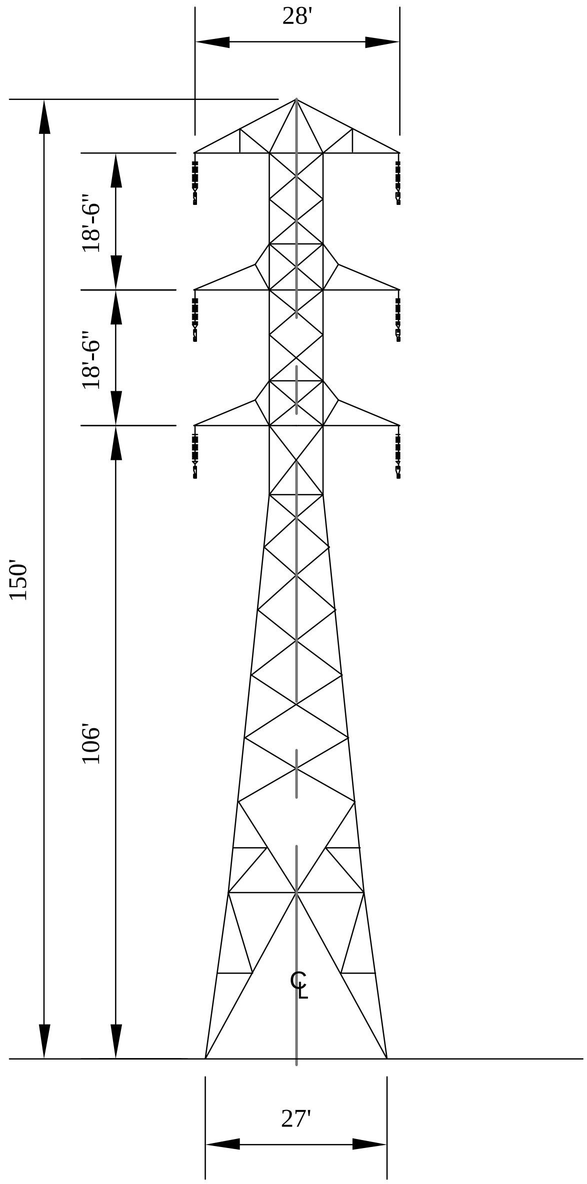


SECTION D-D
EXISTING RIGHT-OF-WAY LOOKING WEST
(Refer to Figure 3-7a)



SECTION D-D
PROPOSED RIGHT-OF-WAY LOOKING WEST
(Refer to Figure 3-7a)

Figure 3-7e
Typical Sections



Note:
Dimensions are approximate and may vary with site conditions.

Figure 3-8
Typical 230kV Double-Circuit
Lattice Steel Tower

Structure Type	Weight (pounds)
Four-legged double-circuit tangent	35,000
Four-legged double-circuit dead-end	65,000

The heights of the structures would vary depending upon the terrain, span length, and the presence of other facilities and features that the transmission line may cross, such as rivers, roads, highways, railroads, telephone lines, and other power transmission and distribution lines. The typical overall structure height would be approximately 150 feet. Where feasible, the new 230kV double-circuit towers would be aligned horizontally with existing 230kV towers.

The conductor height also would vary, depending upon the same factors described above for the structures. The minimum conductor height aboveground would be 30 feet between towers. The typical structure foundations would consist of four cast-in-place concrete piles. The size of piles required varies with the type of structure and soil conditions encountered at each tower site.

The average tower-to-tower spacing (span length) would be approximately 1,400 to 1,500 feet, or about 3.5 to 3.8 towers per mile of line. The exact quantity and placement of the structures depends upon the final detailed design of the transmission line, which is influenced by terrain, land use, environmental resource concerns, and economics.

3.3.2.2 Conductors

Each 230kV phase would be a two-conductor bundle with a spacing of 16 to 18 inches between centers. The typical conductor phase spacing for double-circuit towers is 18.5 feet vertically and 28 feet horizontally (see Figure 3-6). Each conductor is 1.244 inches in diameter, 1,033.5 kcmil ACSR. With this type of conductor, the load current flows through the aluminum strands that are formed in a helix around the core of steel strands. The steel strands provide the mechanical strength to support the aluminum strands.

3.3.2.3 Insulators

The tangent and angle insulator assemblies will consist of one or two, one-piece gray polymer insulators hung vertically from the tower crossarms in the form of an "I." These strings are used to suspend each conductor bundle (phase) from the structure while maintaining the electrical clearance between these conductors, ground, and the structure. The "I" string swings with the conductor during winds. Each insulator has an approximate height of 84 inches and a diameter of about 6 inches. On dead-end structures, the insulators are arranged in a barrel configuration consisting of two polymer insulators.

3.3.2.4 Hardware

Hardware required for the 230kV transmission lines would include suspension clamps, dead-end assemblies, spacers, armor rods, vibration dampers, and other miscellaneous parts. All of the hardware used on the proposed line would be designed for corona-free operation throughout the maximum design voltages.

Conductor spacers would be located along the lines to keep the two subconductors from contacting each other. This avoids conductor damage due to impacts that would occur without these spacers. Armor rods would be installed at the points where the suspension clamp supports the conductors. These armor rods increase the safety and reliability of the lines by minimizing the possibility of conductor damage resulting from flashovers of the insulator string and by protecting the conductor mechanically at the support point. Vibration dampers would be located on the conductor. This helps to prevent metal fatigue of the conductor strands by reducing the vibration caused by the wind.

3.3.2.5 Overhead Groundwires

Overhead groundwire, located on the peak of the transmission line structures, is used to intercept direct lightning strikes to the conductors. The 230kV structures would typically have a single groundwire at the top of the structure, approximately ½ inch in diameter. Any electric current from a lightning strike would be transferred to the ground through the groundwires and the structure. The overhead groundwire for the Devers-Vista No. 2 230kV line would contain optical fibers for communication and line protection purposes.

3.3.2.6 Right-of-Way

The new double-circuit 230kV line between Devers Substation and San Bernardino Junction would be constructed within the existing right-of-way along approximately the same centerline as the existing single-circuit H-frame 230kV transmission line and the existing single-circuit lattice steel 230kV transmission line, which are to be removed.

No additional right-of-way would be needed where reconductoring is proposed between San Bernardino Substation, Vista Substation, and San Bernardino Junction.

3.3.2.7 Access Roads

The west of Devers 230kV transmission system would utilize existing access roads wherever possible. Installation of new structures at some locations may require the construction of spur roads from existing roads to new tower sites.

3.4 RELATED FACILITIES

3.4.1 Substations and Compensation Banks

Substations may perform the following functions: (1) control, (2) electrical compensation, and/or (3) transformation. They may contain circuit breakers, disconnect switches, shunt reactors, series capacitors, transformers, and static VAR compensators, as well as related control, metering, and telecommunication facilities. These functions are established to optimize performance, reliability, and economics of the transmission system.

The control function consists of switching transmission lines, transformers, capacitors, reactors, static VAR compensators, or series reactors via circuit breakers in order to maintain system performance and reliability.

The compensation function is performed by shunt reactors and series capacitors. Shunt reactors limit the voltage rise along long transmission lines, thereby maintaining voltage regulation. Series capacitors compensate for the inherent inductance in long transmission lines and provide more electrical transmission capacity for a given line.

The transformation function consists of stepping down or up the voltage level so that power may either be transmitted or distributed.

3.4.1.1 Devers-Harquahala 500kV Transmission Line

The proposed 500kV transmission line would terminate at two existing facilities—Devers Substation in California and Harquahala Switchyard in Arizona. In addition, the line would connect to two new series capacitor banks and two new shunt reactor banks. The new series capacitor banks would be located adjacent to the existing DPV1 series capacitor banks located in

Arizona and California. One new shunt reactor bank would be located at Devers Substation. The second shunt reactor bank would be located on a new site located at the Harquahala Switchyard.

Devers Substation

This facility is a 500/230/115kV substation presently owned, operated, and maintained by SCE. The proposed modifications would be constructed within the existing fenced Devers Substation.

New equipment would be installed in the existing switchyard. This requires the installation of a new 133-foot-high by 90-foot-wide dead-end structure, circuit breakers and disconnect switches. Disconnect switches associated with the new Devers-Harquahala transmission line would be installed adjacent to and northwest of the existing DPV1 500kV shunt reactors, which would be assigned to the Devers-Harquahala 500kV line.

A 500kV shunt line reactor bank and associated disconnect switches would be installed within Devers Substation. A 500kV Static VAR Compensation (SVC) would be installed north of the 500kV switchyard within the existing Devers Substation. The SVC would terminate into the 500kV switchrack.

Approximately 2 acres would be required temporarily for laydown and construction purposes within the existing Devers Substation.

Series Capacitor Banks

Two new 500kV series capacitor banks would be installed for the proposed Devers-Harquahala transmission line. Each of the new series capacitor banks would be constructed adjacent to an existing DPV1 series capacitor bank, one in Arizona and one in California.

Each of the two series capacitor banks would consist of the following major components:

- Series capacitors
- Dead-end structures – transition structures located on either side of the series capacitor banks where the transmission line conductors enter the series capacitor sites
- Telecommunication equipment
- AC and DC power to operate facility equipment
- Grounding grid – placed beneath the surface of the facility as a safety measure
- Mechanical-electrical equipment room

Series Capacitor Bank – California Site

The proposed California series capacitor site would be located approximately 64 miles to the east of the Devers Substation in the Chuckwalla Valley on BLM land in Section 6, Township 6 South, Range 14 East (Map 3-2b). The new site would be north of and adjacent to the existing DPV1 series capacitor bank between towers M173-T2 and M173-T3. The site is approximately 0.4 mile south of I-10 and is accessed from the nearby Red Cloud Mine Road. The new series capacitor bank would occupy approximately 2 acres inside the fenced site. In addition, a 1-acre fenced material laydown area for storage and staging would be also required for temporary use.

Series Capacitor Bank – Arizona Site

The proposed Arizona series capacitor site would be located approximately 55 miles west of the Harquahala Switchyard on the Ranegras Plain on BLM land in Section 18, Township 2 North, Range 14 West (Map 3-2a). The new site would be south of and adjacent to the existing DPV1 series capacitor bank between towers M61-T3 and M61-T4. The site is approximately 7 miles south of I-10 and is accessed from the nearby El Paso Natural Gas Pipeline road. The new series capacitor bank would occupy approximately 2 acres inside the fenced site. In addition, a 1-acre fenced material laydown area for storage and staging would be required for temporary use.

DPV1 Series Capacitor Interconnection Alternative

In order to comply with the CAISO directive dated June 2004 to increase the electrical current capability of the existing series capacitor banks on the DPV1 500kV transmission line, SCE may need to replace the existing DPV1 series capacitor banks by June 2006.

To expedite construction of the new DPV1 series capacitors, the CAISO recommended that each of the DPV1 series capacitor banks be installed in the proposed Devers-Harquahala 500kV transmission line right-of-way, adjacent to the existing DPV1 series capacitor banks. Construction of the new DPV1 series capacitors on the Devers-Harquahala right-of-way would allow for the existing power transfer capacity of the DPV1 line to continue during construction, as well as provide safer construction conditions.

During construction of the Devers-Harquahala line, the new DPV2 series capacitor banks would be constructed in the original DPV1 locations in Arizona and California. The new facilities would then be connected to the DPV1 transmission line, and the previously upgraded facilities would be connected to the Devers-Harquahala transmission line.

In the near future, SCE may file an application with the BLM to amend the right-of-way grant to allow SCE to construct the DPV1 series capacitor banks on the proposed Devers-Harquahala right-of-way. If this option is not pursued or if the application is not approved by BLM, SCE would construct the DPV2 series capacitor banks as described in the previous section.

Harquahala Switchyard

This existing facility is a 500kV switching station presently owned, operated, and maintained by the New Harquahala, LLC (HGC). SCE would purchase the 500kV switchyard as part of the DPV2 project.

There are presently four 500kV lines terminating in the Harquahala Switchyard—the Harquahala-Hassayampa 500kV transmission line and three lines to the generator transformers of each unit at Harquahala.

Equipment would be installed at Harquahala in a double-breaker configuration. A new 145-foot-high by 100-foot-wide line dead-end structure, circuit breakers, and disconnect switches would be installed in the existing switchyard. All equipment necessary to provide Supervisory Control and Data Acquisition (SCADA) would be installed. Most of the equipment required for this function would be contained in a new telecommunications room.

Approximately 2 acres adjacent to the eastern side of the Harquahala property would be required temporarily for laydown and construction purposes.

500kV Shunt Reactor

A 500kV shunt line reactor bank and associated disconnect switches would be installed for the proposed Devers-Harquahala 500kV transmission line. The preferred location for the shunt reactor is immediately adjacent and north of the Harquahala Switchyard within the Harquahala Generating Station property. An alternative location would be east of the switchyard. The shunt reactor would be installed on approximately two acres of property to be acquired for this purpose. Temporary laydown and construction would require approximately one acre.

Valley Substation

A 500kV SVC would be installed and terminate at the 500kV switchyard inside the existing Valley Substation property line. The western substation fence would be relocated to the edge of the western property line. An area of approximately 2 acres within the substation property would be used for temporary laydown and construction.

3.4.1.2 West of Devers 230kV Transmission System Upgrade – Other Modifications

Various equipment that would be needed for the 230kV upgrade project would be installed within the existing fenced areas at Devers, Vista, Lewis (Orange County), and San Bernardino substations. The SONGS Switchyard (San Diego County) would include conductor replacements, wave traps, disconnect switches, and line relays.

3.4.1.3 Special Protection Scheme

A Special Protection System (SPS) is proposed to mitigate post-transient voltage violations of system planning criteria for the simultaneous loss of DPV1 and Devers-Harquahala, or DPV1 and Harquahala-Hassayampa 500kV lines. This SPS will be designed to drop approximately 900 MW of generation in the PVNGS area and approximately 900 MW of SCE load.

Most of the relays needed to support the special protection scheme would be installed within the existing relay room or mechanical electrical equipment room at each substation site. These may include Devers, Padua, and Vista substations in California, and the PVNGS, Hassayampa, and Harquahala switchyards in Arizona. Other locations in Arizona may require new relays or relay upgrades and/or new circuit breakers or circuit breaker upgrades.

3.4.2 Telecommunications Systems

The proposed telecommunications system would consist of both existing and new SCE facilities. The new facilities are required to increase the reliability of the intertie of microwave systems between SCE and APS, as well as provide primary and backup telecommunications services for the new Devers-Harquahala 500kV transmission line. These services include protective relaying, special protection scheme, SCADA, system dispatching, data, and telephone.

3.4.2.1 Devers-Harquahala 500kV Segment

The primary telecommunications system for the proposed Devers-Harquahala 500kV segment would involve construction of a new telecommunications facility at Harquahala Mountain in Arizona. This new facility would be constructed adjacent to an existing facility owned and operated by CAWCD. Three new microwave systems would be installed at this site: (1) Harquahala Mountain-Smith Peak, (2) Harquahala Mountain-Arizona Series Capacitor Bank, and (3) Harquahala Mountain-Harquahala Substation. Upgrades to APS' existing microwave path between Black Peak and Smith Peak also would be required to increase system capacity. The overall telecommunication system capacity would be shared between SCE and APS through a contractual agreement.

The backup telecommunications system for the proposed Devers-Harquahala 500kV segment would involve installation of a new Optical Ground Wire (OPGW) on the Devers-Harquahala transmission line structures. A new Blythe Optical Repeater facility would be constructed approximately 3 miles west of Blythe within the right-of-way of the new Devers-Harquahala transmission line. Three existing SCE facilities also would be used as optical repeater sites: Mirage Substation, California Series Capacitor Bank, and Arizona Series Capacitor Bank. In addition, approximately 3 miles of existing ground/static wire would be replaced with OPGW on the double-circuit tower line at Copper Bottom Pass.

Harquahala Mountain – A new telecommunications facility would be constructed at Harquahala Mountain. Harquahala Mountain is located on BLM land, 1 mile northwest of Salome in La Paz County, Arizona, in Section 31, Township 6 North, Range 10 West. There is an existing telecommunications facility owned, maintained, and operated by the CAP at this site. This facility was built in the early 1980s by the USBR and is surrounded by a wilderness area. This site is powered by solar since there is no available commercial power. The new telecommunications facility would be constructed adjacent to the existing CAP facility. The new facility would include:

- one 12-foot by 36-foot prefabricated building
- one 110-foot self-supporting tubular steel tower
- one emergency generator installed within the prefab building
- two 500-gallon fuel tanks
- one 30 kilowatt solar panel system
- two air conditioning systems
- one direct current power system
- three microwave systems
- one fence

The site would be unmanned during operation. A typical telecommunications facility is shown in Figure 3-9.

There is an existing 10-mile dirt road leading to Harquahala Mountain. A temporary construction area adjacent to the new facility would be established prior to the actual construction for vehicle parking and material storage. This area will be fenced and gate locked. It is estimated that the temporary construction area would occupy approximately 1 acre and the permanent site would occupy approximately ½ acre.

Blythe Optical Repeater Site – The new Blythe Optical Repeater facility would be constructed within the proposed Devers-Harquahala 500kV right-of-way approximately 3 miles southwest of

Blythe adjacent to SCE's DPV1 right-of-way and CA 78 (Neighbours Boulevard). The site is located in Section 30, Township 7 South, Range 23 East, near Ripley, California. The new facility would include:

- one 12-foot by 36-foot prefabricated building
- one emergency generator installed within the prefab building
- one 500-gallon fuel tank
- 120/240-volt alternating current service
- conduits to the OPGW termination
- two air conditioning systems
- one direct current power system
- one Synchronous Optical Network (SONET) system
- one fence

The site would be unmanned during operation.

A temporary construction area adjacent to the new facility would be established prior to the actual construction for vehicle parking and material storage. This area would be fenced and gate locked. It is estimated that the temporary disturbed area would be 1 acre, and the permanent site would occupy approximately ¼ acre.

<u>Devers Substation</u> – Installation of SONET and channel equipment would be required within the existing Devers Substation to support the primary and backup protection circuits. In addition, a 5-inch conduit would be installed from the telecommunications room to the OPGW termination point on the Devers-Harquahala 500kV transmission tower.

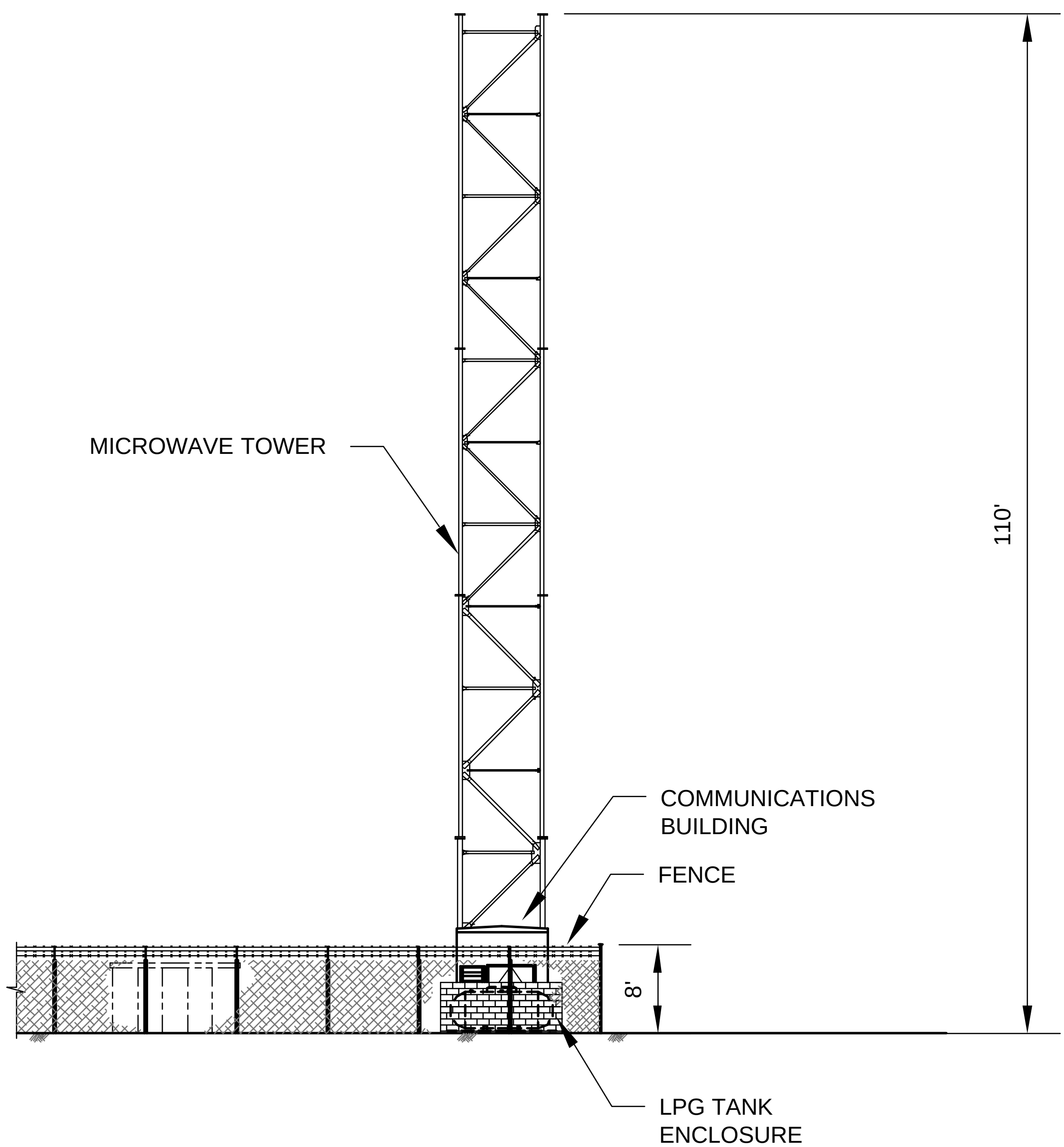


Figure 3-9
Typical Telecommunications Facility

Mirage Substation – Installation of SONET and channel equipment would be required within the existing Mirage Substation to support the backup protection circuits. In addition, a 5-inch conduit would be installed from the telecommunications room to the substation fence. A new fiber optic cable would be installed between the substation and the Devers-Harquahala transmission tower where the OPGW splices would take place.

California Series Capacitor Bank – Installation of SONET and channel equipment would be required within the existing California Series Capacitor Bank to support the backup protection circuits. In addition, a 5-inch conduit would be installed from the telecommunications room to the OPGW termination point on the Devers-Harquahala 500kV transmission tower.

Black Peak Communication Site (APS) – An upgrade to APS' existing microwave equipment and antenna would be required with the existing Black Peak Communication Site to provide additional bandwidth to support the primary protection circuits. The overall system capacity would be shared between SCE and APS through a contractual agreement.

Smith Peak Communication Site (APS) – An upgrade to APS' existing microwave equipment and antenna would be required within the existing Smith Peak Communication Site to provide additional bandwidth to support the primary protection circuits. The overall system capacity would be shared between SCE and APS through a contractual agreement.

Arizona Series Capacitor Bank – Installation of microwave and SONET equipment would be required within the existing Arizona Series Capacitor Bank to support the backup protection circuits. A 5-inch conduit would be installed from the telecommunications room to the OPGW termination point on the Devers-Harquahala 500kV transmission tower. In addition, an upgrade to the existing microwave antenna tower would be required to support two new 10-foot-high performance microwave antennas.

Harquahala Substation – A new telecommunications facility and microwave tower would be constructed within the existing Harquahala Switchyard. Installation of microwave, SONET, and channel equipment would be required to support the primary and backup protection circuits. One new 5-inch conduit would be installed from the new telecommunications room to the OPGW termination point on the Devers-Harquahala 500kV transmission tower. In addition, the existing conduit containing the fiber cable leading to the Harquahala-Hassayampa 500kV tower would be extended from the existing 500kV mechanical-electrical equipment room to the new telecommunications room.

3.4.2.2 Harquahala-West Subalternate Route

The proposed telecommunications systems for the Harquahala-West Subalternate Route would be identical to the proposed Devers-Harquahala 500kV route.

3.4.2.3 Palo Verde Subalternate Route

For the Palo Verde Subalternate Route, SCE would lease bandwidth from APS and Salt River Project (SRP) between Black Peak Communication Site and PVNGS to support the primary protection circuits.

3.4.2.4 Midpoint Substation Preferred and Alternative Sites

For the Midpoint Substation, a new telecommunications facility would be constructed within the substation to provide microwave and fiber optic communications for protective relaying and special protection scheme requirements. One 12-foot by 36-foot prefabricated building and one 110-foot self-supporting tubular steel tower would be installed. Three new microwave paths and two fiber optic systems also would be installed at this site. The proposed microwave paths are Midpoint-Buck Boulevard Substation (Blythe Energy), Midpoint-Chuckwalla Communication

Site, and Midpoint-Cunningham Communication Site. The proposed fiber optic systems are Midpoint-Buck Boulevard Substation (Blythe Energy) and Midpoint-Devers-Harquahala.

Preferred Site – Installation of microwave, SONET, and channel equipment would be required at this site to provide the primary and backup protection circuits. Conduits would be required between the telecommunications room and the 230kV mechanical electrical equipment room , 500kV mechanical electrical equipment room, OPGW termination point on the Devers-Harquahala 500kV transmission tower, and OPGW termination point on the Buck Boulevard-Midpoint 230kV transmission tower.

Chuckwalla Communication Site – Installation of microwave equipment would be required within the existing Chuckwalla Communication Site to support the primary protection circuits. In addition, two new 10-foot-high performance microwave antennas would be installed on the existing microwave tower pointing towards Midpoint Substation.

Cunningham Communication Site (APS) – Installation of microwave equipment would be required within the existing APS Cunningham Communication Site to support the primary protection circuits. In addition, two new 10-foot-high performance microwave antennas would be installed on the existing microwave tower pointing towards Midpoint Substation.

McCoy Communication Site – If Midpoint Substation is constructed in an area where microwave line-of-sight cannot be achieved between Midpoint-Chuckwalla Communication Site, McCoy Mountain Communication Site would be used as an intermediate microwave relay station.

Alternative Site 1, Mesa Verde – Installation of microwave, SONET, and channel equipment would be required at this site to provide the primary and backup protection circuits. Conduits would be required between the telecommunications room and the following: 500kV and 230kV mechanical electrical equipment rooms, OPGW termination point on the Devers-Harquahala 500kV transmission tower, and OPGW termination point on the Buck Boulevard-Midpoint 230kV transmission tower.

Chuckwalla Communication Site – Installation of microwave equipment would be required within the existing Chuckwalla Communication Site to support the primary protection circuits. In addition, two new 10-foot-high performance microwave antennas would be installed on the existing microwave tower pointing to Midpoint Substation.

Cunningham Communication Site (APS) – Installation of microwave equipment would be required within the existing APS Cunningham Communication Site to support the primary protection circuits. In addition, two new 10-foot-high performance microwave antennas would be installed on the existing microwave tower pointing to Midpoint Substation.

Alternative Site 2, Wiley Well – Installation of microwave, SONET, and channel equipment would be required at this site to provide the primary and backup protection circuits. Conduits would be required between the telecommunications room and the following: 500kV and 230kV mechanical electrical equipment rooms, OPGW termination point on the Devers-Harquahala 500kV transmission tower, and the Buck Boulevard-Midpoint 230kV transmission tower.

Chuckwalla Communication Site – Installation of microwave equipment would be required within the existing Chuckwalla Communication Site to support the primary protection circuits. In addition, two new 10-foot-high performance microwave antennas would be installed on the existing microwave tower pointing to Midpoint Substation.

Cunningham Communication Site (APS) – Installation of microwave equipment would be required within the existing APS Cunningham Communication Site to support the primary protection circuits. In addition, two new 10-foot-high performance microwave antennas would be installed on the existing microwave tower pointing to Midpoint Substation.

3.4.2.5 West of Devers 230kV Upgrade

Currently, the fiber optic cable carrying SONET System 47 is wrapped around the ground wire of the existing Devers-Vista No. 2 230kV transmission towers. The proposed upgrade to the double-circuit 230kV transmission line between Devers and Vista would require replacement of the existing fiber wrap cable with a new OPGW on the proposed double-circuit towers. This would require installation of a temporary fiber cable on the Valley-Mayberry-Moreno-Vista 115kV towers between Vista Substation and San Bernardino Junction. This temporary fiber cable is required to re-route existing traffic on the fiber-wrap cable while the line is being reconductored between Vista Substation and San Bernardino Junction. New fiber optic splice cases at San Bernardino Junction also would be installed for splicing purposes.

In order to provide redundant protective relaying circuits for the Devers-San Bernardino 230kV line, a new OPGW would be installed on the Devers-San Bernardino double-circuit towers between San Bernardino Substation and San Bernardino Junction. The primary protection circuits would be carried via existing microwave systems and the backup protection circuits would be carried via SONET System 47.

3.5 CONSTRUCTION

3.5.1 Schedule

The proposed operational date for the DPV2 transmission line project is June 2009. Work activities will commence upon approval by the CPUC and other permitting agencies. Construction on the Devers-Harquahala 500kV line segment would commence March 2007 and take approximately 24 to 28 months to complete. Construction within the 230kV segment west of Devers would commence after June 2006 and be completed in June 2009. The time between completion of construction and the operation date would be used to complete inspection and testing of the project.

3.5.2 Labor Force Requirements

3.5.2.1 Devers-Harquahala 500kV Segment

The construction of the proposed 500kV line is presently planned to be performed by contract personnel with SCE responsible for administration and inspection. The estimated number of personnel and amount of equipment required for each construction phase is shown in Table 3-7. It is estimated that a total of 205 workers (full-time equivalent personnel) will be needed to construct the proposed 500kV line.

TABLE 3-7
PROPOSED DEVERS-HARQUAHALA 500kV TRANSMISSION LINE LABOR FORCE AND EQUIPMENT REQUIREMENTS

Construction Element	Personnel	Equipment	Duration (months)
Management/Office	9	6 – office trailers 9 – pickup trucks	24
Inspection and Environmental	14	14 – pickup trucks	24
Support	9	6 – mechanic trucks 2 – lube service trucks 6 – tool trailers 2 – fire suppression trucks	24
Material Processing	12	8 – forklifts 8 – tractor trucks with trailers	24
Road Crew	12	3 – road graders 3 – dozers 2 – grad-all excavators 3 – water trucks 2 – 10-yard dump trucks 6 – pickup trucks 1- boring rig	24
Foundation Crews	20	5 – pickup trucks 4 – 2½ ton flatbed trucks 4 – backhoes 4 – drill rigs 4 – boom trucks 2 – off-road loaders 2 – tractor truck with trailers 4 – water trucks 1 – trencher	24
Tower Assembly/Erection	75	9 – pickup trucks 9 – 2½ ton flatbed trucks 9 – truck cranes 9 – crew cab pickup trucks 9 – air compressors 4 – large RT cranes	18

TABLE 3-7 PROPOSED DEVERS-HARQUAHALA 500kV TRANSMISSION LINE LABOR FORCE AND EQUIPMENT REQUIREMENTS			
Construction Element	**Personnel**	**Equipment**	**Duration (months)**
Conductor Operations	54	8 – pickups 8 – crew cab pickup trucks 2 – pole truck and trailers 12 – truck cranes 6 – bucket trucks 6 – line trucks 4 – conductor tensioners 2 – static tensioners 2 – sockline pullers 2 – conductor pullers 6 – sagging units (skidder)s 18 – reel stand trailers 9 – 6x6 truck tractors 2 – helicopters 10 – water trucks	18
TOTAL	**205**		**24**

3.5.2.2 West of Devers 230kV Upgrade

The majority of the 230kV system construction west of Devers Substation is presently planned to be performed by contract personnel with SCE responsible for administration and inspection. Certain portions of the work may be reserved for SCE's construction personnel. The number of personnel and amount of equipment required for each construction phase is shown in Table 3-8. It is estimated that a total of 177 workers would be required for the west of Devers upgrade.

TABLE 3-8 WEST OF DEVERS 230kV UPGRADE LABOR FORCE AND EQUIPMENT REQUIREMENTS			
Construction Element	**Personnel**	**Equipment**	**Duration (month)**
Management	3	2 – office trailers 3 – pickup trucks	17
Inspection and Environmental	3	3 – pickup trucks	16
Support	3	2 – mechanic trucks 1 – lube service truck 2 – tool trailers 1 – fire suppression truck	16
Material Processing	6	2 – forklifts 2 – tractor trucks with trailers	16

TABLE 3-8 WEST OF DEVERS 230kV UPGRADE LABOR FORCE AND EQUIPMENT REQUIREMENTS			
Construction Element	**Personnel**	**Equipment**	**Duration (month)**
Road Crew	4	1 – road grader 1 – dozer 1 – grade-all excavator 3 – water trucks 2 – 10-yard dump trucks 2 – pickup trucks 1 – boring rig 1 – backhoe	16
Foundation Crews	23	5 – pickup trucks 4 – 2½ ton flatbed trucks 2 – backhoes 2 – drill rigs 4 – boom trucks 1 – off-road loader 1 – tractor truck with trailer 2 – water trucks	12
Tower Assembly/Erection	64	9 – pickup trucks 9 – 2½ ton flatbed trucks 9 – truck cranes 9 – crew cab pickup trucks 9 – air compressors 1 – large crane	9
Conductor Operations	71	12 – pickups 10 – crew cab pickup trucks 2 – pole trucks and trailers 3 – truck cranes 2 – bucket trucks 2 – line trucks 1 – conductor tensioner 1 – static tensioner 1 – sockline puller 1 – conductor puller 1 – bullwheel puller 2 – sagging units 6 – reel stand trailers 3 – 6x6 truck tractors 1 – helicopter 1 – water truck	16
TOTAL	**177**		**24**
NOTE: Equipment required for line dismantle tasks are embedded within each construction element.			

3.5.3 Facility Siting

3.5.3.1 Devers-Harquahala 500kV Segment

Once the proposed 500kV transmission line route has been approved, a detailed survey would be conducted, additional right-of-way would be acquired, and detailed engineering designs, based on this survey, would be started.

A control centerline would be established first, based on field survey measurements. Control monuments, consisting of 2-inch-diameter iron pipes sealed with a stamped brass cap would be set at maximum intervals of approximately 2 miles. Visual reference points, located both parallel and perpendicular to the control line, would be established so that photogrammetric profiles of the area's topography could be compiled. Upon completion, approximate tower locations would be spotted on the profiles according to engineering design criteria.

Once approximate tower locations have been selected, exact positions would be field surveyed and staked, and a small pipe would be placed at the center of each proposed tower site. The top of the pipe would become the centerline hub elevation, which would be used as the basis for all calculations involving structure height.

Survey crews would locate spur road centerlines and grades. Final determinations of road location curvature, cuts and fills, grades and drainage, and necessary erosion controls would be made in accordance with design standards and practices and/or landowner requirements.

All proposed tower sites and access road sites would be field inspected by qualified SCE personnel to ensure correctness and to address and resolve any land use or environmental considerations.

3.5.3.2 West of Devers 230kV Upgrade

Tower siting for the west of Devers 230kV system would be similar to that for the new 500kV line, except that existing survey monuments established for the existing tower lines would be utilized for locating new structures.

3.5.4 Construction Yards

Construction yards would be used as reporting locations for the workers, vehicle and equipment parking, and as storage locations for material. The construction yards would have office facilities for supervisory and clerical personnel. Normal maintenance for construction equipment would be conducted at these locations. The maximum number of workers reporting to any one-yard area is not expected to exceed 144 at any one time; typically, there would be a maximum of 12 workers.

3.5.4.1 Devers-Harquahala 500kV Segment

Construction of the proposed 500kV transmission line would begin with the establishment of approximately seven temporary construction yards located at strategic points along the route—four in California and three in Arizona. The size of each yard would be 3 to 10 acres depending on land availability and intended use.

3.5.4.2 West of Devers 230kV Upgrade

Construction of the 230kV system west of Devers would not take place sequentially along the right-of-way, but would most likely be done in several stages. Since existing lines and structures must be removed, the construction sequence would be highly influenced by circuit outage availability. Construction yards would likely be set up at existing facilities such as Devers, Vista, and San Bernardino substations, with up to two additional yards set up between Devers and San Bernardino Junction. Each yard would require approximately 3 acres and be located on previously disturbed land parcels.

3.5.4.3 Midpoint Substation Alternatives

Construction of the Midpoint Substation will require a temporary laydown area of approximately 5 acres. The laydown area would be located at or near the existing roadway at the preferred or either of the alternative sites.

3.5.5 Access Roads and Right-of-Way Clearing

3.5.5.1 Devers-Harquahala 500kV Segment

No new main access roads are expected to be required for the proposed 500kV route, with the exception of the approximately 5-mile segment east of the Harquahala Switchyard. Where overland vehicle travel is not possible, upgrades to main access roads and extensions to existing spur roads would be needed to allow passage of construction vehicles. Such upgrades may require vegetation clearing and grading based on site conditions. There are approximately 260 miles of existing main access roads. The total area of potential disturbance for 19.3 miles of new spur roads would be approximately 32.8 acres. The spur roads would be a minimum of 14 feet wide. During grading operations, care would be exercised to minimize side casting. No earth would be removed below final elevations, and no cuts would be made deeper than necessary for clearing and road construction.

Upon completion of construction, any drainage deficiencies would be corrected to prevent future erosion. Trees and brush would be cleared only when necessary to provide electrical clearance, line reliability, or suitable access for maintenance and construction.

3.5.5.2 West of Devers 230kV Upgrade

Construction access is available within the existing right-of-way for the existing 230kV system upgrade. New spur roads would be required for new structures that are not at or adjacent to existing towers. Since no new tower construction is planned, and existing access is available, no new access roads would be required between the San Bernardino Substation, San Bernardino Junction, and Vista Substation. Trees and brush would be cleared only when necessary to provide electrical clearance, line reliability, or suitable access for maintenance and construction.

3.5.5.3 Midpoint Substation Alternatives

A permanent, 24-foot-wide, two-lane access road will be constructed from the existing paved road to the substation site. For the preferred site, the new road would be constructed for a distance of approximately 3 miles from the existing road.

Alternative Site 1, Mesa Verde, would require a 5-mile access road. Alternative site 2, Wiley Well, is located adjacent to the existing paved road and would therefore require only a 100-foot long access road.

3.5.6 <u>Foundation Installation</u>

3.5.6.1 Devers-Harquahala 500kV Segment

The proposed 500kV line from Devers to Harquahala Switchyard would require the construction of approximately 709 new lattice steel towers, 39 H-frames, and 23 tubular steel poles. Each structure would require augured cast-in-place concrete piles. Existing concrete supply facilities would be utilized wherever feasible. If no such facilities exist in certain areas, temporary concrete batch plants would be set up in areas approved by the authorizing agency. Concrete would be hauled to the structure site from the concrete supply facilities in standard concrete trucks. Care would be taken to minimize damage to the existing landscape and natural vegetation. Disposal of unused concrete would be restricted to methods detailed in the stormwater pollution prevention plan.

Counterpoise may need to be installed if the local soil conditions indicate that the soil has a resistance above 30 ohms. This is accomplished by attaching a 0.375-inch cable to the tower steel. The cable is installed 1-foot underground and extends approximately 100 feet (within the right-of-way) from two or more footings.

3.5.6.2 West of Devers 230kV Upgrade

The proposed 230kV modifications for the west of Devers system would require the construction of foundations for approximately 161 structures. Foundation installation for the 230kV upgrade would be similar to that of the 500kV segment as described above.

3.5.7 Structure Assembly and Erection

3.5.7.1 Devers-Harquahala 500kV Segment and West of Devers 230kV Upgrade

At the structure fabrication plant, structural members would be assembled into bundles, shipped by rail or truck to the construction yards, and then trucked to the individual sites. After being assembled into subassemblies, the subassemblies would be put together with the aid of a crane.

Assembly and erection of the structures required for the proposed transmission line would consist of three main activities: (1) assembly of main sections, (2) erection of the sections, and (3) final cleanup. Sections would be joined together with the aid of a crane and erected on foundations. Installation of insulators and travelers and final checkout and cleanup would then conclude structure assembly and erection.

3.5.8 <u>Conductor and Overhead Groundwire Stringing</u>

3.5.8.1 Devers-Harquahala 500kV Segment and West of Devers 230kV Upgrade

The stringing of conductor and overhead groundwire on new transmission lines would normally commence once a suitable number of structures had been erected and inspected. Setup locations for stringing equipment located between suspension towers would be temporary 150-foot by 300-foot areas located adjacent to the access roads approximately every 5,000 to 15,000 feet along the line. Smaller setup areas, 100 feet by 200 feet, are possible near either side of dead-end structures. Geographic, environmental, and cultural factors will determine the final locations of setup locations. Other considerations include specific line design issues such as locations of dead-end structures or line direction changes.

To shield underlying activities and facilities, temporary netting systems or wood pole guard structures would be erected at crossings for roads, streets, railroads, highways, or other transmission, distribution, or communication facilities, as required, prior to stringing operations. On roads where traffic is light, guard structures may not be necessary; however, the use of barriers, flagmen and/or temporary stopping of traffic would be required.

Conductor is usually supplied on 96-inch reels in lengths of up to 7,500-foot reels. Groundwire is usually supplied on reels in 15,000-foot lengths. For new transmission lines, stringing initially would consist of flying in pilot lines (small and lightweight) through the stringing travelers by helicopter, subsequently pulling larger steel cable. The conductor or groundwire would then be pulled from the established setup points by wire stringing equipment. For reconductor of existing lines and overhead groundwire west of Devers Substation, stringing would initially consist of replacing insulators, installing travelers, then transferring the existing conductor to the installed travelers. The existing conductor or groundwire would then be pulled out from the established setup points. The new conductor or groundwire would be pulled in. The conductor or groundwire would then be transferred into suspension hardware.

3.5.9 Removal of Facilities, West of Devers 230kV Upgrade

Two existing single-circuit transmission lines would be removed between Devers Substation and San Bernardino Junction. Guard structures would be erected for the conductor removal activities. In accordance with prearranged outages, facilities would be taken off line, conductor would be removed, and structures disassembled and hauled to staging yards for disposal. Guard structures would then be disassembled and removed. Removal would be coordinated with new line construction, structure rearrangement, and reconductor work. Materials would be recycled where feasible.

3.5.10 Telecommunications Facilities

3.5.10.1 Harquahala Mountain

Contractors and subcontractors would be used to construct the new building and antenna tower. A medium duty crane would be required for the construction of the antenna tower. SCE’s telecommunications construction crews will be used for telecommunications equipment installation.

Three trucks and six men would be needed during peak construction periods. Construction of the new facility and antenna tower will take approximately 12 to 16 weeks to complete and would consist of the following steps:

- site preparation
- erect temporary fencing area
- set the foundations
- install prefab building, fuel tanks, and emergency generator
- install photovoltaic (solar) system
- erect the antenna tower
- install antennas and telecommunications equipment
- erect permanent fencing
- site cleanup

The prefabricated building would be pre-assembled at the manufacturing plant and delivered to the Harquahala Mountain. The building would be set on a concrete pad using a crane. The antenna tower will be assembled and erected on site. Each tower section would be erected using a crane.

3.5.10.2 Blythe Optical Repeater

Contractors and subcontractors would be used to construct the new building. SCE's telecommunications construction crews will be used for telecommunications equipment installation.

Three trucks and six men would be needed during peak construction periods. Construction of the new facility and antenna tower will take approximately 10 to 12 weeks to complete and would consist of the following steps:

- site preparation
- erect temporary fencing area
- set the foundations
- install prefab building, fuel tanks, and emergency generator

- install telecommunications equipment
- erect permanent fencing
- site cleanup

The prefabricated building would be pre-assembled at the manufacturing plant and delivered to the job site. The building would be set on a concrete pad using a crane.

3.5.11 Post-Construction Cleanup

During construction, all excess materials would be removed from the right-of-way. After construction, all debris would be disposed of in a manner such that the area would be returned as near as practicable to its pre-construction appearance. This would include removal of surplus buildings and equipment, lumber, refuse, fencing, and all other items not at the sites prior to construction.

3.6 OPERATION AND MAINTENANCE

3.6.1 Schedule

Following completion of project construction, operation and maintenance of the new lines would commence. Inspection and maintenance activities would include the following:

- routine line patrols by both aircraft and truck
- routine, patrol identified, tower and wire maintenance
- routine line washing
- routine, patrol identified, earth and sand abatement from footings
- routine right-of-way road maintenance

The frequency of inspection and maintenance would depend on various conditions including length of the line and weather effects. Schedules by line are summarized in Table 3-9.

3.6.2 Labor Force Requirements

Inspection and maintenance activities typically include senior patrolman, foreman, lead lineman, journeyman lineman, apprentices, groundmen, helicopter pilots, equipment operators, and laborers. If the magnitude of repairs identified by routine patrols is substantial, other specialized employees such as surveyors, engineers, clerical personnel, and technicians would be attached to maintenance crews as required to address any unique problem that may arise due to such variables as substantial storm damage or vandalism. Labor force requirements by line are summarized in Table 3-9.

For the Devers-Harquahala 500kV line, it is expected that there would be a minor increase in operation and maintenance activity compared to the existing operation and maintenance activity along the existing corridor. No significant increase in patrols or grading would be required.

For the west of Devers upgrade, it is expected that there will be a small decrease in operation and maintenance activity because there would be a reduced number of structures to patrol or maintain and the use of polymer insulators would significantly reduce or nearly eliminate the need for insulator washing.

TABLE 3-9 OPERATION AND MAINTENANCE LABOR FORCE				
Activity	**Frequency**	**Duration**	**Personnel Required**	**Note**
Devers-Harquahala 500kV Transmission Line				
Routine Patrol, Aircraft	Every two years	8 hours	Pilot x 1	Lines are patrolled annually; patrol alternates yearly between helicopter and truck.
			Senior Patrolman x 1	
			Lineman x 1	
Routine Patrol, Truck	Every two years	3 weeks	Senior Patrolman x 1	
			Lineman x 2	
Routine repairs identified by Senior Patrolman	Every year	10 days	Foreman x 3	Repair unique items identified by senior patrolman during annual patrols, varies year to year. As many as three 8-man crews plus operators.
			Senior Lineman x 3	
			Lead Lineman x 3	
			Journeyman Lineman x 6	
			Apprentice x 6	
			Groundmen x 3	
			Equipment Operator x 3	
			Laborer x 3	
Remove Windblown Sand from Tower Footings	Every two years	1 week	Foreman x 1	Windblown sand and earth removed from LST steel by contract crew under direction of senior patrolman.
			Equipment Operator x 1	
			Laborer x 1	
Routine Right-of-Way Grading	Every three years	2 months	Foreman x 1	Grade all approved areas only.
			Equipment Operator x 1	
			Laborer x 1	
Routine Washing	N/A	N/A	N/A	Wash insulators as required.
West of Devers 230kV Transmission System				
Routine Patrol, Aircraft	Seldom	8 hours	Pilot x 1	Lines are patrolled annually; patrol alternates yearly between helicopter and truck.
			Senior Patrolman x 1	
			Lineman x 1	
Routine Patrol, Truck	Every year	1 week	Senior Patrolman x 1	
			Lineman x 1	
Routine repairs identified by Senior Patrolman	Every year	3 days	Foreman x 1	Repair unique items identified by senior patrolman during annual patrols, varies year to year. One 8-man crew plus operators.
			Senior Lineman x 1	
			Lead Lineman x 1	
			Journeyman Lineman x 2	
			Apprentice x 2	
			Groundmen x 1	
			Equipment Operator x 1	
			Laborer x 1	
Routine Right-of-Way Grading	Every year	2 months	Foreman x 1	Grade all approved areas only.
			Equipment Operator x 1	
			Laborer x 1	
Washing	NA	NA	NA	Wash insulators as required.
			NA	

3.6.3 System Operation and Maintenance Procedures

Maintenance of the proposed transmission lines would consist of periodic patrols by ground and air to locate any damage that might adversely affect the integrity and reliability of the line. Other non-emergency maintenance would involve the occasional replacement of insulators damaged by lightning or gunfire, the replacement of tower steel members due to gunfire or wind, and the repair of access and stub roads due to erosion or landslides. Crews would wash insulators, as necessary, using a specialized truck for the 230kV lines west of Devers. In the future, if levels of air pollution increase, the 500kV lines east of Devers Substation would require washing as well. Crews also would remove windblown sand and dirt from footings in areas where it has a tendency to accumulate.

3.7 SAFETY CONSIDERATIONS

3.7.1 Design

Safety is one of the primary considerations in the design of the proposed transmission line project. The proposed DPV2 transmission lines would be protected at the substations with circuit breakers that are connected to the protective relay system to minimize the possibility of electrical shock or fire in the event of either a single or multiple conductor breakage. Lightning protection would be provided by overhead groundwires along the lines.

In accordance with good safety practice, all fences and metal gates, either within or crossing the right-of-way, would be grounded.

3.7.2 Construction

Safety-related measures proposed as part of the construction phase activities are listed below:

- Construction operations would be conducted in a manner to avoid closing or obstructing railroads, roads, or other property until the appropriate permits have been obtained from landowners, governmental agencies, or other authorities having jurisdiction.

- Vehicular construction traffic would be limited to approved access roads, construction yards, and construction sites. No off-road travel would be permitted.

- Construction foremen and personnel would be well informed as to where construction equipment and vehicles would be permitted.

- Fences that cross the proposed transmission system access roads would be gated or modified per agreements with the landowner.

- No work would be performed that would affect any existing pipeline, telephone, telegraph or electric line, irrigation ditch, or other structure until proper authorization has been obtained.

- All applicable fire laws and regulations of the land-management agency with jurisdiction over land crossed by the proposed project would be fully complied with, and all fire plans would be followed.

- Construction-related areas would be maintained in a neat, clean, and sanitary condition at all times.

- Each tower site would be kept free from accumulation of waste materials and rubbish as required for safety, appearance, and prevention of fire hazards.

3.7.3 Operation and Maintenance

In case of single or multiple conductor failure, power would be automatically and rapidly removed from the lines to minimize the possibility of electrical shock or fire.

3.8 PROJECT ECONOMICS

3.8.1 Construction Costs

The estimated nominal cost for the construction of the proposed DPV2 transmission line project including right-of-way and related facilities, substation and series capacitors, voltage support, and telecommunication facilities is approximately $591 million. The estimated cost breakdown by individual project elements is summarized in Table 3-10.

TABLE 3-10
SUMMARY OF ESTIMATED CONSTRUCTION COSTS
FOR THE DEVERS-PALO VERDE 2 PROJECT
(2005 dollars)

Elements	Total Element Costs (x $1,000)
TRANSMISSION LINE	
500kV Transmission Line	$ 246,000
230kV Transmission Line	$ 97,000
Series Capacitors	$ 31,000
Subtotal Transmission Line	$ 374,000
SUBSTATION AND RELATED FACILITIES	
Substation Construction	$ 116,000
Voltage Support	$ 72,000
Special Protection Scheme	$ 3,000
Telecommunications	$ 14,000
Subtotal Substation and Related Facilities	$ 205,000
LAND	$ 12,000
TOTAL PROJECT COST	**$ 591,000**

NOTE: This estimate includes pension, benefits, and administrative and general overhead, but does not include Allowance for Funds Used During Construction (AFUDC).

3.9 DECOMMISSIONING

It is expected that the proposed transmission line would have a useful life of at least 50 years. Decommissioning plans, therefore, have not been developed at this time.

Map 3-2a

DEVERS-HARQUAHALA 500kV PROPOSED AND SUBALTERNATIVE ROUTES

Map 3-2b

DEVERS-HARQUAHALA 500kV PROPOSED AND SUBALTERNATIVE ROUTES

Map 3-2c

DEVERS-HARQUAHALA 500kV PROPOSED AND SUBALTERNATIVE ROUTES

Map 3-3

Palo Verde Subalternate Route