APPENDIX E

Calcite Substation Detailed Project Description

Contents

Tables

Attachment 1

Figures

APPENDIX E
CALCITE SUBSTATION DETAILED PROJECT DESCRIPTION

1. PROJECT OVERVIEW

Southern California Edison Company (“SCE”) proposes to construct the Calcite Substation and associated facilities to interconnect the Aurora Solar, LLC 200 MW Stagecoach 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. The following is a summary of the Calcite Substation Project main 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 adjacent to one another) creating the Calcite-Lugo and Calcite-Pisgah 220 kV Transmission Lines.
- **Generation Tie Line Connection:** Connect the Aurora Solar-built generation tie line (“gen-tie”) into the SCE-owned Calcite Substation. SCE will construct up to three structures and four 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 700 feet of 12 kV overhead distribution line and approximately 3,100 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.
- **Telecommunications Facilities:** Install fiber optic communication cables, equipment, and associated structures for diverse path routing of communications required for the Project.

2. STATION LIGHT AND POWER FOR STAGECOACH FACILITY

SCE will not be providing electric service to the Stagecoach Solar Project facilities.

3. PROJECT LOCATION

The proposed Calcite Substation would be located on an approximate 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-1, Proposed Calcite Substation. The proposed substation footprint would require approximately 7 acres along with approximately 4 acres for drainage, grading, and an access road, generally located within the western part of the approximate 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. 1 220 kV 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 Stagecoach 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 outside the Calcite Substation Property, just west of the proposed Lugo-Pisgah No. 1 220 kV loop-in. Beginning at the last structure to be constructed and owned by Aurora Solar (a dead-end structure) just to the west of the Calcite Substation Property, SCE would construct all remaining electrical facilities to extend the remainder of the gen-tie into the Substation.[1] See Figure SCE-3, Proposed Transmission and Distribution 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 700 feet. The circuit would then continue underground for approximately 3,100 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, Proposed Transmission and Distribution 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 at SCE's Lugo-Mohave 500kV T/L. See Figure SCE1, Proposed Calcite Substation.

4. CALCITE SUBSTATION

The Calcite Substation would be a new regional 220 kV collector station initially needed to support the Stagecoach 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 loop of top guard along the top, and with two gates.

[1] The portion of the gen-tie running from the Stagecoach Solar Project to this last Aurora Solar structure is anticipated to be described elsewhere by Aurora Solar, not in this description of the work to be undertaken by SCE.

4.1 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. Three positions would be utilized in the initial design: one position for the Stagecoach Solar Project gen-tie line, one position for the Pisgah 220 kV transmission line, and one position for the Lugo 220 kV transmission line. The remaining position would be available for future network or generation tie-lines.

Calcite Substation would be initially equipped with:

- Two (2) overhead 220 kV buses
- Six (6) circuit breakers
- Twelve (12) group-operated disconnect switches
- One (1) Mechanical Electrical Equipment Room (MEER)
- Station light and power transformers and associated equipment
- Station lighting
- Permanent wall
- Perimeter Security Intrusion Detection System

4.2 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 4 acres) within the proposed Calcite Substation Property may be necessary for temporary equipment storage and material staging areas. An additional 3 acres would be temporarily disturbed due to construction grading (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			
Element	**Material**	**Approximate Surface Area (sq.ft.)**	**Approximate Volume (cu.yd.)**
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	4,900	850
Equipment and cable trench excavations[1]	Soil	270,000	1,200
Cable Trenches[2]	Concrete	6,300	25
Internal Driveway[3]	Asphalt concrete Class II aggregate base	48,000 48,000	600 900
Access Road[4]	Asphalt concrete Class II aggregate base Concrete	51,000 51,000 51,000	900 1,000 100
Substation Rock Surfacing	Rock, nominal 1 to 1-1/2 inch per SCE Standard	250,000	3,200

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.
2 - Standard cable trench elements are factory fabricated, delivered to the Property and installed by crane. Intersections are cast in place concrete.
3 - Internal Driveway refers to all paved roads within the substation walls.
4 - 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. This includes the area immediately outside the substation.

Table SCE-2. Land Disturbance for Substation Construction					
Project Feature	**Project Quantity**	**Disturbed Acreage Calculation**	**Construction Disturbance Acreage**	**Temporary Disturbance Acreage**	**Permanent Disturbance Acreage**
Calcite Substation	1	620' x 480'	10.0	3.0	7.0
Drainage and Grading	1	Varies	2.0	0.0	2.0
New Access Roads	1	linear miles x 24' wide	2.0	0.0	2.0
Material & Equipment Staging Yard – (Calcite)	1	approx. 2 acres	2.0	2.0	0.0
Total Estimated Disturbance Acreage			**16.0**	**5.0**	**11.0**

4.3 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.

4.4 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.

4.5 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.

4.6 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.

4.6 DUST CONTROL

During construction, water trucks from local water purveyors would be used to minimize the quantity of airborne dust created by construction activities. Tables A and B in Attachment 1 present estimated construction water demand.

4.8 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.

4.9 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.

4.10 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.

4.11 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. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Substation and 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**
Survey (1)				**4**	**10**		**Substation, Laydown Yard & Access Road**
1-Ton Truck, 4x4	300	Gas	2		10	8	
Grading (2)				**10**	**40**		**Substation, Laydown Yard & Access Road**
1-Ton Truck, 4x4	300	Gas	1		40	8	
Dozer	350	Diesel	1		40	7	
Loader	350	Diesel	2		40	7	

Table SCE-3. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Substation and 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**
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	
Fencing (3)				**5**	**25**		**Substation & Laydown Yard**
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	
Civil (4)				**10**	**60**		**Substation & Access Road**
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	
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/Diesel	2		60	7	
Tool Truck	300	Gas	1		60	7	
Utility Cart	50	Diesel	2		60	7	
Water Truck	300	Diesel	2		60	8	
MEER Install (Drop In) (5)				**7**	**25**		**Substation**
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	

Table SCE-3. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Substation and 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**
Electrical (6)				**10**	**70**		**Substation**
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	
Wiring (7)				**4**	**65**		**Substation**
1-Ton Truck, 4x4	300	Gas	1		65	8	
Manlift/Bucket Truck	150	Diesel	1		25	4	
Utility Cart	50	Diesel	1		65	7	
Maintenance Crew (8)				**2**	**30**		**Substation**
1-Ton Truck, 4x4	300	Gas	1		30	8	
Testing (9)				**4**	**60**		**Substation**
Test Truck	300	Gas	2		60	8	
Asphalt (10)				**6**	**40**		**Substation & Access Road**
1-Ton Truck, 4x4	300	Gas	2		40	4	
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:

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

4.12 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.[2] 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 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, possible minor grading to level the site, and application of gravel or crushed rock for dust/erosion control.

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.

5. TRANSMISSION LINE (“T/L”) AND RELATED STRUCTURES

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

5.1 E-220 KV TRANSMISSION LINE LOOP-IN DESIGN

The proposed Calcite Substation would connect to the Lugo-Pisgah No. 1 220 kV Transmission 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

[2] Transmission line construction materials commonly stored at construction staging yards typically include, but may 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 include, but may 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).

approximately 2,500 feet long. See Figure SCE-3, Proposed 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 kV 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, Proposed 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 500 kV and Lugo-Mohave 500 kV transmission lines. The path would then continue north to two double-circuit structures with approximate heights of 110 to 160 feet. See Figure SCE-4, 220 kV Tubular Steel Pole Configuration for possible 220 kV 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 they would not be in use in the proposed configuration.

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, Proposed Transmission and Distribution Lines.

5.2 E-220 KV GENERATION TIE LINE EXTENSION DESIGN

The proposed Calcite Substation design includes terminating the Stagecoach 220 kV gen-tie line into the switchrack. See Figure SCE3, Proposed Transmission and Distribution Lines. There would be up to 3 TSP dead-end structures with heights ranging from approximately 130 feet to approximately 180 feet on the Calcite Substation Property for the connection of Stagecoach's gen-tie line to a 220 kV position inside Calcite Substation. The Stagecoach 220 kV gen-tie line would carry 200 MW utilizing 2B1590 kcmil "Lapwing" Aluminum Conductor Steel Reinforced ("ACSR") conductor or similar.

The structures inside the proposed Calcite Substation Property would be constructed by SCE and would be dead-end structures. Aurora Solar would be responsible for construction of all structures beyond the last SCE dead-end structure from the Point of Change of Ownership (POCO) to the Stagecoach Substation. SCE would construct, own, operate, and maintain the circuit from the customer-owned POCO structure to the A-Frame of the Calcite Substation. SCE would work with Aurora Solar to integrate final design of the POCO structure. See Figure SCE3, Proposed Transmission and Distribution Lines.

5.3 TRANSMISSION LINE ACCESS AND SPUR ROADS

This portion of the Calcite Substation Project involves construction within existing and new Right of Way (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 220 kV 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/Radius along curvatures to accommodate the vehicle envelope as it turns (resulting in a maximum drivable width of 22 feet).

5.4 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 Tubular Steel Pole (“TSP”) would consist of one poured-in-place concrete footing 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 50 to 150 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.

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 below 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 TSPs and 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.

5.5 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 below 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.

5.6 LAND DISTURBANCE

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

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 Towers (1)	2	220' x 220'	2.2	2.2	0
Construct New TSPs (2)	5	220' x 220'	5.6	5.2	0.4
Construct New Steel Pole H-frames (2)	4	220' x 220'	4.4	4.1	0.3
220kV Conductor Stringing Areas (3)	12	400' x 150'	16.5	16.5	0
Install Underground Ground Wire (4)	1,100	linear feet x 15' wide	0.4	0.4	0

Existing Tower Work Areas	2	100' x 100'	0.5	0.5	0
New Access Roads / Road Widening (5)		Varies	1.4	0	1.4
Access Road & Tower Buffers		Varies	1.3	1.3	0
Material & Equipment Staging Yard – (Calcite)	1	approx. 2 acres	2	2	0
Total Estimated Disturbance Acreage (6)			**35.0**	**32.9**	**2.1**

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

5.7 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.

5.8 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 California Public Utilities Commission (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 General Order (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 aide 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 to 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 and towers (as defined by California Code of Regulations Title 14, Division 1.5, Ch 7, 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.

5.9 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. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and 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**
Survey (1)				**4**	**4**		**4 Miles**
1-Ton Truck, 4x4	300	Gas	2		4	8	1 Mile
Road Work & Structure Pads (3)				**5**	**10**		**2 Miles & 9 Pads**
1-Ton Truck, 4x4	300	Gas	1		10	8	
Backhoe/Front Loader	125	Diesel	1		10	4	
Tracked Dozer	150	Diesel	1		10	8	
Motor Grader	250	Diesel	1		10	8	
Water Truck	300	Diesel	2		10	8	
Drum Compactor	100	Diesel	1		10	4	
Excavator	250	Diesel	1		3	4	
Lowboy Truck/Trailer	450	Diesel	1		10	2	
Guard Structure Installation (4)				**6**	**2**		**4 Structures**
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	
Flatbed Truck	400	Diesel	1		2	8	
Conductor & GW Removal (5)				**14**	**4**		**9,250 Feet**
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	
LST Removal (6)				**6**	**4**		**2 Structures**
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	
Flatbed Truck	400	Diesel	1		4	2	
LST Foundation Removal (7)				**4**	**2**		**2 Structures**
1-Ton Truck, 4x4	300	Gas	2		2	4	
Compressor Trailer	60	Diesel	1		2	8	

Table SCE-5. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and 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	
Steel Pole Structure Foundation Installation (8)				**6**	**15**		**9 Structures**
1-Ton Truck, 4x4	300	Gas	2		15	4	
Boom/Crane Truck	350	Diesel	1		15	4	
Backhoe/Front Loader	125	Diesel	1		15	8	
Drill Rig	275	Diesel	1		10	8	
Water Truck	300	Diesel	1		15	8	
Dump Truck	350	Diesel	1		15	8	
Concrete Truck	350	Diesel	3		8	6	
Steel Pole Structure Haul (9)				**4**	**3**		**9 Structures**
1-Ton Truck, 4x4	300	Gas	1		3	8	
Boom/Crane Truck	350	Diesel	1		3	4	
Flatbed Truck	400	Diesel	1		3	8	
Steel Pole Structure Assembly (10)				**6**	**8**		**9 Structures**
1-Ton Truck, 4x4	300	Gas	2		8	4	
Compressor Trailer	60	Diesel	1		8	8	
Manlift/Bucket Truck	250	Diesel	1		8	8	
R/T Crane (L)	275	Diesel	1		8	8	
Steel Pole Structure Erection (11)				**6**	**8**		**9 Structures**
1-Ton Truck, 4x4	300	Gas	2		8	4	
Compressor Trailer	60	Diesel	1		8	4	
Manlift/Bucket Truck	250	Diesel	1		8	8	
Crane	400	Diesel	1		8	8	
220kV Conductor & GW Installation (12)				**28**	**7**		**43,500 Feet**
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	

Table SCE-5. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and 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**
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	
Hughes 500 E	400	Jet A	1		7	7	
Fuel, Helicopter Support Truck	300	Diesel	1		7	7	
UG Ground Wire Installation (13)				**4**	**6**		**1,100 Trench Feet**
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	
Guard Structure Removal (14)				**6**	**2**		**4 Structures**
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	
Flatbed Truck	400	Diesel	1		2	8	
Restoration (15)				**7**	**6**		**3 Miles**
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:
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. Steel Pole Structure Foundation Installation = one 6 man crew
9. Steel Pole Structure Haul = one 4 man crew
10. Steel Pole Structure Assembly = one 6 man crew
11. Steel Pole Structure Erection = one 6 man crew

12. Conductor & GW Installation = one 28 man crew
13. UG Ground Wire Installation = one 4 man crew
14. Guard Structure Removal = one 6 man crew
15. Restoration = one 7 man crew

6. DISTRIBUTION SYSTEM FOR STATION LIGHT AND POWER

6.1 DISTRIBUTION FOR CALCITE SUBSTATION

An extension of a 12 kV distribution circuit would be required to provide permanent station light and power and/or temporary power for construction for Calcite Substation. The 12kV distribution circuitry would be extended for approximately 700 feet by installing approximately 6 wood poles. See Figure SCE-1, Proposed Calcite Substation; Figure SCE-5, Pole Configuration; and Figure SCE-6, 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 Right of Way (ROW) and then turn north along the Calcite Substation driveway and into Calcite Substation. The total underground circuit extension length would be approximately 3,100 feet. 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).

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.

6.2 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. See Table SCE-6A for details.

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 a piece. 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-6A. Distribution System Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Distribution Line Extension for Station Light & Power to Calcite Substation

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 (1)				**3**	**2**		**Approx 2 Down Guys**
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		2	8	1 Down Guy/ Day
Bucket Truck	300	Diesel	1		2	8	
Install New Poles (2)				**4**	**6**		**12 Wood Poles**
1-Ton Pickup Truck, 4x4	300	Diesel	2		6	8	2 Wood Pole/Day

Table SCE-6A. Distribution System Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Distribution Line Extension for Station Light & Power to Calcite Substation

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**
30-Ton Crane Truck	300	Diesel	1		6	8	
Bucket Truck	300	Diesel	2		6	8	
40' Flatbed Truck/ Trailer	350	Diesel	1		6	8	
Install Overhead Wire (3)				**6**	**1**		**700 Circuit Feet**
1-Ton Crew Cab Pickup Truck, 4x4	300	Diesel	1		1	8	1,000 Feet/Day
55’ Double Bucket Truck	350	Diesel	1		1	8	
Underground Cable Pulling & Transformer Installation (4)				**4**	**3**		**3,100 Circuit Feet**
1-Ton Pickup Truck, 4x4	300	Diesel	1		3	8	1,000 Feet/Day
55’ Double Bucket Truck	350	Diesel	1		3	8	
Hydraulic Rewind Puller	300	Diesel	1		3	8	
Underground Cable Makeup (5)				**4**	**2**		
1-Ton Crew Cab, 4x4	300	Diesel	1		2	8	
55’ Double Bucket Truck	350	Diesel	1				
Underground Trenching, Structure Excavation Conduit (6)				**4**	**6**		**Approx. 2,800 ft.**
1-Ton Pickup Truck, 4x4	300	Diesel	1		6	8	500 Feet/Day
Backhoe/Front Loader	200	Diesel	1		6	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		6	8	
4000 gallon Water Truck	350	Diesel	1		6	8	
Concrete Truck	350	Diesel	1		6	8	
Underground Boring, Casing and Conduit Installation (7)				**6**	**3**		**Approx. 300 ft.**
1-Ton Pickup Truck, 4x4	300	Diesel	1		3	8	100 Feet/Day
Backhoe/Front Loader	200	Diesel	1		3	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		3	8	

Table SCE-6A. Distribution System Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Distribution Line Extension for Station Light & Power to Calcite Substation

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**
Excavation and Boring Equipment	300	Diesel	1		3	8	
Restoration (8)				**4**	**1**		**2,800 feet**
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	2,800 ft. x 2 ft.	0.13	0.13	0
Underground construction equipment work space	1	2,800 ft. x 28 ft.	1.8	1.8	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.	0.0014	0	0.0014
New Poles	6	2.5 ft. diameter (5.0 sq.ft.)	0.0007	0	0.0007
Pole replacements for new telecom	6	2.5 ft. diameter (5.0 sq.ft.)	0.0007	0	0.0007
Down Guys	2	1 ft. x 1.25 ft.	0.00005	0	0.00005
Overhead construction equipment work space	1	125 ft. x 60 ft.	0.172	0.172	0
Total Estimated Disturbance Acreage			**2.132**	**2.130**	**0.002**

Distribution System for Station Light & Power	
Distribution Circuit Extension Length (Proposed)	3,800 ft. (0.5 miles approximately)
Total Length Underground (U.G.)	3,100 ft.
– New U.G. Conduits Needed	3,100 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 (Average 4 men per crew)	24 Crew Days
Total Man Days Required (4 x 24)	96 Man Days

Crew Size Assumptions:
1. Overhead Line Work = one 3 man crew
2. Pole installation/replacement crew = one 4 man crew

3. Overhead Line Work = two 3 man crews
4. Underground Cable Pulling = one 4 man crew
5. Underground Cable Makeup = one 4 man crew
6. Trenching and Conduit Installation = one 4 man crew
7. Trenching and Underground Boring = one 6 man crew
8. Trenching Backfill and Restoration = one 4 man crew

7. TELECOMMUNICATION FACILITIES

A telecommunication system would be required to provide monitoring and remote operation capabilities of the electrical equipment at Calcite Substation, transmission line protection, and Remedial Action Scheme (or “RAS”)[3].

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.[4] See Figure SCE-1, Proposed Calcite Substation.

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 the CA 247 Hwy and along Haynes Road, and then overhead along a new telecommunications and distribution pole line. The proposed line turns north along an un-named dirt road for approximately 1,000 feet attaching to existing wood poles and arriving at the Barstow Repeater Communication Site (“CS”). The line would

[3] RASs are “protective systems that typically utilize a combination of conventional protective relays, computer-based processors, and telecommunications to accomplish rapid, automated response (including outages) to unplanned power system events” (CAISO Master Definition Supplement, available at: http://caiso.com/rules/Pages/Regulatory/Default.aspx). Currently, there is an existing High Desert Power Plant (HDPP) RAS that is in place and the Stagecoach Solar Project would be required to participate in the HDPP RAS (as well as be subject to CAISO’s congestion management protocols that could be implemented by CAISO) at the outset. In addition, SCE is also in the process of preparing to develop the North of Lugo Centralized RAS (NoL CRAS) to replace the existing HDPP RAS and other RASs in the area, as a distinct and independent project being separately undertaken irrespective of, and with independent utility from, the Calcite Substation Project. Once the NoL CRAS is complete, both Calcite Substation and the Stagecoach Solar Project would participate in the NoL CRAS instead of the HDPP RAS. All CRAS conversion work is limited to installing equipment within the MEER building.

[4] That OPGW is expected to be in place as a result of the anticipated completion of SCE’s Eldorado Lugo Mohave Series Capacitors (ELM) Project. The ELM Project is a distinct and independent project being separately undertaken by SCE that has independent utility from the Calcite Substation Project and was approved by the CPUC on August 27, 2020. Completion and operation of the ELM 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 500kV Remedial Action Scheme Project (LVRAS 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 LVRAS Project, which also has independent utility from the Calcite Substation Project. Assuming that both the ELM Project and the LVRAS 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).

drop down into a new riser and continues underground for approximately 750 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 south-west 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.

7.1 TELECOMMUNICATION GEN-TIE CABLES

The first proposed telecommunication gen-tie cable route will be an OPGW fiber optic cable installed by the customer from the customer's substation on the gen-tie 220 kV structures. The OPGW would end at a splice enclosure on the first customer-owned structure outside the Calcite Substation. Underground conduit and cable would be installed by the customer from the transmission POCO with the OPGW splice to the telecommunication POCO vault outside the wall of the Calcite Substation. The customer would a leave a 100' coil of cable in the POCO vault. An SCE crew would use the coil for making the demarcation splice in the POCO vault. SCE will install approximately 1,000 feet of conduit and cable from the POCO vault to the MEER. See Figure SCE-1, Proposed Calcite Substation.

The diverse telecommunication gen-tie cable route would be an underground fiber optic cable installed by the customer in the gen-tie 220kV right of way. The conduit with this underground cable would connect to the diverse POCO vault outside the Calcite Substation. A coil of 100' of the cable would be left in the diverse POCO vault for making the demarcation splice. SCE will install approximately 1,000 feet of conduit and cable from the diverse POCO vault to the MEER and make the demarcation splice.

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

7.2 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, 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.

7.3 LAYDOWN AREAS AND ACCESS ROADS

Laydown areas may include the following existing SCE facilities.

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

7.4 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 SCE-7H.

7.5 INSTALLATION OF FIBER OPTIC CABLE ON POLES

The overhead fiber optic cable SCE installs is a type of cable known as All Dielectric Self-supporting Fiber Optic Cable (ADSS). Usually this cable is installed with the use of a bucket truck. One four-man crew and two trucks would be used. A crew can install up to 1,000 feet of cable in one day. A crew can complete one 96 fiber splice in a day.

ADSS stringing includes all activities associated with the installation of cables on existing wood pole or Light Weight Steel (LWS) structures. This activity includes the installation of cross arms, suspension and dead-end hardware assemblies and vibration dampeners, stringing sheaves (rollers or travelers) may be used when installing the cable. 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 5,000 feet to 20,000 feet over flat or mountainous terrain. Fiber optic cable pulls are based on access for pulling equipment to designated dead-end structures, terrain, and suitability for fiber optic cable 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.

A distribution line pole would be replaced if the pole does not meet wind load specifications. Inter-set poles may be added to spans where needed to achieve required ground clearance for the fiber optic cable. Replacing distribution line pole requires a four-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. Conductors would be transferred from the existing pole to the new pole and the old pole removed.

7.6 INSTALLATION OF FIBER OPTIC CABLE 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 between underground vaults. The fiber optic cable is then installed inside the innerduct. An approximate 30-foot x 40-foot work area is required at each vault to install the underground cable. A coil of 100’ of cable is left on each cable end in the vault for splicing.

7.7 SPLICING FIBER OPTIC CABLE

For splicing fiber optic cables, Outside Plant Splicing Labs and Foreman Trucks would be used. The workspace required would be an approximate 30-foot by 40-foot area. The crew would bring the fiber optic cable ends into the Splice Lab and splice together the fibers from the two cables. After the fibers are spliced and secured in a splice case, the splice case and cable slack would be mounted on a cross arms on a pole or attached to the side wall of an underground vault. Because of the rigid nature of OPGW, the splice case is placed inside a splice cabinet mounted on a lattice tower and the OPGW stored in a coil around the cabinet.

7.8 OPERATION AND MAINTENANCE

Following the completion of project construction, operation of the new telecommunication facilities would commence. 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

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Fiber Optic Cable on 5-foot Crossarm				**5**	**3**		**1,700 Feet**
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		3	8	800 Feet/Day
Bucket Truck	300	Diesel	2		3	8	
Install Down Guys				**2**	**2**		**Approx 4 Down Guys**
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		2	4	2 Down Guy/Day
Bucket Truck	300	Diesel	1		2	4	
Install Fiber Optic Cable Underground				**5**	**4**		**3,250 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	1		4	8	1,000 Feet/Day
Bucket Truck	350	Diesel	2		4	8	
Splice Fiber Optic Cable				**2**	**4**		**3 Splices**
Splicing Lab	300	Diesel	2		4	8	1 splice per Day
Underground Conduit				**5**	**2**		**Approx. 750 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	1		2	8	500 Feet/Day
Backhoe/Front Loader	200	Diesel	1		2	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		2	8	
4000 gallon Water Truck	350	Diesel	1		2	8	
Concrete Truck	350	Diesel	1		1	8	
Restoration				**7**	**1**		**750 Feet**
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 OPGW Slice at M29-T3

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Fiber Optic Cable Underground				**5**	**6**		**5,600 Feet**
¾-Ton Pickup Truck, 4x4	300	Diesel	2		6	8	1,000 Feet/Day
Bucket Truck	350	Diesel	2		6	8	
Splice Fiber Optic Cable				**5**	**2**		**2 Splices**
Splicing Lab	300	Diesel	2		2	8	1splice/Day
Underground Conduit				**5**	**12**		**Approx 5,600 Feet**
¾-Ton Pickup Truck, 4x4	300	Diesel	1		12	8	500 Feet/Day
Backhoe/Front Loader	200	Diesel	1		12	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		12	8	
4000 gallon Water Truck	350	Diesel	1		12	8	
Concrete Truck	350	Diesel	1		12	8	
Restoration				**7**	**2**		**5,600 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	2		2	2	1 Mile/Day
Water Truck	300	Diesel	1		2	8	

Table SCE-7C. Telecommunication Fiber Optic Cable Summary

	Calcite to Repeater	**Calcite to M29-T3**
Fiber-Optic Cable Length (Proposed)	5,050 ft.	5,600 ft.
Total Length Underground (U.G.)	3,250 ft.	5,600 ft.
Existing U.G. Conduits (installed by distribution)	3,100 ft.	0 ft.
New U.G. Conduits Needed	750 ft.	5,600 ft.
Total Length Overhead (O.H.)	1,700 ft.	0ft.
On Existing Poles – O.H.	1,000 ft.	0 ft.
On New Poles – O.H. (installed by distribution)	700 ft.	0 ft.
Existing Poles	5	0
New Poles Required	0	0
New Down Guys Required	4	0
Time and Resources to Construct (4 men per crew)	16 Crew Days	22 Crew Days
Total Man Days Required	64 Man Days	88 Man Days

Table SCE-7D. Telecommunication Ground Disturbance Calculations					
Telecommunication Route Project Feature	**Qty.**	**Disturbed Acreage Calculation**	**Acres Disturbed During Construction**	**Acres to Be Restored**	**Acres Permanently Disturbed**
Calcite – Barstow Repeater					
Trenching	1	2ft X 750	0.034 (1,500 sq.ft.)	0.034 (1,500 sq.ft.)	0
Underground construction equipment workspace	1	28ft X 750	0.48 (21,000 sq.ft.)	0.48 (21,000 sq.ft.)	0
Calcite – M29-T3					
Trenching	1	2ft X 5,600	0.26 (11,200 sq.ft.)	0.26 (11,200 sq.ft.)	0.002 (96 sq.ft.)
Underground construction equipment work space	1	28ft X 5,600	3.6 (156,800 sq.ft.)	3.6 (156,800 sq.ft.)	0

Table SCE-7E. Telecommunication Systems Construction Activities, Construction Equipment and Workforce Estimates by Activity: PGW Gen-tie Fiber Optic Cable							
WORK ACTIVITY				**ACTIVITY PRODUCTION**			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Fiber Optic Cable				**4**	**1**		**1,100 Feet**
¾-Ton Pickup Truck, 4x4	300	Diesel	2		1	8	1,100 Feet/Day
Bucket Truck	350	Diesel	2		1	8	
Splice Fiber Optic Cable				**4**	**2**		**2 Splices**
Splicing Lab	300	Diesel	2		2	8	1 Splice/Day
Underground Conduit				**5**	**1**		**Approx. 225 Feet**
A splice cabinet	300	Diesel	1		1	8	225 Feet/Day
Backhoe/Front Loader	200	Diesel	1		1	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		1	8	
4000 gallon Water Truck	350	Diesel	1		1	8	
Concrete Truck	350	Diesel	1		1	8	
Restoration				**7**	**1**		**225 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	2		1	2	225 Feet/Day
Water Truck	300	Diesel	1		1	8	

Table SCE-7F. Telecommunication Systems Construction Activities, Construction Equipment and Workforce Estimates by Activity: Redundant Gen-tie Fiber Optic Cable

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Fiber Optic Cable				**4**	**1**		**1,000 Feet**
A splice cabinet Truck, 4x4	300	Diesel	2		1	8	1,000 Feet/Day
Bucket Truck	350	Diesel	2		1	8	
Splice Fiber Optic Cable				**4**	**2**		**2 Splices**
Splicing Lab	300	Diesel	2	2	2	8	1 Splices/Day
Underground Conduit				**5**	**1**		**Approx. 225 Feet**
A splice cabinet	300	Diesel	1		1	8	225 Feet/Day
Backhoe/Front Loader	200	Diesel	1		1	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		1	8	
4000 gallon Water Truck	350	Diesel	1		1	8	
Concrete Truck	350	Diesel	1		1	8	
Restoration				**7**	**1**		**225 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	2		1	2	225 Feet/Day
Water Truck	300	Diesel	1		1	8	

Table SCE-7G. Telecommunication Fiber Optic Gen-tie Cable Summary

	OPGW Gen-tie	**ADSS Gen-tie**
Fiber-Optic Cable Length (Proposed)	1,100 Feet	1,000 Feet
Total Length Underground (U.G.)	1,100 Feet	1,000 Feet
Existing U.G. Conduits (Installed by Substation Construction)	875 Feet	775 Feet
New U.G. Conduits Needed	225Feet	225 Feet
Total Length Overhead (O.H.)	0 Feet	0 Feet
On Existing Poles – O.H.	0 Feet	0 Feet
On New Poles – O.H.	0 Feet	0 Feet
Existing Poles	0	0
New Poles Required	0	0
New Down Guys Required	0	0
Time and Resources to Construct (4 men per crew)	5 Crew Days	5 Crew Days
Total Man Days Required	20 Man Days	20 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**
OPGW Gen-tie	1	2ft x 225	0.01 (450 sq ft)	0.01 (450 sq ft)	0.0004 (16 sq.ft)
Underground construction equipment work space	1	28ft x 225	0.145 (6,300 sq.ft.)	0.145 (6,300 sq.ft.)	0
ADSS Gen-tie	1	2ft x 225	0.01 (450 sq.ft.)	0.01 (450 sq.ft.)	0.0004 (16 sq.ft)
Underground construction equipment work space	1	28ft x 225	0.145 (6,300 sq.ft.)	0.145 (6,300 sq.ft.)	0

8. ALTERNATIVE CALCITE SUBSTATION

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

8.1 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, Alternative Calcite Substation.

8.2 E-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 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-7, Alternative Transmission and Distribution Lines. The routes for these new T/Ls would require crossing under SCE’s Eldorado-Lugo and Lugo-Mohave 500 kV lines.

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 SCE-7, Alternative 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-5, 220 kV Tubular Steel Pole Configuration for possible 220 kV Structure Configurations. A 220 kV double circuit structure 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 LSTs in the existing SCE ROW would be removed since they would not be in use in the proposed configuration.

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-7, Alternative Transmission and Distribution Lines.

Tables SCE-8A and SCE-8B below provides 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

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 Towers (1)	2	220' x 220'	2.2	2.2	0
Construct New 220 kV Structures (2)	7	220' x 220'	7.8	7.2	0.6
Construct New Steel Pole H-frames (2)	4	220' x 220'	4.5	4.1	0.4
220kV Conductor Stringing Areas (3)	13	400' x 150'	17.9	17.9	0
Install Underground Ground Wire (4)	1,100	linear feet x 15' wide	0.4	0.4	0
Existing Tower Work Areas	2	100' x 100'	0.5	0.5	0
New Access Roads / Road Widening (5)		Varies	2.0	0	2.0
Access Road & Tower Buffers		Varies	1.3	1.3	0
Material & Equipment Staging Yard – (Calcite)	1	approx. 2 acres	2	2	0
Total Estimated Disturbance Acreage (6)			**39.3**	**36.3**	**3.0**

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

Table SCE-8B. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and Gen-tie

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Crew Workforce**	**Estimated Schedule (Days)**	**Estimated Usage (Hrs/Day)**	**Estimated Activity Value**
Survey (1)				**4**	**4**		**4 Miles**
1-Ton Truck, 4x4	300	Gas	2		4	8	1 Mile
Staging/Material Yard (2)				**4**			**1 Yard**
1-Ton Truck, 4x4	300	Gas	2		Duration of Project	4	
R/T Forklift	125	Diesel	1			4	
Ranger	50	Diesel	1			4	
Generator	49	Diesel	1			8	
Water Truck	300	Diesel	2			8	
Road Work & Structure Pads (3)				**5**	**11**		**2 Miles & 11 Pads**
1-Ton Truck, 4x4	300	Gas	1		11	8	
Backhoe/Front Loader	125	Diesel	1		11	4	
Tracked Dozer	150	Diesel	1		11	8	
Motor Grader	250	Diesel	1		11	8	
Water Truck	300	Diesel	2		11	8	
Drum Compactor	100	Diesel	1		11	4	
Excavator	250	Diesel	1		3	4	
Lowboy Truck/Trailer	450	Diesel	1		11	2	
Guard Structure Installation (4)				**6**	**2**		**4 Structures**
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	

Table SCE-8B. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and Gen-tie

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Crew Workforce**	**Estimated Schedule (Days)**	**Estimated Usage (Hrs/Day)**	**Estimated Activity Value**
Flatbed Truck	400	Diesel	1		2	8	
Conductor & GW Removal (5)				**14**	**4**		**9,250 Feet**
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	
LST Removal (6)				**6**	**4**		**2 Structures**
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	
Flatbed Truck	400	Diesel	1		4	2	
LST Foundation Removal (7)				**4**	**2**		**2 Structures**
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	
220 kV Structure Foundation Installation (8)				**6**	**19**		**11 Structures**
1-Ton Truck, 4x4	300	Gas	2		19	4	
Boom/Crane Truck	350	Diesel	1		19	4	
Backhoe/Front Loader	125	Diesel	1		19	8	
Drill Rig	275	Diesel	1		12	8	
Water Truck	300	Diesel	1		19	8	
Dump Truck	350	Diesel	1		19	8	
Concrete Truck	350	Diesel	3		10	6	
220 kV Structure Steel Haul (9)				**4**	**4**		**11 Structures**
1-Ton Truck, 4x4	300	Gas	1		4	8	
Boom/Crane Truck	350	Diesel	1		4	4	
Flatbed Truck	400	Diesel	1		4	8	

Table SCE-8B. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and Gen-tie

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Crew Workforce**	**Estimated Schedule (Days)**	**Estimated Usage (Hrs/Day)**	**Estimated Activity Value**
220 kV Structure Assembly (10)				**6**	**10**		**11 Structures**
1-Ton Truck, 4x4	300	Gas	2		10	4	
Compressor Trailer	60	Diesel	1		10	8	
Manlift/Bucket Truck	250	Diesel	1		10	8	
R/T Crane (L)	275	Diesel	1		10	8	
220 kV Structure Erection (11)				**6**	**10**		**9 Structures**
1-Ton Truck, 4x4	300	Gas	2		10	4	
Compressor Trailer	60	Diesel	1		10	4	
Manlift/Bucket Truck	250	Diesel	1		10	8	
Crane	400	Diesel	1		10	8	
220kV Conductor & GW Installation (12)				**28**	**12**		**71,500 Feet**
1-Ton Truck, 4x4	275	Gas	8		12	4	
Manlift/Bucket Truck	250	Diesel	4		12	8	
Boom/Crane Truck	350	Diesel	2		12	8	
R/T Crane (M)	215	Diesel	2		12	4	
Dump Truck	350	Diesel	1		12	4	
Wire Truck/Trailer	350	Diesel	2		12	8	
Sock Line Puller	300	Diesel	1		5	8	
Bullwheel Puller	350	Diesel	1		9	8	
Static Truck/ Tensioner	350	Diesel	1		12	8	
R/T Forklift	125	Diesel	1		12	8	
Spacing Cart	10	Diesel	3		4	8	
Backhoe/Front Loader	125	Diesel	1		9	4	
Sag Cat w/ Winches	350	Diesel	2		12	2	
Water Truck	300	Diesel	1		12	8	
Lowboy Truck/Trailer	450	Diesel	2		12	2	
Hughes 500 E	400	Jet A	1		12	7	
Fuel, Helicopter Support Truck	300	Diesel	1		12	7	
UG Ground Wire Installation (13)				**4**	**6**		**1,100 Trench Feet**
1-Ton Truck, 4x4	275	Gas	1		6	4	
Backhoe/Front Loader	125	Diesel	1		6	8	
Dump Truck	350	Diesel	1		6	8	

Table SCE-8B. Calcite Substation Project Construction, Equipment and Workforce Estimates by Activity: Construct 220 kV Transmission Line Loop-in and Gen-tie

WORK ACTIVITY				ACTIVITY ESTIMATES			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Crew Workforce**	**Estimated Schedule (Days)**	**Estimated Usage (Hrs/Day)**	**Estimated Activity Value**
Water Truck	300	Diesel	1		6	8	
Guard Structure Removal (14)				**6**	**2**		**4 Structures**
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	
Flatbed Truck	400	Diesel	1		2	8	
Restoration (15)				**7**	**6**		**3 Miles**
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:
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. Steel Pole Structure Foundation Installation = one 6 man crew
9. Steel Pole Structure Haul = one 4 man crew
10. Steel Pole Structure Assembly = one 6 man crew
11. Steel Pole Structure Erection = one 6 man crew
12. Conductor & GW Installation = one 28 man crew
13. UG Ground Wire Installation = one 4 man crew
14. Guard Structure Removal = one 6 man crew
15. Restoration = one 7 man crew

8.3 DISTRIBUTION SYSTEM FOR SUBSTATION LIGHT AND POWER

To provide service for substation light and power at the Alternative Substation Property, approximately 5,000 feet of 12 kV overhead and underground distribution circuitry 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 from the corner of Waalew & Fern Roads, westward overhead along Waalew Road, (westbound) for approximately 1,700 feet. The circuitry would then transition to an underground configuration and extend westward along Waalew Road for approximately 1,500 feet. This would include boring approximately 300 feet underground to cross California Highway 247. The circuitry would then turn south and extend underground for approximately another 1,800 feet to serve the Alternative Substation Property. See Figure SCE-7, Alternative Transmission and Distribution 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 underground 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 Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Distribution Line Extension for Station Light and Power

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Down Guys (1)				**4**	**10**		**Approx 10 Down Guys**
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		10	8	1 Down Guy/Day
Bucket Truck	300	Diesel	1		10	8	
Install New Poles (2)				**4**	**13**		**25 Wood Poles**
1-Ton Pickup 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' Flatbed Truck/Trailer	350	Diesel	1		13	8	
Install Overhead Wire (3)				**6**	**2**		**1,700 Circuit Feet**
1-Ton Crew Cab Pickup Truck, 4x4	300	Diesel	1		2	8	1,000-Feet/Day
55’ Double Bucket Truck	350	Diesel	1		2	8	
Underground Cable Pulling & Transformer Installation (4)				**4**	**3**		**3,300 Circuit Feet**
1-Ton Pickup Truck, 4x4	300	Diesel	1		3	8	1,000 Feet/Day
55’ Double Bucket Truck	350	Diesel	1		3	8	
Hydraulic Rewind Puller	300	Diesel	1		3	8	
Underground Cable Makeup (5)				**4**	**2**		
1-Ton Crew Cab, 4x4	300	Diesel	1		2	8	
55’ Double Bucket Truck	350	Diesel	1				

Table SCE-9. Distribution System Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Distribution Line Extension for Station Light and Power

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Underground Trenching/Structure Excavation Conduit (6)				**4**	**7**		**Approx. 3,300 Feet**
1-Ton Pick-up Truck, 4x4	300	Diesel	1		7	8	500 Feet/Day
Backhoe/Front Loader	200	Diesel	1		7	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		7	8	
4000 gallon Water Truck	350	Diesel	1		7	8	
Concrete Truck	350	Diesel	1		7	8	
Survey (7)				**4**	**1**		**0.5 Miles**
1 Ton Truck, 4x4	300	Gas	2	4	1	8	1 Mile/Day
Road Work (8)				**5**	**3**		**0.5 Miles**
1 Ton Truck, 4x4	300	Gas	1		3	8	800 Feet/Day
Backhoe/Front Loader	200	Diesel	1		3	4	
Tracked Dozer	150	Diesel	1		3	8	
Motor Grader	250	Diesel	1		3	8	
Water Truck	300	Diesel	2		3	8	
Drum Compactor	100	Diesel	1		3	4	
Excavator	250	Diesel	1		3	4	
Lowboy Truck/Trailer	450	Diesel	1		3	2	
Underground Boring, Casing and Conduit Installation (9)				**6**	**3**		**Approx. 300 Feet**
1-Ton Pick-up Truck, 4x4	300	Diesel	1		3	8	100 Feet/Day
Backhoe/Front Loader	200	Diesel	1		3	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		3	8	
Excavation and Boring Equipment	300	Diesel	1		3	8	
Restoration (10)				**4**	**1**		**3,300 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	2		1	2	1 Mile/Day
Water Truck	300	Diesel	1		1	8	

Distribution Land Disturbance					
Project Feature	**Project Quantity**	**Disturbed Acreage Calculation**	**Construction Disturbance Acreage**	**Temporary Disturbance Acreage**	**Acres Permanently Disturbed**
Underground trench/duct for conduit	1	3,300 ft. x 2 ft.	0.151	0.151	0
Underground construction equipment work space	1	3,300 ft. x 28 ft.	2.121	2.121	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
Distribution access road	1	16 ft. x 2000 ft.	0.734	0.092	0.642
Total Estimated Disturbance Acreage			**3.928**	**3.279**	**0.6486**

Distribution System for Station Light & Power	
Distribution Circuit Extension Length (Proposed)	5000 ft. (0.95 miles)
Total Length Underground (U.G.)	3,300 ft.
New U.G. Conduits Needed	3,300 ft
Total Length Overhead (O.H.)	1,700 ft.
New Poles – O.H.	1,700 ft.
New Poles Required	25
New Down Guys Required	10
New Distribution Access Road	2,000 ft. x 16 ft.
Time and Resources to Construct (Approximately 4 men per crew)	45 Crew Days
Total Man Days Required	180 Man Days

Crew Size Assumptions:
1. Overhead Line Work = one 3 man crew
2. Pole Installation/Replacement crew = one 4 man crew
3. Overhead Line Work = two 3 man crews
4. Underground Cable Pulling = one 4 man crew
5. Underground Cable Makeup = one 4 man crew
6. Trenching and Conduit Installation = one 4 man crew
7. Survey = one 4 man crew
8. Road Work = one 5 man crew
9. Trenching and Underground Boring = one 6 man crew
10. Trenching Backfill and Restoration = one 4 man crew

8.4 TELECOMMUNICATION FACILITIES

The telecommunication facilities associated with an Alternative Substation Property instead of the Calcite Substation Property would be as described below:

The Primary fiber optic cable would be installed from the Alternative Substation Property to the SCE Barstow Repeater Communication Site located in the SCE Transmission Right of Way north of Haynes Road and east of Fern Road. Beginning at the Alternative Substation Property the telecommunication facilities would be installed along with the 12kV Station Light and Power as described in the alternate distribution section to the intersection of Fern Road and Waalew Road. From this intersection, the telecommunication line would extend overhead on new poles west on Desert Lane approximately 1,300 feet, then south on existing poles 2,500 feet to the SCE right of way. The line would dip down into a new riser and continue underground for approximately 900 feet to the Barstow Repeater Communication Site ("CS").

For the Secondary fiber optic cable to the Alternative Substation Property, the underground conduits would extend within the new ROW for the proposed 220kV loop-in lines for approximately 4,000 feet, then follow the Secondary cable route proposed for the Calcite Substation approximately 1,700 feet along the existing ROW to the OPGW splice located at M29-T3.

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 SCE-10D.

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

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Overhead Cable				**4**	**6**		**5,500 Feet**
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		6	8	1,000 Feet/Day
Bucket Truck	300	Diesel	2		6	8	
Install Down Guys				**4**	**4**		**Approx 8 Down Guys**
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		4	4	2 Down Guy/Day
Digger Truck	300	Diesel	1		4	6	
Install Poles				**4**	**3**		**Approx 6 Poles**
1-Ton Crew Cab Flat Bed	300	Diesel	1		3	4	2 Poles/Day

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

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Digger Truck	300	Diesel	1		3	6	
Install Underground Fiber Optic Cable				**8**	**4**		**4,200 Feet**
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		4	8	1,000 Feet/Day
Bucket Truck	350	Diesel	2		4	8	
Splice Fiber Optic Cable				**4**	**4**		**4 Splices**
Splicing Lab	300	Diesel	2		4	4	1 Splice/Day
Underground Conduit at Repeater Site				**5**	**2**		**Approx. 900 Feet**
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		2	8	500 Feet/Day
Backhoe/Front Loader	200	Diesel	1		2	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		2	8	
4000 gallon Water Truck	350	Diesel	1		2	8	
Concrete Truck	350	Diesel	1		2	4	
Restoration				**7**	**1**		**900 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	2		1	8	900/Day
Water Truck	300	Diesel	1		1	8	

Table SCE-10B. Telecommunication Systems Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Alternative Substation to OPGW splice at M29-T3 Fiber Optic Cable

WORK ACTIVITY				ACTIVITY PRODUCTION			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Install Fiber Optic Cable (3)				**8**	**6**		**5,700 Feet**
¾-Ton Pick-up Truck, 4x4	300	Diesel	2		6	8	2,000 Feet/Day
Bucket Truck	350	Diesel	2		6	8	
Splice Fiber Optic Cable				**4**	**4**		**4 Splices**
Splicing Lab	300	Diesel	2		8	4	1 Splice/Day
Underground Conduit				**5**	**12**		**Approx. 5,700 Feet**
¾-Ton Pick-up Truck, 4x4	300	Diesel	1		12	8	500 Feet/Day

Table SCE-10B. Telecommunication Systems Construction Activities, Construction Equipment and Workforce Estimates by Activity: Construct Alternative Substation to OPGW splice at M29-T3 Fiber Optic Cable							
WORK ACTIVITY				**ACTIVITY PRODUCTION**			
Primary Equipment Description	**Estimated Horsepower**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs/Day)**	**Estimated Production Per Day**
Backhoe/Front Loader	200	Diesel	2		12	8	
1-Ton Crew Cab Flatbed, 4x4	300	Diesel	1		12	8	
4000 gallon Water Truck	350	Diesel	1		12	8	
Concrete Truck	350	Diesel	1		12	8	
Restoration (4)				**7**	**2**		**5,700 Feet**
1-Ton Crew Cab, 4x4	300	Diesel	2		2	8	2,600/Day
Water Truck	300	Diesel	1		2	8	

Table SCE-10C. Telecommunication Fiber Optic Cable Summary		
	Alternative to Repeater	**Alternative to M29-T3**
Fiber-Optic Cable Length (Proposed)	9,700 ft.	5,700 ft.
Total Length Underground (U.G.)	4,200 ft.	5,700 ft.
Existing U.G. Conduits (Conduit installed by Distribution)	3,300 ft.	0 ft.
New U.G. Conduits Needed	900 ft.	5,700 ft.
Total Length Overhead (O.H.)	5,500 ft.	0ft.
On Existing Poles – O.H.	2,500 ft.	0 ft.
On New Poles – O.H. (Installed by Transmission Telecom)	1,300 ft.	
On New Poles – O.H. (Installed by Distribution)	1,700 ft.	0 ft.
Existing Poles	25	0
New Poles Required	6	0
New Down Guys Required	8	0
Time and Resources to Construct (4 men per crew)	24 Crew Days	24 Crew Days
Total Man Days Required	96 Man Days	96 Man Days

Table SCE-10D. Telecommunication Ground Disturbance Calculations					
Telecommunication Route Project Feature	**Qty.**	**Disturbed Acreage Calculation**	**Acres Disturbed During Construction**	**Acres to Be Restored**	**Acres Permanently Disturbed**
Alternative Substation Repeater CS					
Trenching	1	2 ft. x 900 ft.	0.04 acres (1,800 sq.ft)	0.04 acres (1,800 sq.ft)	0.0004 acres (16 sq.ft)
Underground construction equipment workspace	1	28 ft. x 900 ft.	0.58 acres (25,200 sq.ft.)	0.58 acres (25,200 sq.ft.)	0
New Poles	6	2.5 ft. Diameter (5.0 sq. ft.)	0.0007 acre (30 sq. ft.)	0	0.0007 acre (30 sq. ft.)
Down Guys	8	1 ft. x 1.25 ft.	0.0002 acre	0.0002 acre	0
Alternative Substation M29-T3					
Trenching	1	2 ft. x 5,700 ft.	0.26 acres (11,400 sq.ft.)	0.26 acres (11,400 sq.ft.)	0.002 acres (112 sq.ft.)
Underground construction equipment workspace	1	28 ft X 5,700 ft.	3.66 acres (159,600 sq.ft.)	3.66 acres (159,600 sq.ft.)	0

ATTACHMENT 1: FIGURES AND TABLES

This attachment includes the following:

- Table A: Total Construction Water Demand: Proposed Substation
- Table B: Total Construction Water Demand: Alternative Substation
- Figures SCE-1 through SCE-7 follow the two tables.

Table A: Total Construction Water Demand: Proposed Substation

Calcite Substation and the Interconnection of Stagecoach Solar Project

Table 5 - Total Water Demand for Project Duration

Disturbance Source	Duration (days)	Demand From Table 2 (gallons/acre/day)	Total Area (acres)	Active Areas (acres)	Daily Water Demand (gallons/day)	Evapotranspiration Table 3 (additional gallons/day)	Daily Task Demand (gallons/day)	Applications (times/day)	Duration Task Demand (Gallons)	Duration Task Demand (acre-feet)
Calcite Substation	425	1,815	14.0	7.0	12,705	2,730	15,435	3	6,559,856.62	20.13
Transmission Loop-in and SCE Portion of Gen-Tie Construction	81	1,815	35.0	5.2	9,523	2,046	11,569	3	937,078.27	2.88
Distribution System for Station Light and Power to Calcite Substation	96	1,815	2.1	0.3	580	125	705	3	67,633.04	0.21
Telecommunication Fiber Optic Cable	38	1,815	3.9	0.6	1,050	226	1,276	3	48,473.42	0.15
Telecommunication Gen-Tie	30	1,815	0.3	0.05	84	18	103	3	3,075.15	0.01
Material & Equipment Staging/Laydown Yards	30	1,210	2.0	2.0	2,420	780	3,200	3	95,999.63	0.29
Fill Compaction									2,131,348.92	6.54
Hydroseeding									155,042.63	0.48
Total (Overall)		Total Disturbed Area:	57.3	acres					**9,998,507.7**	**30.7**

Total Demand: 31 Acre-Feet for project duration
(10 Millon Gallons for project duration)

-All areas based on the reference Land Disturbance Tables given in: Calcite Project Description Draft March 2021.
-Project components durations based on workforce estimates by activity in the Tables given in: Calcite Project Description Draft March 2021.
-Assume 15% of general construction/grading considered active at any given time throughout the project except within the substation.
-Assume that due to the size of the substation that 50% of it would be active at any given time throughout the project.
-Assume that the access roads may utilize soil binders and the number of water applications for dust suppression per day may be reduced.
-Assume that the project will work a 6 day work week.
-Assume 26 working days per month, on average.
-Assume that concrete for this project will be premixed offsite by the concrete provider.

Table B: Total Construction Water Demand: Alternative Substation

Alternative Calcite Substation Location and the Interconnection of Stagecoach Solar Project

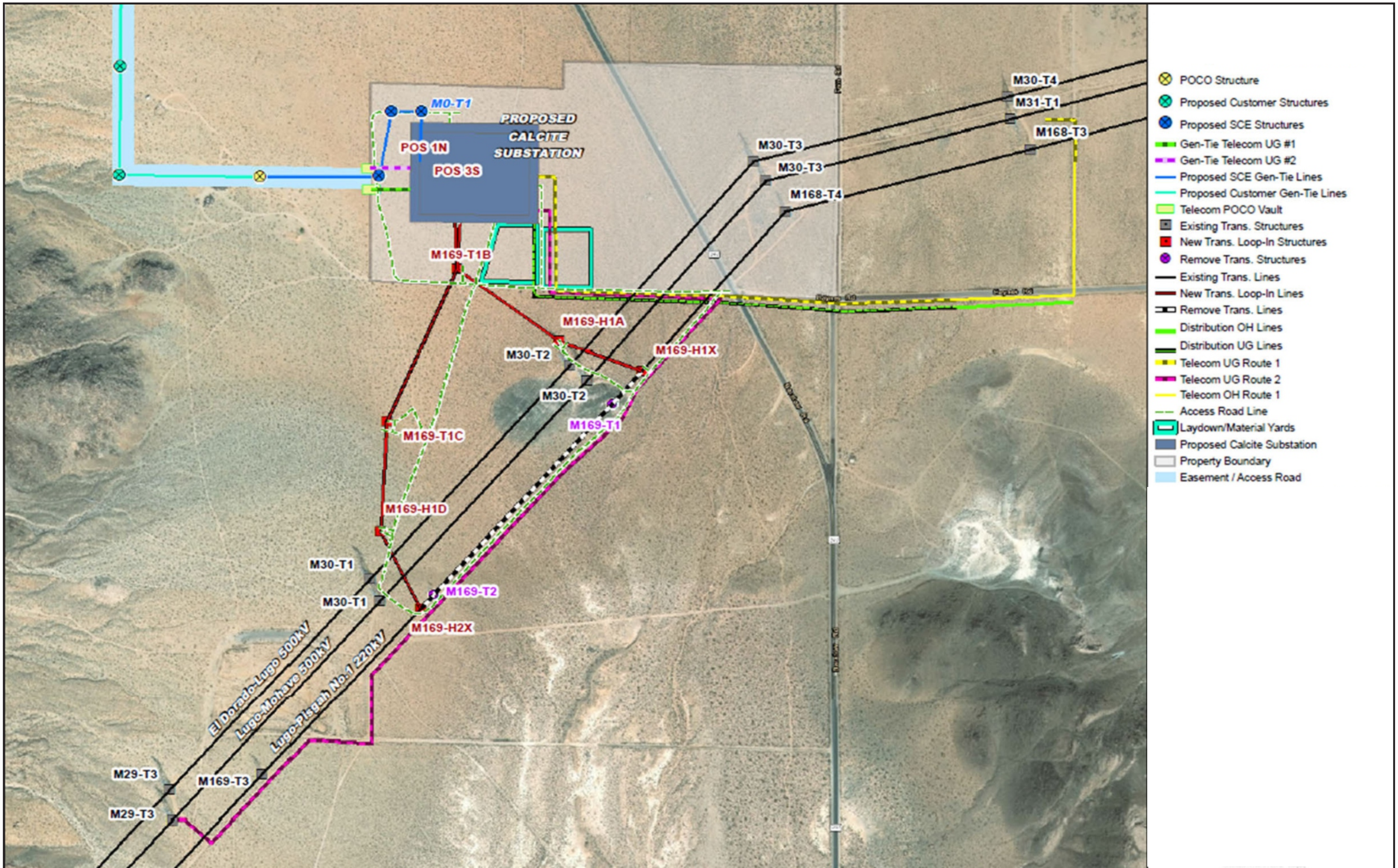
Table 5 - Total Water Demand for Project Duration

Disturbance Source	Duration (days)	Demand From Table 2 (gallons/acre/day)	Total Area (acres)	Active Areas (acres)	Daily Water Demand (gallons/day)	Evapotranspiration Table 3 (additional gallons/day)	Daily Task Demand (gallons/day)	Applications (times/day)	Duration Task Demand (Gallons)	Duration Task Demand (acre-feet)
Alternative Substation	416	1,815	14.0	7.0	12,705	2,730	15,435	3	6,420,942.01	19.71
Transmission Loop-In and SCE Portion of Gen-Tie Construction	92	1,815	39.2	5.9	10,681	2,295	12,976	3	1,193,816.58	3.66
Distribution System Line Extension for Station Light and Power	180	1,815	3.9	0.6	1,070	230	1,300	3	233,928.57	0.72
Telecommunication Gen-Tie	30	1,815	0.3	0.05	84	18	103	3	3,075.15	0.01
Telecommunication Systems Construct Alternative Substation to Barstow Repeater and OPGW splice at M29-T3 Fiber Optic Cable	96	1,815	4.5	0.7	1,238	266	1,504	3	144,356.03	0.44
Material & Equipment Staging/Laydown Yards	30	1,210	2.0	2.0	2,420	780	3,200	3	95,999.63	0.29
Fill Compaction									2,131,348.92	6.54
Hydroseeding									162,546.16	0.50
Total (Overall)		Total Disturbed Area:	64.0	acres					**10,386,013.0**	**31.9**

Total Demand: 32 Acre-Feet for project duration
(10 Million Gallons for project duration)

-For Land Disturbance Areas, reference Land Disturbance Tables given in: Calcite Project Description Draft March 2021.
-Project components durations based on workforce estimates by activity in the Tables given in: Calcite Project Description Draft March 2021.
-Assume 15% of general construction/grading considered active at any given time throughout the project except within the substation.
-Assume that due to the size of the substation that 50% of it would be active at any given time throughout the project.
-Assume that the access roads may utilize soil binders and the number of water applications for dust suppression per day may be reduced.
-Assume that the project will work a 6 day work week.
-Assume 26 working days per month, on average.
-Assume that concrete for this project will be premixed offsite by the concrete provider.

Figures



Source: Edison, 2021.

Figure SCE-1

Proposed Calcite Substation

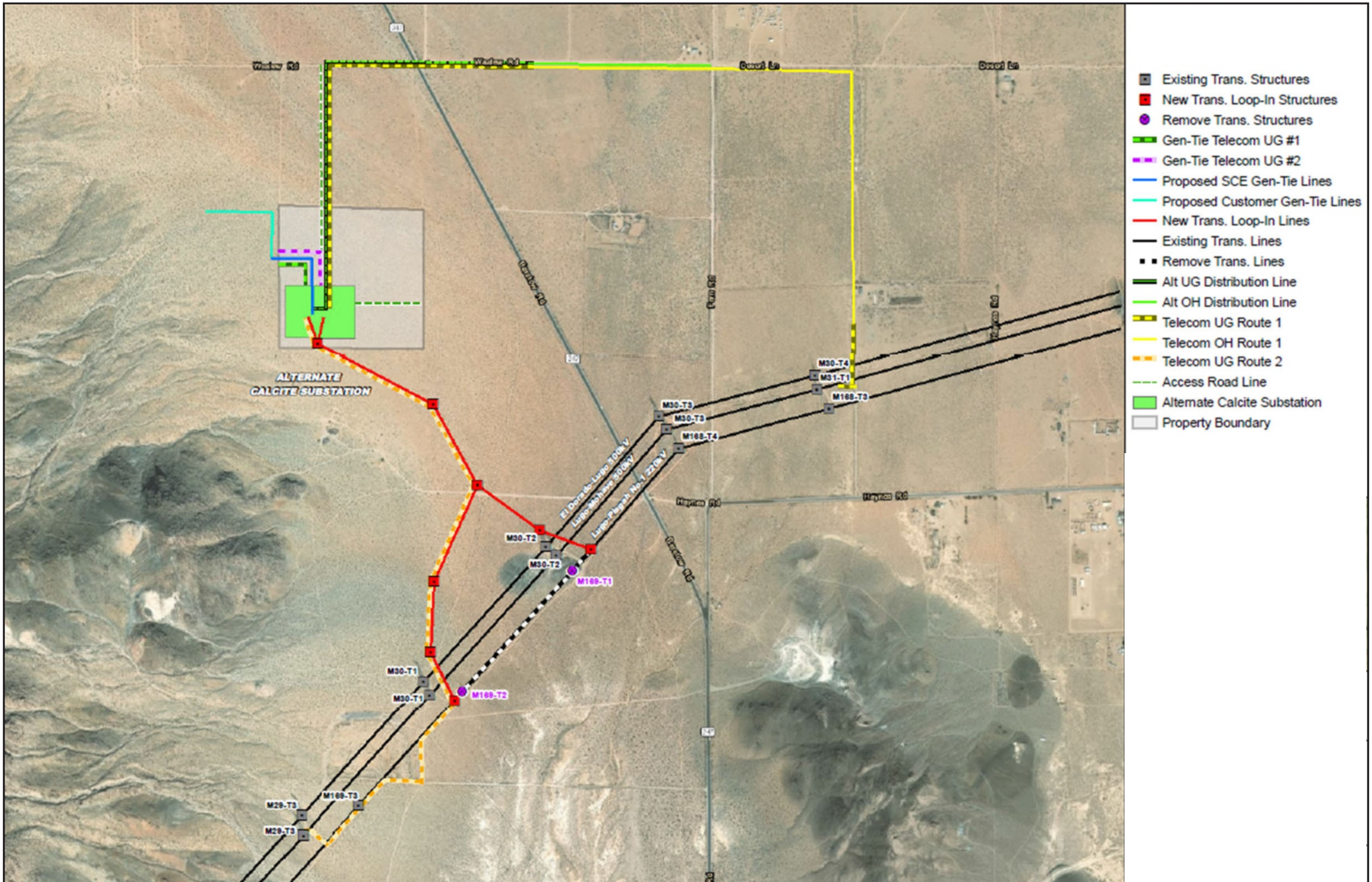
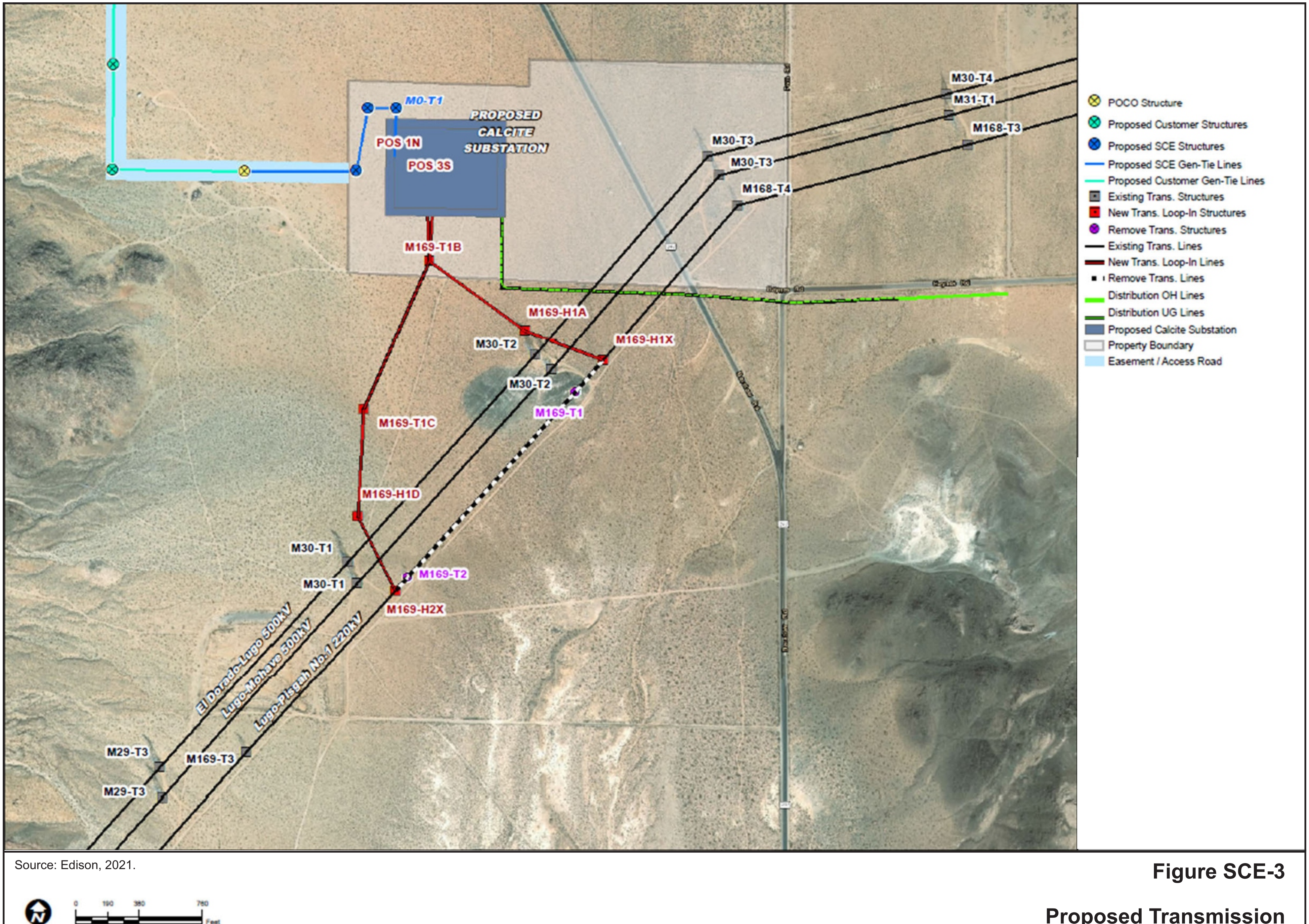


Figure SCE-2

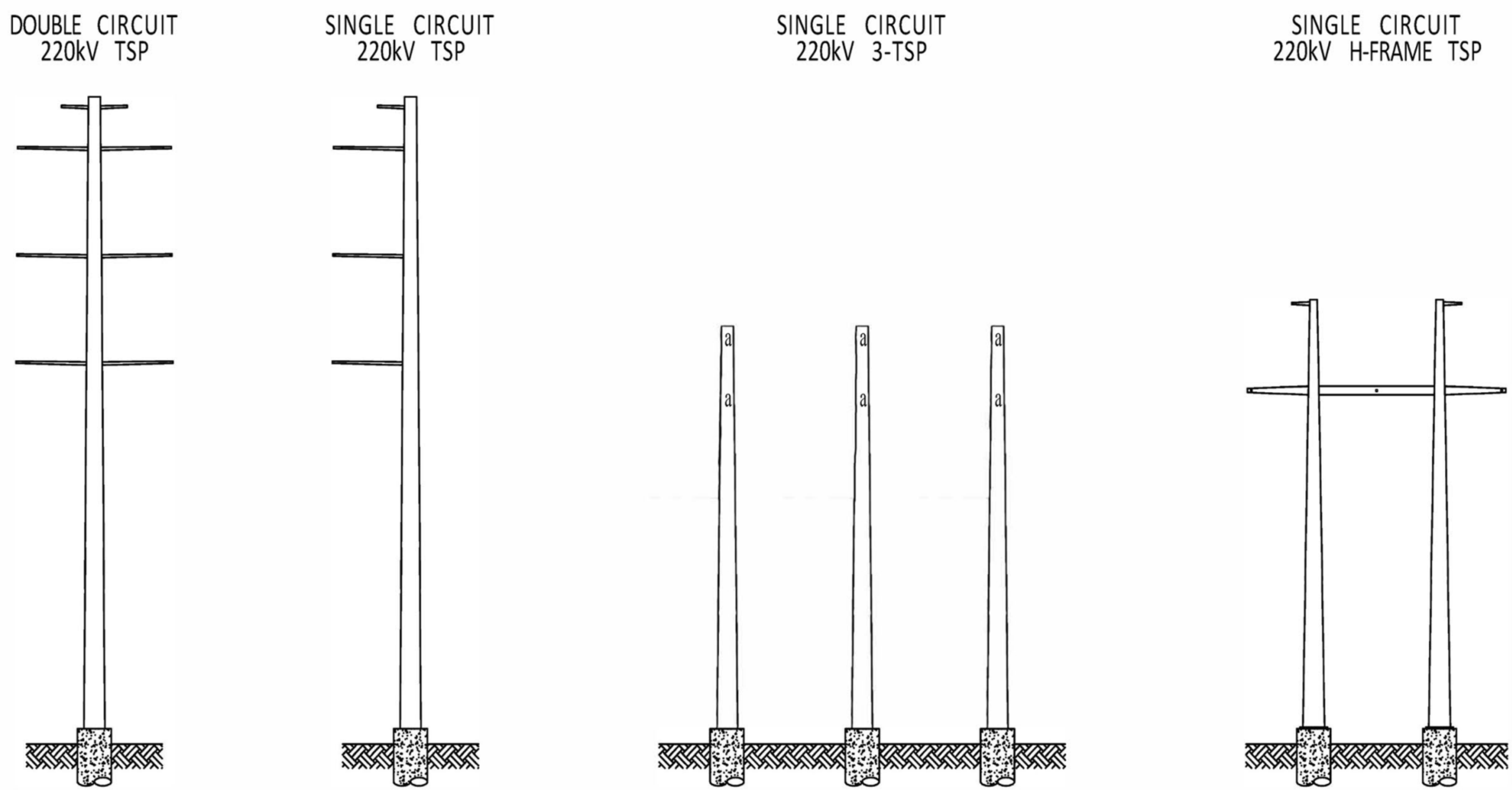
Alternative Calcite Substation



Source: Edison, 2021.

Figure SCE-3

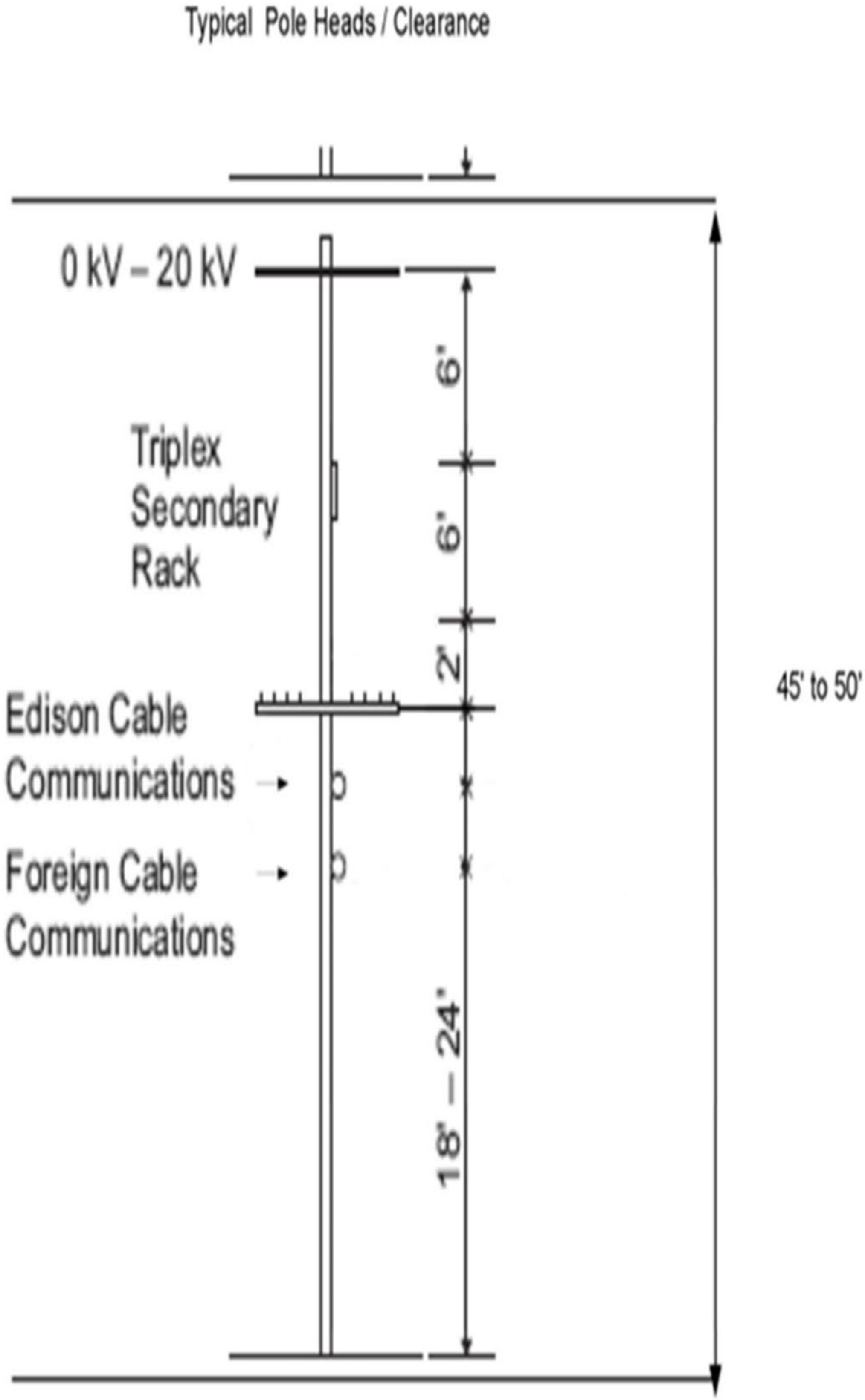
Proposed Transmission and Distribution Lines



Source: Edison, 2021.

Figure SCE-4

220kV Tubular Steel Pole Configuration



Source: Edison, 2021.

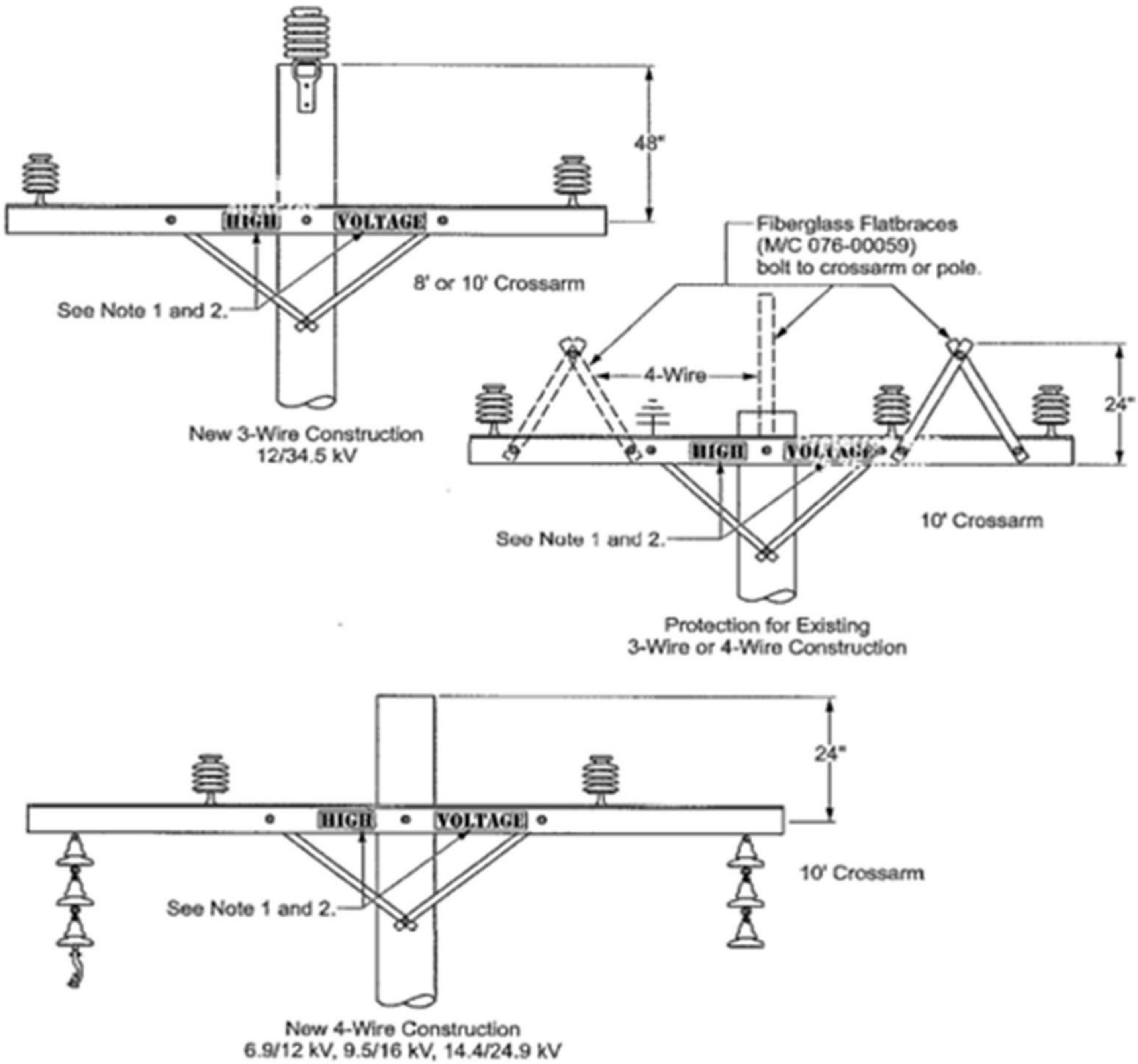
Figure SCE-5

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



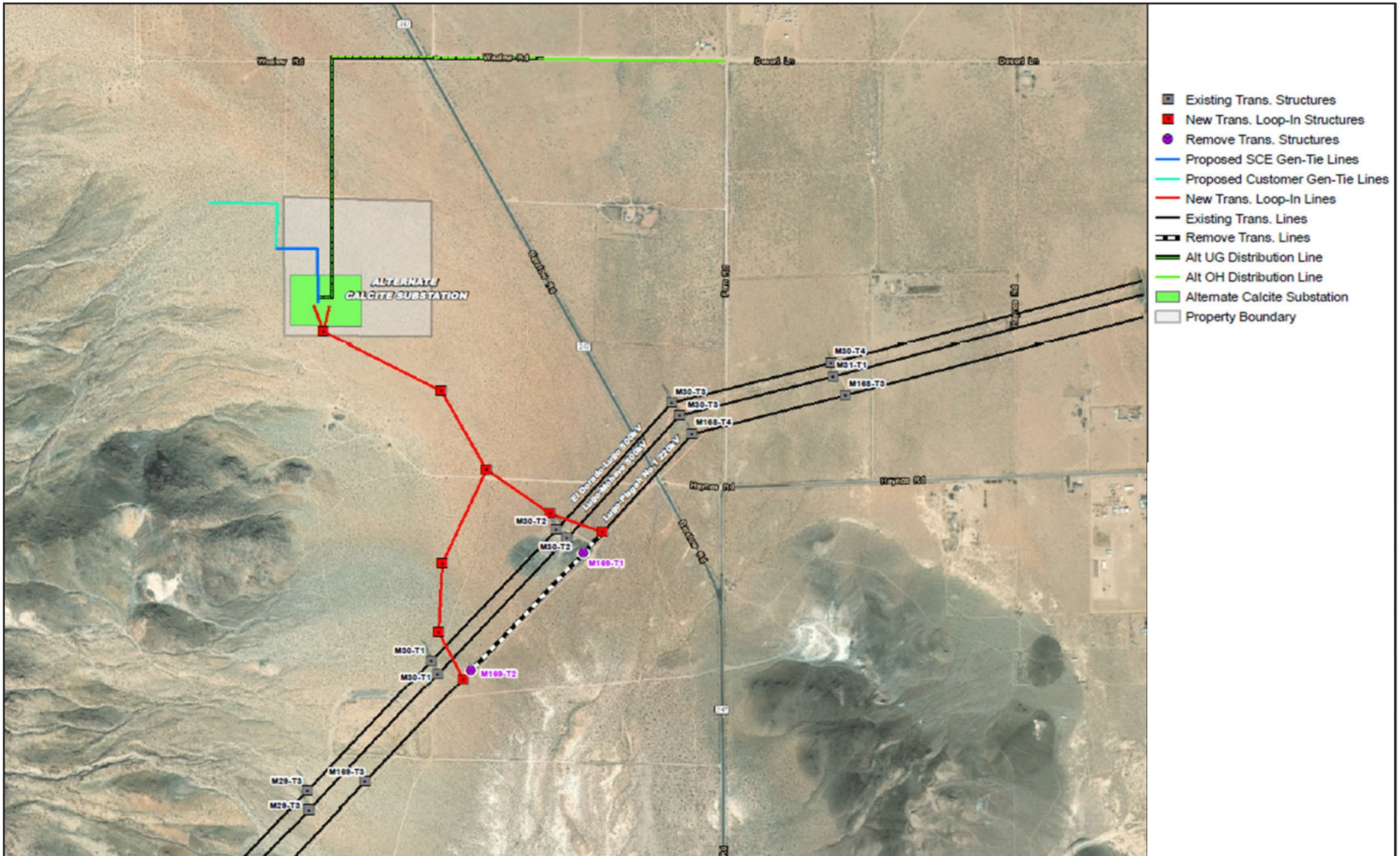
Note(s):

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.

Source: Edison, 2021.

Figure SCE-6

Pole and Crossarm Configuration with Raptor Guard



Source: Edison, 2021.

Figure SCE-7

Alternative Transmission and Distribution Lines