

## **Appendix K**

### **Calcite Substation Project Description**

**ORD MOUNTAIN SOLAR AND  
ENERGY STORAGE PROJECT  
ENVIRONMENTAL IMPACT REPORT**



**PROJECT DESCRIPTION**  
**SCE'S CALCITE SUBSTATION AND THE**  
**INTERCONNECTION OF ORD MOUNTAIN SOLAR**  
**PROJECT**

**SEPTEMBER 2018**



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# **CALCITE SUBSTATION PROJECT DESCRIPTION**

## **PROJECT OVERVIEW**

Southern California Edison Company (“SCE”) proposes to construct the Calcite Substation and associated facilities to interconnect the NextEra Energy Resources (“NEER”) 60 MW Ord Mountain Solar Project to SCE’s existing Lugo-Pisgah No. 1 220 kV Transmission Line (collectively, the “Calcite Substation Project”). See Figure SCE-1 PROPOSED CALCITE SUBSTATION AND TELECOMMUNICATION LINES. The following is a summary of the Calcite Substation Project major components:

- **Calcite Substation:** Construct a 220 kV switchyard on approximately 7 acres along with an approximately 4 acres for drainage, grading, and an access road.
- **Transmission Lines:** Loop-in the Lugo-Pisgah No. 1 220 kV Transmission Line into Calcite Substation adding a total of approximately 5,000 feet of new transmission line (two lines of approximately 2,500 feet located side-by-side within a corridor approximately 2,500 feet long) creating the Calcite-Lugo and Calcite-Pisgah 220 kV Transmission Lines.
- **Generation Tie Line Connection:** Connect the NEER-built generation tie line (“gen-tie”) into the SCE-owned Calcite Substation property. SCE will construct up to two structures and three spans, starting at the generator’s closest structure to the Calcite Substation property to connect to the new position within the switchyard.
- **Distribution Line for Calcite Substation Light and Power:** Construct approximately 700feet of 12 kV overhead distribution line and approximately 2,100 feet of underground distribution line (connecting the existing distribution system along Haynes Road to Calcite Substation) to provide temporary power for construction and permanent substation light and power.
- **Distribution line for Ord Mountain Solar Project** (to be determined).
- **Telecommunications Facilities:** Install fiber optic communication cables, equipment, and associated structures for diverse path routing of communications required for the Project.

This project description is based on planning level assumptions. Further details will be made available upon completion of preliminary and final engineering, using the most current SCE design and construction practices, identification of field conditions, verification of availability of materials and equipment, and compliance with applicable environmental and permitting requirements. With regards to construction work activities, SCE anticipates working typical construction schedules; however, the actual construction hours may vary based on workforce resources and activities.



## PROJECT LOCATION

The proposed Calcite Substation would be located on an approximately 75 acre parcel of land that extends on the west and east sides of California State Highway 247, directly north of Haynes Road, in the County of San Bernardino (“Calcite Substation Property”) See Figure SCE-2 CALCITE PROPOSED AND ALTERNATIVE SUBSTATION PROPERTY BOUNDARIES. The proposed substation footprint would require approximately 7 acres along with an approximately 4 acres for drainage, grading, and an access road, generally located within the western part of the approximately 75 acre parcel.

By looping the existing Lugo-Pisgah No.1 220 kV transmission line into Calcite Substation, two new 220 kV transmission lines would be created. These transmission lines (T/Ls) would depart from the existing Lugo-Pisgah No. 1 line approximately 2,500 feet south of Calcite Substation, cross under SCE’s Eldorado-Lugo and Lugo-Mohave 500 kV lines, and enter Calcite Substation from the south.

The Ord Mountain Solar Project’s portion of the 220 kV gen-tie line along with OPGW and underground fiber are currently anticipated to extend onto an easement within the Calcite Substation Property, just east of the proposed Lugo-Pisgah No. 1 220 kV loop-in. Beginning at the last structure to be constructed and owned by NEER (a dead-end structure) on the Calcite Substation Property but outside the fenced area of proposed Calcite Substation, SCE would construct all remaining electrical and telecommunication facilities to extend the remainder of the gen-tie into the Substation.<sup>1</sup> See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND SUBTRANSMISSION LINES. The Calcite Substation would require the extension of the existing 12 kV distribution circuit in order to provide temporary power and permanent substation light and power. The existing 12 kV overhead circuit would extend westward overhead on Haynes Road, for approximately 2,000 feet. The circuit would then continue underground for approximately 2,100 feet by heading westward under the existing transmission right-of-way (ROW) along Haynes Road and then north along the new Calcite Substation access road into the station light and power rack within Calcite Substation. See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND SUBTRANSMISSION LINES.

The telecommunication facilities to support the Calcite Substation would require two new fiber optic cables. The fiber optic cables would connect Calcite Substation to SCE’s Barstow Repeater Communication Site (“CS”) and to a splice box on tower M29-T3 on SCE’s Lugo Mohave 500kV T/L. See Figure SCE-1 PROPOSED CALCITE SUBSTATION AND TELECOMMUNICATIONS LINES.

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<sup>1</sup> The portion of the gen-tie running from the Ord Mountain Solar Project to this last NEER structure is anticipated to be described elsewhere by NEER, not in this description of the work to be undertaken by SCE

## **PROJECT DESCRIPTION**

### **I. CALCITE SUBSTATION**

The Calcite Substation would be a new regional 220 kV collector station initially needed to support the Ord Mountain Solar Project, measuring approximately 620 feet by 480 feet. The Calcite Substation would be an unattended collector station (no power transformation) surrounded by a wall with a visible loop of razor wire along the top and with two gates.

#### **Substation Design and Equipment**

SCE would engineer, design, construct, and test the proposed Calcite Substation. The Substation would be designed to accommodate a total of eight 220 kV positions, with four positions initially constructed. Two positions would be utilized in the initial design: one position shared between the Ord Mountain Solar Project gen-tie and the Pisgah 220 kV transmission line, and one position for the Lugo 220 kV transmission line. The remaining two positions would be available for future network or generation tie-lines.

Calcite Substation would be initially equipped with:

- Two (2) overhead 220 kV buses
- Five (5) circuit breakers
- Ten (10) group-operated disconnect switches
- One (1) Mechanical Electrical Equipment Room (MEER)
- Light and power transformers and associated equipment
- Station lighting
- Permanent wall
- Perimeter Security Intrusion Detection System

#### **Grading and Land Disturbance**

The Calcite Substation Property would be prepared by clearing existing vegetation and installing a temporary chain-link fence to surround the construction site. The Property would be graded in accordance with approved grading plans. The area to be enclosed by the proposed substation perimeter wall would be graded to a slope that varies between one and two percent. To protect the substation from flooding, and to keep the existing drainage patterns, drainage conveyances would be constructed around the substation. These features would disturb an area approximately 35' feet wide around the substation (approximately two acres) resulting in a total permanent disturbance area of approximately 11 acres. Final site grading and drainage would be subject to the conditions of the grading permit obtained from the County of San Bernardino (see Table SCE – 1 below).

Additional temporary land disturbance (up to approximately 5 acres) within the proposed Calcite Substation Property may be necessary for temporary equipment storage and material staging areas (see Table SCE- 2 below).

The Calcite Substation access road would be 24 feet wide and composed of asphalt concrete. This road would connect to Highway 247 (Barstow Road) and would require the improvement of approximately 1,100 feet of the existing Haynes Road and the establishment of approximately 800 feet of new road. Permanent land disturbance would be approximately 2 acres on the Calcite Substation Property. Any permits needed for the access road would be acquired from the local agencies.

**Table SCE - 1:**  
**Substation Ground Surface Improvement Materials and Estimated Volumes**

<b>Element</b>	<b>Material</b>	<b>Approximate Surface Area (ft<sup>2</sup>)</b>	<b>Approximate Volume (yd<sup>3</sup>)</b>
Site Fill (import)	Soil	420,000	51,000
Waste Removal (export)	Soil/Vegetation	420,000	3,000
Replacement fill (import)	Soil	420,000	4,000
Substation Equipment Foundations	Concrete	4,000	700
Equipment and cable trench excavations *	Soil	270,000	1,200
Cable Trenches**	Concrete	6,300	25
Internal Driveway ***	Asphalt concrete	48,000	600
	Class II aggregate base	48,000	900
Access Road****	Asphalt concrete	51,000	900
	Class II aggregate base	51,000	1,000
	Concrete	51,000	100
Substation Rock Surfacing	Rock, nominal 1 to 1-1/2 inch per SCE Standard	250,000	3,200

**Notes to Table SCE - 1**

\* Excavation “spoils” would be placed on site during the below-ground construction phase and used to the extent possible for the required on-site grading.

\*\* Standard cable trench elements are factory fabricated, delivered to the Property and installed by crane. Intersections are cast in place concrete.

\*\*\* Internal Driveway refers to all paved roads within the substation walls.

\*\*\*\* Access Road refers to the paved road from the public right of way to the primary entrance gate and secondary access.

Table SCE - 2 below provides the approximate area of land disturbance at the Calcite Substation Property, within the substation wall and the required drainage structures. This includes the area immediately outside the substation, as well as the approximate volume and type of earth materials proposed to be used or disposed.

**Table SCE - 2:  
Land Disturbance for Substation Construction**

<b>Project Feature</b>	<b>Project Quantity</b>	<b>Disturbed Acreage Calculation</b>	<b>Construction Disturbance Acreage</b>	<b>Temporary Disturbance Acreage</b>	<b>Permanent Disturbance Acreage</b>
Calcite Substation	1	620' x 480'	7.0	0.0	7.0
Drainage and Grading	1	Varies	2.0	0.0	2.0
New Access Roads	1	linear <u>miles</u> x 24' wide	2.0	0.0	2.0
Material & Equipment Staging Yard - (Calcite)	1	approx. 2 acres	2.0	2.0	0.0
<b>Total Estimated Disturbance Acreage (5)</b>			<b>13.0</b>	<b>2.0</b>	<b>11.0</b>

### **Below Grade Construction**

After the Calcite Substation Property is graded, below grade facilities would be installed. Below grade facilities include a ground grid, underground conduit, trenches, and all required foundations. The design of the ground grid would be based on soil resistivity measurements collected during a geotechnical investigation that would be conducted prior to construction.

### **Equipment Installation**

Above grade installation of substation facilities (*i.e.*, buses, circuit breakers, steel structures, and the MEER) would commence after the below grade structures are in place.

### **Hazards and Hazardous Materials**

Construction and operation of the Calcite Substation would require the limited use of hazardous materials such as fuels, lubricants, and cleaning solvents. SCE would comply with all applicable laws relating to hazardous materials use, storage, and disposal. A Stormwater Pollution Prevention Plan (SWPPP) would also be prepared for the Calcite Substation Project.

### **Waste Management**

Construction of the Calcite Substation would result in the generation of various waste materials including soil, vegetation, and sanitation waste (portable toilets). Soil excavated for the Calcite Substation would either be used as fill or disposed of off-site at an appropriately licensed waste facility. Sanitation waste (*i.e.*, human generated waste) would be disposed of according to sanitation waste management practices.

## **Dust Control**

During construction, water trucks may be used to minimize the quantity of airborne dust created by construction activities.

## **Post-Construction Cleanup**

Any damage to existing roads as a result of construction would be repaired once construction is completed in accordance with local agency requirements. Following completion of construction activities, SCE would also restore all areas that were temporarily disturbed by construction of the Calcite Substation to as close to preconstruction conditions as possible or where applicable to the conditions agreed upon between the landowner and SCE. In addition, all construction materials and debris would be removed from the area and recycled or properly disposed of off-site. SCE would conduct a final inspection to ensure that cleanup activities were successfully completed.

## **Operations and Maintenance**

The proposed Calcite Substation would be unstaffed, and electrical equipment within the substation would be remotely monitored and controlled by an automated system from SCE's Lugo Substation Switching Center. SCE personnel would typically visit for electrical switching and routine maintenance purposes. Routine maintenance would include equipment testing, monitoring and repair.

## **Geotechnical Studies**

Prior to the start of construction, SCE would conduct a geotechnical study of the Substation Property and the transmission line routes that would include an evaluation of the depth to the water table, evidence of faulting, liquefaction potential, physical properties of subsurface soils, soil resistivity, and slope stability.. Geotechnical borings would take place at various depths throughout the Calcite Substation Property.

## **Construction Equipment Personnel and Temporary Facilities**

The estimated elements, materials, number of personnel and equipment required for construction of the Calcite Substation are summarized below in Table SCE - 3. In addition to the information provided in Table SCE - 3, a temporary contractor office trailer and equipment trailer would be placed within the proposed substation construction area during the construction phase of the project.

Construction would be performed by either SCE construction crews or its contractors. Contractor construction personnel would be managed by SCE construction management personnel. SCE anticipates a total of approximately 30 construction personnel working on

any given day. SCE anticipates that crews would work concurrently whenever possible; however, the estimated deployment and number of crew members would be dependent upon county permitting, material availability and construction scheduling. For example, installation of electrical equipment (such as the MEER, wiring, and circuit breaker) installation may occur while the transmission line construction proceeds.

**Table SCE - 3**

<b>CALCITE SUBSTATION PROJECT CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT 220KV SUBSTATION &amp; ACCESS ROAD</b>							
<b>WORK ACTIVITY</b>				<b>ACTIVITY ESTIMATES</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
<b>Survey (1)</b>				<b>4</b>	<b>10</b>		<b>Substation, Laydown Yard &amp; Access Road</b>
1-Ton Truck, 4x4	300	Gas	2		10	8	
<b>Grading</b>				<b>10</b>	<b>40</b>		<b>Substation, Laydown Yard &amp; Access Road</b>
1-Ton Truck, 4x4	300	Gas	1		40	8	
Dozer	350	Diesel	1		40	7	
Loader	350	Diesel	2		40	7	
Scraper	350	Diesel	2		40	7	
Grader	350	Diesel	1		40	7	
Dump Truck	350	Diesel	2		40	7	
Backhoe	200	Diesel	2		40	7	
Tamper	350	Diesel	1		35	7	
Tool Truck	300	Gas	1		40	7	
Utility Cart	50	Diesel	2		40	7	
Water Truck	300	Diesel	3		40	8	
<b>Fencing</b>				<b>5</b>	<b>25</b>		<b>Substation &amp; Laydown Yard</b>
1-Ton Truck, 4x4	300	Gas	1		25	8	
Bobcat	200	Diesel	1		25	8	
Flatbed Truck	300	Gas	1		15	3	
Utility Cart	50	Diesel	1		25	7	
Water Truck	300	Diesel	1		25	8	
<b>Civil</b>				<b>10</b>	<b>60</b>		<b>Substation &amp; Access Road</b>
1-Ton Truck, 4x4	300	Gas	1		60	8	
Excavator	60	Diesel	1		45	4	
Lo-Drill/Auger	350	Diesel	1		30	4	
Backhoe	200	Diesel	2		60	7	
Bobcat	200	Diesel	1		60	8	

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV SUBSTATION & ACCESS ROAD**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Dump Truck	350	Diesel	2		50	7	
Skip Loader	350	Diesel	1		60	8	
Forklift	200	Diesel	1		45	4	
Concrete Truck	300	Diesel	2		30	4	
Generator	50	Gas			60	7	
Tool Truck	300	Gas	1		60	7	
Utility Cart	50	Diesel	2		60	7	
Water Truck	300	Diesel	2		60	8	
<b>MEER Install (Drop In)</b>				<b>7</b>	<b>25</b>		<b>Substation</b>
1-Ton Truck, 4x4	300	Gas	1		25	8	
Manlift/Bucket Truck	150	Diesel	2		20	7	
Stake Truck	350	Gas	1		20	3	
Crane	350	Diesel	1		15	4	
Forklift	250	Diesel	1		25	4	
Tool Truck	300	Gas	1		25	7	
<b>Electrical</b>				<b>10</b>	<b>70</b>		<b>Substation</b>
1-Ton Truck, 4x4	300	Gas	2		3	8	
Scissor Lift	60	Diesel	1		70	7	
Manlift/Bucket Truck	150	Diesel	2		60	7	
Reach Manlift	250	Diesel	1		45	7	
Crane	400	Diesel	1		20	4	
Forklift	250	Diesel	1		70	4	
Generator	50	Gas	1		70	7	
Utility Cart	50	Diesel	2		70	7	
Tool Truck	300	Gas	1		70	7	
<b>Wiring</b>				<b>4</b>	<b>65</b>		<b>Substation</b>
1-Ton Truck, 4x4	300	Gas	1		65	8	
Manlift/Bucket Truck	150	Diesel	1		25	4	
Utility Cart	50	Diesel	1		65	7	
<b>Maintenance Crew</b>				<b>2</b>	<b>30</b>		<b>Substation</b>
1-Ton Truck, 4x4	300	Gas	1		30	8	
<b>Testing</b>				<b>4</b>	<b>60</b>		<b>Substation</b>
Test Truck	300	Gas	2		60	8	
<b>Asphalt</b>				<b>6</b>	<b>40</b>		<b>Substation &amp; Access Road</b>
1-Ton Truck, 4x4	300	Gas	2		40	4	

**CALCITE SUBSTATION PROJECT  
CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY  
CONSTRUCT 220KV SUBSTATION & ACCESS ROAD**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Stake Truck	350	Gas	1		30	4	
Dump Truck	350	Diesel	1		35	7	
Asphalt Paver	350	Diesel	1		35	7	
Tractor	350	Diesel	1		40	4	
Paving Roller	150	Diesel	2		40	6	
Asphalt Curb Machine	50	Diesel	1		30	4	
Utility Cart	50	Diesel	1		40	7	

**Crew Size Assumptions For:**

- 1) Survey – one 4-man crew
- 2) Grading – one 10-man crew
- 3) Fencing – one 5-man crew
- 4) Civil – one 10-man crew
- 5) MEER – one 7-man crew
- 6) Electrical – one 10-man crew
- 7) Wiring – two 2-man crews (4 total)
- 8) Maintenance – one 2-man crew
- 9) Testing – two 2-man crews (four total)
- 10) Asphalt/Paving – one 6-man crew

## Material & Equipment Staging Yard

Construction of the Substation, transmission lines, distribution lines, and telecommunication lines would require the establishment of approximately 4-acres of staging yards within the Calcite Substation Property. This staging yard would be used as a reporting location for workers, vehicle and equipment parking, and material storage.<sup>2</sup> The yard may also have construction trailers for supervisory and clerical personnel. The staging yard may be lit for staging and security. Normal maintenance and refueling of

<sup>2</sup> Transmission line construction materials commonly stored at construction staging yards typically include, but not be limited to: construction trailers; construction equipment; portable sanitation facilities; steel bundles; steel/wood poles; conductor reels; overhead ground wire (OHGW); hardware; insulators; cross arms; signage; consumables (such as fuel and filler compound); waste materials for salvaging, recycling, or disposal; and BMP materials (such as straw wattles, gravel, and silt fences). Substation construction materials commonly stored at the construction staging area would include, but not be limited to: portable construction trailers; sanitation facilities; electrical and construction equipment such as circuit breakers, disconnect switches, lightning arresters, transformers, vacuum switches, steel beams, rebar, foundation cages, conduit, insulators, conductor and cable reels, pull boxes and line hardware; and BMP materials (such as straw wattles, gravel, and silt fences).



construction equipment would also be conducted at the yard. All refueling and storage of fuels would be in accordance with the Storm Water Pollution Prevention Plan (SWPPP).

Preparation of the staging yard would include temporary perimeter fencing and depending on existing ground conditions at the Property, include the application of gravel or crushed rock.

The majority of the materials associated with construction efforts would be delivered by truck to the staging yard, although some materials may be delivered directly to the temporary construction laydown/ work areas.

Any land that may be disturbed at the staging yard could be restored to preconstruction conditions if there is no longer a need for the staging yard.

## **II. TRANSMISSION LINE (T/L) AND RELATED STRUCTURES**

SCE's transmission line requirements for the Ord Mountain Solar Project interconnection to the Lugo-Pisgah No. 1 220 kV Transmission Line are defined by the following components: loop-in lines, and gen-tie line connection. Each of these components is described below.

### **220 kV Transmission Line Loop-In Design**

The proposed Calcite Substation would connect to the Lugo-Pisgah No. 1 220 kV Transmission Line transmission source line via a loop-in T/L. The loop-in would modify the Lugo-Pisgah No. 1 220 kV Transmission Line creating two new line segments: the Calcite-Lugo 220 kV T/L and the Calcite-Pisgah 220 kV T/L. Each new T/L segment entering into the Calcite Substation would be approximately 2,500 feet long. See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES.

The proposed routes for these new T/Ls would require crossing under SCE's Eldorado-Lugo and Lugo-Mohave 500 kV lines. Crossing under the 500 kV lines would require direct embedding the static wire at each crossing for adequate grounding and to satisfy GO95 overhead clearance requirements between circuits. See Figure SCE-4 220 LATTICE STEEL TOWER CONFIGURATION and Figure SCE-5 220KV TUBULAR STEEL POLE CONFIGURATION.

The new 220 kV T/Ls would require approximately six transmission structures; four single circuit structures and two double-circuit structures. See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES. Four single circuit structures with heights ranging from approximately 50 feet to approximately 100 feet would be used to cross underneath the Eldorado-Lugo 500kV and Lugo-Mohave 500kV transmission lines. The path would then continue north to two double-circuit structures with approximate heights of 110 to 160ft. See Figure SCE-4

220kV LATTICE STEEL TOWER CONFIGURATION and Figure SCE-5 220kV TUBULAR STEEL POLE CONFIGURATION for possible 220kV structure configurations. The conductor utilized would be 2B-1590 kcmil “Lapwing” Aluminum Conductor Steel Reinforced (“ACSR”) conductor or similar.

Additionally, two existing 220 kV lattice steel towers in the existing ROW would be removed since it would not be in use in the proposed configuration. The final combination of poles and towers will be determined during detailed engineering.

The six new structures would require a new ROW ranging between approximately 100 and 200 feet wide (depending on structure types and line crossings) from SCE’s existing ROW to the Calcite Substation Property. See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES.

### **220 kV Generation Tie Line Extension Design**

The proposed Calcite Substation design includes terminating the Ord Mountain 220 kV gen-tie line into the switchrack. See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES. There would be one double-circuit lattice or TSP dead-end structures with heights ranging from approximately 130 feet to approximately 180 feet on the Calcite Substation Property for the connection of Ord Mountain’s gen-tie line to a 220 kV position inside Calcite Substation. While the Ord Mountain 220 kV gen-tie line would carry 60 MW, the TSP or LST would be designed for additional future load, utilizing 2B-1590 kcmil “Lapwing” Aluminum Conductor Steel Reinforced (“ACSR”) conductor.

The structure outside the proposed Calcite Substation would be constructed by SCE and would be dead-end structure. NEER would be responsible for construction of all structures beyond that dead-end structure. SCE would construct, own, operate, and maintain the circuit to the tower connection at the first Ord Mountain structure. SCE would work with NEER to integrate final design. See Figure SCE-3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES and SCE-9 PROPOSED GEN-TIE DESIGN.

### **Transmission Line Access and Spur Roads**

This portion of the Calcite Substation Project involves construction within existing and new ROW. Existing public roads as well as existing transmission line roads would be used as much as possible during construction. However, the Calcite Substation Project would require new transmission line roads to access the new 220kV transmission line segments and structure locations between the Calcite Substation and existing SCE ROW.

Transmission line roads are classified into two groups: access roads and spur roads. Access roads are through roads that run between tower sites and serve as the main

transportation route. Spur roads are roads that lead from access roads and terminate at one or more structure sites.

Rehabilitation work may be necessary in some locations along the existing transmission line roads to accommodate construction activities. This work may involve the re-grading and repair of existing access and spur roads, including work such as: clearing of vegetation; grading to remove potholes, ruts, and other surface irregularities; widening of the drivable surface of the road; improving drainage across access roads; and over-excavation and re-compaction to provide a smooth and dense riding surface capable of supporting heavy construction equipment. The actual widening would vary between approximately 1 foot and approximately 10 feet, in order to provide a minimum drivable width for safe vehicle operation.

Portions of the drivable surface would be widened along curved sections of the access road. Access road gradients would be leveled so that sustained grades generally do not exceed approximately 12 percent. Along curves in the road, typically, a minimum radius of curvature of 50 feet measured at the center line of the usable road surface is required.

New access road alignments would first be cleared and grubbed of vegetation. Roads would be blade-graded to remove potholes, ruts, and other surface irregularities; fill material would be deposited where necessary; and roads would be re-compacted to provide a smooth and dense riding surface capable of supporting heavy construction equipment. The graded road would have a minimum drivable width that will vary between 14 feet and 22 feet with 2 feet of shoulder on each side as required by the existing land terrain, but may be wider depending on final engineering requirements and field conditions. The minimum center line turning radius required along a curve is 50 feet (the minimum turning radius required to meet construction and maintenance vehicle requirements) and where typical berm and swale drainage improvements is required for erosion control along the road. This width is increased by a factor  $400/\text{Radius}$  along curvatures to accommodate the vehicle envelope as it turns (resulting in a maximum drivable width of 22 feet).

### **Construction of New 220 kV Transmission Structures**

The new structure pad locations and laydown/work areas (see Table SCE - 4) would first be graded and/or cleared of vegetation as required to provide a reasonably level and vegetation-free surface for structure installation. Property would be graded such that water would run toward the direction of the natural drainage. In addition, drainage would be designed to prevent ponding and erosive water flows that could cause damage to the structure footings. The graded area would be compacted to at least 90 percent relative density, and would be capable of supporting heavy vehicular traffic.

Structure foundations would be engineered to satisfy the soil/rock profile at each location as needed based on final engineering results. Typical structure foundations for each Lattice Steel Tower (“LST”) would consist of four poured-in-place concrete footings and

Tubular Steel Pole (“TSP”) H-Frames would require two drilled poured-in-place concrete footings. Actual footing diameters and depths for each of the structure foundations would depend on the soil conditions and topography at each property and would be determined during final engineering.

The foundation process begins with the drilling of the holes for each type of structure. The holes would be drilled using truck- or track-mounted excavators with various diameter augers to match the diameter requirements of the structure type. The excavated material would be distributed at the structure site, used as fill for new roads or substation property or used in the rehabilitation of existing access roads. Alternatively, the excavated soil may be disposed of at an off-site disposal facility in accordance with all applicable laws.

Following excavation of foundation footings, steel reinforced rebar cages would be set, survey positioning of anchor bolts and/or stub angles would be verified, and concrete would then be poured. The steel reinforced rebar cages would be assembled off-site and delivered to the structure location by flatbed truck. A typical transmission structure foundation would require approximately 45 to 65 cubic yards of concrete delivered to the structure location depending upon the type of structure being constructed and each footing would project approximately 1 to 4 feet above the ground level. During construction, existing concrete supply facilities would be used where feasible.

LSTs would be assembled within the temporary laydown areas at each tower location. See Table SCE - 4 for approximate laydown dimensions. Structure assembly begins with the hauling and stacking of steel bundles from a staging yard to each structure location. This activity involves the use of trucks with trailers and a rough terrain forklift. After steel is delivered and stacked within the structure laydown/work area, crews would proceed with the assembly of leg extensions, body panels, boxed sections, and cages/bridges. Assembled sections would be lifted into place with a crane and secured by a combined erection and torquing crew.

TSP and H-Frames consist of multiple sections. The pole sections would be placed in temporary laydown areas at each pole location. See Table SCE - 4 for approximate laydown dimensions. Structure assembly begins with the hauling of steel pole sections from a staging yard to each structure location. This activity involves the use of trucks with trailers and a rough terrain crane. After the steel pole sections are delivered and placed within the structure laydown/work area, crews would proceed with the assembly of the structure. A crane would be used to set each steel pole base section on top of the previously prepared foundations. When the base section is secured, the remaining sections of the H-Frames would be lifted into place with a crane and secured by an erection crew.

After construction is completed, the transmission structure site would be graded such that water would run toward the direction of the natural drainage. In addition, drainage would be designed to prevent ponding and erosive water flows that could damage the structure

footing. The graded area would be compacted and capable of supporting heavy vehicular traffic.

## **Wire Stringing of 220 kV Conductor**

Wire stringing activities would be in accordance with SCE common practices and are similar to process methods detailed in the IEEE Standard 524-2003 (Guide to the Installation of Overhead Transmission Line Conductors).

To ensure the safety of workers and the public, safety devices such as traveling grounds, guard structures, radio-equipped public safety roving vehicles and linemen would be in place prior to the initiation of wire stringing activities. Advanced planning by supervision is required to determine circuit outages, pulling times, and safety protocols for ensuring that the safe installation of wire is accomplished. Wire stringing includes all activities associated with the installation of the primary conductors onto transmission line structures. These activities include the installation of conductor, ground wire (“OHGW/OPGW”), insulators, stringing sheaves (rollers or travelers), vibration dampeners, weights, suspension and dead-end hardware assemblies for the entire length of the route.

The following five steps describe typical wire stringing activities:

- Step 1: Planning: Develop a wire stringing plan to determine the sequence of wire pulls and the set-up locations for the wire pull/tensioning/splicing equipment.
- Step 2: Sock Line Threading: A helicopter would fly a lightweight sock line from structure to structure, which would be threaded through rollers in order to engage a camlock device that would secure the pulling sock in the roller. This threading process would continue between all structures through the rollers of a particular set of spans selected for a wire pull.
- Step 3: Pulling: The sock line would be used to pull in the conductor pulling rope and/or cable. The pulling rope or cable would be attached to the conductor using a special swivel joint to prevent damage to the wire and to allow the wire to rotate freely to prevent complications from twisting as the conductor unwinds off the reel.
- Step 4: Splicing, Sagging, and Dead-Ending: Once the conductor is pulled in, if necessary, all mid-span splicing would be performed at dead end tower locations. Once the conductor is to proper tension and dead-ended to the structures, the splicing would be completed.
- Step 5: Clipping-In: After the conductor is dead-ended, the conductors would be secured to all tangent structures; a process called clipping in. Once this is complete, spacers would be attached between the bundled conductors of each phase to keep uniform separation between each conductor.

The puller, tensioner, and splicing set-up locations associated with the Calcite Substation Project's transmission facilities would be temporary and the land would be restored to its previous condition following completion of pulling and splicing activities. The set-up locations require level areas to allow for maneuvering of the equipment and, when possible, these locations would be located on existing roads and level areas to minimize the need for grading and cleanup. The number and location of these sites would be determined during final engineering. The approximate area needed for stringing set-ups associated with wire installation is variable and depends upon terrain. See Table SCE - 4 for approximate size of pulling, tensioning and splicing equipment set-up areas and laydown dimensions.

Wire pulls are the length of any given continuous wire installation process between two selected points along the line. Wire pulls are selected based on availability of dead-end structures, conductor size, geometry of the line as affected by points of inflection, terrain, and suitability of stringing and splicing equipment set-up locations. Generally, pulling locations and equipment set-ups would be in direct line with the direction of the overhead conductors and established approximately a distance of three times the height away from the adjacent structure.

Each stringing operation consists of a puller set-up positioned at one end and a tensioner set-up with wire reel stand truck positioned at the other end of the wire pull. Temporary splices may be used during stringing since permanent splices that join the conductor together cannot travel through the rollers. Splicing set-up locations are used to remove temporary pulling splices and install permanent splices once the conductor is strung through the rollers located on each structure.

### **Land Disturbance**

Table SCE - 4 below provides information on temporary and permanent land disturbance areas related to construction of the transmission loop-in lines.

**Table SCE - 4: Land Disturbance for Transmission Loop-In  
and SCE Portion of Gen-tie Construction**

Project Feature	Project Quantity	Disturbed Acreage Calculation	Construction Disturbance Acreage	Temporary Disturbance Acreage	Permanent Disturbance Acreage
Guard Structures	4	150' x 50'	0.7	0.7	0
Remove Existing Lattice Steel Tower (1)	2	220' x 220'	2.2	2.2	0
Construct New Lattice Steel Tower (2)	2	220' x 220'	2.2	1.7	0.5
Construct New Steel H-Frame Pole (2)	4	200' x 200'	3.7	3.4	0.3
Construct New Gen-Tie Structure (2)	1	220' x 220'	1.1	0.9	0.3
220kV Conductor Stringing Area (3)	6	400' x 150'	8.3	8.3	0
Install Underground Ground Wire (4)	1,100	linear feet x 15' wide	0.4	0.4	0
Existing Tower Work Area	2	100' x 100'	0.5	0.5	0
New Access Roads / Road Widening (5)		Varies	1.0	0	1.0
Access Road & Tower Buffers		Varies	1.3	1.3	0
Material & Equipment Staging Yard - (Calcite)	1	approx. 2 acres	2	2	0
<b>Total Estimated Disturbance Acreage (6)</b>			<b>23.3</b>	<b>21.3</b>	<b>2.0</b>

**Notes:**

1. Includes the removal of existing conductor, teardown of existing structure, and removal of foundation 2' below ground surface.
2. Includes structure assembly & erection, conductor & OHGW installation. Area to be restored after construction. Portion of R/W within 20' of ALL structures to remain cleared of vegetation. Permanently disturbed areas for H-Frame/3-Pole=0.08 acre.
3. Based on standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.
4. Based on a required ground wire needed between structures underneath the existing 500kV T/Ls.
5. Based on a combination of widening existing roads and constructing new roads to a drivable road width of 14'-22' w/ 2' of berm on each side of road.
6. The disturbed acreage calculations are estimates based upon SCE's preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE's Construction Manager and/or Contractor awarded project.

**Foundation / Base Volume and Area Calculations (approximate):**

LST: 4 per structure, 32-ft deep, 3.5-ft diameter; Earth removed for footings = 45.6 cu.yds; Surface area = 38.5 sqft

H-Frame: 2 per structure, 30-ft deep, 6-ft diameter; Earth removed for footings = 62.8 cu.yds; Surface area = 56.5 sqft



## **Construction Site Cleanup**

Any damage to existing roads as a result of construction would be repaired once construction is complete.

SCE would restore all areas that are temporarily disturbed by project activities (including the staging yard, pull and tension sites, and structure laydown and assembly sites) to preconstruction conditions following the completion of construction.

Restoration may include grading and restoration of sites to original contours and reseeding where appropriate. In addition, all construction materials and debris would be removed from the area and recycled or properly disposed of at an off-site disposal facility in accordance with all applicable laws. SCE would conduct a final inspection to ensure that cleanup activities are successfully completed.

## **Operations and Maintenance**

Operations and Maintenance (O&M) activities are necessary to ensure reliable service, as well as the safety of the utility worker and the general public, as mandated by the CPUC. SCE facilities are subject to Federal Energy Regulatory Commission jurisdiction. SCE transmission facilities are under operational control of the California Independent System Operator.

The transmission lines would be maintained in a manner consistent with CPUC G.O. 95 and G.O. 128 as applicable. Normal operation of the lines would be controlled remotely through SCE control systems and manually, in the field, as required. SCE inspects overhead transmission facilities in a manner consistent with CPUC G. O. 165 a minimum of once per year via ground and/or aerial observation, but this usually occurs more frequently based on system reliability.

Maintenance is performed as needed to maintain circuit reliability. A majority of regular O&M activities related to overhead facilities are performed from existing access roads with no surface disturbance. These activities could include repairing/re-stringing conductors to repair damage, washing/replacing insulators, repairing/replacing hardware components, replacing poles/towers, tree trimming, brush and weed control, and access road maintenance. Repairs to existing facilities, such as repairing/replacing existing poles/towers or conductor re-stringing, could occur in undisturbed areas.

Routine access road maintenance is conducted on an annual and/or as-needed basis to maintain a vegetation-free corridor to facilitate access to existing facilities and to aid in fire prevention. Road maintenance activities could include: blading to smooth over washouts, eroded areas, and washboard surfaces; cleaning ditches; moving/establishing



berms; clearing/installing functional drain inlets to culverts; repairing culverts; clearing/establishing water bars; and cleaning/repairing over-side drains. Access road maintenance could include the repair, replacement and/or installation of storm water diversion devices on an as-needed basis.

O&M activities could also include brushing activities in order to maintain vegetation-free access roads and clearances around electrical lines. Brushing (*i.e.*, trimming or shrub removal) approximately two-five feet beyond road's edge or berm is necessary to keep vegetation from intruding into the roadway. In addition, the clearance of brush and weeds around pole and transmission tower pads is necessary for fire protection and may be required by applicable regulations on fee owned ROWs. In accordance with Public Resources Code section 4292, a 10-foot radial clearance around non-exempt poles (as defined by California Code of Regulations Title 14, Article 4) and a 25- to 50-foot radial clearance around non-exempt towers (as defined by California Code of Regulations Title 14, Article 4) would be maintained.

In addition to regular O&M activities, emergency repairs could be required at any time. SCE conducts a wide variety of emergency infrastructure repairs due to damage resulting from high winds, storms, fires, and other natural disasters and accidents. Such repairs could include replacement of towers, poles, or conductors.

## Labor and Equipment

Construction would be performed by SCE Crews or its contract personnel. The estimated number of persons and types of equipment required for each phase of transmission line construction is shown in Table SCE - 5 below.

**Table SCE - 5**

<b>CALCITE SUBSTATION PROJECT CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN &amp; GEN-TIE</b>							
<b>WORK ACTIVITY</b>				<b>ACTIVITY ESTIMATES</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
<b>Survey (1)</b>				<b>4</b>	<b>4</b>		<b>4 Miles</b>
1-Ton Truck, 4x4	300	Gas	2		4	8	1 Mile
<b>Staging/Material Yard (2)</b>				<b>4</b>			<b>1 Yard</b>
1-Ton Truck, 4x4	300	Gas	2			4	
R/T Forklift	125	Diesel	1		Duration of Project	4	
Ranger	50	Diesel	1			4	
Generator	49	Diesel	1			8	

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN & GEN-TIE**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Water Truck	300	Diesel	2			8	
<b>Road Work &amp; Structure Pads (3)</b>				<b>5</b>	<b>6</b>		<b>2 Miles &amp; 7 Pads</b>
1-Ton Truck, 4x4	300	Gas	1		6	8	
Backhoe/Front Loader	125	Diesel	1		6	4	
Tracked Dozer	150	Diesel	1		6	8	
Motor Grader	250	Diesel	1		6	8	
Water Truck	300	Diesel	2		6	8	
Drum Compactor	100	Diesel	1		6	4	
Excavator	250	Diesel	1		2	4	
Lowboy Truck/Trailer	450	Diesel	1		6	2	
<b>Guard Structure Installation (4)</b>				<b>6</b>	<b>2</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		2	8	
Compressor Trailer	60	Diesel	1		2	4	
Manlift/Bucket Truck	250	Diesel	1		2	4	
Boom/Crane Truck	350	Diesel	1		2	8	
Auger Truck	210	Diesel	1		2	4	
Flat Bed Truck	400	Diesel	1		2	8	
<b>Conductor &amp; GW Removal (5)</b>				<b>14</b>	<b>4</b>		<b>9,250 Feet</b>
1-Ton Truck, 4x4	300	Gas	4		4	4	
Manlift/Bucket Truck	250	Diesel	2		4	8	
Boom/Crane Truck	350	Diesel	2		4	8	
Puller	350	Diesel	1		4	8	
Static Truck/Tensioner	350	Diesel	1		4	8	
Dump/Stake Bed Truck	350	Diesel	1		4	8	
<b>LST Removal (6)</b>				<b>6</b>	<b>4</b>		<b>2 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		4	4	
Compressor Trailer	60	Diesel	1		4	8	
R/T Crane (L)	275	Diesel	1		4	8	
Dump Truck	350	Diesel	1		4	8	
Flat Bed Truck	400	Diesel	1		4	2	
<b>LST Foundation Removal (7)</b>				<b>4</b>	<b>2</b>		<b>2 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		2	4	
Compressor Trailer	60	Diesel	1		2	8	

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN & GEN-TIE**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Backhoe/Front Loader	125	Diesel	1		2	8	
Dump Truck	350	Diesel	1		2	8	
Excavator	250	Diesel	1		2	2	
<b>LST Foundation Installation (8)</b>				<b>7</b>	<b>12</b>		<b>3 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		12	4	
Boom/Crane Truck	350	Diesel	1		12	4	
Backhoe/Front Loader	125	Diesel	1		12	8	
Drill Rig	275	Diesel	1		6	8	
Dump Truck	350	Diesel	1		12	4	
Concrete Truck	350	Diesel	3		6	6	
<b>LST Steel Haul (9)</b>				<b>4</b>	<b>3</b>		<b>3 Structures</b>
1-Ton Truck, 4x4	300	Gas	1		3	8	
R/T Forklift	125	Diesel	1		3	4	
Flat Bed Truck	400	Diesel	1		3	8	
<b>LST Steel Assembly (10)</b>				<b>10</b>	<b>12</b>		<b>3 Structures</b>
1-Ton Truck, 4x4	300	Gas	3		12	4	
Compressor Trailer	60	Diesel	1		12	8	
R/T Forklift	125	Diesel	1		12	8	
R/T Crane (M)	215	Diesel	1		12	4	
<b>LST Erection (11)</b>				<b>12</b>	<b>12</b>		<b>3 Structures</b>
1-Ton Truck, 4x4	300	Gas	4		12	4	
Compressor Trailer	60	Diesel	1		12	8	
R/T Crane (L)	275	Diesel	1		8	8	
Crane	400	Diesel	1		4	8	
<b>H-Frame Foundation Installation (12)</b>				<b>6</b>	<b>24</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		24	4	
Boom/Crane Truck	350	Diesel	1		24	4	
Backhoe/Front Loader	125	Diesel	1		24	8	
Drill Rig	275	Diesel	1		16	8	
Water Truck	300	Diesel	1		24	8	
Dump Truck	350	Diesel	1		24	8	
Concrete Truck	350	Diesel	3		12	6	
<b>H-Frame Haul (13)</b>				<b>4</b>	<b>3</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	1		3	8	

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN & GEN-TIE**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Boom/Crane Truck	350	Diesel	1		3	4	
Flat Bed Truck	400	Diesel	1		3	8	
<b>H-Frame Assembly (14)</b>				<b>6</b>	<b>5</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		5	4	
Compressor Trailer	60	Diesel	1		5	8	
Manlift/Bucket Truck	250	Diesel	1		5	8	
R/T Crane (L)	275	Diesel	1		5	8	
<b>H-Frame Erection (15)</b>				<b>6</b>	<b>5</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		5	4	
Compressor Trailer	60	Diesel	1		5	4	
Manlift/Bucket Truck	250	Diesel	1		5	8	
Crane	400	Diesel	1		5	8	
<b>220kV Conductor &amp; OHGW Installation (16)</b>				<b>28</b>	<b>7</b>		<b>37,250 Feet</b>
1-Ton Truck, 4x4	275	Gas	8		7	4	
Manlift/Bucket Truck	250	Diesel	4		7	8	
Boom/Crane Truck	350	Diesel	2		7	8	
R/T Crane (M)	215	Diesel	2		7	4	
Dump Truck	350	Diesel	1		7	4	
Wire Truck/Trailer	350	Diesel	2		7	8	
Sock Line Puller	300	Diesel	1		3	8	
Bullwheel Puller	350	Diesel	1		5	8	
Static Truck/Tensioner	350	Diesel	1		7	8	
R/T Forklift	125	Diesel	1		7	8	
Spacing Cart	10	Diesel	3		2	8	
Backhoe/Front Loader	125	Diesel	1		5	4	
Sag Cat w/ Winches	350	Diesel	2		7	2	
Water Truck	300	Diesel	1		7	8	
Lowboy Truck/Trailer	450	Diesel	2		7	2	
<b>UG Ground Wire Installation (17)</b>				<b>4</b>	<b>6</b>		<b>1,100 Trench Feet</b>
1-Ton Truck, 4x4	275	Gas	1		6	4	
Backhoe/Front Loader	125	Diesel	1		6	8	
Dump Truck	350	Diesel	1		6	8	
Water Truck	300	Diesel	1		6	8	
<b>Guard Structure Removal (18)</b>				<b>6</b>	<b>2</b>		<b>4 Structures</b>

**CALCITE SUBSTATION PROJECT  
CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY  
CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN & GEN-TIE**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
1-Ton Truck, 4x4	300	Gas	2		2	8	
Compressor Trailer	60	Diesel	1		2	4	
Manlift/Bucket Truck	250	Diesel	1		2	4	
Boom/Crane Truck	350	Diesel	1		2	8	
Flat Bed Truck	400	Diesel	1		2	8	
<b>Restoration (19)</b>				<b>7</b>	<b>6</b>		<b>3 Miles</b>
1-Ton Truck, 4x4	300	Gas	2		6	4	
Backhoe/Front Loader	125	Diesel	1		6	8	
Motor Grader	250	Diesel	1		6	4	
Water Truck	300	Diesel	1		6	8	
Drum Compactor	100	Diesel	1		6	4	
Lowboy Truck/Trailer	450	Diesel	1		6	2	

**Crew Size Assumptions For:**

- 1) Survey = one 4-man crew
- 2) Staging/Material Yards = one 4-man crew per yard
- 3) Roads & Pad Work = one 5-man crew
- 4) Guard Structure Installation = one 6-man crew
- 5) Conductor/GW Removal = one 14-man crew
- 6) LST Removal = one 6-man crew
- 7) LST Foundation Removal = one 4-man crew
- 8) LST Foundation Installation = one 7-man crew
- 9) LST Steel Haul = one 4-man crew
- 10) LST Steel Assembly = one 10-man crew
- 11) LST Erection = one 12-man crew
- 12) H-Frame Foundation Installation = one 6-man crew
- 13) H-Frame Haul = one 4-man crew
- 14) H-Frame Assembly = one 6-man crew
- 15) H-Frame Erection = one 6-man crew
- 16) Conductor & GW Installation = one 28-man crew
- 17) UG Ground Wire Installation = one 4-man crew
- 18) Guard Structure Removal = one 6-man crew
- 19) Restoration = one 7-man crew

### **III. DISTRIBUTION SYSTEM FOR STATION LIGHT AND POWER**

An extension of a 12 kV distribution circuit would be required to provide temporary power for construction and permanent station light and power for Calcite Substation. Based on instructions from NextEra<sup>3</sup>, the site development plan for Ord Mountain Solar Project calls for an existing 12 kV line. Per the plan, the existing circuitry is proposed to be extended approximately 1,700 feet along the north side of Haynes Road, traveling west to the intersection of Haynes Road and Fern Road. The circuitry will then travel north along Fern Road to the NextEra site.

The Calcite Substation Project calls for extending the 12 kV distribution circuit overhead westward on Haynes Road originating at the intersection of Haynes Road and Fern Road. The 12kV distribution circuitry would be extended for approximately 700 feet by installing approximately 6 wood poles. See Figure SCE-6 POLE CONFIGURATION, and Figure SCE-7 POLE AND CROSSARM CONFIGURATION WITH RAPTOR GUARD.

The 12 kV distribution circuit would then extend underground heading west along Haynes Road under the existing California Highway 247 and transmission ROW and then turn north along the Calcite Substation driveway and into Calcite Substation. The total underground circuit extension length would be approximately 1700 ft. of which 1400 hundred feet is forecasted to have surface disturbance - See Figure SCE-1 PROPOSED CALCITE SUBSTATION AND TELECOMMUNICATION LINES. These new facilities would also be utilized for installation of the required telecommunication fiber optic cables into Calcite Substation (described below in Section IV. Telecommunication Facilities).

The overhead conductor size is proposed to be 1/0 ACSR and the underground cable size is proposed to be a 1/0 aluminum jacketed concentric neutral cable. Circuit modification may be required to provide support for voltage regulating requirements such as new capacitors or voltage regulators. A pad-mount transformer would be installed on the Calcite Substation Property outside the Calcite Substation for temporary construction power. Additionally, new station light and power transformers would be installed within the Calcite Substation fence.

Materials needed for distribution construction activities would be stored at the proposed staging yard within the Calcite Substation Property described above. Two line trucks with three-person crews (6 people total) would be called upon to perform the work.

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<sup>3</sup> NextEra has applied for distribution service for Station Light and Power and construction power to their facility. It is assumed that the distribution line extension for the Ord Mountain Solar Project SL&P will be built prior to the distribution line extension for Calcite Substation SL&P. This is because the circuit extension along the north side of Haynes Road and east of Fern Road will be extended to serve both sites.

## **Construction Activities for Distribution Lines and Related Structures**

For the locations that require overhead construction, components would be shipped by truck to the staging yard and then trucked to the individual sites. Poles and associated equipment would then be erected along the required routes. The permanent ground disturbance for each pole installation would be approximately 4.9 sq. ft. per pole and 0.1 sq. ft. per pole anchor. At some structure locations, vegetation may be removed and/or trimmed to accommodate the installation of overhead and/or underground distribution facilities.

Wire stringing includes all activities associated with installation of the distribution circuit conductors onto the distribution poles. This would include the installation of primary conductor, insulators, and dead-end hardware assemblies. These installations may also include vibration dampeners, weights, spacers and fault indicators. Insulators and stringing sheaves (rollers or travelers) may be attached to the conductors as part of the stringing activity, during the distribution pole erection process. The dimensions of the area needed for the stringing setups associated with conductor installation will vary depending on structure height and terrain conditions, but will not extend beyond the limits of the temporary construction use areas. At some wire stringing locations, vegetation may be removed and/or trimmed to accommodate the wiring stringing process.

For the locations that require the construction of a trench or underground structure, excavation activities would generally be done using a backhoe. The anticipated dimensions for the trench would be approximately 24 inches wide by approximately 51 inches deep, and by the lengths identified earlier in this section. Shields or trench shoring would then be temporarily installed for safety to brace the walls of the trench. The conduits would then be installed using spacers to create a duct bank consisting of two columns of three stacked 5-inch conduits apiece. The temporary shoring would be removed.

Underground structure excavation would typically be a maximum of three feet greater than the structure's width and length dimensions, as well as a maximum of four feet deeper than the structure's height. The backhoe would be used to place the excavated soil into the dump truck to haul away. The area of disturbance would be approximately 30 feet on either side of trench and on all sides of the underground structures. The conduits would then be encased in concrete with a minimum encasement of three inches on all sides. After the concrete encasement has hardened, the trench would be backfilled with 1.5 sack and sand slurry (which is a mix of sand and water with 1.5 bags of cement added with no aggregate). If repaving is necessary, this work would be performed in accordance with San Bernardino County permit requirements. Precast underground structures would typically be installed and backfilled with slurry.

**Table SCE - 6**

<b>DISTRIBUTION SYSTEM CONSTRUCTION ACTIVITIES CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT DISTRIBUTION LINE EXTENSION FOR STATION LIGHT &amp; POWER</b>							
<b>WORK ACTIVITY</b>				<b>ACTIVITY PRODUCTION</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install Down Guys (2)</b>				<b>6</b>	<b>2</b>		<b>Approx 2 Down Guys</b>
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		2	8	1 Down Guy /Day
Bucket Truck	300	Diesel	1		2	8	
<b>Install New Poles (2)</b>				<b>6</b>	<b>3</b>		<b>6 Wood Poles</b>
1-Ton Pick-up Truck, 4x4	300	Diesel	2		3	8	2-Wood Pole/Day
30-Ton Crane Truck	300	Diesel	1		3	8	
Bucket Truck	300	Diesel	2		3	8	
40' Flat Bed Truck/ Trailer	350	Diesel	1		3	8	
<b>Install Overhead Wire (2)</b>				<b>6</b>	<b>1</b>		<b>700 Circuit Feet</b>
1-Ton Crew Cab Pick-up Truck, 4x4	300	Diesel	1		1	8	1,000 feet / Day
55' Double Bucket Truck	350	Diesel	1		1	8	
<b>Underground Cable Pulling (3) &amp; Transformer Installation</b>				<b>4</b>	<b>2</b>		<b>1,700 Circuit Feet</b>
1 - Ton Pick-up Truck, 4x4	300	Diesel	1		2	8	1,000 feet/Day
55' Double Bucket Truck	350	Diesel	1		2	8	
Hydraulic Rewind Puller	300	Diesel	1		2	8	

<b>DISTRIBUTION SYSTEM CONSTRUCTION ACTIVITIES CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT DISTRIBUTION LINE EXTENSION FOR STATION LIGHT &amp; POWER</b>							
<b>WORK ACTIVITY</b>				<b>ACTIVITY PRODUCTION</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Underground Cable Makeup (4)</b>				<b>3</b>	<b>2</b>		



1- Ton Crew Cab, 4x4	300	Diesel	1	2	8	
55' Double Bucket Truck	350	Diesel	1			
<b>Underground Trenching, Structure Excavation Conduit</b>				<b>4</b>	<b>3</b>	<b>Approx. 1,400 ft.</b>
1-Ton Pick-up Truck, 4x4	300	Diesel	1	3	8	500 ft./Day
Backhoe/Front Loader	200	Diesel	1	3	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1	3	8	
4000 gallon Water Truck	350	Diesel	1	3	8	
Concrete Truck	350	Diesel	1	3	8	
<b>Underground Boring, Casing and Conduit Installation</b>				<b>4</b>	<b>3</b>	<b>Approx. 300 ft.</b>
1-Ton Pick-up Truck, 4x4	300	Diesel	1	3	8	100 ft./Day
Backhoe/Front Loader	200	Diesel	1	3	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1	3	8	
Excavation and Boring Equipment	300	Diesel	1	3	8	
<b>Restoration (4)</b>				<b>7</b>	<b>1</b>	<b>1,400 feet</b>
1-Ton Crew Cab, 4x4	300	Diesel	2	1	2	1 Mile/Day
Water Truck	300	Diesel	1	1	8	

Project Feature	Project Qty.	Disturbed Acreage Calculation	Construction Disturbance Acreage	Temporary Disturbance Acreage	Acres Permanently Disturbed
Underground trench/duct for conduit	1	1,200 ft. x 2 ft.	0.055	0.055	0
Underground construction equipment work space	1	1,200 ft. x 28 ft.	0.771	0.771	0
Distribution line excavation pits	5	10 ft. x 24 ft.	0.0275	0.0275	0
Underground Highway crossing	1	No surface disturbance	No surface disturbance	No surface disturbance	No surface disturbance
Distribution line vault covers	3	4 ft. x 5 ft.	0.0005	0	0.0005
New Poles	12	2.5 ft. diameter (5.0 sq. ft.)	0.005	0	0.005
Down Guys	2	1 ft. x 1.25 ft.	0.0002	0	0.0002

Overhead construction equipment work space	1	125 ft. x 60 ft.	0.172	0.172	0
<b>Total Estimated Disturbance Acreage</b>			<b>1.0237</b>	<b>1.018</b>	<b>0.0057</b>

<b>Distribution System for Station Light &amp; Power</b>	
Distribution Circuit Extension Length (Proposed)	2,100 ft. (0.5 miles approximately)
Total Length Underground (U.G.)	1,400 ft.
-New U.G. Conduits Needed	1,400 ft
Total Length Overhead (O.H.)	700 ft.
-New Poles – O.H.	700 ft.
-New Poles Required	6
New Down Guys Required	2
Time and Resources to Construct(4 men per crew)	17 Crew Days
Total Man Days Required	80 Man Days

<b>Crew Size Assumptions:</b>
1. Trenching and Conduit Installation = one 4-man crew
2. Overhead Line Work = one 3-man crew
3. Underground Cable Makeup = one 3-man crew
4. Underground Cable Pulling = one 4-man crew
5. Pole replacement crew = one 4-man crew

## **IV. TELECOMMUNICATION FACILITIES**

A telecommunication system would be required in order to provide monitoring and remote operation capabilities of the electrical equipment at Calcite Substation, transmission line protection, and Remedial Action Scheme (or “RAS”).

The SCE telecommunication facilities expected to be constructed as part of the Calcite Substation Project would include two approximately 1-mile long fiber optic cables to the nearest splice points on an OPGW that is expected to already be in place on the 500kV Lugo-Mohave T/L by the time any work associated with the Calcite Substation Project commences.<sup>4</sup> See Figure SCE-1 PROPOSED CALCITE SUBSTATION AND TELECOMMUNICATION LINES.

The first proposed fiber optic cable would start from Calcite Substation and would be installed along the new 12 kV distribution path as previously described in Section III, including the new underground section under Haynes road, and the overhead along 12 new poles. The proposed line turns north along an un-named dirt road for approximately 1,100 feet attaching to existing wood poles and arriving at the Barstow Repeater Communication Site (“CS”). The line would drop down into a new riser and continues underground for approximately 150 feet into an existing communication room within the CS.

The second proposed fiber optic cable would start from Calcite Substation and exit the substation to the south for approximately 400 feet in new underground conduit and then turn east onto Haynes Road for approximately 1,200 feet. The conduit would turn southwest on an existing access road for approximately 4,000 feet and then turn northwest to get to tower M29-T3 on the Lugo-Mohave T/L where the existing splice box is located. This underground conduit route would be built exclusively for telecommunications use.

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<sup>4</sup> That OPGW is expected to be in place as a result of the anticipated completion of SCE’s anticipated Eldorado Lugo Mohave (“ELM”) Series Capacitors project. The ELM Series Capacitors project is a distinct and independent project being separately undertaken by SCE that has independent utility from the Calcite Substation Project. Completion and operation of the ELM Series Capacitors project would include OPGW which would be tapped in order to connect to the proposed Calcite Substation. Similarly, SCE also has another distinct and independent project with telecommunications equipment that, if constructed, would obviate the need to construct any other telecommunication facilities to support the Calcite Substation, namely, the Lugo-Victorville 500 kV Transmission Line Special Protection Scheme (“SPS”) Project. In fact, SCE has already submitted a Standard Form 299 application to the U.S. Bureau of Land Management for authorization to complete the Lugo-Victorville 500 kV Transmission Line SPS Project, which also has independent utility from the Calcite Substation Project. Assuming that both the ELM Series Capacitors project and the Lugo-Victorville 500 kV Transmission Line SPS Project currently planned by SCE are constructed and placed into operation prior to the operation of Calcite Substation, SCE would not need to construct any further telecommunication facilities to support the Calcite Substation (other than the two 1-mile taps described above).

## **Telecommunication Gen-Tie Cables**

The first proposed telecommunication gen-tie cable route will be an OPGW fiber optic cable. The line would start from Calcite Substation and exit the substation to the north for approximately 200 feet attaching to a transmission overhead structure. From there the proposed line would turn east for approximately 900 feet overhead, attaching to a NextEra owned transmission tower. At the NextEra tower, the line would drop down the tower leg and enter a splice enclosure. The splice enclosure would be considered the demarcation vault where an SCE telecom crew would connect the SCE fiber with a 100 foot coil of fiber that NextEra will leave in the enclosure. The 2 fibers would be spliced together and the splice case would remain in the enclosure. The excess cable would be coiled up and wrapped around the outside of the enclosure. See Figure SCE-9: PROPOSED GEN-TIE DESIGN.

The redundant telecommunication gen-tie cable route would start at Calcite Substation and exit the substation underground to the east for approximately 50 feet entering an SCE manhole. From there the proposed line would turn north/east for approximately 450 feet underground and will enter a demarcation vault. At the demarcation vault an SCE telecom crew will connect the SCE fiber with a 100 foot coil of fiber that NextEra will leave in the vault. The 2 fibers will be spliced together, placed inside a splice enclosure, and left inside the vault.

The above description is based on our preliminary design and would be finalized as part of final engineering.

## **Telecommunications Equipment**

- New overhead/underground 96-strand fiber optic cable to connect the Calcite Substation to Barstow Repeater CS. New overhead/underground 96-strand fiber optic cables to connect Calcite Substation to an existing splice box on M29-T3 on Lugo Mohave 500kV T/L.
- The Calcite Substation MEER would also include a communication room for telecommunication equipment. The communication room would be equipped with AC power, AC-DC rectifiers, DC power, battery, overhead cable tray, redundant air conditioners, fiber terminating shelves, lightwave terminals, microwave terminals, channel equipment, communications alarm/switch equipment, data equipment and diverse fiber entry conduits for connection to outside plant fiber optic cables.
- New fiber optic multiplex equipment and channel equipment at Lugo, Pisgah, Victor, Kramer and Gale Substations and any other location necessary to support the communication requirements for the Calcite Substation Project.

- Replacement of existing poles if required, to be determined by final engineering.

## **Laydown Areas and Access Roads**

Laydown areas may include the following existing SCE facilities;

- Victorville Service Center - Hesperia Rd, Victorville
- Apple Valley Sub – Deep Creek Rd, Apple Valley
- Calcite Substation Property – Barstow Rd. (Hwy. 247), Lucerne Valley
- Barstow Service Center – Rimrok Rd, Barstow

## **Construction Activities**

SCE or its contractor crews would use standard construction methods to construct the required fiber optic cables. The crews would comply with all rules, regulations and standards while in their performance of the construction phase. Portions of the fiber optic cable would be constructed on existing overhead distribution and transmission wood and light duty steel poles. In addition, portions of the cable would be constructed on new overhead structures and newly constructed underground conduit system(s), subject to determination through final engineering. This project description is based on planning level assumptions. Exact details would be determined following completion of preliminary and final engineering, identification of field conditions, availability of labor, material, and equipment, and compliance with applicable environmental and permitting requirements.

Generally no hazardous material would be used in installing underground conduit, new wood communication poles, and the stringing of fiber-optic cables. There is generally no need for local services or utilities (such as water). Waste generated (which typically would include empty cable reels, cut-off pieces of fiber cable) would be disposed of at existing SCE facilities.

The cable crew would use existing roads or previously established roads to proceed with the function of cable installation when possible. Workforce estimates, equipment details, and disturbance totals are provided in Tables SCE – 7A through – 7H.

## **All Dielectric Self Supporting (ADSS) Installation on Poles**

The overhead fiber optic cable would be installed by attaching cross arms on distribution poles. This would require the use of a bucket truck. One four-man crew and two trucks would be used. A crew can install up to 2,000 feet of cable in one day. A crew can complete three splices in one day.

Overhead ADSS stringing includes all activities associated with the installation of cables onto cross arms on existing wood pole structures. This activity includes the installation of vibration dampeners, and suspension and dead-end hardware assemblies. Stringing sheaves (rollers or travelers) are attached during the framing process. A standard wire

stringing plan includes a sequenced program of events starting with determination of cable pulls and cable pulling equipment set-up positions. Advanced planning by supervision determines pulling locations, times, and safety protocols needed for ensuring that safe and quick installation of cable is accomplished.

Fiber optic cable pulls typically occur every 1,000 feet to 2,000 feet over flat or mountainous terrain. Fiber optic cable splices are required at the ends of each cable pull. Fiber optic cable pulls are the length of any given continuous cable installation process between two selected points along the existing overhead or underground structure line. Fiber optic cable pulls are selected, where possible, based on availability of pulling equipment and designated dead-end structures at the ends of each pull, geometry of the line as affected by points of inflection, terrain, and suitability of fiber optic cable stringing and splicing equipment set ups. The dimensions of the area needed for stringing set ups varies depending upon the terrain; however, a typical stringing set up is 40 feet by 60 feet. Where necessary due to space limitations, crews can work from within a smaller area.

Distribution line poles would be replaced or inter-set poles would be installed if the pole does not meet wind load or ground clearance requirements with addition of fiber cable. Replacing distribution line pole requires a five-man crew, one pole trailer truck, one pole digger truck, and one crew truck. An approximate 30-foot x 40-foot work area is required for the work. A hole about eight feet in depth would be drilled next to the existing pole, and a new pole would be erected. A conductor would be transferred from the existing pole to the new pole and the old pole would be cut or removed.

### **Installation in Conduit**

For the installation of the fiber optic cable in existing and new underground conduit, a high density polyethylene smooth wall innerduct would be used. Innerduct facilitates the installation of the fiber optic cable, provides protection, and helps identify the cable. The innerduct is installed first inside the conduit. The fiber optic cable is then installed inside the innerduct. For splicing OPGW cables, special Outside Plant Splicing Lab Vehicles and Foreman Trucks would be used. The work space required would be an approximately 30-foot by 40-foot area. The crew would bring the OPGW cable ends into the Splice Labs and splice together the two ends. After the cables are spliced, the splice case would be placed inside the OPGW splice cabinet. The slack loop would be coiled around the back of the cabinet.

### **Operation and Maintenance**

Following the completion of project construction, operation of the new telecommunication facilities would commence. Inspection and maintenance activities would occur at least once per year. The frequency of inspection and maintenance activities would be on an as-needed basis.

**Table SCE – 7A:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**Construct Barstow Repeater CS - Calcite Fiber Optic Cable**

<b>Work Activity</b>				<b>Activity Production</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install 5 foot Crossarm(1)</b>				<b>4</b>	<b>3</b>		<b>4,500 ft</b>
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		3	8	24 Crossarms /Day
Bucket Truck	300	Diesel	2		3	8	
<b>Install Down Guys</b>				<b>2</b>	<b>1</b>		<b>Approx 2 Down Guys</b>
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		1	4	1 Down Guy /Day
Bucket Truck	300	Diesel	1		1	4	
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>2</b>		<b>2 Circuit Miles</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		2	8	3,000 ft./Day
Bucket Truck	350	Diesel	2		2	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>4</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	8	4	
<b>Underground Conduit</b>				<b>5</b>	<b>2</b>		<b>Approx. 150 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		2	8	100 ft./Day
Backhoe/Front Loader	200	Diesel	1		2	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		2	8	
4000 gallon Water Truck	350	Diesel	1		2	8	
Concrete Truck	350	Diesel	1		1	8	<b>700 ft.</b>
<b>Restoration (4)</b>				<b>7</b>	<b>1</b>		<b>2 Miles</b>
1-Ton Crew Cab, 4x4	300	Diesel	2		1	2	1 Mile/Day
Water Truck	300	Diesel	1		1	8	

**Table SCE – 7B:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**Construct Calcite tap to M29-T3 splice on OPGW**

<b>Work Activity</b>				<b>Activity Production</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>8</b>		<b>2 Circuit Miles</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		8	8	3,000 ft./Day

Bucket Truck	350	Diesel	2		8	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>4</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	8	4	
<b>Underground Conduit</b>				<b>5</b>	<b>28</b>		<b>Approx. 6,000 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		28	8	200 ft./Day
Backhoe/Front Loader	200	Diesel	1		28	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		28	8	
4000 gallon Water Truck	350	Diesel	1		28	8	
Concrete Truck	350	Diesel	1		4	8	<b>700 ft.</b>
<b>Restoration (4)</b>				<b>7</b>	<b>34</b>		<b>2 Miles</b>
1-Ton Crew Cab, 4x4	300	Diesel	2		34	2	1 Mile/Day
Water Truck	300	Diesel	1		34	8	

**Table SCE - 7C:  
Telecommunication Fiber Optic Cable Summary**

	<b>Calcite to Repeater</b>		<b>Calcite to M29-T3</b>
Fiber-Optic Cable Length (Proposed)	4,500 ft. (1 mile)		5,600 ft. (1 mile)
Total Length Underground (U.G.)	1,700 ft.		5,600 ft.
-Existing U.G. Conduits	0 ft.		0 ft.
-New U.G. Conduits Needed	1,700 ft.		5,600 ft.
Total Length Overhead (O.H.)	2,800 ft.		0ft.
-On Existing Poles - O.H.	800 ft.		0 ft.
-On New Poles – O.H.	2,000 ft.		0 ft.
-Existing Poles	4		0
-New Poles Required	12		0
New Down Guys Required	2		0
Time and Resources to Construct(4 men per crew)	13 Crew Days		78 Crew Days
Total Man Days Required	52 Man Days		213 Man Days

**Table SCE – 7D:  
Telecommunication Ground Disturbance Calculations Table SCE – 7D:  
Telecommunication Ground Disturbance Calculations**

<b>Telecommunication Route Project Feature</b>	<b>Qty.</b>	<b>Disturbed Acreage Calculation</b>	<b>Acres Disturbed During Construction</b>	<b>Acres To Be Restored</b>	<b>Acres Permanently Disturbed</b>
Calcite – M29-T3					
Trenching	1	3ft X 5,600	.38 (16,800 sq. ft.)	.38 (16,800 sq. ft.)	.38 (16,800 sq. ft.)



**Table SCE – 7E:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**OPGW Gen-Tie Fiber Optic Cable**

Work Activity	Estimated Horse- Power	Probable Fuel Type	Primary Equipment Quantity	Activity Production		Duration of Use (Hrs/Day)	Estimated Production Per Day
Primary Equipment Description				Estimated Workforce	Estimated Schedule (Days)		
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>1</b>		<b>1,100 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		1	8	1,100 ft./Day
Bucket Truck	350	Diesel	2		1	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>2</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	2	8	

**Table SCE – 7F:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**Redundant Gen-Tie Fiber Optic Cable**

Work Activity	Estimated Horse- Power	Probable Fuel Type	Primary Equipment Quantity	Activity Production		Duration of Use (Hrs/Day)	Estimated Production Per Day
Primary Equipment Description				Estimated Workforce	Estimated Schedule (Days)		
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>1</b>		<b>500 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		1	8	500 ft./Day
Bucket Truck	350	Diesel	2		1	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>2</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	2	4	
<b>Underground Conduit</b>				<b>5</b>	<b>5</b>		<b>Approx. 500 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		5	8	100 ft./Day
Backhoe/Front Loader	200	Diesel	1		5	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		5	8	

4000 gallon Water Truck	350	Diesel	1	5	8	
Concrete Truck	350	Diesel	1	5	8	500 ft.
<b>Restoration (4)</b>			<b>7</b>	<b>1</b>		<b>500 ft.</b>
1-Ton Crew Cab, 4x4	300	Diesel	2	1	2	
Water Truck	300	Diesel	1	1	8	

**Table SCE – 7G:  
Telecommunication Fiber Optic Gen-Tie Cable Summary**

	OPGW Gen-Tie		Redundant Gen-Tie
Fiber-Optic Cable Length (Proposed)	1,100 ft.		500 ft.
Total Length Underground (U.G.)	0 ft.		500 ft.
-Existing U.G. Conduits	0 ft.		0 ft.
-New U.G. Conduits Needed	0 ft.		500 ft.
Total Length Overhead (O.H.)	1,100 ft.		0ft.
-On Existing Poles - O.H.	0 ft.		0 ft.
-On New Poles – O.H.	0 ft.		0 ft.
-Existing Poles	0		0
-New Poles Required	0		0
New Down Guys Required	0		0
Time and Resources to Construct(4 men per crew)	3 Crew Days		9 Crew Days
Total Man Days Required	12 Man Days		36 Man Days

**Table SCE –7H:  
Telecommunication Gen-Tie Ground Disturbance Calculations**

Telecommunication Route Project Feature	Qty.	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres To Be Restored	Acres Permanently Disturbed
Redundant Gen-Tie	1	3ft X 500	.03 (1,600 sq. ft.)	.03 (1,600 sq. ft.)	.03 (1,600 sq. ft.)

## **V. PROJECT ALTERNATIVE**

As a result of the project screening process, SCE identified one substation site alternative (“Alternative Substation Property”). See Figure SCE-2 CALCITE PROPOSED AND ALTERNATIVE SUBSTATION PROPERTY BOUNDARIES. Below are project components that would differ if the Alternative Substation Property were utilized instead of the proposed Calcite Substation Property.

### **Alternative Substation Property Location**

The Alternative Substation Property is located on approximately 40 acres of land on the west side of California State Highway 247 in the County of San Bernardino. The substation would be constructed within the central portion of the parcel. Access to Highway 247 is anticipated to be provided via Haynes Road south of the substation property. The road is a combination of building new and improving existing roads for approximately 4,500 feet coming from Haynes Road. See Figure SCE-2 CALCITE PROPOSED AND ALTERNATIVE SUBSTATION PROPERTY BOUNDARIES.

### **220 kV Transmission Line Loop-in**

If constructed on the Alternative Substation Property, the Calcite Substation would be connected to the Lugo-Pisgah No. 1 220 kV Transmission Line transmission source line via a loop-in T/L. The loop-in would modify the Lugo-Pisgah No. 1 220 kV Transmission Line creating two new line segments: the Calcite-Lugo 220 kV T/L and the Calcite-Pisgah 220 kV T/L. Each new T/L segment entering into the Calcite Substation would be approximately 3,500 feet long. See Figure SCE-8 ALTERNATIVE CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND SUBTRANSMISSION LINES.

The routes for these new T/Ls would require crossing under SCE’s Eldorado-Lugo and Lugo-Mohave 500 kV lines. See Figure SCE-4 220kV LATTICE STEEL TOWER CONFIGURATION.

The new 220 kV T/Ls would require approximately 8 transmission structures, (*i.e.*, 4 single-circuit structures and 4 double-circuit structures). See Figure -3 CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES. Four single-circuit structures with heights ranging from approximately 50 feet to approximately 100 feet would be used to cross underneath the Eldorado-Lugo 500kV and Lugo-Mohave 500kV transmission lines. The path would then continue north to four double-circuit structures with heights ranging from approximately 110 feet to approximately 160 feet. See Figure SCE-4 220kV LATTICE STEEL TOWER CONFIGURATION for possible 220 kV Structure Configurations. The 220 kV double circuit TSP or LST would be located just outside of the substation wall (but within the

proposed Calcite Substation Property). The conductor utilized would be 2B-1590 kcmil “Lapwing” Aluminum Conductor Steel Reinforced (ACSR) conductor or similar.

Additionally, two existing 220 kV LST in the existing SCE ROW would be removed since it would not be in use in the proposed configuration. The final combination of poles and towers will be determined during detailed engineering.

The 8 new structures would require a new ROW ranging between approximately 100 and 200 feet wide (depending on structure types and line crossings) from SCE’s existing ROW to the new proposed Calcite Substation Property See Figure SCE-8  
**ALTERNATIVE CALCITE SUBSTATION AND ASSOCIATED TRANSMISSION AND DISTRIBUTION LINES.**

Tables SCE – 8A and SCE – 8B below provide Land disturbance and equipment work force estimates, respectively for the alternative option.

**Table SCE – 8A: Land Disturbance for Transmission Loop-In and SCE Portion of Gen-tie Construction**

<b>Project Feature</b>	<b>Project Quantity</b>	<b>Disturbed Acreage Calculation</b>	<b>Construction Disturbance Acreage</b>	<b>Temporary Disturbance Acreage</b>	<b>Permanent Disturbance Acreage</b>
Guard Structures	4	150' x 50'	0.7	0.7	0
Remove Existing Lattice Steel Tower (1)	2	220' x 220'	2.2	2.2	0
Construct New Lattice Steel Tower (2)	4	220' x 220'	4.4	3.4	1.0
Construct New Steel H-Frame Pole (2)	4	200' x 200'	3.7	3.4	0.3
220kV Conductor Stringing Area (3)	8	400' x 150'	11.0	11.0	0
Install Underground Ground Wire (4)	1,100	linear <u>feet</u> x 15' wide	0.4	0.4	0
Existing Tower Work Area	2	100' x 100'	0.5	0.5	0
New Access Roads / Road Widening (5)		Varies	2.0	0.0	2.0
Access Road & Tower Buffers		Varies	2.8	2.8	0
Material & Equipment Staging Yard - (Calcite)	1	approx. 2 acres	2	2	0
<b>Total Estimated Disturbance Acreage (6)</b>			<b>29.7</b>	<b>26.4</b>	<b>3.3</b>

**Notes:**

1. Includes the removal of existing conductor, teardown of existing structure, and removal of foundation 2' below ground surface.
2. Includes structure assembly & erection, conductor & OHGW installation. Area to be restored after construction. Portion of R/W within 20' of ALL structures to remain cleared of vegetation. Permanently disturbed areas for H-Frame=0.08 acre.
3. Based on standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.
4. Based on a required ground wire needed between structures underneath the existing 500kV T/Ls.

5. Based on a combination of widening existing roads and constructing new roads to a drivable road width of 14'-22' w/ 2' of berm on each side of road.

6. The disturbed acreage calculations are estimates based upon SCE's preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE's Construction Manager and/or Contractor awarded project.

**Foundation / Base Volume and Area Calculations (approximate):**

LST: 4 per structure, 32-ft deep, 3.5-ft diameter; Earth removed for footings = 45.6 cu.yds; Surface area = 38.5 sqft

H-Frame: 2 per structure, 30-ft deep, 6-ft diameter; Earth removed for footings = 62.8 cu.yds; Surface area = 56.5 sqft

**Table SCE - 8B: Calcite Substation Project  
Construction Equipment And Workforce Estimates By Activity**

<b>CALCITE SUBSTATION PROJECT CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN (ALTERNATE)</b>							
<b>WORK ACTIVITY</b>				<b>ACTIVITY ESTIMATES</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
<b>Survey (1)</b>				<b>4</b>	<b>5</b>		<b>5 Miles</b>
1-Ton Truck, 4x4	300	Gas	2		5	8	
<b>Staging/Material Yard (2)</b>				<b>4</b>			<b>1 Yard</b>
1-Ton Truck, 4x4	300	Gas	2			4	
R/T Forklift	125	Diesel	1			4	
Ranger	50	Diesel	1			4	
Generator	49	Diesel	1			8	
Water Truck	300	Diesel	2			8	
<b>Road Work &amp; Structure Pads (3)</b>				<b>5</b>	<b>7</b>		<b>3 Miles &amp; 8 Pads</b>
1-Ton Truck, 4x4	300	Gas	1		7	8	
Backhoe/Front Loader	125	Diesel	1		7	4	
Tracked Dozer	150	Diesel	1		7	8	
Motor Grader	250	Diesel	1		7	8	
Water Truck	300	Diesel	2		7	8	
Drum Compactor	100	Diesel	1		7	4	
Excavator	250	Diesel	1		2	4	
Lowboy Truck/Trailer	450	Diesel	1		7	2	
<b>Guard Structure Installation (4)</b>				<b>6</b>	<b>2</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		2	8	

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN (ALTERNATE)**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Compressor Trailer	60	Diesel	1		2	4	
Manlift/Bucket Truck	250	Diesel	1		2	4	
Boom/Crane Truck	350	Diesel	1		2	8	
Auger Truck	210	Diesel	1		2	4	
Flat Bed Truck	400	Diesel	1		2	8	
<b>Conductor &amp; GW Removal (5)</b>				<b>14</b>	<b>4</b>		<b>9,250 Feet</b>
1-Ton Truck, 4x4	300	Gas	4		4	4	
Manlift/Bucket Truck	250	Diesel	2		4	8	
Boom/Crane Truck	350	Diesel	2		4	8	
Puller	350	Diesel	1		4	8	
Static Truck/Tensioner	350	Diesel	1		4	8	
Dump/Stake Bed Truck	350	Diesel	1		4	8	
<b>LST Removal (6)</b>				<b>6</b>	<b>4</b>		<b>2 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		4	4	
Compressor Trailer	60	Diesel	1		4	8	
R/T Crane (L)	275	Diesel	1		4	8	
Dump Truck	350	Diesel	1		4	8	
Flat Bed Truck	400	Diesel	1		4	2	
<b>LST Foundation Removal (7)</b>				<b>4</b>	<b>2</b>		<b>2 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		2	4	
Compressor Trailer	60	Diesel	1		2	8	
Backhoe/Front Loader	125	Diesel	1		2	8	
Dump Truck	350	Diesel	1		2	8	
Excavator	250	Diesel	1		2	2	
<b>LST Foundation Installation (8)</b>				<b>7</b>	<b>16</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		16	4	
Boom/Crane Truck	350	Diesel	1		16	4	
Backhoe/Front Loader	125	Diesel	1		16	8	
Drill Rig	275	Diesel	1		8	8	
Dump Truck	350	Diesel	1		16	4	
Concrete Truck	350	Diesel	3		8	6	
<b>LST Steel Haul (9)</b>				<b>4</b>	<b>4</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	1		4	8	

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN (ALTERNATE)**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
R/T Forklift	125	Diesel	1		4	4	
Flat Bed Truck	400	Diesel	1		4	8	
<b>LST Steel Assembly (10)</b>				<b>10</b>	<b>16</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	3		16	4	
Compressor Trailer	60	Diesel	1		16	8	
R/T Forklift	125	Diesel	1		16	8	
R/T Crane (M)	215	Diesel	1		16	4	
<b>LST Erection (11)</b>				<b>12</b>	<b>16</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	4		16	4	
Compressor Trailer	60	Diesel	1		16	8	
R/T Crane (L)	275	Diesel	1		11	8	
Crane	400	Diesel	1		6	8	
<b>H-Frame Foundation Installation (12)</b>				<b>6</b>	<b>24</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		24	4	
Boom/Crane Truck	350	Diesel	1		24	4	
Backhoe/Front Loader	125	Diesel	1		24	8	
Drill Rig	275	Diesel	1		16	8	
Water Truck	300	Diesel	1		24	8	
Dump Truck	350	Diesel	1		24	8	
Concrete Truck	350	Diesel	3		12	6	
<b>H-Frame Haul (13)</b>				<b>4</b>	<b>3</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	1		3	8	
Boom/Crane Truck	350	Diesel	1		3	4	
Flat Bed Truck	400	Diesel	1		3	8	
<b>H-Frame Assembly (14)</b>				<b>6</b>	<b>5</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		5	4	
Compressor Trailer	60	Diesel	1		5	8	
Manlift/Bucket Truck	250	Diesel	1		5	8	
R/T Crane (L)	275	Diesel	1		5	8	
<b>H-Frame Erection (15)</b>				<b>6</b>	<b>5</b>		<b>4 Structures</b>
1-Ton Truck, 4x4	300	Gas	2		5	4	
Compressor Trailer	60	Diesel	1		5	4	
Manlift/Bucket Truck	250	Diesel	1		5	8	
Crane	400	Diesel	1		5	8	
<b>220kV Conductor &amp; OHGW Installation (16)</b>				<b>28</b>	<b>11</b>		<b>60,600 Feet</b>

**CALCITE SUBSTATION PROJECT**  
**CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY**  
**CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN (ALTERNATE)**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
1-Ton Truck, 4x4	275	Gas	8		11	4	
Manlift/Bucket Truck	250	Diesel	4		11	8	
Boom/Crane Truck	350	Diesel	2		11	8	
R/T Crane (M)	215	Diesel	2		11	4	
Dump Truck	350	Diesel	1		11	4	
Wire Truck/Trailer	350	Diesel	2		11	8	
Sock Line Puller	300	Diesel	1		5	8	
Bullwheel Puller	350	Diesel	1		8	8	
Static Truck/Tensioner	350	Diesel	1		11	8	
R/T Forklift	125	Diesel	1		11	8	
Spacing Cart	10	Diesel	3		4	8	
Backhoe/Front Loader	125	Diesel	1		8	4	
Sag Cat w/ Winches	350	Diesel	2		11	2	
Water Truck	300	Diesel	1		11	8	
Lowboy Truck/Trailer	450	Diesel	2		11	2	
<b>UG Ground Wire Installation (17)</b>				<b>4</b>	<b>6</b>	<b>1,100 Trench Feet</b>	
1-Ton Truck, 4x4	275	Gas	1		6	4	
Backhoe/Front Loader	125	Diesel	1		6	8	
Dump Truck	350	Diesel	1		6	8	
Water Truck	300	Diesel	1		6	8	
<b>Guard Structure Removal (18)</b>				<b>6</b>	<b>2</b>	<b>4 Structures</b>	
1-Ton Truck, 4x4	300	Gas	2		2	8	
Compressor Trailer	60	Diesel	1		2	4	
Manlift/Bucket Truck	250	Diesel	1		2	4	
Boom/Crane Truck	350	Diesel	1		2	8	
Flat Bed Truck	400	Diesel	1		2	8	
<b>Restoration (19)</b>				<b>7</b>	<b>8</b>	<b>4 Miles</b>	
1-Ton Truck, 4x4	300	Gas	2		8	4	
Backhoe/Front Loader	125	Diesel	1		8	8	
Motor Grader	250	Diesel	1		8	4	
Water Truck	300	Diesel	1		8	8	
Drum Compactor	100	Diesel	1		8	4	



**CALCITE SUBSTATION PROJECT  
CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY  
CONSTRUCT 220KV TRANSMISSION LINE LOOP-IN (ALTERNATE)**

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Crew Workforce	Estimated Schedule (Days)	Estimated Usage (Hrs/Day)	Estimated Activity Value
Lowboy Truck/Trailer	450	Diesel	1		8	2	

### Distribution System for Substation Light and Power

To provide service for substation light and power at the Alternative Substation Property, approximately 4,000 feet of 12 kV overhead distribution line and approximately 1,000 feet of underground distribution line would be constructed in multiple sections to connect the existing distribution system along Waalew Road to the substation. This would require extending the 12 kV circuit overhead along Waalew Road, (west-bound) approximately 3,000 feet and then extending approximately 300 feet underground to cross California Highway 247. The circuit would then extend approximately 1,000 feet overhead (south bound) towards the substation. Finally, approximately 700 feet of underground distribution line would then be constructed to serve the Alternative Substation Property. See Figure SCE-1 PROPOSED CALCITE SUBSTATION AND TELECOMMUNICATION LINES.

The requirement for conductor sizes and types, circuit modifications for voltage regulation, substation light and power transformer size, the need for a laydown location or staging yard and workforce times and requirements would be the same as for the proposed Calcite Substation Project. To provide access to the new overhead distribution lines, a new access road approximately 2,000 feet long and approximately 16 feet wide would be constructed from Waalew Road and travel southbound to the Alternate Substation Property to the substation.

**Table SCE – 9:  
Distribution System for Station Light and Power**

DISTRIBUTION SYSTEM CONSTRUCTION ACTIVITIES CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT DISTRIBUTION LINE EXTENSION FOR STATION LIGHT & POWER							
WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Install Down Guys (2)				6	10		Approx 10 Down Guys

1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1	10	8	1 Down Guy /Day
Bucket Truck	300	Diesel	1	10	8	
<b>Install New Poles (2)</b>				<b>6</b>	<b>13</b>	<b>25 Wood Poles</b>
1-Ton Pick-up Truck, 4x4	300	Diesel	2	13	8	2-Wood Pole/Day
30-Ton Crane Truck	300	Diesel	1	13	8	
Bucket Truck	300	Diesel	2	13	8	
40' Flat Bed Truck/ Trailer	350	Diesel	1	13	8	

<b>DISTRIBUTION SYSTEM CONSTRUCTION ACTIVITIES CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY CONSTRUCT DISTRIBUTION LINE EXTENSION FOR STATION LIGHT &amp; POWER</b>							
<b>WORK ACTIVITY</b>				<b>ACTIVITY PRODUCTION</b>			
Primary Equipment Description	Estimated Horse- Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install Overhead Wire (2)</b>				<b>6</b>	<b>4</b>		<b>4,000 Circuit Feet</b>
1-Ton Crew Cab Pick-up Truck, 4x4	300	Diesel	1		4	8	1,000 feet / Day
55' Double Bucket Truck	350	Diesel	1		4	8	
<b>Underground Cable Pulling (3) &amp; Transformer Installation</b>				<b>4</b>	<b>1</b>		<b>700 Circuit Feet</b>
1 - Ton Pick-up Truck, 4x4	300	Diesel	1		1	8	1,000 feet/Day
55' Double Bucket Truck	350	Diesel	1		1	8	
Hydraulic Rewind Puller	300	Diesel	1		1	8	
<b>Underground Cable Makeup (4)</b>				<b>3</b>	<b>2</b>		
1- Ton Crew Cab, 4x4	300	Diesel	1		2	8	
55' Double Bucket Truck	350	Diesel	1				
<b>Underground Trenching, Structure Excavation Conduit</b>				<b>4</b>	<b>2</b>		<b>Approx. 700 ft.</b>
1-Ton Pick-up Truck, 4x4	300	Diesel	1		2	8	500 ft./Day
Backhoe/Front Loader	200	Diesel	1		2	8	

1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1	2	8
4000 gallon Water Truck	350	Diesel	1	2	8
Concrete Truck	350	Diesel	1	2	8

<b>DISTRIBUTION SYSTEM CONSTRUCTION ACTIVITIES</b> <b>CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY</b> <b>CONSTRUCT DISTRIBUTION LINE EXTENSION FOR STATION LIGHT &amp; POWER</b>							
WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Underground Boring, Casing and Conduit Installation</b>				<b>4</b>	<b>3</b>		<b>Approx. 300 ft.</b>
1-Ton Pick-up Truck, 4x4	300	Diesel	1		3	8	100 ft./Day
Backhoe/Front Loader	200	Diesel	1		3	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		3	8	
Excavation and Boring Equipment	300	Diesel	1		3	8	
<b>Restoration (4)</b>				<b>7</b>	<b>1</b>		<b>700 feet</b>
1-Ton Crew Cab, 4x4	300	Diesel	2		1	2	1 Mile/Day
Water Truck	300	Diesel	1		1	8	

Project Feature	Project Qty.	Disturbed Acreage Calculation	Construction Disturbance Acreage	Temporary Disturbance Acreage	Acres Permanently Disturbed
Underground trench/duct for conduit	1	700 ft. x 2 ft.	0.032	0.032	0
Underground construction equipment work space	1	700 ft. x 28 ft.	0.449	0.449	0
Distribution line excavation pits	10	10 ft. x 24 ft.	0.055	0.055	0
Underground Highway crossing	1	No surface disturbance	No surface disturbance	No surface disturbance	No surface disturbance
Distribution line vault covers	8	4 ft. x 5 ft.	0.0036	0	0.0036
New Poles	25	2.5 ft. diameter (5.0 sq. ft.)	0.0028	0	0.0028
Down Guys	10	1 ft. x 1.25 ft.	0.0002	0	0.0002

Overhead construction equipment work space	5	125 ft. x 60 ft.	0.86	0.86	0
<b>Total Estimated Disturbance Acreage</b>			<b>1.4026</b>	<b>1.396</b>	<b>0.0066</b>

<b>Distribution System for Station Light &amp; Power</b>	
Distribution Circuit Extension Length (Proposed)	5000 ft. (0.95 miles)
Total Length Underground (U.G.)	1,000 ft.
-New U.G. Conduits Needed	1,000 ft
Total Length Overhead (O.H.)	4,000 ft.
-New Poles – O.H.	4,000 ft.
-New Poles Required	25
New Down Guys Required	10
Time and Resources to Construct(4 men per crew)	36 Crew Days
Total Man Days Required	199 Man Days

<b>Crew Size Assumptions:</b>
1. Trenching and Conduit Installation = one 4-man crew
2. Overhead Line Work = one 3-man crew
3. Underground Cable Makeup = one 3-man crew
4. Underground Cable Pulling = one 4-man crew
5. Pole replacement crew = one 4-man crew

## Telecommunication Facilities

Except as discussed below, the telecommunication facilities associated with a project at the Alternative Substation Property instead of the Calcite Substation Property would be the same regardless of which site is ultimately used:

The first proposed fiber optic cable would start from Calcite and would be installed overhead along the new 12 kV distribution path previously described in the alternate distribution section, and then continue east approximately 1,400 feet, then south approximately 4,000 feet along existing poles, and finally arriving at the Barstow Repeater Communication Site (“CS”). The line would dip down into a new riser and continue underground for approximately 150 feet into an existing communication room within the CS.

For the splice box tap, the underground conduits would extend along the new ROW under the proposed 220kV loop-in lines for approximately 2,000 feet.

The cable crew would use existing roads or previously established roads to proceed with the function of cable installation when possible. Workforce estimates, equipment details, and disturbance totals are provided in Tables SCE – 10A through – 10H

**Table SCE – 10A:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**Construct Barstow Repeater CS - Calcite Fiber Optic Cable**

<b>Work Activity</b>				<b>Activity Production</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install 5 foot Crossarm(1)</b>				<b>4</b>	<b>6</b>		<b>7,500 ft</b>
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		6	8	24 Crossarms /Day
Bucket Truck	300	Diesel	2		6	8	
<b>Install Down Guys</b>				<b>4</b>	<b>2</b>		<b>Approx 2 Down Guys</b>
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		2	4	1 Down Guy /Day
Bucket Truck	300	Diesel	1		2	4	
<b>Install Fiber Optic Cable (3)</b>				<b>8</b>	<b>4</b>		<b>2 Circuit Miles</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		4	8	3,000 ft./Day
Bucket Truck	350	Diesel	2		4	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>4</b>		<b>Splices</b>
Splicing Lab	300	Diesel	2	2	10	4	
<b>Underground Conduit</b>				<b>5</b>	<b>12</b>		<b>Approx. 1,150 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		12	8	100 ft./Day
Backhoe/Front Loader	200	Diesel	1		12	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		12	8	
4000 gallon Water Truck	350	Diesel	1		12	8	
Concrete Truck	350	Diesel	1		11	8	<b>700 ft.</b>
<b>Restoration (4)</b>				<b>7</b>	<b>10</b>		<b>2 Miles</b>
1-Ton Crew Cab, 4x4	300	Diesel	2		10	2	1 Mile/Day
Water Truck	300	Diesel	1		10	8	

**Table SCE – 10B:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**Construct Calcite tap to M29-T3 splice on OPGW**

<b>Work Activity</b>				<b>Activity Production</b>			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>11</b>		<b>2 Circuit Miles</b>

¾-Ton Pick-up Truck, 4x4	300	Diesel	2		11	8	3,000 ft./Day
Bucket Truck	350	Diesel	2		11	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>4</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	10	4	
<b>Underground Conduit</b>				<b>5</b>	<b>38</b>		<b>Approx. 7,600 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		38	8	200 ft./Day
Backhoe/Front Loader	200	Diesel	1		38	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		38	8	
4000 gallon Water Truck	350	Diesel	1		38	8	
Concrete Truck	350	Diesel	1		6	8	<b>700 ft.</b>
<b>Restoration (4)</b>				<b>7</b>	<b>40</b>		<b>2 Miles</b>
1-Ton Crew Cab, 4x4	300	Diesel	2		40	2	1 Mile/Day
Water Truck	300	Diesel	1		40	8	

**Table SCE - 10C:  
Telecommunication Fiber Optic Cable Summary**

	<b>Calcite to Repeater</b>		<b>Calcite to M29-T3</b>
Fiber-Optic Cable Length (Proposed)	7,500 ft. (1.5 mile)		7,600 ft. (1.5 mile)
Total Length Underground (U.G.)	1,000 ft.		5,600 ft.
-Existing U.G. Conduits	0 ft.		0 ft.
-New U.G. Conduits Needed	1,000 ft.		7,600 ft.
Total Length Overhead (O.H.)	6,500 ft.		0ft.
-On Existing Poles - O.H.	3500 ft.		0 ft.
-On New Poles – O.H.	4,000 ft.		0 ft.
-Existing Poles	25		0
-New Poles Required	25		0
New Down Guys Required	2		0
Time and Resources to Construct(4 men per crew)	44 Crew Days		103 Crew Days
Total Man Days Required	176 Man Days		412 Man Days

**Table SCE – 10D:  
Telecommunication Ground Disturbance Calculations**

<b>Telecommunication Route Project Feature</b>	<b>Qty.</b>	<b>Disturbed Acreage Calculation</b>	<b>Acres Disturbed During Construction</b>	<b>Acres To Be Restored</b>	<b>Acres Permanently Disturbed</b>
Calcite – M29-T3					
Trenching	1	3ft X 7,600	0.523 (22,800 sq. ft.)	0.523 (22,800 sq. ft.)	0.523 (22,800 sq. ft.)

**Table SCE – 10E:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**OPGW Gen-Tie Fiber Optic Cable**

<b>Work Activity</b>	<b>Activity Production</b>						
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>1</b>		<b>1,100 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		1	8	1,100 ft./Day
Bucket Truck	350	Diesel	2		1	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>2</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	2	8	

**Table SCE – 10F:**  
**Telecommunication Systems Construction Activities**  
**Construction Equipment and Workforce Estimates by Activity**  
**Redundant Gen-Tie Fiber Optic Cable**

<b>Work Activity</b>	<b>Activity Production</b>						
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
<b>Install Fiber Optic Cable (3)</b>				<b>4</b>	<b>1</b>		<b>500 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		1	8	500 ft./Day
Bucket Truck	350	Diesel	2		1	8	
<b>Splice Fiber Optic Cable</b>				<b>4</b>	<b>2</b>		<b>2 Splices</b>
Splicing Lab	300	Diesel	2	2	2	4	
<b>Underground Conduit</b>				<b>5</b>	<b>5</b>		<b>Approx. 500 ft.</b>
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		5	8	100 ft./Day
Backhoe/Front Loader	200	Diesel	1		5	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		5	8	
4000 gallon Water Truck	350	Diesel	1		5	8	
Concrete Truck	350	Diesel	1		5	8	500 ft.
<b>Restoration (4)</b>				<b>7</b>	<b>1</b>		<b>500 ft.</b>
1-Ton Crew Cab, 4x4	300	Diesel	2		1	2	
Water Truck	300	Diesel	1		1	8	

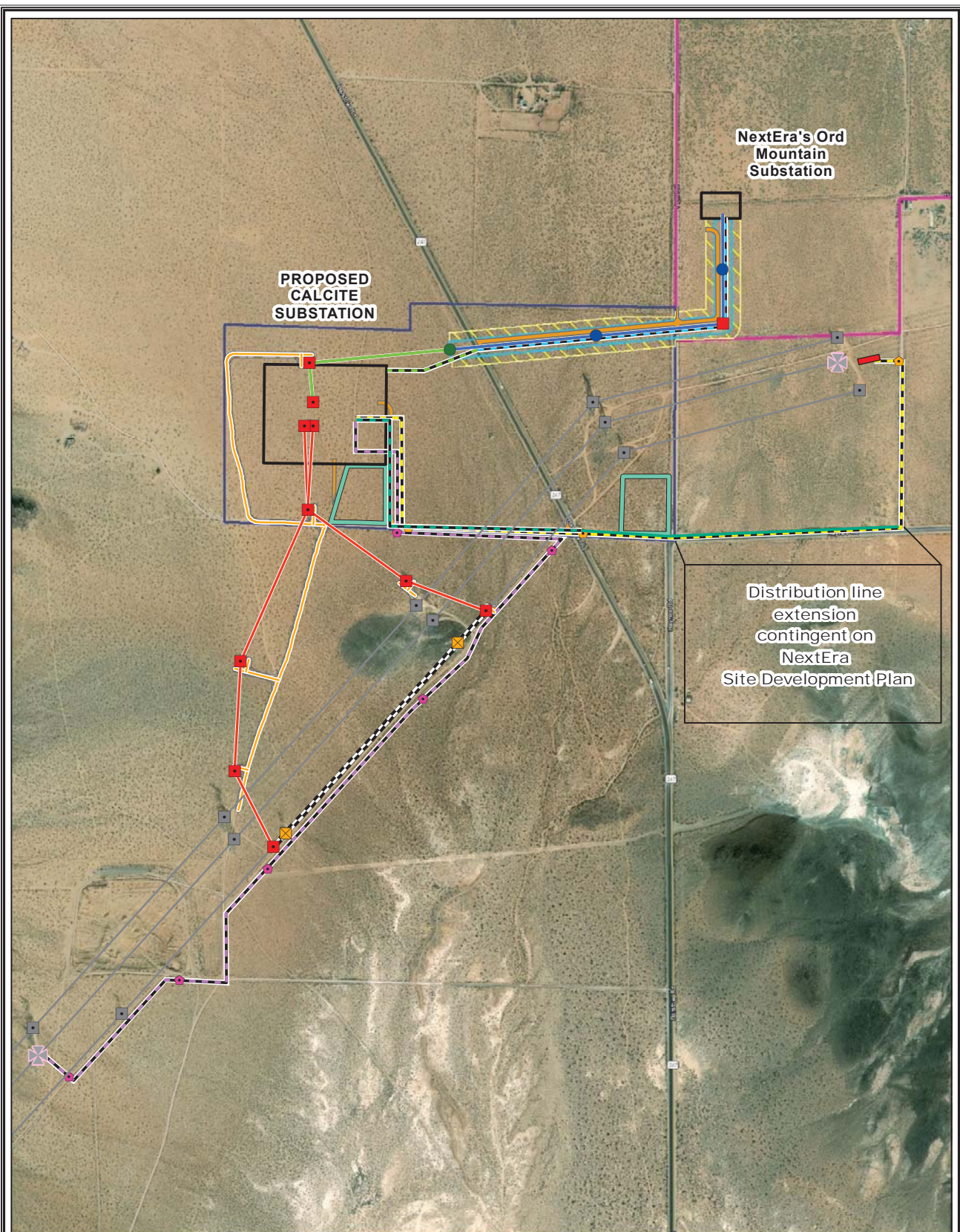
**Table SCE – 10G:  
Telecommunication Fiber Optic Gen-Tie Cable Summary**

	<b>OPGW Gen-Tie</b>		<b>Redundant Gen-Tie</b>
Fiber-Optic Cable Length (Proposed)	1,100 ft.		500 ft.
Total Length Underground (U.G.)	0 ft.		500 ft.
-Existing U.G. Conduits	0 ft.		0 ft.
-New U.G. Conduits Needed	0 ft.		500 ft.
Total Length Overhead (O.H.)	1,100 ft.		0ft.
-On Existing Poles - O.H.	0 ft.		0 ft.
-On New Poles – O.H.	0 ft.		0 ft.
-Existing Poles	0		0
-New Poles Required	0		0
New Down Guys Required	0		0
Time and Resources to Construct(4 men per crew)	3 Crew Days		9 Crew Days
Total Man Days Required	12 Man Days		36 Man Days

**Table SCE –10H:  
Telecommunication Gen-Tie Ground Disturbance Calculations**

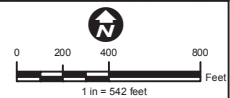
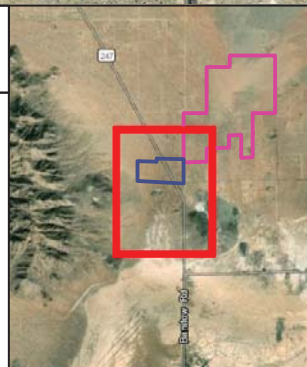
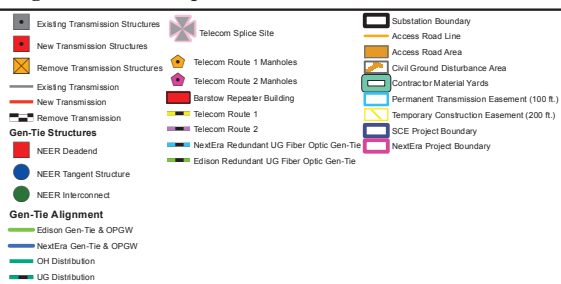
<b>Telecommunication Route Project Feature</b>	<b>Qty.</b>	<b>Disturbed Acreage Calculation</b>	<b>Acres Disturbed During Construction</b>	<b>Acres To Be Restored</b>	<b>Acres Permanently Disturbed</b>
Redundant Gen-Tie	1	3ft X 500	.03 (1,600 sq. ft.)	.03 (1,600 sq. ft.)	.03 (1,600 sq. ft.)





## CALCITE SUBSTATION

Figure SCE-1: Proposed Calcite Substation



Date: 9/20/2019  
 File Name: Figure SCE-1 Proposed Calcite Substation.dwg  
 Version: 5  
 Created By: Grant Jenkins  
 Real Property Geospatial Analysis  
 Project Engineer: James Bennett  
 Project Manager: Harold Andrich

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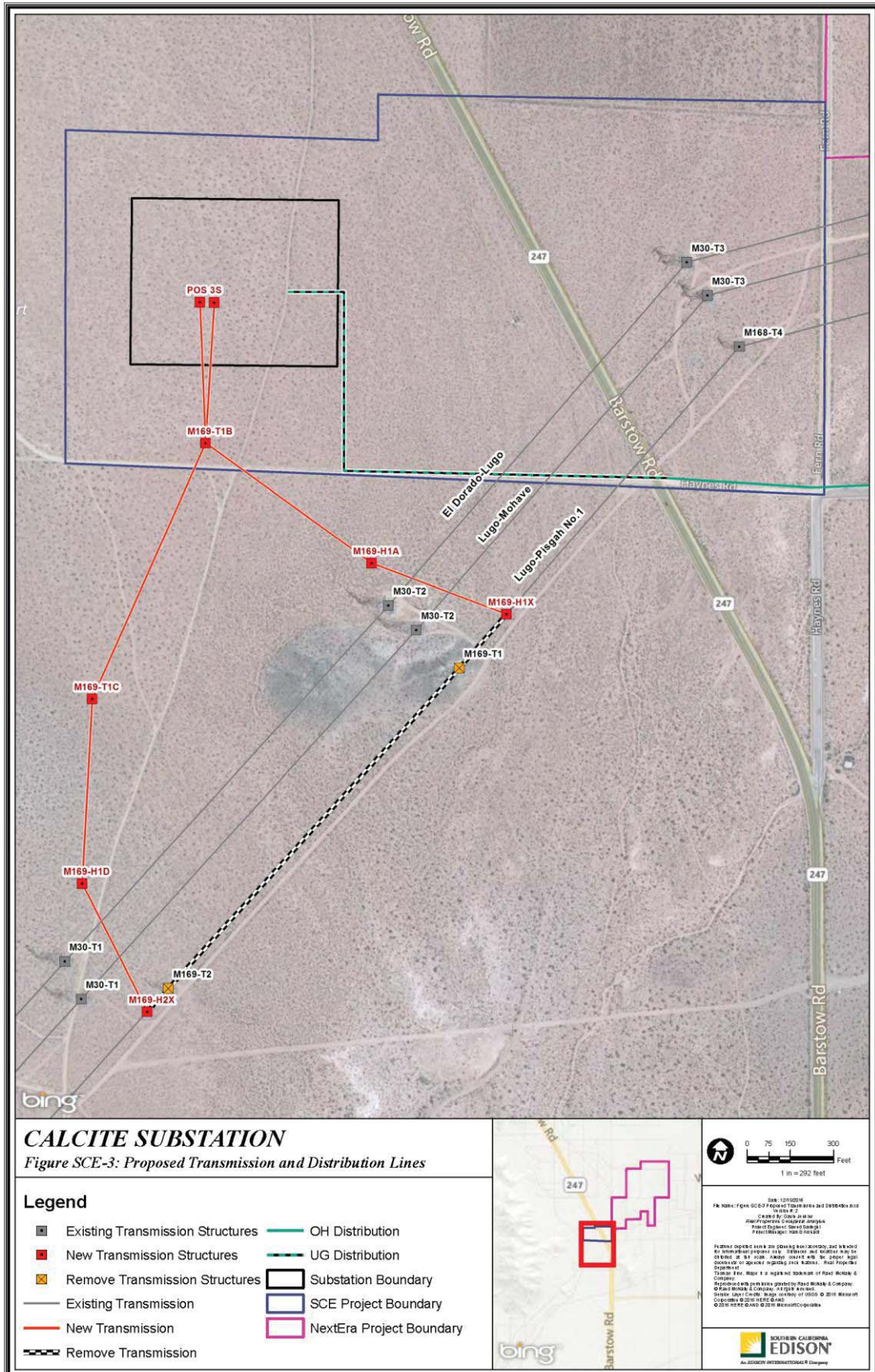
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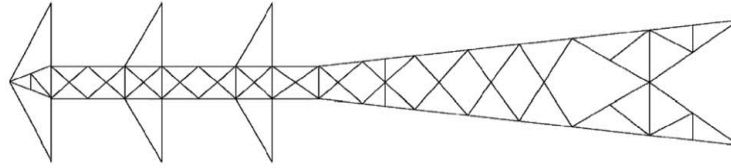




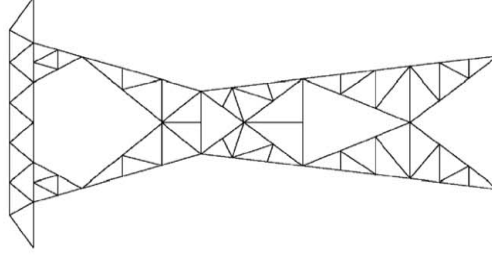




DOUBLE  
220KV



SINGLE  
220KV

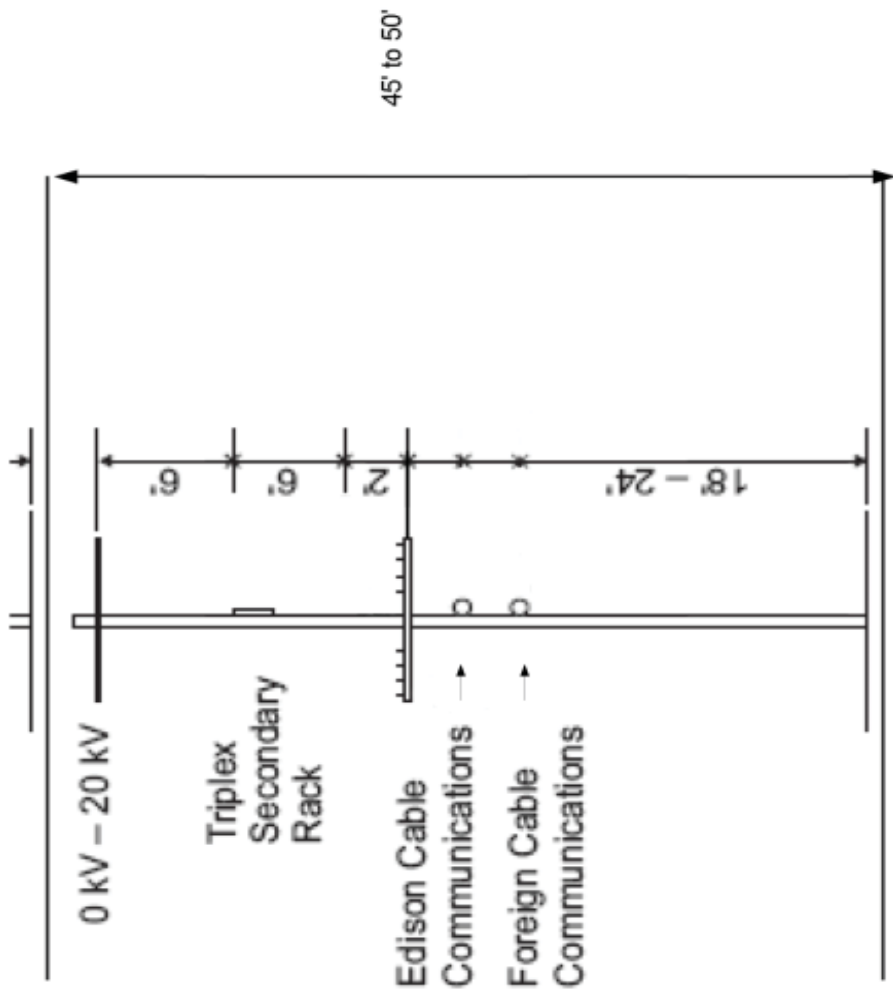


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**FIGURE SCE-4**  
**220KV**  
**LATTICE STEEL TOWER CONFIGURATION**



# Typical Pole Heads / Clearance



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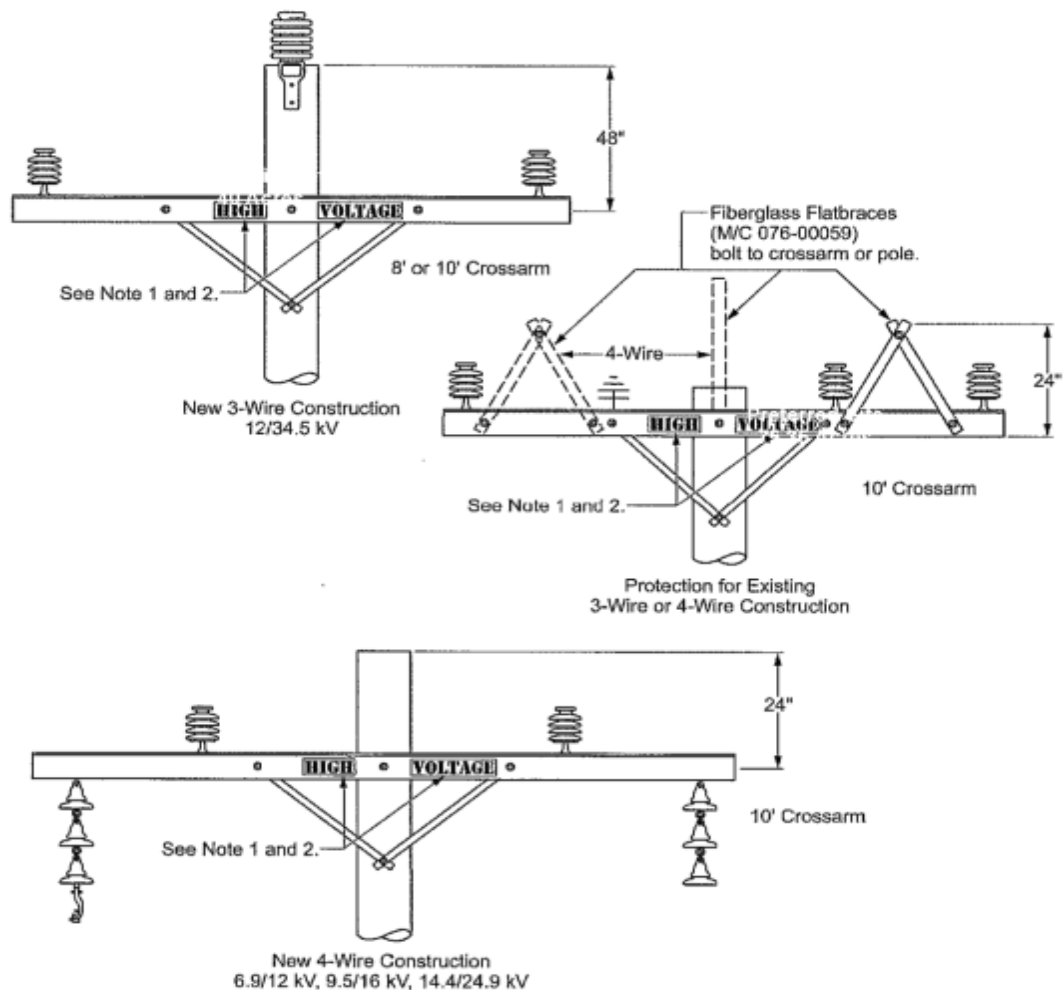
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**FIGURE SCE-6**  
**POLE CONFIGURATION**

# DC 535 Raptor Construction

## Scope DC 535.1 Construction for Protection of Bald or Golden Eagles and Other Large, Rare, Predatory Birds

Figure DC 535-1: Raptor Construction



### Note(s):

1. HIGH VOLTAGE signs mounted on crossarm are for existing installations only. For new or replacement of deteriorated sign installations, encircle the pole with HIGH VOLTAGE sign per PO 120.



